資料－６　環境影響評価に関する
再委託業者からの報告書

PREPARATORY SURVEY FOR THE GREATER KAMPALA METROPOLITAN AREA TRANSMISSION SYSTEM IMPROVEMENT PROJECT

ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT

FINAL REPORT

Prepared for:
UGANDA ELECTRICITY TRANSMISSION COMPANY LIMITED
Plot 10 Hannington Road
P. O. Box 7625, Kampala, Uganda.
Tel: +256-414-233-433
Fax: +256-414-341-789
W: www.uetcl.com

By:

AIR WATER EARTH (AWE) LTD
Civil, Environmental Engineers & Project Management Consultants
M1. 27 Binayomba Road, Bugolobi
P. O. Box 22428, Kampala, UGANDA.
T: 041-4268466, Mob: 078-2580480
E: mail@awe-engineers.com
W: www.awe-engineers.com

In Association with:

YACHIYO ENGINEERING COMPANY LIMITED (YEC)

CS Tower, 5-20-8, Asakusabashi, Taito-ku,
Tokyo, 111-8648, Japan
Tel: +81-03-5822-2900

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Lead Consultants
Isa KABENGE, PhD.
BScEng (MAK), MEng (SA), PhD (USA)
Registered EIA Practitioner (Cert No. CC/EIA/110/15)
Drainage Engineer/GIS specialist & Team Leader.
Eng. Lammeck KAJUBI; PE.
BScEng (1.1 Hons), MEngSc(Env)(UQ-Australia), MUIPE
Registered Professional Environmental Engineer (PE)- UGANDA
Registered EIA Practitioner (Cert No.CC/EIA/108/15)
Environmental Engineer
Herbert Mpagi KALIBBALA, PhD.
BScEng(Civ)(MAK), MScEng (Env) (MAK), PhD, GMUIPE
Registered EIA Practitioner (Cert No. CC/EIA/109/15)
Civil/Infrastructure Engineer.
Pamela K. TASHOBYA
BA (MAK), MSc (Dev Mgt.)
Registered EIA Practitioner (Cert No.CC/EIA/111/15)
Socio-development Specialist
Faith MUGERWA
BA (MAK), MA (Soc)
Registered EIA Practitioner (Cert No. CC/EIA/113/15)
Sociologist

Contributing Consultants:
Brenda Amanda BScEng.(MAK), MScEng (UK) **Civil Engineer**
Ivan Kibuka Kiguli Dip. PC (UK),BScTech. (UK) **Pollution Control Engineer**
Susanne Muyindike BScEng.(MAK), MScEng.(Belgium) **Water Resources Engineer**
Joseph Kyagulanyi BScEng(MAK), MScEng (MAK) **Hydrologist**
Dr. Robert Kityo BSc. (MAK), MSc (MAK) , PhD. (MAK) **Ecologist – Mammals and Birds**
James Kalema PhD BSc. (MAK), MSc (MAK) , PhD. (MAK) **Ecologist – Vegetation and Flora**
Ahmed Bukenya BSc. (MAK) **Ecologist – Invertebrates**
Sadic Wasswa BSc. (MAK) **Ecologist – Herpetiles**
Edward Okot Omoya BSc(MAK), MSc (MAK) **Ecologist – Fauna**
Ivan Bamweyana BSc.,(MAK), MSc (Cand.) (MAK) **Surveyor/ GIS Specialist**
Sharifah Nakigozi BSc(MAK), MSc. OSH (Malaysia) **Occupational Health and Safety Specialist**
Ian Kakuru BSc. Land Economics (MAK) **Valuation Surveyor**

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ACRONYMS & ABBREVIATIONS

AP	Angle Point
AWE	Air Water Earth (AWE) Limited, *(here in the consultant)*
Cap.	Chapter
cct	Circuit
DPP	District Development Plan
EA	Environmental Assessment
EAC	East African Community
EIS	Environmental Impact Statement
ESIA	Environmental and Social Impact Assessment
e-Waste	Electronic Waste
GKMA	Greater Kampala Metropolitan Area
GIS	Gas-Insulated Switchgear
HC	Health Centre (e.g. HC IV, HC III, HC II)
HIV/AIDS	Human Immunodeficiency Virus/ Acquired Immunodeficiency Syndrome
JICA	Japan International Cooperation Agency
LC	Local Council
NEMA	National Environment Management Authority
NFA	National Forestry Authority
NGO	Non-Governmental Organization
O&M	Operation and Maintenance
ODA	Official Development Assistance of Japan
PAP	Project Affected Persons
PCB	Polychlorinated biphenyls
PCDP	Public Consultation and Disclosure Plan
PPE	Personal Protective Equipment
RAP	Resettlement Action Plan
REA	Rural Electrification Agency
RoW	Right of Way
SS	Substation
SF6	Sulfur Hexafluoride Gas
STDs	Sexually Transmitted Diseases
TC	Town Council
TL	Transmission Line
ToR	Terms of Reference
UBOS	Uganda Bureau of Statistics
UEGCL	Uganda Electricity Generation Company Limited
UETCL	Uganda Electricity Transmission Company Limited
UPE	Universal Primary Education
UWA	Uganda Wildlife Authority
VAT	Value Added Tax
YEC	Yachiyo Engineering Company Limited

EXECUTIVE SUMMARY

01. Background

The Republic of Uganda has been experiencing high economic growth and approximately 7% annual economic growth has been recorded over the past years. In line with this growth trend, the power demand has also been increasing rapidly at 9.7% on average per year from 2007 to 2012. The Government of Uganda and the electricity companies have been developing the power sources mainly by utilizing abundant water resources in Uganda.

However, these entities are facing difficulties in upgrading the power system to satisfy the recent power demand since it requires huge amount of costs. Against this background, the Government of Uganda has requested Japan's ODA loan project called 'The Greater Kampala Metropolitan Area Transmission System Improvement Project' (hereinafter abbreviated as "Project") to the Government of Japan, which aims at the development of transmission and substation system in Kampala Metropolitan Area, to realize the sustainable social and economic development. The Project aims to increase the capacity of power supply through the upgrade of transmission and substation system in Kampala Metropolitan Area.

In accordance to the National Environment Act 1995, electrical infrastructure projects, including substation and transmission line development, are required to undertake an environmental impact assessment and obtain approval from the National Environment Management Authority (NEMA). The Project contracted Air Water Earth Ltd. (AWE) to undertake the ESIA on behalf of Uganda Electricity Transmission Company Ltd. (UETCL), the executing agency of this Project.

02. Outline of Project Components

The Project includes a number of components as listed in Table ES 01. The components include construction of new substations, upgrade and improvement of existing substations, and expansion of existing transmission lines.

Table ES 01: List of Project Components

Main component		Outline	Contents
Substation	1. Buloba Substation	Approx. area: 200 m x 260 m	New Construction
	(1) 220 / 132 kV Transformer	125 MVA×2units	
	(2) 132 / 33 kV Transformer	40 MVA×2units	
	(3) 220 kV Switchgear	1 lot	
	(4) 132 kV Switchgear	1 lot	
	(5) 33 kV Switchgear	1 lot	
	(6) Control building	1 lot	
	(7) Access road	Approx. 8 m x 750 m	
	2. New Mukono Substation	Approx. area: 130 m x 105 m	New Construction
	(1) 220 / 132 / 33 kV Transformer	125 MVA×3units	
	(2) 220 kV Gas Insulated Switchgear	1 lot	
	(3) 132 kV Gas Insulated Switchgear	1 lot	
	(4) Control building	1 lot	

Main component		Outline	Contents
	(5) 132 kV transmission line (New Mukono Substation – Mukono Substation)	Approx. 0.3 km×2cct	
	(6) Access road	Approx. 8 m x 1,200 m	
	3. Kawaala Substation		
	(1) 132 / 33 kV Transformer	40 MVA×3units	
	(2) 132 / 11 kV Transformer	20 MVA×1unit	
	(3) 132 kV Gas Insulated Switchgear	1 lot	Renovation
	(4) 33 kV Switchgear	1 lot	
	(5) 11 kV Switchgear	1 lot	
	(6) Control building	1 lot	
	4. Bujagali Substation		
	(1) 220 / 132 / 33 kV Transformer	250 MVA×1unit	Upgrade
	(2) 220 kV Switchgear	1 lot	
	(3) 132 kV Switchgear	1 lot	
	5. Mutundwe Substation		Upgrade
	(1) 132 kV Switchgear	1 lot	
	6. Mobile substation	40 MVA×1 unit	Procurement
Transmission	**7.** 220 kV Transmission Line		
	(1) Buloba branch point – Buloba Substation	Approx. 0.9 km×4cct	New Construction
	(2) New Mukono branch point – New Mukono Substation	Approx. 4.2 km×4cct	New Construction
	8. 132 kV Transmission Line		
	(1) Buloba branch point-Buloba Substation	Approx.0.8 km×2cct	New Construction
	(2) New Mukono Substation -New Mukono branch point (Southern trunk line)	Approx.0.4 km×2cct	New Construction
	(3) Mukono branch point (Northern trunk line) -Kampala North Substation	Approx.25.4 km×1cct	Re-conductoring
	(4) Kampala North Substation — Mutundwe Substation	Approx.10.2 km×2cct	Re-conductoring
	(5) Kampala North Substation — Lugogo Substation	Approx. 5.3 km×2cct	Re-conductoring
	(6) Kawaala branch point — Kawaala Substation	Approx.0.1 km×2cct	Cabling

03. Project Location

The Project will involve construction of new substations and associated transmission lines (Buloba and New Mukono), upgrade of substations (Kawaala, Bujagali and Mutundwe), and re-conductoring of 132

kV transmission lines. Table ES 02 presents the location of the project components by Village, Parish, Sub County, County and District. Figure ES 01 shows the Transmission Line Network in GKMA (Existing and Planned) while Figure ES 02 shows the Sections of transmission lines that will be re-conductored.

Table ES 02: Location of Project Components

Component	Location				GIS Co-ordinates (of substation location)
	District	County/ Sub County	Parish	Village	
Construction of substations					
Buloba substation	Mpigi	Mawokota County / Kiringente Sub County	Sekiwunga	Nakirebe, Kaggaba, Mabuye	432122 E, 28384 N
New Mukono substation	Mukono	Mukono County / Nama Sub County	Mpoma	Nama II, Buyuki, Luwunga	480587 E, 42750 N
			Kasenge	Kivuvu	
			Namawojjolo	Wanjeyo, Namawojjolo West, Bwefulumya	
Upgrade of substations					
Kawaala substation	Kampala	Lubaga Division	Lubya	Namungoona II	448764 E, 37072 N
Bujagali substation	Buikwe				515039 E, 55312 N
Mutundwe substation	Kampala	Lubaga Division			448185 E, 32427 N
Re-conductoring of 132 kV transmission lines					
Mukono branch point (Northern trunk line) - Kampala North Substation	Mukono District – Wakiso District –Kampala District				
Kampala North Substation — Mutundwe Substation	Kampala District				
Kampala North Substation — Lugogo Substation	Kampala District				

04. Project Proponent and Cost

Name and address: Uganda Electricity Transmission Limited Company (UETCL)
Plot 10 Hannington Road
P.O. Box 7625, Kampala, Uganda
Tel: +256 414 233 433

Contact Person: Eriasi Kiyemba
Managing Director
Email: eriasi.kiyemba@uetcl.com

Estimated Project Cost: USD 115 million

05. Project Justification

The Government of Uganda, through UETCL, is planning to improve the power sector of Uganda by putting in place robust electricity infrastructure to make the power supply more reliable, secure and sufficient to meet the electricity requirements of the people of Uganda.

Through this Project implementation, UETCL intends to improve the power supply in Greater Kampala Metropolitan Area with the objective of boosting the transmission grid capacity to securely deliver power supply to the metropolitan area in the short and long term, and to improve the reliability, availability and quality of power supply to the area.

06. ESIA Requirements

The third schedule of the NEMA guidelines lists energy projects/ activities among those that should be subjected to an EIA before they are granted approval for implementation. According to the National Environment Act (Cap. 153) Third Schedule, this project lies in category 10 (Electrical Infrastructure, including – (b) electrical transmission lines, (c) electrical substations), which require a detailed EIA to be conducted before Project implementation. The ESIA report was prepared in accordance to the requirements stipulated in the Environmental Impact Assessment Regulations, 1998 and JICA's "Guidelines for Environmental and Social Considerations (2010)". The report analyses the potential environmental impacts of the Project and proposes mitigation measures and monitoring programs to ensure that environmental impacts are avoided or kept to minimum. The mitigation measures and monitoring programs are compiled into an Environmental and Social Management Plan (ESMP) and Environmental and Social Monitoring Plan (ESMOP).

Source: JICA Study Team
Figure ES 01: Transmission Line Network in GKMA (Existing and Planned)

Source: JICA Project Team

Figure ES 02: Sections of transmission lines that will be re-conductored (lines in red)

07. Description of Main Project Components

In order to meet the set objectives, the Project will involve the following components:

- ≠ Construction of new substations and associated transmission lines at Buloba and Mukono
- ≠ Upgrade of existing substations at Mutundwe and Bujagali
- ≠ Renovation of existing substation at Kawaala and cabling of associated transmission line
- ≠ Re-conductoring of existing transmission lines
- ≠ Procurement of mobile substation

a) Construction of Buloba Substation and Associated Transmission Lines

The Buloba substation will be constructed in Mpigi District, approximately 25 km west of central Kampala. The substation will connect to the Kawanda–Masaka 220 kV Transmission Line (currently under construction) by constructing two 220 kV transmission lines of approximately 0.9 km length. The separation distance between the two transmission lines will be 35 m, which is the minimum distance required between the transmission towers. Table ES 03 provides a summary of the primary data for Buloba substation.

The Buloba substation will also be connected to the existing Mutundwe—Kabulasoke 132 kV transmission line located immediately south of Kampala–Mityana Road, by constructing a 132 kV transmission line of approximately 0.8 km length. A new access road of approximately 750 m length (8 m width) will also be constructed within the corridor of the 132 kV transmission line, which will connect the new substation with Kampala–Mityana Road.

Table ES 03: Primary data of Buloba Substation

Main component	Outline
Buloba Substation	Approx. area: 200 m x 260 m
220 / 132 kV Transformer	125 MVA×2units
132 / 33 kV Transformer	40 MVA×2units
220 kV Switchgear	1 lot
132 kV Switchgear	1 lot
33 kV Switchgear	1 lot
Control building	1 lot
Access road	Approx. 8 m x 750 m
220 kV Transmission Line	
Buloba branch point – Buloba Substation	Approx. 0.9 km×4cct
132 kV Transmission Line	
Buloba branch point-Buloba Substation	Approx.0.8 km×2cct

Source: JICA Study Team

b) Construction of Mukono Substation and Associated Transmission Lines

The New Mukono substation will be constructed in Mukono District, approximately 25 km east of central Kampala. The substation is proposed as an expansion of the planned 3x63 MVA, 132/33 KV Mukono Industrial Park substation. The expansion will involve installation of an additional 3x125 MVA, 220/132 kV transformers in order to provide network operational flexibility and reliability of supply to Mukono

Industrial Park that is gazetted by the government. Table ES 04 provides a summary of the Mukono Project components.

Table ES 04: Primary data of New Mukono Substation

Main component	Outline
New Mukono Substation	Approx. area: 130 m x 105 m
220 / 132 / 33 kV Transformer	125 MVA×3units
220 kV Gas Insulated Switchgear	1 lot
132 kV Gas Insulated Switchgear	1 lot
Control building	1 lot
132 kV transmission line (New Mukono Substation – Mukono Substation)	Approx. 0.3 km×2cct
Access road	Approx. 8 m x 1,200 m
220 kV Transmission Line	
New Mukono branch point – New Mukono Substation	Approx. 4.2 km×4cct
132 kV Transmission Line	
New Mukono Substation -New Mukono branch point (Southern trunk line)	Approx. 0.4 km×4cct

Source: JICA Study Team

c) Renovation of Kawaala Substation

Kawaala Substation is an existing substation located approximately 5km the north-west area in the central area of Kampala, in Kampala District. The substation has one (01) 20 MVA of 132/11 kV power transformer and distributes power through three (03) 11 kV feeders.

To enable the Kawaala (Namungoona) substation handle the added capacity, the substation will be renovated by removing the existing facilities and replacement by new transformers, switchgears and control building. The existing overhead transmission line that connects to the Kampala North-Mutundwe 132 kV transmission line will also be replaced by installing new underground transmission cable of approximately 100 m length. The underground cable option was selected to minimize land acquisition and resettlement impacts. Table ES 06 provides a summary of the proposed components for the renovation of Kawaala substation

Table ES 06: Primary data of Kawaala Substation (Proposed)

Specification	Quantity
132/33 kV power transformer (40 MVA)	3
132/11 kV power transformer (20 MVA)	1
132 kV Gas Insulated Switchgear	1
33 kV Switchgear	1
11 kV Switchgear	1
Control Building	1

Source: JICA Study Team

d) Upgrade of Bujagali Substation

Bujagali substation is an existing substation located inside the Plot of Bujagali Hydroelectric Power Station.

The substation will be upgraded by installing new transformers and switchgears inside available empty space.

e) Upgrade Mutundwe Substation

Mutundwe substation is located in Lubaga Division, Kampala District. The upgrade of the substation will involve installation of one (01) unit of 132 kV Switchgear.

f) Mobile Substation

A mobile substation is a substation on wheels, which is used to provide interim grid connections and temporary power supplies. The substation is a completely self-contained trailer mounted unit comprised of transformer, cooling equipment, high and low voltage circuit protection, metering, relaying, AC and DC auxiliary power supplies and surge protection. One (01) unit of 40 MVA mobile substations will be procured as part of this Project. The mobile substation will be kept at Lugogo substation since this will make it easily accessible to the other substations within Kampala.

g) Transmission Line Re-conductoring

Approximately 41 km of existing 132 kV transmission lines will be re-conductored (removed and replaced by new higher capacity lines). The existing transmission towers will continue to be used.

The 132 kV transmissions that will be re-conductored as part of this Project are:

i. Mukono branch point (Northern trunk line) to Kampala North Substation – approximately 25.4 km x 1 cct.
ii. Kampala North Substation to Mutundwe Substation – approximately 10.2 km x 2 cct.
iii. Kampala North Substation to Lugogo Substation – approximately 5.3 km x 2 cct.

08. Project Implementation

a) Construction Activities

Construction of substations and transmission lines will in general use the methods commonly employed in other projects in Uganda.

b) Construction Materials

Construction works will require raw materials such as cement, aggregates, gravel, wood, bricks and reinforcing steel bar. Most will be procured from Uganda from licensed suppliers, and there will be no need for the Project to develop any new quarries.

c) Construction Schedule

While the duration of construction works will vary between Project components, the Project is expected to be completed within 2 years, including onsite construction works, processes such as drawing approval, equipment manufacturing and transportation.

d) Construction Workers

Around 20 workers (e.g. mason, supervisor, unskilled labourer) are expected daily to be working at the substation construction sites. Around the same number of workers will also be working at the

transmission line sites. Most workers will be procured locally, although skilled foreigners may be hired for highly technical works. The entire recruitment process for the workers will be managed by the contractors in accordance with Uganda labour laws.

e) Operation and Maintenance Activities

Once the transmission lines and substations are constructed and in operation, there will be no activities that may cause significant environmental impacts (e.g. discharge of pollutants, noise) or hazards providing that the facilities are maintained in good working order. Operation and maintenance work will be conducted in accordance to UETCL safety procedure.

09. Project Alternatives

a) No Project Scenario

If the project is not implemented, the numerous benefits of improved power supply in the GKMA, and the associated economic benefits would be foregone.

The "no project" scenario is neither a tenable nor beneficial alternative because power is required to support rapid socio-economic development in the Greater Kampala region Metropolitan Area.

b) Location Alternatives

i. Buloba Substation

Three alternatives were analysed for the new Buloba substation site and transmission line route. Option 1 was considered as the most viable option mainly due to the least amount of land acquisition required and lowest construction cost. Table ES 07 shows the alternative analysis of Buloba substation location and transmission line route.

Table ES 07: Alternative analysis of Buloba substation location and transmission line route

Item	Option 1	Option 2	Option 3
Substation location	Between ongoing World Bank (WB) 220kV transmission line and existing 132kV transmission line	Near the planned oil plant and along the ongoing WB 220kV transmission line	Same as Option 2.
Start point of transmission line	Existing 132kV transmission line	Mutundwe substation	Mutundwe substation
End point of transmission line	The ongoing WB 220kV transmission line	New Buloba substation	New Buloba substation
Distance of transmission line	Overhead line of approx. 1.7 km	Underground line of approx. 3km + overhead line of approx. 12 km	Overhead line of approx. 18 km
Environmental impacts	Impact low as the area is mostly farmland and shrubs.	Impact high as it requires construction of towers along marshland.	Impact high as it requires construction of towers along marshland.

Item	Option 1	Option 2	Option 3
Social impacts	Area of land acquisition less compared to other Options.	Area of land acquisition higher compared to Option 1.	Area of land acquisition highest compared to other Options.
Construction cost	Lowest, due to the shortest transmission line.	Highest due to the underground transmission line.	Higher than Option 1, due to the longer transmission line.
Overall assessment	Most recommended due to the lowest impacts on social and natural environments and lowest cost among all.	Not recommended due to the higher impacts on environments compared to Option 1. The cost is the highest among all.	Not recommended due to the highest impacts on social environment.

ii. New Mukono Substation

Alternative routes of the new 220 kV transmission line were considered along the forest area near the new substation. Following are the options considered:

Option 1: Routing of the new 220 kV transmission line west side of the Mukono Industrial Park ('China') transmission line so to avoid the forest.

Option 2: Routing of the new 220 kV transmission line east side of the Mukono Industrial Park ('China') transmission line.

Option 3: Routing of the new 220 kV transmission line east side of the Mukono Industrial Park ('China') transmission line but with underground cable to minimize forest clearance.

The viability of the three alternative route options was analysed by considering environmental impacts, socioeconomic impacts and construction cost factors. Option 2 was considered as the most viable option mainly due to comparatively less socio-economic impacts and low construction cost. Table ES 08 shows the alternative analysis of Mukono new 220 kV transmission line route.

Table ES 08: Results of alternative analysis for the new 220 kV transmission line route

	Option 1	Option 2	Option 3
Environmental impacts	Impacts will be less than the other options as it will avoid the forest area.	Approximately 7 ha of forest area will need to be cleared.	Approximately 1 ha of forest area will need to be cleared.
Socioeconomic impacts	Land acquisition will be difficult as the route passes over a commercial sugar cane farm.	Socioeconomic activity limited compared to Option 1. Will require agreement of NFA, the landowner.	Socioeconomic activity limited compared to Option 1. Will require agreement of NFA, the landowner.
Construction cost	Same as Option 2	Same as Option 1	Approximately 6 times of Options 1 and 2.

	Option 1	Option 2	Option 3
Overall assessment	Although Option 1 will not require any forest clearance, it was considered unfeasible due to difficulty in land acquisition.	Although Option 2 will require the most amount of forest clearance, it was considered the most viable option mainly due to significantly lower construction cost than Option 3.	Although Option 3 will require less forest clearance than Option 2, it was considered unfeasible due to significantly higher construction cost than Option 2.

010. Acquisition of Permits

Implementation of the Project will require UETCL to obtain the necessary permits in line with Ugandan laws. Table ES 09 provides a list of the identified permits that UETCL will obtain before implementation of the proposed transmission system improvement Project. UETCL will work with the various government agencies and identify and obtain any other permits deemed necessary for Project implementation.

Table ES 09: Permits to be acquired for Project implementation

Permit	Responsible Agency	Reason for Permit
Water abstraction permit	DWRM	≠ Water abstraction for construction works from natural water courses. In the event that any of the natural water courses is used for abstraction of water for construction, for example River Kasala in Mukono; this permit will be necessary.
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. The transmission lines associated with the Buloba and New Mukono substations traverse sections of swamp. In Mukono, one of the towers connecting to the existing 132 kV line from Nalubaale substation is proposed close to River Kasala.
Permit for excavation	KCCA	≠ Excavation of cable trench for Kawaala substation renovation
Permit for hoarding and scaffolding	KCCA	≠ Hoarding will be required for the renovation works at Kawaala substation because it is very close to residential homes surrounding it.

Permit	Responsible Agency	Reason for Permit
Permit for renovation	KCCA	≠ Kawaala substations are only to be upgraded as part of the Project.
Permit for Architectural and Structural Plans approval	Respective District Physical Planning Offices	≠ Construction of new substations for the Buloba and Mukono Project Components

011. Summary of Baseline Information

Environmental baseline studies were undertaken at each of the sites within the Project scope. Measurements for air quality, ambient noise and EMF were undertaken at all Project sites. Table ES 10 provides a summary of these results. Samples for water quality were only taken within the Project areas where construction from green field will be undertaken i.e. Buloba and Mukono components. Ecological studies were also undertaken only in the Buloba and Mukono Project areas. Table ES 11 provides a summary of these results for the proposed Buloba and Mukono substation locations.

Table ES 10: Summary of results from baseline studies- Physical

Parameter	Project Site				
	Buloba SS	Mukono SS	Kawaala SS	Bujagali SS	Mutundwe SS
Air quality	No detectable levels of PM_{10} and $PM_{2.5}$ were encountered at any of the measurement locations. These measurements indicate a generally pristine environment with respect to air quality.	No detectable levels of PM_{10} and $PM_{2.5}$ were encountered at any of the measurement locations. These measurements indicate a generally pristine environment with respect to air quality.	At only one out of three measurement locations were detectable levels of PM10 encountered. These measurements indicate a generally pristine environment with respect to air quality.	At none of the three measurement locations were detectable levels of PM_{10} and $PM_{2.5}$ encountered. These measurements indicate a generally pristine environment with respect to air quality.	At only one out of four measurement locations were detectable levels of PM_{10} and $PM_{2.5}$ encountered. These measurements indicate a generally pristine environment with respect to air quality.
Ambient Noise	From a sample of 5 measurement locations, 3 of these had an L_{Aeq} above the national limit. This is an indication of an environment already impinged by human activity in relation to noise levels.	From this sample of 4 measurement locations within and near to the proposed boundary/ fencelike of the substation /transmission line, none of these locations had an L_{Aeq} above the national limit. This is an indication of a pristine environment in relation to noise levels.	From this sample of 3 measurement locations, 1 of these locations had an L_{Aeq} above the national limit. This is an indication of an environment already mildly impinged by human activity in relation to noise levels.	From this sample of 3 measurement locations within the boundary/fence line of the substation, none of these locations had an L_{Aeq} above the national limit. This is an indication of a pristine environment in relation to noise levels.	. From this sample of 4 measurement locations, only one of these locations had an L_{Aeq} above the national limit. This is an indication of an environment already mildly impinged by human activity in relation to noise levels.

Parameter	Project Site				
	Buloba SS	Mukono SS	Kawaala SS	Bujagali SS	Mutundwe SS
EMF	Comparison with International Commission on Non-Ionizing Radiation Protection's (ICNIRP) safety limit (10 W/m² or 1000 μW/cm²), implied that the EMF levels in Buloba Project area are much lower than the ICNIRP safety limit.	Comparison with International Commission on Non-Ionizing Radiation Protection's (ICNIRP) safety limit (10 W/m² or 1000 μW/cm²), implied that the EMF levels at Mukono Project area are much lower than the ICNIRP safety limit.	Comparison with International Commission on Non-Ionizing Radiation Protection's (ICNIRP) safety limit (10 W/m² or 1000 μW/cm²), implied that the EMF levels at Kawaala are much lower than the ICNIRP safety limit.	Comparison with International Commission on Non-Ionizing Radiation Protection's (ICNIRP) safety limit (10 W/m² or 1000 μW/cm²), implied that the EMF levels at Bujagali SS are much lower than the ICNIRP safety limit.	Comparison with International Commission on Non-Ionizing Radiation Protection's (ICNIRP) safety limit (10 W/m² or 1000 μW/cm²), implied that the EMF levels at Mutundwe SS are much lower than the ICNIRP safety limit.
Land use	Most of the area was undeveloped land, with a few sections cultivated (food crops and planted forests). Other land uses included brick making in the swampy areas.	The project area has a long history of protected and gazetted areas (Nandagi Central Forest Reserve). However these have primarily been reduced and utilized for agricultural purposes and establishment of industrial parks (factories) with the Mukono Industrial Park within proximity of the	Existing substation. Section to be added is currently used for brick making.	Existing Substation	Existing Substation

Parameter	Project Site				
	Buloba SS	Mukono SS	Kawaala SS	Bujagali SS	Mutundwe SS
		Project area. Swamps and wetlands are predominant in the lowland valleys. A strip of natural vegetation and swamp lies between the proposed site and R. Kasala. The crops grown in the Project area are mostly sweet potatoes, cassava, maize, fallow and large sections of planted forest			

Table ES 11: Summary of results from baseline studies- Water quality and Ecological

Parameter	Project Site	
	Buloba SS	Mukono SS
Water quality	The laboratory analysed results indicated on the whole, a generally acceptable water quality in terms of the physicochemical characteristics. The results indicated a high value for total suspended solids across all three stations and a low pH at Stations 1 and 3. Suspended solids are expected to be high in surface water sources; however, the cause for this in the borehole sample needs further investigation	The laboratory analysed results indicated on the whole, a generally acceptable water quality in terms of the physicochemical characteristics. The results indicated a high value for total suspended solids across all three sampling locations. Suspended solids are expectedly high in surface water sources and particularly in these locations which were surrounded by dense

Parameter	Project Site	
	Buloba SS	Mukono SS
		vegetation.
Ecology - Flora	No plant species of conservation significance were recorded within or around the project area. However, some plant species worth consideration were observed in the area. These were: ≠ The tree species *Maesopsis eminii* is on Uganda's National Forestry Authority 'Reserved Species' list, and is therefore protected from exploitation and threat to its habitats. ≠ The invasive species *Lantana camara* which is a result of introduction in Uganda, with a large potential to suppress the indigenous species of plants	Only one plant species of conservation significance was recorded within the project area, *Jacaranda mimosifolia*. This species is globally threatened and assessed by IUCN as Vulnerable (VU B1+2ac). Other plant species worth consideration were observed in the area. These were: ≠ *Milicia excels* - Lower risk/ Near threatened ≠ *Maesopsis eminii*- 'Reserved Species' on Uganda's National Forestry Authority ≠ Invasive species such as *Broussonetia papyrifera* in the Nandagi Forest Reserve, *Mimosa pigra* and *Ricinus communis*.
Ecology – Invertebrates (Lepidoptera and Odonata)	The conservation status of all species encountered was 'Least Concern' according to IUCN.	Two species encountered i.e. *Papilio dardanus* (VU) and *Papilio demodocus* (NT) are globally threatened due to restricted range and wide spread habitat loss. However, both species can survive in cultivated fields despite being poor competitors even in these fields.
Ecology - Herpetiles	The species encountered during the study are widely distributed in Uganda and in other countries. No species of conservation concern were encountered or recorded.	No species of conservation concern were encountered or recorded.
Ecology - Birds	Great Egret *Casmerodius albus* was recorded as the only species that is listed as Vulnerable at the regional level. All other species were of no particular conservation concern	Five species of conservation concern at the regional level with two being classified as Near threatened while the rest are of Regional Responsibility, being that the largest portion of their range or populations are in the East African region. ≠ White-headed saw-wing (R-RR) ≠ Grey Crowned Crane (R-NT) ≠ Grey Parrot (R-NT) ≠ Spot flanked barbet (R-RR) ≠ Grey-capped Warbler (R-RR)

Parameter	Project Site	
	Buloba SS	Mukono SS
Ecology - Mammals	None of the mammal species recorded is of particular conservation concern.	None of the mammal species recorded is given a high threat category by IUCN. One particular species however – the Uganda Mangabey *Lophocebus ugandae* deserves particular mention given that it is a species endemic to Uganda and most of its previous known range being in the forests fringing Lake Victoria.

012. Key Issues Raised during Stakeholder Consultations

A number of consultative meetings were held with relevant stakeholders in lead government agencies, local community leaders and community members in the respective Project areas between November 2015 and April 2016. Table ES 12 provides a summary of the stakeholders consulted (including the reasons for, and dates of consultation) while Table ES 13 provides a summary of the findings from the stakeholder consultations.

Table ES 12: Stakeholders Engaged and their Interest in the Project

Stakeholder	Interest in Project	Dates of meeting
Mukono District	Location of New Mukono substation and 132 kV TL route (Leaders and community members)	19/11/2015; 30/04.2016;
National Forestry Authority (NFA)	Project impact on forest reserves (Nandagi, Kifu, and Namyoya)	16/03/2016; 5/04/2016
Uganda Wildlife Authority (UWA)	Impacts on Jinja Wildlife Sanctuary	20/11/2015
Buganda Land Board (BLB)	Check if any of the Project areas are under the BLB	24/11/2015
Department of Environmental Affairs (DEA)	Project impact on general environment, especially wetlands	01/12/2015
Ministry of Gender, Labour and Social Development (MGLSD)	Occupational Health and Safety concerns of workers during project implementation	25/05/2016
Kawempe Division, Kampala	Location of Kampala North substation (Leaders and community members)	03/12/2015
Mpigi District	Affected communities of Buloba substation works (Leaders and community members)	12/11/2015; 27/01/2016; 30/03/2016; 04/05/2016; 10/05/2016
Lubaga Division, Kampala	Affected communities of Kawaala (Namungoona) substation works (Leaders and community members)	25/11/2015; 29/03/2016

Table ES 13: Summary of key findings from stakeholder consultations

Issue	Views discussed
Electricity Supply	Issue raised by: Community members Will power supply from the new lines and sub-stations be able to connect for community domestic use? Response: No, the transmission lines are high voltage lines and the local community will not be able to tap directly. However, the improvement in substation equipment will serve to improve on the efficiency of electricity supply in the entire GKMA, including the Project area.
Employment benefits	Issue raised by: Community members

Issue	Views discussed
	Will community members be prioritized for jobs on the Project, especially non-technical work? Response: The Consultant will recommend that UETCL obliges the contractors to hire some local community residents, according to their levels of skill.
Project start	Issue raised by: Community members What is the project duration and when is it expected to commence? Response: The Project is still at the Preparatory stage, while UETCL is looking for funds from the Government of Japan. The ESIA and RAP fall into the required studies before the funds can be approved. Once the funds are approved, the Project will then be able to start.
Compensation	Issue raised by: Community members Projects take place but compensation delays for a long time and this affects the PAPs because their plans are put on hold and they incur losses in the process. If assessment has been done but compensation is eventually not done and the project is aborted. How would the PAPs be compensated after sacrificing their properties and not undertaking any developments as a result? Will PAPs be permitted to use the land after the project has been implemented? Response: No, the corridors will be purchased at 100% and once UETCL has purchased the land, the PAPs will be expected to give up all rights to the land.
Economic Displacement	Issue raised by: Brick making community - Kawaala Will the project give time for the brick making to be completed before the project can commence? Response: A grace period will be given by UETCL, within which time it is expected that the brick makers will sell off their bricks and possibly move the business to a new location.
Project through Nandagi CFR	Issue raised by: National Forestry Authority (NFA) Nandagi is located outside the nursery bed, the land was given to tree farmers by NFA, so the land belongs to NFA, but the trees belong to individual farmers. It is also managed by NFA. Since it is government land, an offset fee is paid. NFA will dialogue with UETCL regarding the offset. Biodiversity evaluation of the forest should be part of the ESIA study. Response: The procedure recommended by NFA, regarding compensation

Issue	Views discussed
	and offsetting the forest reserve will be followed.
Traffic management	Issue raised by: Kawempe Division, Office of the Town Clerk For traffic along major roads, will diversions be required? Response: No, re-conductoring will not require traffic diversion since the trucks with cable winches and tensioners will not have to access each tower.
Transmission line reserves	Issue raised by: Kawempe Division, Office of the Town Clerk Local leaders within the area –Mulago III Parish of the Kamwokya area where people have encroached should be engaged. Response: Local leaders within all the Project areas will be involved in the Project, particularly in sections where land acquisition is required.
Community Health and Safety	Issue raised by: Kawempe Division, Office of the Town Clerk How will encroachers in the transmission line corridor be handled, especially in the event of an accident? Response: Safety precautions will be taken throughout the Project. For the re-conductoring, safety nets will be used to ensure that all people on the ground are safe, in the event of falling equipment or parts.
Occupational Health and Safety	Issue raised by: OSH Department, Ministry of Gender, Labour and Social Development ▪ The Contractors should have plans for safety, in line with the OSH Act, 2006. UETCL will be responsible for ensuring that the contractors conduct their activities in line with these Plans. MGLSD will be responsible for doing safety inspections at the construction sites to ensure compliance. ▪ Contractor should provide workers with adequate personal protective equipment after risk assessment has been done (PPE); ▪ The contractor will be required to register the site as a workplace before commencement of work; ▪ After 6 months any workplace should have a safety committee. Response: Noted.
Ecological conservation	Issue raised by: Wetlands Management Department The areas of wetland destroyed during construction need to be restored to as near as possible to the original after construction. The vegetation cleared especially trees should be replaced with the

Issue	Views discussed
	indigenous species to that area. Response: This recommendation will be given in the ESIA report so that contractors are aware of their obligations towards restoration activities.

013. Potential Environmental and Social Impacts Assessed and Recommendation Measures

An in-depth assessment of the potential impacts during the pre-construction and construction, and 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.

Tables ES 14 to ES 17 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, for the different phases of the Project.

A. Pre-Construction and Construction Phase Impacts

Table ES 14: Summary of Potential Negative Impacts and Impact Significance Ranking – Pre-construction and Construction Phase

Ref No.	Impact	Buloba SS	Mukono SS	Kawaala SS	Bujagali SS	Mutundwe SS	Re-conductoring Transmission lines
1.	Permanent Land Take / Involuntary Resettlement	Moderate	Major	Moderate	N/A	N/A	N/A
2.	Economic Displacement	Moderate	Moderate	Moderate	N/A	N/A	N/A
3.	Impact on Air Quality	Moderate	Minor	Moderate	Minor	Minor	N/A
4.	Water Pollution	Moderate	Moderate	N/A	N/A	N/A	N/A
5.	Soil Erosion and Degradation	Moderate	Moderate	Minor	N/A	N/A	N/A
6.	Impact on Wetlands	Moderate	Moderate	N/A	N/A	N/A	N/A
7.	Noise and Vibrations	Minor	Minor	Moderate	Minor	Minor	N/A
8.	Improper Management of Waste	Moderate	Moderate	Minor	Minor	Minor	Moderate
9.	Change in Landscape	Moderate	Moderate	Moderate	N/A	N/A	N/A
10.	Risks Associated with Social Interaction with Construction Workers	Moderate	Moderate	N/A	N/A	N/A	N/A
11.	Occupational and Community Health and Safety Risks	Moderate	Moderate	Moderate	Moderate	Moderate	Moderate
12.	Traffic Accidents and Disruption	Moderate	Moderate	Moderate	Moderate	Minor	Moderate
13.	Temporary Disruption of Electricity Supply	Moderate	Moderate	Moderate	Moderate	Moderate	Moderate
14.	Impact on Ecological Environment						
	A. Flora and Vegetation	Moderate	Major	N/A	N/A	N/A	N/A
	B. Invertebrates	Moderate	Moderate	N/A	N/A	N/A	N/A
	C. Herpetiles	Moderate	Moderate	N/A	N/A	N/A	N/A

Ref No.	Impact	Buloba SS	Mukono SS	Kawaala SS	Bujagali SS	Mutundwe SS	Re-conductoring Transmission lines
	D. Birds	Moderate	Major	N/A	N/A	N/A	N/A
	E. Mammals	Minor	Moderate	N/A	N/A	N/A	N/A
15.	Impact on Nandagi Central Forest Reserve	N/A	Moderate	N/A	N/A	N/A	N/A
16.	Climate Change Impacts	Moderate	Moderate	N/A	N/A	N/A	N/A
17.	Impact on Physical Cultural Resources	Moderate	Moderate	N/A	N/A	N/A	N/A
18.	Improper Camp Decommisioning	Minor	Minor	N/A	N/A	N/A	N/A

Table ES 15: Summary of the recommended enhancement and mitigation measures for the Project – Pre-construction and Construction Phase

Ref No.	Potential Impact	Enhancement / Mitigation Measures
	POSITIVE IMPACTS	
1.	**Income to material/ equipment suppliers and contractors** Construction of the New Mukono and Buloba substations and upgrading of Kawaala, Mutundwe and Bujagali substations will involve civil, electrical and mechanical works which will require sourcing of requisite materials both locally and internationally. Construction of the transmission lines will require cement and aggregates for pylon foundations, transfer cables, conductors and metallic beams.	Earth materials for example, murram, aggregate (stones and sand) are obtained from quarry operations. Conscious or unwitting purchase of these materials from unlicensed operations indirectly supports, encourages and promotes environmental degradation at illegal quarry sites and can cause medium to long-term negative impacts. It will therefore be a contractual obligation for contractors to procure construction materials from legitimate or licensed sources.
2.	**Employment and Skills Training** The construction of the Buloba and New Mukono substations	Wherever feasible, local people will be considered for job opportunities commensurate with their level of skills. Adequate occupational health and safety standards will be provided to ensure the work environment is conducive. The onus

Ref No.	Potential Impact	Enhancement / Mitigation Measures
	will require workers with various levels of skill, including skilled, semi-skilled and unskilled labour. Contractors will be required for construction of substation facilities, civil works, construction of onsite building and the transmission lines. Electrical and mechanical expertise will be required for the upgrade of the Kawaala, Mutundwe and Bujagali substations as well as re-conductoring of the 132 kV transmission lines from Mukono branch point – Kampala North substation, Kampala North Substation – Mutundwe Substation, and Kampala North to Lugogo Substation.	will be on the Contractor to ensure that children under the age of twelve are not employed at the site and any children above fourteen years are not given physically demanding work and work under adult supervision as per restrictions of the Employment Act 2006. The Contractors will be obligated to fight the ills of child labour, and as such, will be liable for any offences such as Child Labour amongst the contractors' workers, in line with the provisions of the Children's Act and Penal Code Act
3.	**Benefit to local retail businesses** It is expected that the construction and upgrade of the substations and transmission lines, expected to last at least two years, will necessitate a workforce of about 20 people. The workforce, construction crews will require food, accommodation and sundries most of which will be provided by local retail shops. This will present a short-term economic benefit for local business owners	i. Contractors and subcontractors will encourage their workers to support businesses that conduct their businesses in line with national laws. 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.
	NEGATIVE IMPACTS	
1.	**Permanent Land Take / Involuntary Resettlement** <u>Buloba SS</u> The two 220 kV transmission lines will share their corridor and the combined corridor width will be 75 m while the 132 kV transmission line will have a corridor width of 30 m. Land	i. The width of the transmission line corridors will be minimized through corridor sharing. ii. All PAPs will be provided fair and adequate compensation and assistance (e.g. allowances and livelihood restoration programs) until their livelihood and incomes are restored to at least pre-project levels, in accordance to the Project's ARAP. The ARAP will be based on Ugandan laws and in compliance

Ref No.	Potential Impact	Enhancement / Mitigation Measures
	acquisition for the access road will not be required as it will be aligned within the 132 kV transmission line corridors. Mukono SS Land acquisition will be required for securing the 220 kV and 132 kV transmission line corridors and access road (land for the substation will be secured by the preceding 3x63 MVA, 132/33 kV Mukono Industrial Park substation). Kawaala SS Although the substation land is already currently owned by UETCL, the area where the cable will be laid is owned by individuals who are squatters on Kabaka's land. The corridor to be acquired for the cable route is approximately 100 m long and 5 m wide.	to JICA Guidelines on Environmental and Social Consideration. iii. Additional assistance will be provided to vulnerable social groups if any are identified, for example child-headed homes, homes of elderly people. iv. Internal and external monitoring will be implemented and a grievance mechanism established.
2.	**Economic Displacement** Buloba SS The project site has both perennial and seasonal crops, woodlot and abandoned gardens. Mukono SS The project site has both perennial and annual crops, and forest trees (mostly planted with a few natural sections) Kawaala SS There will be economic displacement in this area because five	i. Promptly compensate economically displaced persons for loss of assets or access to assets at full replacement cost. ii. Provide replacement property (for example, agricultural or commercial sites) of equal or greater value, or cash compensation at full replacement cost where appropriate, to persons with legal rights or claims to land which are recognised or recognisable under the national law. iii. Provide assistance that will off-set any loss of a community's commonly held resources. iv. This could take the form of initiatives that enhance the productivity of the remaining resources to which the community has access, in-kind or cash compensation for loss of access or provision of access to alternative sources of the lost resource.

Ref No.	Potential Impact	Enhancement / Mitigation Measures
	(05) of the six (06) identified PAPs use the land for brick making, and for majority it is their primary source of income.	v. Compensate economically displaced persons who are without legally recognisable claims to land for lost assets (such as crops, irrigation infrastructure and other improvements made to the land) other than land, at full replacement cost. The client is not required to compensate or assist opportunistic settlers who encroach on the project area after the cut-off date. vi. Provide additional targeted assistance (for example, credit facilities, training, or job opportunities) and opportunities to improve or at least restore their income-earning capacity, production levels, and standards of living to economically displaced persons whose livelihoods or income levels are adversely affected. In case of businesses experiencing downtime or having to close as a result of project-related displacement, both the owner of the business and employees losing pay or employment are eligible for such assistance. vii. Provide transitional support to economically displaced persons, as necessary, based on a reasonable estimate of the time required to restore their income-earning capacity, production levels, and standards of living.
3.	**Impact on Air Quality** The construction phase will involve activities such as construction of the control building, foundations for gas insulated switchgears, transformers, and towers. These activities have the potential to produce fugitive dust emissions that could pollute the ambient air quality. A number of equipment and machinery such as tippers, delivery vehicles will also be used during the construction and these are likely to produce fugitive emissions.	i. Keeping exposed soil surfaces in damp condition by water spraying and material stockpiles covered when not in use. ii. Use of well-maintained vehicles and machines. Vehicles and machines emitting excessive pollutants (e.g. black soot) to be removed until repaired. iii. Use of closed/covered trucks when transporting dusty materials. iv. Switching off engines of construction vehicles and machines when not in use. v. To mitigate against dust emissions, control measures such as regular sprinkling of water on dusty areas and temporary access roads; and observing set speed limits among other measures will be implemented; the use of PPE will also be established to minimize the impact of the duct, where it occurs.

Ref No.	Potential Impact	Enhancement / Mitigation Measures
4.	**Water Pollution** Removal of vegetation cover in the ROW, wayleaves and substation site whose root systems bind the soil may increase the risk of erosion by water or wind in the project area. During rainy seasons (months of March and April, and September to November), the loss of moisture-retaining function of the vegetation will lead to increased surface run-off, carrying with it eroded soil particles that will ultimately end up in water sources within the Project area.	Discharge of concrete wash water i. Discharge of untreated concrete wash water to surface waters (e.g. rivers, lakes) to be strictly prohibited. ii. Concrete wash water (e.g. from concrete mixer and pump trucks) to be discharged only at designated facilities (e.g. facilities with wash water treatment system). iii. Recycling of wash water will be done as far as practical. Soil erosion and run-off from construction site i. Avoid removing short vegetation and grass along the transmission line corridor as far as it does not hinder construction works. ii. Implementation of temporary erosion control measures (e.g. silt fence, erosion mats) especially where construction sites are near surface water. iii. Revegetation of exposed slopes immediately after construction is completed. iv. Construction of retaining walls for exposed slope protection if necessary. Pollution sources (oil and human waste) i. Spillage of hazardous liquids (e.g. oil) to be prevented by implementing spill prevention measures (see "Soil pollution" section below for details). ii. Installation of portable toilets for construction workers.
5.	**Soil Erosion and Degradation** Clearance of vegetation at the proposed site will have the potential to contribute to soil erosion through the agents of wind and running water. Activities such as earthworks, construction of the proposed substation and associated facilities, spillage or uncontrolled release of potentially polluting material such as concrete wash water, fuels (oils, diesel, hydraulic fluid, or	Prior to construction, a Construction Environmental Management Plan (CEMP) will be prepared by the contractor and submitted to the Supervising Consultant for approval. A range of appropriate erosion and sediment control measures will be contractually required to be implemented during the construction of the substation, tower bases and the new access road, to minimise the potential for environmental harm on soils and local receiving waters. Specific management measures relating to soils and water would be documented

Ref No.	Potential Impact	Enhancement / Mitigation Measures
	lubricants) or paint during construction could also contribute to soil degradation. Localised soil contamination would also arise from irresponsible waste management on site. Earthworks when constructing tower foundations near and/or within swamps or near streams could increase sediment load in watercourses, mainly around tower footings if within the wetland.	in a sub plan Soil and Water Management Plan (SWMP) including an Erosion and Sediment Control Plan (ESCP).
6.	**Impact on wetlands** Contamination of the wetland (swamp and swamp forest) could be as a result of spillage of fuels, oils and lubricants from Project vehicles and equipment; or dumping of filling material into the wetland to provide for access for delivery of workers, materials and equipment. Buloba SS The Project area close to the Kampala-Masaka highway still has wetland habitats, with intact patches in parts. There were also sections of forested swamps within the Project area, particularly near the end of the proposed transmission line where the line will join with the Kawanda-Masaka 220 kV on-going Project. Mukono SS Wetlands were observed in the low lying areas, e.g. close to the Kampala-Jinja highway where there were still wetland habitats, with intact permanent patches in parts. There were other parts of the project area with wetland habitats but many of these were already degraded with human activity.	i. Access through sections of wetland, particularly undisturbed wetland, will be minimised as much as possible. ii. Where access through sections of wetland could not be avoided, restoration activities will be undertaken at the end of the construction period, to ensure sustainable development of the Project area. iii. As part of its overall pollution response plan, the Contractor shall have an Oil Spill Contingency Plan which has a number of controls and procedures for minimising or preventing accidental discharge of hydrocarbons (fuel, oils, and lubricants).
7.	**Noise and Vibrations**	i. In principal, noisy construction works to be limited to normal working hours and no operation on Sundays and public holidays.

Ref No.	Potential Impact	Enhancement / Mitigation Measures
	During the construction of the substation, noise and vibrations may be generated from heavy trucks ferrying materials and equipment to the site, earth movers as well as concrete mixers and generators being used at the site. Noise and vibrations will be a temporary and reversible impact ending with completion of construction activities.	ii. Noisy equipment to be located as far as possible and aligned to be directed away from sensitive receptors. iii. Vehicles and machinery to be equipped with exhaust mufflers and well maintained. iv. Additional noise suppression measures (e.g. covering of noisy units) to be implemented if noise levels at nearest sensitive receptor consistently exceeds national noise standard or in case of consistent complaints. v. Construction workers to be provided with appropriate PPE such as ear plugs and ear muffs for protection against excessive noise. vi. Construction machines and vehicles to be turned off when not in use.
8.	**Improper Management of Waste** During transmission line and substation construction, waste will be generated, including vegetation stripped from right of way, soil excavated from tower foundation sites, packaging waste (cement bags, paper, polyethene sheets, and wood pallets), metal scrap, wire cuttings, wooden planks, polyethene sheets, PET water bottles and waste oil from construction equipment or vehicles.	i. Maximization of reuse and recycling. ii. Storage of waste only in designated waste containers and areas. Waste will be sorted to ensure appropriate final disposal. iii. Storage of hazardous wastes in specialized/labelled containers and facility. iv. Wastes to be handled and disposed only by NEMA-authorized waste management entities. v. Strict prohibition of littering and implementation of awareness programs for the construction workers.
9.	**Change in Landscape** <u>Buloba SS</u> The proposed site location is currently used for farming, and is surrounded by similar gardens of matooke, sweet potatoes, cassava and such crops, as well as fallow. The transmission line corridor is similar in nature, with sections that are swampland at the start and towards the end. Construction of the	i. Site restoration (e.g. revegetation) to be implemented immediately after construction is completed. ii. Creation of green belt, if necessary.

Ref No.	Potential Impact	Enhancement / Mitigation Measures
	substation will change the landscape in the area, from a green vegetated one to a built one. <u>Mukono SS</u> The proposed line route is currently used for farming on the northern part and forest on the Southern part of the route. Part of the footprint for Mukono component site lies within the Nandagi Central Forest Reserve. Construction of the towers and installation of the conductors will alter the appearance of the landscape.	
10.	**Risks Associated with Social Interaction with Construction Workers** The construction workforce for the Project will likely interact with the communities along the proposed transmission line route during construction. Interaction between the residents and construction workers will be inevitable, particularly in the Northern section of the line route since the area is mostly residential. The location of the construction workers' areas of abode will be within the community and therefore some resources will be shared. This social interaction between the workers and the community could result in fraternization that could be sexual. 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.	i. Holding of awareness programs for the construction workers. ii. Preparation of Code of Conduct to be strictly followed by the workers.

Ref No.	Potential Impact	Enhancement / Mitigation Measures
11.	**Occupational and Community Health and Safety Risks** Construction of proposed transmission line associated with the Mukono Industrial Park substation, will involve moving heavy equipment and materials through settlements, trading centres and construction activities adjacent to residential areas. This potentially poses accident risk to the general public and construction workers. Fatal accidents could arise from unskilled operation of heavy construction machinery, unsatisfactory safety guidelines around the construction site or falling from line's lattice towers when workers neglect requisite equipment (e.g. safety latches).	i. Compliance to JICA's "The Guidance for the Management of Safety for Construction Works in Japanese ODA Projects". ii. Implementation of safety training programs for all workers. iii. Provision of appropriate Personal Protective Equipment (PPE). iv. Holding of regular tool box meeting to discuss safety. v. Lockout - tag out procedures to be clearly displayed on site and followed. vi. Contractor to provide appropriate safety signage at high risk locations (e.g. near fuel tanks) including ancillary work sites.
12.	**Traffic Accidents and Disruption** Construction of the 220 kV transmission lines and the 132 kV transmission line will involve activities that will require delivery of material such as cement, sand, coarse aggregates, steel trusses or members, as well as hauling away of debris from the Project area to the ultimate disposal location. The additional construction traffic could have an added impact on the roads leading to these sites. Buloba SS is accessible off the Masaka-Mbarara highway, Mukono SS off Kampala-Jinja Road, Kawaala SS off Kasubi-Namungoona Road, Bujagali off Kayunga Road, and Mutundwe SS off Masaka Road in Nalukolongo.	i. Strict compliance to speed limits. ii. Avoid as far as practical of using roads with high risk of accidents. iii. Vehicle motion alarm to be installed on all construction vehicles. iv. Placement of traffic officers and appropriate safety/warning signs in high risk locations (e.g. 'Heavy Trucks Turning', 'Road Diverted', 'Half Road Closed', etc.) v. The construction contractor will be required to submit a Traffic Management Plan to UETCL and other necessary organizations for approval.
13.	**Temporary Disruption of Electricity Supply**	i. Construction works will be planned in manner to minimize duration of power outage.

Ref No.	Potential Impact	Enhancement / Mitigation Measures
	A number of technical checks will be necessary during the process of connecting the substation and the associated transmission lines to the grid. This will result in disruption of electricity supply in the areas that will be connected to the substations within this Project.	ii. If power outage is unavoidable, it will be communicated to the public and facilities (e.g. hospital) in advance. iii. Overhead line work to be designed and carried out in a way to avoid interference with existing power lines and maintaining safe separation distances from existing distribution lines.
14.	**Impact on Ecological Environment (Buloba SS and Mukono SS)**	
	A. Flora and Vegetation ***<u>Loss and degradation of habitat:</u>*** The transmission line mainly crosses wetlands and agro-systems, with some sizeable areas of natural vegetation. The wetland habitats still harbour plant and other forms of biodiversity that is bound to be affected by the proposed activities of the power line construction. ***<u>Reduction in abundance (cover) of some species of woody biomass</u>***: The vegetation clearance mentioned above will mostly affect the mature trees, which are seed sources for natural regeneration. This will cause a faster reduction in cover of woody vegetation along the transmission line. ***<u>Proliferation of invasive plant species</u>***: At least one species of invasive plant (*Lantana camara*) occurs in the areas traversed by the proposed transmission line. This poses a threat to the indigenous plant species which are already decimated and susceptible.	i. Revegetation of exposed surfaces (e.g. cut and fill slopes) to be done by native plant species only, and immediately after works are completed to minimize chance of colonization by invasive species. ii. Removal of invasive species if observed along the revegetation sites. iii. Implementation of environmental awareness programs for the construction workers, with special focus on threatened species. iv. Strictly prohibit hunting and poaching of wild life and cutting of trees. v. Prevention and minimization of pollution (e.g. noise, water) through strict implementation of planned pollution control measures.
	B. Invertebrates <u>Buloba SS</u> The area was found to be low in terms of species diversity for	i. Invasions in the plant communities will be monitored and when sighted must be halted since such invasions drastically reduce food resources for invertebrates. ii. It will be good practice to have flower producing plants inside and on the fence

Ref No.	Potential Impact	Enhancement / Mitigation Measures
	both orders Lepidoptera (Butterflies) and Odonata (Dragon flies and Damsel flies). All species encountered in the area were of Least Concern (LC) according to the IUCN red list of conservation species. Mukono SS There were two species of high conservation regard. *Papilio dardanus* (VU) and *Papilio demodocus* (NT) are globally threatened due to restricted range and wide spread habitat loss. However, both species can survive in cultivated fields despite being poor competitors even in these fields.	of the infrastructure if the expanse taken up is to remain useful to invertebrates especially butterflies iii. Arrangements for maintaining the corridors through which electricity lines pass have to be put in place and with great care especially for forested areas in the reserve. This will reduce destruction and alteration of habitats.
	C. Herpetiles Reptiles and amphibians are generally classified by the type of habitats they prefer or occupy. Therefore alterations of the habitat will imply destruction of species composition and their niche. Regarding the above context, the major impacts of the proposed project will most likely be: *i. Continued loss and degradation of habitat* Since the greatest portion of land was already converted into agricultural fields, further clearance of vegetation is expected to aggravate habitat destruction. Among the habitats that will be affected are the remnant wetlands (wooded bush lands and the forest reserve) which are critical breeding and foraging sites species. *ii. Loss and reduction in abundance / cover of some species of non woody and woody biomass*	i. Flush throughout the entire area before vegetation clearance at key work sites, this gives time for slow animals to escape. ii. Sensitize workers about the role of these animals in the ecosystem and the need to conserve them. iii. Restore the ecological state of the surrounding sites immediately after portions and / or all project activities in the area have been accomplished. iv. The clearance of land will be minimized by limiting activities only to designated sites preferably the already cultivated ground. v. Encourage conservation and protection of the wetland systems, forests and other habitat patches. This will prevent direct pollution of swampy ecosystem and ensure a reasonable degree of reptiles and amphibian protection. vi. All wastes will be managed according to the set standards by National Environment Authority. vii. Enrichment planting will be fostered in areas that will be degraded to facilitate natural vegetation regeneration which will ensure faunal species persistence.

Ref No.	Potential Impact	Enhancement / Mitigation Measures
	This is usually during the project implementation phase, where there will be vegetation clearance, excavation and human presence. Such activities distort the ecosystem by removing cover used by herpetiles to hide from predators. During vegetation clearance and excavation, some slow moving species such as chameleons and some frogs are killed. *Note: No species of conservation concern were encountered or recorded in either Buloba or Mukono sites.*	
	D. Birds The potential negative impacts on birds as a result of the Project would include: i) Habitat loss – This will result where vegetation that forms the matrix environment for the animals will be cleared to install power transmission poles. ii) Collision with the power line: - The new line will introduce a perpendicular structure off the existing high voltage transmission line along Masaka road and this could be a potential trap in the flight path of the birds. Buloba SS The majority of species recorded are those that would survive in human modified landscapes except perhaps for the five F species which cannot survive without forest (Yellow-rumped Tinker bird *Pogoniulus bilineatus*, Green Hylia *Hylia prasina*, African Emerald Cuckoo *Chrysococcyx cupreus*, and Great blue	i. Deliberate efforts need to be made to avoid unnecessary cutting of trees in the operation areas. The developer needs to have a sensitization campaign for its workers so that they appreciate the value and role of trees in biodiversity conservation. ii. Activities will be restricted only to the areas that must be disturbed to avoid unnecessary vegetation removal. iii. All project workers will be sensitized to minimize damage to vegetation and flora. The workers and communities shall also be sensitized about the dangers and threats the invasive species pose to biodiversity and ecosystem stability. iv. Closely monitor and supervise the operations to ensure compliance. v. Circumvent the natural vegetation wherever possible.

Ref No.	Potential Impact	Enhancement / Mitigation Measures
	Turaco *Corythaeola cristata)*. In addition, several water birds were also recorded and these are dependent on the presence of open water and/or wetland habitats. Four species (Common Squaco Heron, Great Egret, White-faced Whistling Duck, and Malachite Kingfisher) are dependent on the water/wetland habitats and could therefore be affected by alteration or disappearance of their preferred habitat. Mukono SS 5 species of birds listed at the regional level, two of them being Near Threatened (Grey Crowned Crane *Balearica regulorum* and Grey Parrot *Psittacus erithacus*). At the Global level the Crane is Endangered while the Parrot is Vulnerable.	
	E. Mammals Habitat loss for the mammals would result from vegetation clearance for the substation site (Buloba) and transmission line corridor (Buloba and Mukono). Buloba SS There was no record of large mammals in the Project area. The only species that was physically seen were the monkeys, while for the carnivores their presence was based on faecal material (for the Jackal). Mukono SS There was no record of large mammals in the Project area. The	i. Restore habitats that could ultimately be exploited by the mammals thereby enhancing the biodiversity value of the area. ii. Flush throughout the entire area before vegetation clearance at key work sites, this gives time for slow animals to escape.

Ref No.	Potential Impact	Enhancement / Mitigation Measures
	Uganda Mangabey *Lophocebus Ugandae* deserves particular mention given that it is a species endemic to Uganda and most of its previous known range being in the forests fringing Lake Victoria.	
15.	**Impact on Nandagi Central Forest Reserve** Mukono SS Clearing of the trees from Nandagi CFR will have some impact on the ecological functions of the forest, as well as the economic gain for the private farmers.	i. The loss of forest and associated biodiversity will be compensated (offset) based on the "Forest Biomass and Biodiversity Assessment" undertaken by National Forest Authority (NFA) in conjunction with UETCL. ii. Any threatened flora species (e.g. Jacaranda mimosifolia) that require cutting will be compensated by for example replanting its seed or seedling in a suitable alternative location. iii. Compensation to private farmers for the planted trees based on the ARAP valuation survey. iv. Provision of livelihood restoration assistance to the affected private farmers if necessary.
16.	**Climate Change Impacts** There will be vegetation clearance at the substation site as well as along the transmission line route and access roads to enable access to the site by equipment and crews. Biomass loss reduces carbon sinks necessary for carbon sequestration. Loss of biomass is a negative impact since it reduces natural carbon sinks that would trap carbon dioxide from the atmosphere.	UETCL will adopt a proactive approach of being involved in reforestation programs using indigenous species with local communities in the project affected area, or supporting tree-planting as a compensatory measure for vegetation cover lost during development of transmission line projects. This off-setting undertaking will be explored through discussion with the National Forestry Authority (NFA).
17.	**Impact on Physical Cultural Resources** For Projects being developed from green field (Buloba and Mukono), there is a potential for discovery of physical cultural resources during its implementation, especially activities	A Chance Finds Procedure has been developed as part of the ESMP, to guide the handling of any chance finds during Project implementation. In particular, if any physical cultural resources are found; i. Cease work immediately to avoid any further damage if chance finds are stumbled upon;

Ref No.	Potential Impact	Enhancement / Mitigation Measures
	involving earthworks and excavation.	ii. The identifier must immediately inform his/her Site Supervisor of the discovery; iii. Access to the site must be controlled and the site secured; iv. The Site Supervisor must notify the responsible authorities, including the Ministry of Tourism, Wildlife and Antiquities; v. 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; vi. Consultations to determine relocation costs; and vii. Relocation and replacement.
18.	**Improper Camp Decommisioning** Considering the small number of workers required it is unlikely that workers' camps will be built by the contractors. However, the necessity of these camps will be left to the Contractor's discretion. There is a potential of negative socio-economic impacts if the contractor does not properly restore camp sites to original conditions at the end of construction operations. Derelict equipment, patches of contaminated soil and abandoned waste would not only cause environmental contamination but also social and public health impacts.	Before closure of camps, the contractor should plan for the following elements: i) Requirements and procedure for removing equipment, waste and structures from the camp site; ii) Requirements and procedures to restore the site to original condition, leaving no visual alterations that would impact the landscape; and iii) Description of how possible socio-environmental impacts will be minimised during decommissioning.

B. Operation Phase

Table ES 16: Summary of Potential Negative Impacts and Impact Significance Ranking – Operation Phase

Ref No.	Potential Impact	Impact Significance
	Substations	
1.	Improper waste management	Moderate
2.	EMF Impacts	Minor
3.	Contribution to climate change	Minor
4.	Invasion of rodents and snakes	Moderate
	Transmission Lines	
1.	Improper waste management	Moderate
2.	EMF Impacts	Minor
3.	Corona effect	Minor
4.	Water Pollution	Moderate
5.	Bird collision	Moderate

Table ES 17: Summary of the recommended enhancement and mitigation measures for the Project – Operation Phase

Ref No.	Potential Impact	Enhancement / Mitigation Measures
	POSITIVE IMPACTS	
1.	**Reliable and secure electricity power supply in the GKMA** The Project will improve reliability of power supply to the GKMA through the various interventions including construction of Buloba and New Mukono	This benefit can be sustained through proper management, ensuring all-time site security and regular maintenance of the substations and transmission lines. Additionally, electrical waste will be properly managed to avoid secondary offsite environmental contamination.

Ref No.	Potential Impact	Enhancement / Mitigation Measures
	substations, upgrade of Kawaala, Mutundwe and Bujagali substations, and re-conductoring of 132 kV transmission lines from Mukono branch point – Kampala North substation, Kampala North Substation – Mutundwe Substation, and Kampala North to Lugogo Substation. This is a permanent and direct impact.	
2.	**Economic development (development of other sectors)** The new and upgraded substations will have an overall positive social impact on the resident and business community not only in Kampala, but further in the Greater Metropolitan area that includes parts of Wakiso, Mukono and Mpigi Districts. This is due to the increased reliability in electricity power supply.	This benefit can be sustained through proper management of the substation infrastructure and transmission lines, ensuring all-time site security and regular maintenance of the substations.
3.	**Employment** The operation and maintenance of the project (substations and transmission lines) will require a smaller number of specialised engineers and technicians who will be UETCL staff. A typical substation requires less than ten (10) personnel for day-to-day management.	This benefit can be sustained through training of the employees in the operation of the substations and technological development in their fields. Training in occupational health and safety for the substation operators will also be an important part of the skills training, as well as important for the electricity transmission system since early detection of hazards, faults and defects could be essential in smooth operation of the substation.
4.	**Improved access roads** To ensure access to the substations in Buloba and Mukono, the existing access roads will be improved. For the Buloba component, 750 m of the access road will be widened to 8 m, while 1.2 km of the access road will be widened to 8m in Mukono, including a section of the road that crosses the River Kasala. These roads are currently being used by the local	Regular maintenance of the access roads will be important to ensure access to the substations and also for the local communities in the respective areas.

Ref No.	Potential Impact	Enhancement / Mitigation Measures
	communities, who will enjoy the use of the improved, graded and widened roads.	
	NEGATIVE IMPACTS – SUBSTATION OPERATION	
1.	Improper Waste Management Waste will be generated as a result of the operation and maintenance activities of the substation. The types of waste generated will include: ≠ Oil from transformers - transformers used at the substation pose a risk of oil leakages and spills if not well managed. ≠ E-waste - E-Waste (including transformers, capacitors battery banks, transformer oil) will be generated during this phase and would have long term impacts on the environment, if not properly managed. ≠ Domestic waste – waste from food packaging, plastic bottles, paper packaging from the regular operation and maintenance activities and those of the personnel.	i. Wastes to be handled and disposed only by NEMA-authorized waste management entities. ii. Waste disposal containers will be provided onsite for each waste category. iii. Oil pit to be installed at substations to contain accidental spills during transmission oil exchange. iv. Transmission oil will be free of PCBs. v. Waste oil to be recycled at UETCL facility for reuse. Residues to be disposed at oil companies.
2.	**EMF Impacts** Whenever electricity flows, both electric and magnetic fields exist close to the lines that carry electricity, and close to appliances. During operation and maintenance of the substation and its associated facilities, it is expected that there will be minimal emissions since it is an intermediate substation transforming electricity between 220 / 132 kV and 132 kV /33 kV and thus producing electro-magnetic fields (EMFs) at a lower level,	i. Research shows that the strength of EMFs decreases rapidly with increasing distance from source. The design and layout of the substation is such that the distance between the substation and the nearest neighbouring structure is not less than 6 metres, which is the minimum recommended distance to ensure safety. ii. The metal fence around the substation will ensure that almost no electric fields go beyond the substation fence line. iii. The magnetic fields decrease rapidly with an increase in distance

Ref No.	Potential Impact	Enhancement / Mitigation Measures
	reflecting the lower voltages and smaller sizes.	from the source. The transformers will be constructed about 6 metres from the fence to ensure that magnetic fields produced inside the substation has dropped to background levels at fence line. iv. UETCL will continually keep up with the research regarding the connection of EMF the associated risks to human health, and as such keep up with the technological advances so as keep the risks to levels that are as low as reasonably practicable.
3.	**Contribution to Climate Change** Gas Insulated Switchgear (GIS) will be installed in a number of substations. This GIS type switchgear uses sulfur hexafluoride gas (SF_6) for insulation, which gas has a contribution of less than one part in ten thousand of the total contribution to greenhouse gas emission, a contributor to climate change.	i. The SF_6 gas will be reclaimed during maintenance and end of life treatment. ii. The project will use GIS with gas leakage ratio per year less than 0.1% thereby minimizing impacts to insignificant levels. iii. UETCL will purchase GIS from a supplier that has proven internal procedures to ensure SF_6 release at each stage (production, site maintenance, and end of life). International standards such as IEC 376 for personnel and environment safety, for electrical installations will be some of the conditions to be fulfilled by successful suppliers of GIS.
	NEGATIVE IMPACTS – TRANSMISSION LINES	
1.	**Improper Waste Management** Maintenance activities during transmission line operation will require replacement of conductors. The used conductors and off-cuts from the new conductors will have to be properly handled and managed since they are non-bio-degradable.	i. The principles of an integrated solid waste management system will be implemented i.e. reduction at source, reuse and recycle. ii. The principles of an integrated solid waste management system will be implemented i.e. reduction at source, reuse and recycle.

Ref No.	Potential Impact	Enhancement / Mitigation Measures
2.	**EMF Impacts** Research suggests that magnetic fields are a threat to human health as they can cause cancer or could assist in the development of a cancerous condition, miscarriages, Alzheimer's disease or depression. However, no persuasive evidence has been produced over the years. During operation and maintenance of the substation and its associated facilities, it is expected that there will be minimal emissions since it is an intermediate substation transforming electricity between 220 / 132 kV and thus producing electro-magnetic fields (EMFs) at a lower level, reflecting the lower voltages and smaller sizes.	i. UETCL will continually keep up with the research regarding the connection of EMF the associated risks to human health, and as such keep up with the technological advances so as keep the risks to levels that are as low as reasonably practicable. ii. UETCL will enforce the transmission line corridor to ensure potential exposure to EMF is minimised.
3.	**Corona Effect** A corona discharge is an electrical discharge brought on by the ionization of a fluid surrounding a conductor that is electrically charged, under certain conditions. Spontaneous corona discharges occur naturally in high-voltage systems unless care is taken to limit the electric field strength.	i. The designer will maintain a ratio of wire size (wire radius) to turn-to-turn spacing (D/r) of less than 5.85, so that corona will not develop. ii. Workmanship is often the most difficult corona source to identify. Care must be taken to ensure consistent and uniform windings, along with the absence of foreign materials (dust, lint, soldering flux, hand lotion, etc.). Also, solder connections will be smooth and without "solder points." iii. Potting materials will be low-enough viscosity to insure good penetration within the coils. iv. Use of the appropriate conductor sizes and material will be ensured during the life of the transmission lines. v. Regular maintenance of the transmission lines to ensure that any damaged conductors can be detected early and replaced, as damaged conductors are more prone to the corona effect.

Ref No.	Potential Impact	Enhancement / Mitigation Measures
4.	**Water Pollution** Clearing vegetation under the transmission lines to provide access for maintenance increasing the potential for soil erosion that leads to contamination of downstream receiving water bodies. River Kasala in near the Mukono component would be especially prone to eroded soils.	i. Avoid removing short trees and grasses along the transmission line corridor as far as it does not hinder maintenance works.
5.	**Bird collision with Transmission Lines** Presence of the transmission lines provides a navigation hazard for birds, increasing the potential for electrocution and entanglement. Large birds that may not easily manoeuvre would be especially at risk.	i. Installation of avian flight diverters (during construction) along the new transmission lines (Buloba and Mukono).

014. 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. The components of the proposed Project will be located in the districts of Kampala, Wakiso, Mukono, Buikwe and Mpigi. Within each of these districts, there are ongoing and planned infrastructure projects that shall potentially overlap on a temporal and spatial scale with the planned project.

Particular consideration for cumulative impacts is associated with the construction of the Buloba substation and associated transmission lines and the construction of transmission lines for the Mukono substation. The on-going projects that could have cumulative impacts with the Buloba component include the upgrading of road junctions, the second phase of the Northern Bypass, construction of the Entebbe Express way and Bombo road. Of particular concern will be impacts associated with the World Bank funded Kawanda–Masaka 220 kV Transmission Line (currently under construction) which will be interconnected with the Buloba component. The impacts associated with the construction of the transmission lines for the Mukono transmission line for this Project could have an additive effect considering that construction of the Mukono Industrial Park substation and associated transmission line will take place about the same time. In addition, the land requirement for the corridors to accommodate the planned standard gauge railway and oil pipe line at Mukono will compound the land take impact.

Thus cumulative impacts will be contributed by those activities within the host districts which overlap both spatially and temporary with this Project. Such project's activities include acquiring land for infrastructure development, clearing of vegetation, provision of employment opportunities and associated logistical requirements.

Mitigation measures

i) All projects to be developed must undertake individual ESIA studies that must be approved by NEMA and strictly follow the approval conditions.
ii) Kampala, Wakiso, Mukono, Buikwe and Mpigi Districts' Local authorities must provide for strict enforcement of approval requirements before projects are implemented.
iii) All projects that require abstraction of water must obtain permits for DWRM and ensure compliance to approval conditions to ensure availability and quality.
iv) 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 environment will be followed. In particular UETCL will synchronise development of the proposed Project with the other planned and ongoing projects.

015. Environmental and Social Management and Monitoring Plan

Based on the environmental impact assessment, an Environmental and Social Management Plan (ESMP) was prepared to ensure that project impacts are avoided or minimized. The ESMP summarizes the planned mitigation measures against the anticipated environmental impacts, the responsibility for its implementation and supervision, and estimated cost. Table ES 18 shows the ESMP.

Implementation of the construction mitigation measures will be the responsibility of the Construction Contractor under the supervision of the Supervising Consultant. Based on this ESMP, the Construction

Contractor will be required to prepare and submit a detailed Construction Environmental Management Plan (CEMP), Waste Management Plan (WMP) and Occupational Health and Safety Plan (OHSP) to UETCL and other relevant organizations for approval. To ensure that the CEMP is effectively implemented, a qualified and experienced environmental officer will need to be assigned in the Construction Contractor and Supervising Consultant respective teams. If unexpected adverse impacts occur, they will be reported immediately to NEMA to seek advice.

An Environmental and Social Monitoring Plan (ESMoP) was prepared to check the effectiveness of the measures proposed in the ESMP. If the measures are inadequate, they will be revised until impacts are reduced to satisfactory levels. The ESMoP describes the monitoring methodology, responsibility for its implementation and estimated cost. Table ES 19 shows the ESMoP.

016. Grievance Mechanism

During the construction phase, signage will be displayed at temporary yards and major construction sites outlining the complaints procedure and contact details for making complaints. Upon receiving of a complaint, the following procedure will in general be followed:

- Inform complainant within 24 hours upon acknowledgement of complaint.
- Investigate the complaint to determine its validity and the source of the problem.
- Identify and undertake any action required and communicate response action to complainant.
- Report the complaint in monitoring report including actions, resolution status and any outstanding actions required.

Table ES 18: Outline of Environmental and Social Management Plan:

Item	Potential impacts	Mitigation measures	Implementation responsibility	Supervision responsibility	Estimated cost
Preconstruction phase					
Involuntary resettlement	Loss of land, crops, structures, etc. due to land acquisition for the new substations and transmission lines (Buloba, Mukono and Kawaala).	• For the 2 x 220 kV transmission lines in Mukono and Buloba sites, the width of the transmission line corridors will be minimized through corridor sharing. • All PAPs will be provided fair and adequate compensation and assistance (e.g. allowances and livelihood restoration programs) until their livelihood and incomes are restored to at least pre-project levels, in accordance to the Project's ARAP. The ARAP will be based on Ugandan laws and in compliance to JICA Guidelines on Environmental and Social Consideration. • Additional assistance will be provided to vulnerable social groups if any. • Internal and external monitoring will be implemented and grievance mechanism established.	UETCL	Office of the Chief Government Valuer	USD 2,111,244 or UGX 7,389,354,180 (Estimated in ARAP)
Conservation area	Partial loss of forest and biodiversity within Nandagi Forest Reserve due to land acquisition for the Mukono transmission lines.	• The loss of forest and associated biodiversity will be compensated (offset) based on the "Forest Biomass and Biodiversity Assessment" undertaken by National Forest Authority (NFA) in conjunction with UETCL. • Any threatened flora species (e.g. *Jacaranda mimosifolia*) that require cutting will be compensated by for example replanting its seed or seedling in a suitable alternative location. • NFA and UETCL shall undertake forest restoration and other activities that shall enhance the management of the remaining Central Forest Reserves. • Nandagi Indigenous Tree Nursery shall be supported to produce more seedlings for Forest restoration.	UETCL/NFA	NEMA, Ministry of Water and Environment	Part of ARAP cost above (Estimated in ARAP)
	Partial loss of NFA leased private tree planting farms within Nandagi Forest Reserve due to land acquisition for the Mukono transmission lines.	• Compensation to private farmers for the planted trees based on the ARAP valuation survey. • NFA shall undertake awareness activities and guide Licensee tree farmers to continue with Tree Planting projects. • Provision of livelihood restoration assistance to the affected private farmers if necessary.	UETCL	NFA	Part of ARAP cost above (Estimated in ARAP)

Item	Potential impacts	Mitigation measures	Implementation responsibility	Supervision responsibility	Estimated cost
Construction phase					
Air pollution	Fugitive dust emission from heavy construction works (e.g. grading works)	• Keeping exposed soil surfaces in damp condition by water spraying and material stockpiles covered when not in use.	Construction contractor	Supervising consultant, NEMA, UETCL	USD 15,000
	Dust and exhaust gas emissions from construction vehicles and machines	• Use of well-maintained vehicles and machines. Vehicles and machines emitting excessive pollutants (e.g. black soot) to be removed until repaired. • Use of closed/covered trucks when transporting dusty materials. • Switching off engines of construction vehicles and machines when not in use.	Construction contractor	Supervising consultant, NEMA, UETCL	USD 35,000 for maintenance programme
Water pollution	Discharge of concrete wash water.	• Discharge of untreated concrete wash water to surface water and groundwater to be strictly prohibited. • Concrete wash water (e.g. from concrete mixer and pump trucks) to be discharged only at designated facilities (e.g. facilities with wash water treatment system). • Recycling of wash water as far as practical.	Construction contractor	Supervising consultant, NEMA, UETCL	USD 10,000 for wash water treatment at to designated facility
	Soil erosion and runoff from construction site (Buloba and Mukono)	• Avoid removing short vegetation and grass along the transmission line corridor as far as it does not hinder construction works. • Implementation of temporary erosion control measures (e.g. silt fence, erosion mats) especially where construction sites are near surface water. • Revegetation of exposed slopes immediately after construction is completed. • Construction of retaining walls for exposed slope protection if necessary. • Construction of temporary runoff drainage channel. • Stockpiles and temporarily removed topsoil to be stored in a location and manner to prevent soil runoff into surface waters.	Construction contractor	Supervising consultant, NEMA, UETCL	USD 6,000 for re-vegetation and slope protection
	Accidental spillage of hazardous liquids and discharge of human waste	• Spillage of hazardous liquids (e.g. oil) to be prevented by implementing spill prevention measures. • Installation of portable toilets for construction workers.	Construction contractor	Supervising consultant, NEMA, UETCL	USD 6,000
Soil pollution	Accidental spillage and leakage of hazardous liquids	• Regular inspection of vehicles and machines for oil and fuel leaks. Leaking vehicles and machines to be removed until repaired. • Spill response kit (e.g. absorbents) to be readily available at the	Construction contractor	Supervising consultant, NEMA, UETCL	USD 15,000 for spill response equipment and

Item	Potential impacts	Mitigation measures	Implementation responsibility	Supervision responsibility	Estimated cost
		construction site. • Hazardous substances to be stored only in specialized/labelled containers and designated storage facility. • Storage facility to be located as far as possible from sensitive areas (e.g. groundwater wells, surface water) and well secured from the public. • Storage and handling facilities of hazardous liquid to be bunded with an impermeable base. • Posting of warning signs at the storage facility. • Hazardous materials only to be handled by trained staff.			bunding of risk-prone equipment
Noise	Noise from heavy construction works	• Vehicles and machinery to be equipped with exhaust mufflers and well maintained. • Noisy equipment to be located as far as possible and aligned to be directed away from sensitive receptors. • In principal, noisy construction works to be limited to normal working hours and no operation on Sundays and public holidays. • Additional noise suppression measures (e.g. covering of noisy units) to be implemented if noise levels at nearest sensitive receptor consistently exceeds national noise standard or in case of consistent complaints. • Construction workers to be provided with appropriate PPE such as ear plugs and ear muffs for protection against excessive noise. • Construction machines and vehicles to be turned off when not in use.	Construction contractor	Supervising consultant	USD 10,000 for appropriate PPE and equipment mufflers
Waste	Generation of construction wastes (e.g. cleared vegetation, concrete debris, removed transmission cables, waste oil)	• Maximization of reuse and recycling. • Storage of wastes only in designated waste containers and areas. • Storage of hazardous wastes in specialized/labelled containers and facility. • Wastes to be handled and disposed only by NEMA-authorized waste management entities. • Strict prohibition of littering and implementation of awareness programs for the construction workers. • Daily clean-ups at the construction sites. • The construction contractor will be required to submit Construction Waste Management Plan (WMP) to UETCL and other necessary organizations for approval.	Construction contractor	Supervising consultant	USD 10,000 for waste handling contractor(s)
Hydrology	Disruption of tributary and water channel flow due to construction of access	• Culverts will be installed where the access road crosses the tributary and channel	Construction contractor	Supervising consultant	Included in construction base cost

Item	Potential impacts	Mitigation measures	Implementation responsibility	Supervision responsibility	Estimated cost
	road (Mukono)				
Social infrastructures	Temporary restriction in the use of access road (New Mukono)	• The access road will be constructed in manner to minimize disturbance to local users (e.g. secure of one-lane width). • Placement of traffic control flagmen, especially at rush hour. • Local community to be informed beforehand if any restrictions occur. • Placement of appropriate safety/warning signs in strategic locations (e.g. 'Heavy Trucks Turning', 'Road Diverted', 'Half Road Closed', etc.) shall be done during the construction period.	Construction contractor	Supervising consultant	USD 4,200 for warning signage
	Temporary disruption of electricity supply	• Construction works will be planned in manner to minimize duration of power outage. • If power outage is unavoidable, it will be communicated to the public and facilities (e.g. hospital) in advance. • Overhead line work to be designed and carried out in a way to avoid interference with existing power lines and maintaining safe separation distances from existing distribution lines.	Construction contractor, UETCL	Supervising consultant; UETCL	Included in construction base cost
Landscape	Change in landscape due to construction of new substations and transmission line (Buloba and Mukono).	• Site restoration (e.g. revegetation) to be implemented immediately after construction is completed. • Creation of green belt, if necessary.	Construction contractor	Supervising consultant	USD 5,700 for site restoration
Infectious diseases	Risk of spreading infectious diseases due to influx of construction workers	• Holding of awareness programs for the construction workers. • Preparation of Code of Conduct to be strictly followed by the workers. • Contractor to undertake HIV/AIDS Management campaigning including Training, distribution of quality Contraceptives and Voluntary Counselling and Testing among workers and adjacent communities and schools.	Construction contractor	Supervising consultant	USD 8,000
Conflicts	There are potential conflicts among workers and between workers and adjacent communities	• Contractor to set-up a Conflict Redress Plan to be approved by UETCL • Contractor to set-up and operationalize a Conflict Redress Committee for approved by UETCL	Construction contractor	Supervising consultant, UETCL	USD 2,000

Item	Potential impacts	Mitigation measures	Implementation responsibility	Supervision responsibility	Estimated cost
Occupational safety	Occupational accidents (e.g. working at height)	• Compliance to JICA's "The Guidance for the Management of Safety for Construction Works in Japanese ODA Projects" and Uganda's OSH Act. • Implementation of safety training programs for all workers. • Provision of appropriate Personal Protective Equipment (PPE). • Holding of regular tool box meeting to discuss safety. • Lockout - tag out procedures to be clearly displayed on site and followed. • Contractor to deploy an HSE Officer approved by UETCL. • Contractor to provide appropriate safety signage at high risk locations (e.g. near fuel tanks) including ancillary work sites. • The construction contractor will be required to submit an Occupational Health and Safety Plan (OHSP) to UETCL and other necessary organizations for approval.	Construction contractor	Supervising consultant	USD 25,000 for appropriate PPE
Accidents	Traffic accidents and disruption due to construction-related traffic	• Strict compliance to speed limits. • Contractor to undertake daily Tool Box Talks for Workers • Avoid, as far as practical using roads with high risk of accidents. • Vehicle motion alarm to be installed on all construction vehicles. • Placement of traffic officers and appropriate safety/warning signs in high risk locations (e.g. 'Heavy Trucks Turning', 'Road Diverted', 'Half Road Closed', etc.). • Contractor to maintain a Health and Accident register • The construction contractor will be required to submit a Traffic Management Plan to UETCL and other necessary organizations for approval. • Contractor to Deploy a qualified Site Nurse and Doctor-On-Call • Contractor to set-up a Site Clinic for treatment of minor ailments. However, other cases shall be referred for specialized management • Contractor to provide a well-stocked First Aid Kit	Construction contractor	Supervising consultant	USD 19,000 for site clinic, site nurse and on-call doctor
Ecosystem	Proliferation of invasive species (Buloba and Mukono)	• Revegetation of exposed surfaces (e.g. cut and fill slopes) to be done by native plant species only, and immediately after works are completed to minimize chance of colonization by invasive species. • Removal of invasive species if observed along the revegetation sites.	Construction contractor	NFA	USD 4,500 for revegetation pf exposed surfaces
	Disturbance to flora and fauna (Buloba and Mukono)	• Implementation of environmental awareness programs for the construction workers, with special focus on threatened species. • Strictly prohibit hunting and poaching of wild life and cutting of trees. • Prevention and minimization of pollution (e.g. noise, water) through strict implementation of planned pollution control measures.	Construction contractor	Supervising consultant	USD 4,000 for environmental awareness training

Item	Potential impacts	Mitigation measures	Implementation responsibility	Supervision responsibility	Estimated cost
Physical Cultural Resources	Loss of archaeological, burial sites, sacred trees, shrines and other physical cultural resources	• Development of a Physical Cultural Resources Management Plan If such physical cultural resource are found: • Consultations to determine relocation costs • Relocation and replacement	UETCL, Contractor	DMM, MGLSD	USD 20,000
Operation phase					
Water pollution	Pollution of surface water due to soil runoff from transmission line corridor and substations (Buloba and Mukono)	• Avoid removing short trees and grasses along the transmission line corridor as far as it does not hinder maintenance works.	UETCL	NEMA	-
Waste	Generation of operation waste (e.g. transformer oil)	• Wastes to be handled and disposed only by NEMA-authorized waste management entities. • Waste disposal containers will be provided onsite for each waste category. • Oil pit to be installed at substations to contain accidental spills during transmission oil exchange. • Transmission oil will be free of PCBs. • Waste oil to be recycled at UETCL facility for reuse. Residues to be disposed at oil companies.	UETCL	NEMA	USD 20,000 for waste handling contractor
Ecosystem	Bird collision with transmission line	• Installation of avian flight diverters (during construction) along the new transmission lines (Buloba and Mukono).	Construction contractor	NEMA/UWA	USD 23,000
TOTAL					**USD 2,353,644**

Table ES19: Environmental and Social Monitoring Plan (ESMoP)

Category	Aim	Method	Frequency	Implementation responsibility	Estimated cost
Preconstruction phase					
Involuntary resettlement	To check the progress and effectiveness of ARAP implementation (Buloba, Mukono and Kawaala)	**[Internal monitoring]** · Assessment of whether compensation and other entitlements are being delivered in line with the ARAP. · Assessment of whether agreed measures to restore or enhance standards of living are being implemented. · Assessment of whether agreed measures to restore or enhance livelihood and sources of income are being implemented. · Identifying any conflicts or problems, issues, or cases of hardship resulting from the resettlement process.	· 1/month during ARAP implementation · Every 3 months during post resettlement for at least 2 years	UETCL	USD 275,000
		[External monitoring] · Assessment of compliance with ARAP actions · Assessment of pre- and post-resettlement socio-economic situation of the affected households · Reviewing records of grievances and following up whether or not appropriate corrective actions have been undertaken and outcomes are satisfactory.	· 2/year during ARAP implementation · 1/year during post resettlement for at least 2 years	Independent organization	USD 145,000
Conservation area	To check the progress and effectiveness of off-set programs at Nandagi Forest Reserve (Mukono)	Joint monitoring between UETCL and NFA. Detailed monitoring method to be determined between UETCL and NFA based on the Land, Biomass and Biodiversity Assessment.	· 4/year for the first year · 1/year for at least 3 years post off-set establishment	UETCL/NFA	To be estimated through the Land, Biomass and Biodiversity Assessment
Construction phase					
Air pollution	To check whether excessive dust and exhaust gas are not emitted from the construction sites (Buloba, Mukono, Kawaala)	Visual inspection of: · Fugitive dust emissions from construction sites · Exhaust gas emissions from construction vehicles and equipment	· Daily	Construction supervisor	Part of supervision base cost
		Field measurement of air quality (PM_{10}, $PM_{2.5}$) at sensitive receptors near the substation sites. Results to be compared with WHO air quality guideline.	· 1/week during heavy construction works (over a six months period)	Construction supervisor (subcontract to local consultant)	USD 24,000
Water pollution	To check whether	Field measurement of surface water quality (e.g. pH, EC, DO, SS,	· 1/month	Construction	USD 36,000

Category	Aim	Method	Frequency	Implementation responsibility	Estimated cost
	construction activities are not causing water pollution (Buloba and Mukono)	turbidity, TN, TP, oil & grease) at Buloba and New Mukono. Results to be compared with baseline data.	(over a 12 months period)	supervisor (subcontract to local consultant)	
Soil pollution	To check of any leaks of hazardous liquids	Visual inspection of: ・Oil leaks from construction machines and vehicle. ・Leaks from storage and handling areas of hazardous liquids.	・1/week	Construction supervisor	Part of supervision base cost
Noise	To check whether excessive noise are not emitted from the construction sites (Buloba, Mukono, Kawaala)	Field measurement of noise level (LAeq) at sensitive receptors near the substation sites. Results to be compared with National Environment (Noise Standards And Control) Regulations, 2003.	・Daily during heavy construction works ・Daily/hourly on receipt of any complaints	Construction supervisor	Part of supervision base cost. Cost of portable sound meter: USD 1,300
Waste	To check whether wastes are stored and handled in accordance to the contractor's Waste Management Plan (All sites)	Visual inspection of waste storage sites and construction sites.	・Daily	Construction supervisor	Part of supervision base cost
Occupational safety	To check whether safety procedures are implemented in accordance to OHSP (All sites)	Visual inspection of work safety procedures and equipment.	・Daily	Construction supervisor	Part of supervision base cost
Ecosystem	To check if construction activities are not causing any unnecessary disturbance to surrounding habitats and species (Buloba and Mukono)	Field surveys of sensitive habitats and flora/fauna around the project sites.	・1/month (over a 12 months period)	Construction supervisor (subcontract to local consultant)	USD 24,000
Operation phase					
Water pollution	To check the growth status of revegetated areas and whether soil runoff is not polluting surface water (Buloba and Mukono)	Observation of growth status of revegetated areas and water quality measurements of adjacent surface water (SS, turbidity).	・3/year until regrowth is confirmed	UETCL (subcontract to local consultant)	USD 9,000

Category	Aim	Method	Frequency	Implementation responsibility	Estimated cost
Waste	To check operation wastes are stored and handled in accordance to the Waste Management Plan (All sites)	Inspection of oil leakages and waste management practices at the substations.	・4/year	UETCL	Included in UETCL's operation and maintenance budget
Ecosystem	To check of any bird collision incidence along the transmission line corridor (Buloba and Mukono)	Field reconnaissance and community interview along the transmission line corridor.	・3/year for at least 2 years	UETCL	Included in UETCL's operation and maintenance budget

1 INTRODUCTION

1.1 BACKGROUND

The Republic of Uganda has been experiencing high economic growth and approximately 7% annual economic growth has been recorded over the past years. In line with this growth trend, the power demand has also been increasing rapidly at 9.7% on average per year from 2007 to 2012. The Government of Uganda and the electricity companies have been developing the power sources mainly by utilizing abundant water resources in Uganda.

However, these entities are facing difficulties in upgrading the power system to satisfy the recent power demand since it requires huge amount of costs. Against this background, the Government of Uganda has requested Japan's ODA loan project called 'The Greater Kampala Metropolitan Area Transmission System Improvement Project' (hereinafter abbreviated as "Project") to the Government of Japan, which aims at the development of transmission and substation system in Kampala Metropolitan Area, to realize the sustainable social and economic development. The Project aims to increase the capacity of power supply through the upgrade of transmission and substation system in Kampala Metropolitan Area.

In accordance to the National Environment Act 1995, electrical infrastructure projects, including substation and transmission line development, are required to undertake an environmental impact assessment and obtain approval from the National Environment Management Authority (NEMA). The Project contracted Air Water Earth Ltd. (AWE) to undertake the ESIA on behalf of Uganda Electricity Transmission Company Ltd. (UETCL), the executing agency of this Project.

The ESIA report was prepared in accordance to the requirements stipulated in the Environmental Impact Assessment Regulations, 1998 and JICA's "Guidelines for Environmental and Social Considerations (2010)". The report analyses the potential environmental impacts of the Project and proposes mitigation measures and monitoring programs to ensure that environmental impacts are avoided or reduced to a minimum (a level that is as low as reasonably practicable). The mitigation measures and monitoring programs are compiled into an Environmental and Social Management Plan (ESMP) and Environmental and Social Monitoring Plan (ESMOP).

1.2 OUTLINE OF PROJECT COMPONENTS

The Project includes a number of components as listed in Table 1-1. The components include construction of new substations, upgrade and improvement of existing substations, and expansion of existing transmission lines.

Table 1-1: List of Project Components

	Main component	Outline	Contents
Substation	**1. Buloba Substation**	Approx. area: 200 m x 260 m	
	(1) 220 / 132 kV Transformer	125 MVA×2units	
	(2) 132 / 33 kV Transformer	40 MVA×2units	
	(3) 220 kV Switchgear	1 lot	
	(4) 132 kV Switchgear	1 lot	New Construction
	(5) 33 kV Switchgear	1 lot	
	(6) Control building	1 lot	
	(7) Access road	Approx. 8 m x 750 m	
	2. New Mukono Substation	Approx. area: 130 m x 105 m	
	(1) 220 / 132 / 33 kV Transformer	125 MVA×3units	
	(2) 220 kV Gas Insulated Switchgear	1 lot	
	(3) 132 kV Gas Insulated Switchgear	1 lot	New Construction
	(4) Control building	1 lot	
	(5) 132 kV transmission line (New Mukono Substation – Mukono Substation)	Approx. 0.3 km×2cct	
	(6) Access road	Approx. 8 m x 1,200 m	
	3. Kawaala Substation		
	(1) 132 / 33 kV Transformer	40 MVA×3units	
	(2) 132 / 11 kV Transformer	20 MVA×1unit	
	(3) 132 kV Gas Insulated Switchgear	1 lot	Renovation
	(4) 33 kV Switchgear	1 lot	
	(5) 11 kV Switchgear	1 lot	
	(6) Control building	1 lot	
	4. Bujagali Substation		
	(1) 220 / 132 / 33 kV Transformer	250 MVA×1unit	Upgrade
	(2) 220 kV Switchgear	1 lot	
	(3) 132 kV Switchgear	1 lot	
	5. Mutundwe Substation		Upgrade
	(1) 132 kV Switchgear	1 lot	
	6. Mobile substation	40 MVA×1 unit	Procurement
Transmission	**7. 220 kV Transmission Line**		
	(1) Buloba branch point – Buloba Substation	Approx. 0.9 km×4cct	New Construction
	(2) New Mukono branch point – New Mukono Substation	Approx. 4.2 km×4cct	New Construction
	8. 132 kV Transmission Line		
	(1) Buloba branch point-Buloba Substation	Approx.0.8 km×2cct	New Construction
	(2) New Mukono Substation -New Mukono branch point (Southern trunk line)	Approx.0.4 km×2cct	New Construction
	(3) Mukono branch point (Northern trunk line) - Kampala North Substation	Approx.25.4 km×1cct	Re-conductoring
	(4) Kampala North Substation — Mutundwe Substation	Approx.10.2 km×2cct	Re-conductoring
	(5) Kampala North Substation — Lugogo Substation	Approx. 5.3 km×2cct	Re-conductoring
	(6) Kawaala branch point — Kawaala Substation	Approx.0.1 km×2cct	Cabling

1.3 PROJECT LOCATION

The Project will involve construction of new substations and associated transmission lines (Buloba and New Mukono), upgrade of substations (Kawaala, Bujagali and Mutundwe), and re-conductoring of 132 kV transmission lines. Table 1-2 presents the location of the project components by Village, Parish, Sub County, County and District. Figure 1-1 shows the transmission line network in the GKMA Project.

Table 1-2: Location of Project Components

Component	Location				GIS Co-ordinates (of substation location)
	District	County/ Sub County	Parish	Village	
Construction of substations					
Buloba substation	Mpigi	Mawokota County / Kiringente Sub County	Sekiwunga	Nakirebe, Kaggaba, Mabuye	432122 E, 28384 N
New Mukono substation	Mukono	Mukono County / Nama Sub County	Mpoma	Nama II, Buyuki, Luwunga	480587 E, 42750 N
			Kasenge	Kivuvu	
			Namawojjolo	Wanjeyo, Namawojjolo West, Bwefulumya	
Upgrade of substations					
Kawaala substation	Kampala	Lubaga Division	Lubya	Namungoona II	448764 E, 37072 N
Bujagali substation	Buikwe				515039 E, 55312 N
Mutundwe substation	Kampala	Lubaga Division			448185 E, 32427 N
Re-conductoring of 132 kV transmission lines					
Mukono branch point (Northern trunk line) - Kampala North Substation	Mukono District – Wakiso District –Kampala District				
Kampala North Substation — Mutundwe Substation	Kampala District				
Kampala North Substation — Lugogo Substation	Kampala District				

Source: JICA Study Team
Figure 1-1: Transmission Line Network in GKMA (Existing and Planned)

1.4 PROJECT PROPONENT AND COST

Name and address: Uganda Electricity Transmission Limited Company (UETCL)
Plot 10 Hannington Road
P.O. Box 7625, Kampala, Uganda
Tel: +256 414 233 433

Contact Person: Eriasi Kiyemba
Managing Director
Email: eriasi.kiyemba@uetcl.com

Estimated Project Cost: USD 115 million

1.5 BRIEF DESCRIPTION OF SUBSTATION

A substation is a part of an electrical generation, transmission, and distribution system. Substations transform voltage from high to low, or the reverse, or perform any of several other important functions. A substation generally consist of switchgear (combination of electrical disconnect switches, fuses or circuit breakers used to control, protect and isolate electrical equipment), transformer and control building.

Generally two types of switchgear will be employed: open-air isolator switchgear or gas-insulated switchgear (GIS). An open-air isolator type requires relatively large area but construction cost is low. GIS type uses sulfur hexafluoride gas (SF_6) for insulation. It requires less space for installation but is more costly. The adoption of SF_6 in switchgear for all operating conditions has advantages in performance, size, weight, global cost and reliability. However, in the unlikely event of SF_6 leakage, (which is a greenhouse gas) into the atmosphere, the gas may contribute to climate change albeit only slightly.

1.6 BRIEF DESCRIPTION OF TRANSMISSION LINE

The transmission tower will be of the steel lattice type commonly used in Uganda and worldwide. The height of the tower will vary depending on the site topography and surrounding structures, but a clearance height of at least 7 – 8 m will be secured from the ground level. The four corners of the transmission tower base will be secured over a concrete foundation.

1.7 PROJECT JUSTIFICATION

The Government of Uganda, through UETCL, is planning to improve the power sector of Uganda by putting in place robust electricity infrastructure to make the power supply more reliable, secure and sufficient to meet the electricity requirements of the people of Uganda.

Through this Project implementation, UETCL intends to improve the power supply in Greater Kampala Metropolitan Area with the objective of boosting the transmission grid capacity to securely deliver power supply to the metropolitan area in the short and long term, and to improve the reliability, availability and quality of power supply to the area.

1.8 ESIA REQUIREMENTS

According to the National Environment Act (Cap. 153) Third Schedule, this project lies in category 10 (Electrical Infrastructure, including – (b) electrical transmission lines, (c) electrical substations), which require a detailed EIA to be conducted before Project implementation. Annex 3 of the NEMA guidelines lists energy projects/ activities among those that should be subjected to an EIA before they are granted approval for implementation. The ESIA report was prepared in accordance to the requirements stipulated in the Environmental Impact Assessment Regulations, 1998 and JICA's "Guidelines for Environmental and Social Considerations (2010)". The report analyses the potential environmental impacts of the Project and proposes mitigation measures and monitoring programs to ensure that environmental impacts are avoided or kept to minimum. The mitigation measures and monitoring programs are compiled into an Environmental and Social Management Plan (ESMP) and Environmental and Social Monitoring Plan (ESMOP).

1.9 ESIA OBJECTIVES

The principal objectives of the ESIA were to:

1) Provide a complete description of the area proposed for development. This included a description of the main elements of the development, highlighting sensitive aspects of the construction and operational phases;
2) Identify the major environmental issues of concern through the collection of baseline data which included pollution (air quality, noise and water), natural and social and environmental aspects.
3) Consultation of stakeholders (institutions and community leaders and members);
4) Outline the Legislations and Regulations relevant to the project;
5) Predict the likely impacts of the development on the described environment, including direct, indirect and cumulative impacts, and indicate their relative importance to the design of the electricity transmission system facilities;
6) Identify mitigation action to be taken to minimize adverse impacts and quantify associated costs;
7) Design a Monitoring Plan which will ensure that the mitigation plan is adhered to; and
8) Describe the alternatives to the project that could be considered at the various sites.

Specifically, the ESIA along the proposed line route and the substations focused at impacts on the following:

i) Fauna and flora;
ii) Drainage and water resources;
iii) Land use and agriculture;
iv) Protected areas/natural forested areas/ wildlife sanctuaries (Loss and biodiversity considerations);
v) Property, settlements and community facilities;
vi) Health and safety;
vii) Security implications;
viii) Noise and air quality; and

ix) Conflict between workers and local people.

The ESIA considered issues of alternative line route and alternative locations of the substations. Furthermore the study paid attention to identification of significant ecosystem types based on land use as well as vegetation communities along the line route and the substations.

2 PROJECT DESCRIPTION

2.1 DESCRIPTION OF MAIN PROJECT COMPONENTS

In order to meet the set objectives, the Project will involve the following components:

- ≠ Construction of new substations and associated transmission lines at Buloba and Mukono. These will be developed from green field.
- ≠ Upgrade of existing substations at Mutundwe and Bujagali
- ≠ Renovation of existing substation at Kawaala and cabling of associated transmission line
- ≠ Re-conductoring of existing transmission lines
- ≠ Procurement of mobile substation

2.1.1 Construction of Buloba Substation and Associated Transmission Lines

The Buloba substation will be constructed (from green field) in Mpigi District, approximately 25 km west of central Kampala. The substation will connect to the Kawanda–Masaka 220 kV Transmission Line (currently under construction) by constructing two 220 kV transmission lines of approximately 0.9 km length. The separation distance between the two transmission lines will be 35 m, which is the minimum distance required between the transmission towers.

The Buloba substation will also be connected to the existing Mutundwe－Kabulasoke 132 kV transmission line located immediately south of Kampala–Mityana Road, by constructing a 132 kV transmission line of approximately 0.8 km length.

A new access road of approximately 750 m length (8 m width) will also be constructed within the corridor of the 132 kV transmission line, which will connect the new substation with Kampala–Mityana Road.

Table 1-2 indicates the specifications of Buloba Substation and associated transmission line. 220 kV incoming feeders will be connected to 220 kV transmission line (2 circuits) currently under construction by the World Bank with open-pit method. Also, two feeders will be connected to existing 132 kV transmission line (1 circuit) from Mutundwe to Kabulasoke by pi branch. Figure 2-1 shows the proposed topographical layout and Figure 2-2 show the proposed layout of the substation.

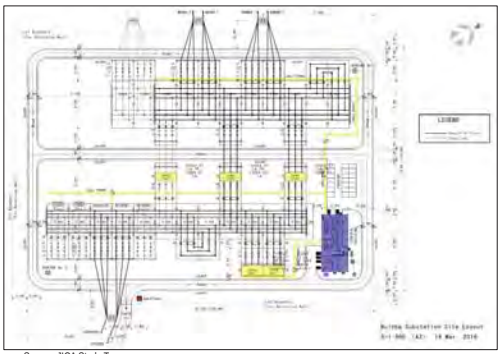
Table 2-1: Primary data of Buloba Substation

Main component	Outline
Buloba Substation	Approx. area: 200 m x 260 m
220 / 132 kV Transformer	125 MVA×2units
132 / 33 kV Transformer	40 MVA×2units
220 kV Switchgear	1 lot
132 kV Switchgear	1 lot
33 kV Switchgear	1 lot
Control building	1 lot
Access road	Approx. 8 m x 750 m
220 kV Transmission Line	
Buloba branch point – Buloba Substation	Approx. 0.9 km×4cct
132 kV Transmission Line	
Buloba branch point-Buloba Substation	Approx.0.8 km×2cct

Source: JICA Study Team

Source: Prepared by JICA Project Team with Google Earth

Figure 2-1: Proposed topographical layout of Buloba Substation and associated transmission lines



Source: JICA Study Team

Figure 2-2: Proposed Site Layout of Buloba substation

2.1.2 Construction of Mukono Substation and Associated Transmission Lines

The New Mukono substation will be constructed in Mukono District, approximately 25 km east of central Kampala. The substation is proposed as an expansion of the planned 3x63 MVA, 132/33 KV Mukono Industrial Park substation. The expansion will involve installation of an additional 3x125 MVA, 220/132 kV transformers in order to provide network operational flexibility and reliability of supply to Mukono Industrial Park that is gazetted by the government. Table 2-2 provides a summary of the Mukono Project components.

Table 2-2: Primary data of New Mukono Substation

Main component	Outline
New Mukono Substation	Approx. area: 130 m x 105 m
220 / 132 / 33 kV Transformer	125 MVA×3units
220 kV Gas Insulated Switchgear	1 lot
132 kV Gas Insulated Switchgear	1 lot
Control building	1 lot
132 kV transmission line (New Mukono Substation – Mukono Substation)	Approx. 0.3 km×2cct
Access road	Approx. 8 m x 1,200 m
220 kV Transmission Line	
New Mukono branch point – New Mukono Substation	Approx. 4.2 km×4cct
132 kV Transmission Line	
New Mukono Substation -New Mukono branch point (Southern trunk line)	Approx. 0.4 km×4cct

Source: JICA Study Team

The New Mukono substation (constructed from green field) will connect to the existing Bujagali–Kawanda 220 kV transmission line located north of the substation by constructing two 220 kV transmission lines (length of approx. 4.2 km). The existing Nalubaale－Kampala North 132 kV transmission line running south of the Bujagali–Kawanda 220 kV transmission line, will be overpassed by lowering the 132 kV transmission line through constructing a gantry tower between transmission towers as shown in Figure 2-3 The separation distance between the two transmission lines will be 25 m or 35 m, depending on the transmission section[1].

[1] In general, a wider separation distance will be required for short transmission sections, to avoid interference between the transmission towers.

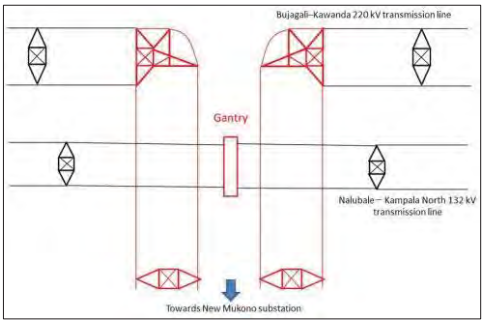


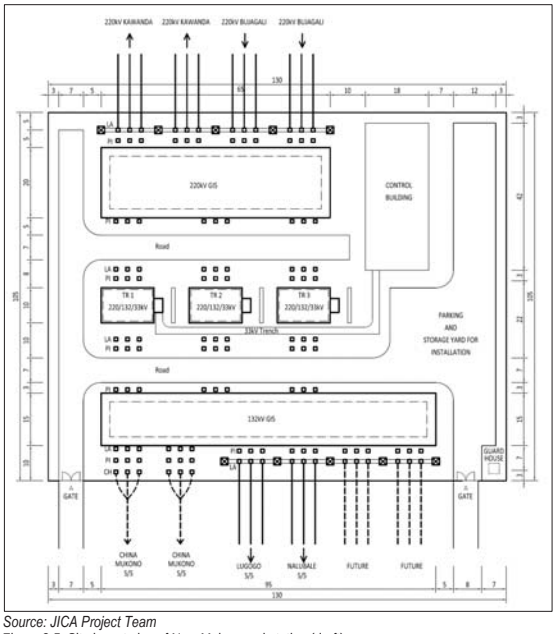
Figure 2-3: Image of overpassing method

A 132 kV transmission line (length of approx. 0.4 km) will also be constructed, which will connect to the existing Kira - Nalubaale－Lugogo 132 kV transmission line located south of the substation.

A new access road of approximately 1,200 m (8 m width) length will be constructed over an existing dirt road running between the substation and main road (road A109). Although a small river crosses the access road route, the river flow will be maintained by installing culverts. The river will be temporary diverted during the culvert installation.

Figure 2-4 shows the topographical layout of New Mukono substation and the associated transmission lines. The figure also shows the location of the Chinese government funded substation and associated transmission line. Figure 2-5 shows the draft site layout plan of New Mukono substation.

Source: Prepared by JICA Project Team with Google Earth
Figure 2-4: Topographical layout of New Mukono substation and associated transmission lines



Source: JICA Project Team
Figure 2-5: Site layout plan of New Mukono substation (draft)

2.1.3 Renovation of Kawaala Substation

Kawaala Substation is an existing substation located approximately 5km the north-west area in the central area of Kampala, in Kampala District. The substation has one (01) 20 MVA of 132/11 kV power transformer and distributes power through three (03) 11 kV feeders.

To enable the Kawaala (Namungoona) substation handle the added capacity, the substation will be renovated by removing the existing facilities and replacement by new transformers, switchgears and control building. The existing overhead transmission line that connects to the Kampala North-Mutundwe 132 kV transmission line will also be replaced by installing new underground transmission cable of approximately 100 m length. The underground cable option was selected to minimize land acquisition and resettlement impacts.

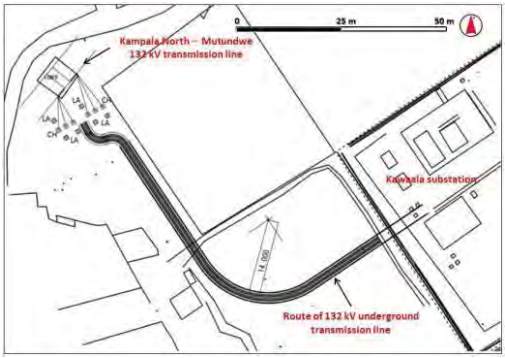
Table 2-3: Primary data of Kawaala Substation (Proposed)

Specification	Quantity
132/33 kV power transformer (40 MVA)	3
132/11 kV power transformer (20 MVA)	1
132 kV Gas Insulated Switchgear	1
33 kV Switchgear	1
11 kV Switchgear	1
Control Building	1

Source: JICA Study Team

The substation size is a rectangle-shape (60 m x 40 m). The area is approximately 2,400 m^2 and it is relatively narrow compared to other substations whose capacity and specification are similar with this substation. Therefore, 132 kV gas insulated switchgear is considered as equipment for the narrow area. Additionally, the direct connection by ducts between the transformers and 132 kV GIS are thought to be technically appropriate.

Three-direction of the substation site is surrounded by residential area. Thus, the distribution feeders can be extended only to the one direction, facing the access road. Hence, it is examined to install gantries for 33 kV feeders along the road on the site to facilitate the connection work of new 33 kV feeders to the new Kawaala Substation smoothly. As for 11 kV feeders, since they are connected to existing Kawaala Substation by underground cables, it seems to be technically unnecessary to construct gantries.



Source: JICA Project Team
Figure 2-6: Route of underground transmission cable

2.1.4 Upgrade of Bujagali Substation

Bujagali substation is an existing substation located inside the Plot of Bujagali Hydroelectric Power Station.

The substation will be upgraded by installing new transformers and switchgears inside available empty space. No land acquisition will be required. Figure 2-13 shows the existing topographical layout of Bujagali substation.

Source: Prepared by JICA Project Team with Google Earth
Figure 2-7: Existing topographical layout of Bujagali substation and upgrade area

2.1.5 Upgrade of Mutundwe Substation

Mutundwe substation is located in Lubaga Division, Kampala District. The upgrade of the substation will involve installation of one (01) unit of 132 kV Switchgear. Figure shows the topographical layout of Mutundwe substation.

Source: Prepared by JICA Project Team with Google Earth
Figure 2-8: Current topographical layout of Mutundwe Substation

2.1.6 Mobile Substation

A mobile substation is a substation on wheels, which is used to provide interim grid connections and temporary power supplies. The substation is a completely self-contained trailer mounted unit comprised of transformer, cooling equipment, high and low voltage circuit protection, metering, relaying, AC and DC auxiliary power supplies and surge protection. One (02) unit of 40 MVA mobile substations will be procured as part of this Project.

The major components of a mobile substation are the high voltage section, transformer and cooling, low voltage section, controls / protection / metering / auxiliary supply and trailer-special design features sections. Applications of a mobile substation include:

- ≠ Continuity of service for planned construction, maintenance and inspection programs •
- ≠ Standby or temporary service
- ≠ Over-capacity service
- ≠ Replace complete substation in event of equipment failure
- ≠ Electrical power source in isolated areas

For a mobile substation to be used as an alternative transformer when an existing substation is faulty, or offline for any reason, it is necessary to analyse the mobility to access the existing substations while achieving the sufficient substation capacity. The mobile substation will be kept at Lugogo substation, from where accessibility to the other substations in Kampala is easy, thus fulfilling the requirements for mobility as summarized in Table 2-4.

Table 2-4: Required specification for the mobility

Description	Specification
Up hilling gradient	12% or less
Turning radius	To be capable of entering into road with the width of 7.5 meters from the vertically crossing main road with its width of 15 meters.

Source: JICA Study Team

To achieve the high mobility with high substation capacity, it is effective to divide the main equipment such as primary voltage switchgear, main transformer, secondary voltage transformer, panels etc. into different trailers to equalize and minimize weights and sizes of each unit. Based on this design, the specification of the main transformer of the mobile substation which satisfies the mobility indicated in Table 2-4 shall be as shown in Table 2-5.

Table 2-5: Specification of main transformer

➢ **Capacity**	40 MVA
➢ **Primary voltage**	132 kV
➢ **Secondary voltage**	33 – 11 kV
➢ **On load tap changer (OLTC)**	OLTC shall be furnished in the primary side and its range is +5%~-12.5% (17 taps)
➢ **Cooling system**	ODAF
➢ **Vector group**	Y-Y-Δ (Delta winding shall be connected to the auxiliary transformer)

Since the distribution network in Uganda consists of either 33 kV or 11 kV, the secondary voltage shall be selectable type secondary voltage, 33 kV or 11 kV. Figure 2-9 shows the image of a mobile transformer unit.

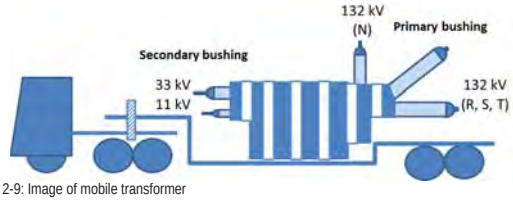


Figure 2-9: Image of mobile transformer

The specification of main equipment other than the mobile transformer is stated in Table 2-6.

Table 2-6: Specification of main equipment other than the mobile transformer

➢ **Primary switchgear**	Gas insulated switchgear shall be applied. The CT and VT shall be included in it.
➢ **Secondary switchgear**	33 kV gas insulated switchgear (cubicle type) shall be used for both 33 kV and 11 kV voltage classes.
➢ **Primary side power cable**	Copper (400 mm^2)
➢ **Secondary side power cable**	Copper (1,600 mm^2)

Connection methods of mobile substation at substations

i. Connection to air insulated switchgears

At substations where the air insulated switchgears are used such as Lugogo Substation, Mutundwe Substation and Kampala North Substation, the mobile substation shall be connected to the existing bus bar. If the spare bay is available the bus bar is connected to the primary switchgear through overhead conductors. The conductors shall be supported by mobile panzer masts. For the connection between primary switchgear and the main transformer, and between the main transformer and the secondary switchgear, the power cables will be used. When the mobile substation is connected to the bus bar, it

will be required to power outage the bus bar during the connection. Figure 2-10 shows the image of the connection by using the spare bay.

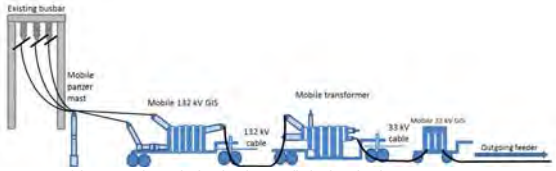


Figure 2-10: Image of the connection to the bus bar (AIS applied substations)

ii. Connection to gas insulated switchgears (GIS)

It is not feasible to connect to the mobile substation from bus bars at substations applying GIS, such as Queensway Substation (To be commissioned in 2017) and Kawaala Substation (GIS shall be applied by this Project), the cable head located at the outside of these substation to function to connect the overhead conductors to power cables shall be used. In this case the secondary voltage could be connected to either the distribution network directly or the in-coming switchgear. Figure 2-11 shows the image of the connection to GIS substations.

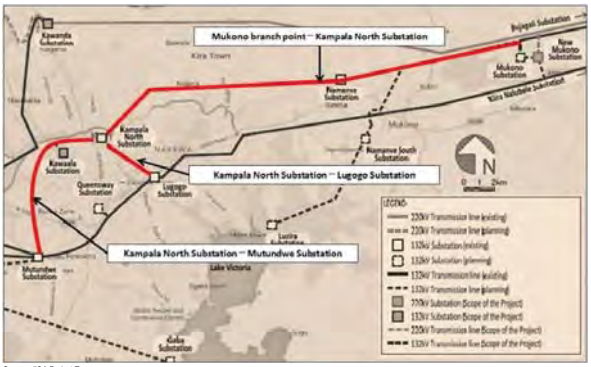
Figure 2-11: Image of the connection to the bus bar (GIS applied substations)

2.1.7 Transmission Line Re-conductoring

Approximately 41 km of existing 132 kV transmission lines will be re-conductored (removed and replaced by new higher capacity lines). The existing transmission towers will continue to be used.
The 132 kV transmissions that will be re-conductored as part of this Project are:

iv. Mukono branch point (Northern trunk line) to Kampala North Substation – approximately 25.4 km x 1 cct.
v. Kampala North Substation to Mutundwe Substation – approximately 10.2 km x 2 cct.
vi. Kampala North Substation to Lugogo Substation – approximately 5.3 km x 2 cct.

Figure 2-12 shows the transmission lines that will be re-conductored (lines in red).



Source: JICA Project Team
Figure 2-12: Sections of transmission lines that will be re-conductored (lines in red)

2.2 PROJECT IMPLEMENTATION

2.2.1 Construction activities

Construction of substations and transmission lines will in general use the methods commonly employed in other projects in Uganda. This Section provides a general description of the planned construction methods. A more detailed construction plan will be developed in the detailed design phase.

2.2.1.1 Substations

Construction of new substations (Buloba and New Mukono) will typically involve the following construction works:

1) Clearance of vegetation (trees, shrubs)
2) Grading works (cutting and filling) to level the site
3) Construction of concrete foundation
4) Installation of equipment and control building
5) Inter-grid connection

Renovation of Kawaala substation will initially include a process of removing and relocating the existing facilities (e.g. transformers, switchgears, cables) and demolition of the concrete foundation. Prior to removing the transformer, the transformer oil inside will be collected for later reuse. The removed equipment will be stored in UETCL's storage area for later reuse or recycling. The Kawaala substation will also temporarily halt its operation until renovation works are completed. In the meantime, another substation will temporarily replace the role of Kawaala substation.

Main construction machines required for substation construction will be:

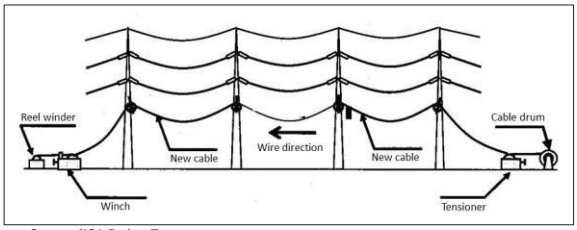
- Wheel loader
- Excavator
- Dump truck
- Crane and truck crane
- Concrete truck
- Pneumatic hammer (for demolition works)

2.2.1.2 Transmission line

2.2.1.2.1 New transmission line

Construction of new transmission lines (Buloba and New Mukono) will typically involve the following works:

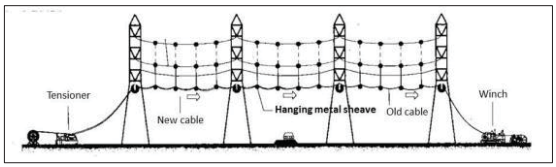
1) Clearance of vegetation along the transmission line corridor and within the footprint of the transmission tower base. Low-lying vegetation along the transmission line corridor will be maintained.
2) Construction of concrete foundation of the transmission tower. This will include excavation of tower base, concrete placement and backfilling. The concrete mix will be prepared at the site.
3) Erection of transmission tower (assembling of prefabricated components of the lattice structure)
4) Stringing of transmission cable. Transmission cable will be installed by installing a winch at one end of the line section, and a tensioner and cable drum at the other end. Figure 2-13 shows an image of the stringing process.



Source: JICA Project Team
Figure 2-13: Illustration of stringing process

2.2.1.2.2 Re-conductoring of transmission line

Re-conductoring involves replacing the wires of the existing transmission cable with new cables. The method of re-conductoring will be similar to the stringing process shown in Figure 2-13. In urban areas, hanging metal sheaves will be used to avoid any hazard and contact with structures on the ground. Figure 2-14 shows an image of stringing process in urban areas.



Source: JICA Project Team
Figure 2-14: Image of stringing process in urban areas

Re-conductoring works will be conducted in sections of 3-4 km at a time. Although electric transmission along the re-conductoring route will be stopped, power supply will be maintained by diverting to an alternative transmission route. Equipment required for the re-conductoring works will be transported by using the existing corridor.

2.2.1.2.3 Underground transmission cable

Installation of the new underground transmission line at Kawaala substation will mainly involve the following works:

1) Removal existing transmission cable and tower
2) Excavation along the underground cable route (up to around 1.5 m depth)
3) Installation of concrete trough and transmission cable
4) Backfilling

2.2.1.3 Temporary construction facilities

Temporary construction facilities (e.g. material stockyard, equipment storage area) required for the construction works are planned to be established within the site boundary of the substations and

corridor of the transmission lines. Temporary land acquisition is therefore not likely to be required. It is unlikely that construction workers' camps will be required for this Project; however, in the even that they are, the Contractor will inform UETCL of the location and obtain permission to proceed.

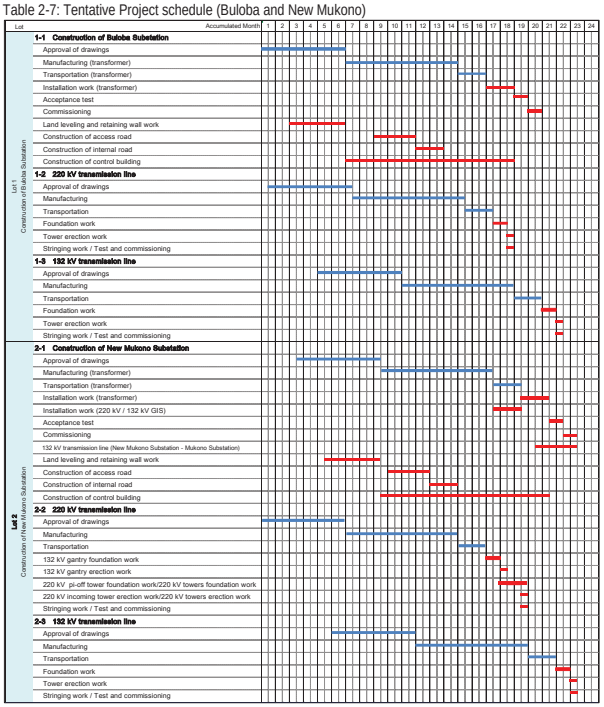
2.2.2 Construction materials

Construction works will require raw materials such as cement, aggregates, gravel, wood, bricks and reinforcing steel bar. Most will be procured from Uganda from licensed suppliers, and there will be no need for the Project to develop any new quarries.

2.2.3 Construction schedule

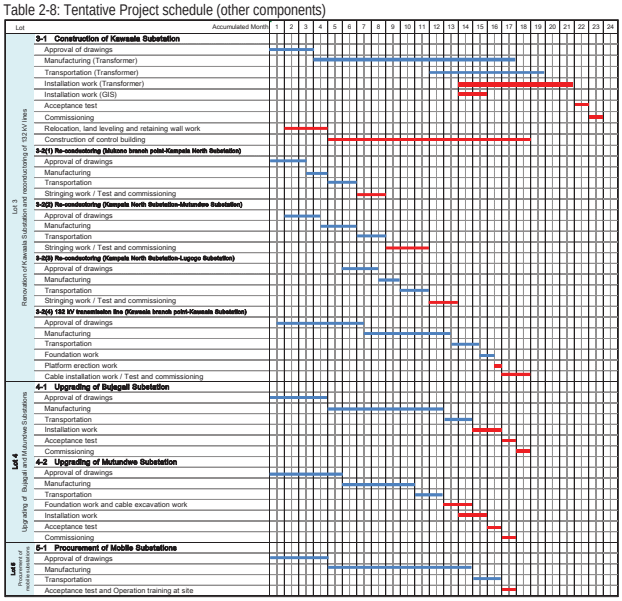
While the duration of construction works will vary between Project components, the Project is expected to be completed within 2 years, including onsite construction works, processes such as drawing approval, equipment manufacturing and transportation. Table 2-7 and Table 2-8 show the tentative timetables for the Project.

Table 2-7: Tentative Project schedule (Buloba and New Mukono)



Source: JICA Project Team

Table 2-8: Tentative Project schedule (other components)



Source: JICA Project Team

2.2.4 Construction workers

Around 20 workers (e.g. mason, supervisor, unskilled labourer) are expected daily to be working at the substation construction sites. Around the same number of workers will also be working at the transmission line sites. Most workers will be procured locally, although skilled foreigners may be hired for highly technical works. The entire recruitment process for the workers will be managed by the contractors in accordance with Uganda labour laws. It is uncertain at the moment whether there will be any need for establishing workers camp.

Normal working hours are planned to be from around 08:00-17:00 from Monday to Saturday. Works outside of normal working hours will require permission from UETCL and relevant local authorities.

2.2.5 Operation and maintenance activities

Once the transmission lines and substations are constructed and in operation, there will be no activities that may cause significant environmental impacts (e.g. discharge of pollutants, noise) or hazards providing that the facilities are maintained in good working order. Operation and maintenance work will

be conducted in accordance to UETCL safety procedure. However, appropriate waste management will be required especially for wastes generated from routine maintenance work such as transmission oil replacement.

2.3 PROJECT DECOMMISSIONING

Information provided by UETCL indicated that it is unlikely for the substations and their associated infrastructure to be decommissioned. Instead they will be continually upgraded and capacity increased to suit prevailing technology and energy demand of the time.

2.4 PROJECT ALTERNATIVES

Various alternatives were considered in the process of siting and routing the new substations (Buloba and New Mukono) and associated transmission lines.

2.4.1 No Project' Scenario

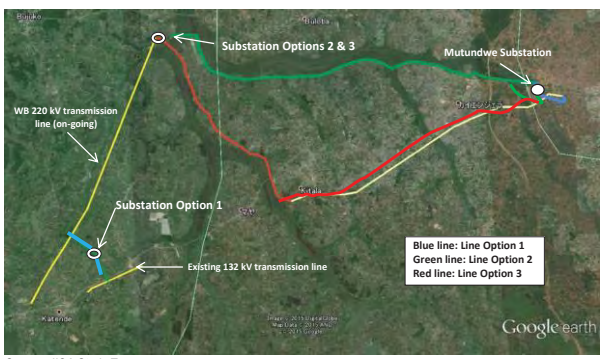
If the project is not implemented, the numerous benefits of improved power supply in the GKMA, and the associated economic benefits would be foregone.

The "no project" scenario is neither a tenable nor beneficial alternative because power is required to support rapid socio-economic development in the Greater Kampala region Metropolitan Area.

2.4.2 Location alternatives

2.4.2.1 Buloba Substation

Three alternatives were analysed for the new Buloba substation site and transmission line route. The locations of the alternatives are indicated in Figure 2-15.



Source: JICA Study Team

Figure 2-15: Locations of alternatives for Buloba substation

Table 2-9 is a summary of the alternative analysis. In conclusion, Option 1 was considered as the most viable option mainly due to the least amount of land acquisition required and lowest construction cost.

Table 2-9: Alternative analysis of Buloba substation location and transmission line route

Item	Option 1	Option 2	Option 3
Substation location	Between ongoing World Bank (WB) 220kV transmission line and existing 132kV transmission line	Near the planned oil plant and along the ongoing WB 220kV transmission line	Same as Option 2.
Start point of transmission line	Existing 132kV transmission line	Mutundwe substation	Mutundwe substation
End point of transmission line	The ongoing WB 220kV transmission line	New Buloba substation	New Buloba substation
Distance of transmission line	Overhead line of approx. 1.7 km	Underground line of approx. 3km + overhead line of approx. 12 km	Overhead line of approx. 18 km
Environmental impacts	Impact low as the area is mostly farmland and shrubs.	Impact high as it requires construction of towers along marshland.	Impact high as it requires construction of towers along marshland.
Social impacts	Area of land acquisition less compared to other Options.	Area of land acquisition higher compared to Option 1.	Area of land acquisition highest compared to other Options.
Construction cost	Lowest, due to the shortest transmission line.	Highest due to the underground transmission line.	Higher than Option 1, due to the longer transmission line.
Overall assessment	Most recommended due to the lowest impacts on social and natural environments and lowest cost among all.	Not recommended due to the higher impacts on environments compared to Option 1. The cost is the highest among all.	Not recommended due to the highest impacts on social environment.

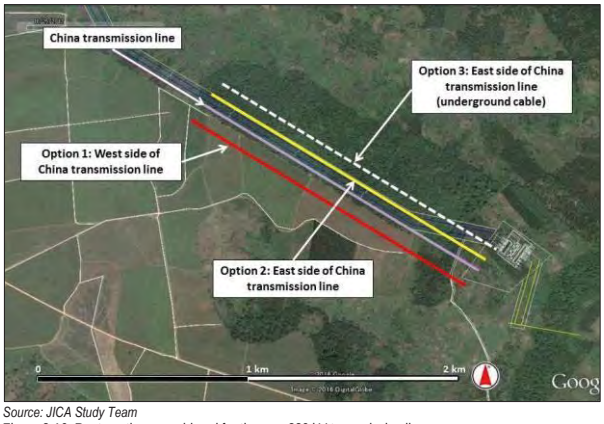
2.4.2.2 New Mukono Substation

Alternative routes of the new 220 kV transmission line were considered along the forest area near the new substation. Following are the options considered (Figure 2-16)

Option 1: Routing of the new 220 kV transmission line west side of the Mukono Industrial Park ('China') transmission line so to avoid the forest.

Option 2: Routing of the new 220 kV transmission line east side of the Mukono Industrial Park ('China') transmission line.

Option 3: Routing of the new 220 kV transmission line east side of the Mukono Industrial Park ('China') transmission line but with underground cable to minimize forest clearance.



Source: JICA Study Team

Figure 2-16: Route options considered for the new 220 kV transmission line

The viability of the three alternative route options was analysed by considering environmental impacts, socioeconomic impacts and construction cost factors. Table 2-8 shows the results of the alternative analysis. In conclusion, Option 2 was considered as the most viable option mainly due to comparatively less socioeconomic impacts and low construction cost.

Table 2-10: Results of alternative analysis for the new 220 kV transmission line route

	Option 1	Option 2	Option 3
Environmental impacts	Impacts will be less than the other options as it will avoid the forest area.	Approximately 7 ha of forest area will need to be cleared.	Approximately 1 ha of forest area will need to be cleared.
Socioeconomic impacts	Land acquisition will be difficult as the route passes over a commercial sugar cane farm.	Socioeconomic activity limited compared to Option 1. Will require agreement of NFA, the landowner.	Socioeconomic activity limited compared to Option 1. Will require agreement of NFA, the landowner.
Construction cost	Same as Option 2	Same as Option 1	Approximately 6 times of Options 1 and 2.
Overall assessment	Although Option 1 will not require any forest clearance, it was considered unfeasible due to difficulty in land acquisition.	Although Option 2 will require the most amount of forest clearance, it was considered the most viable option mainly due to significantly lower construction cost than Option 3.	Although Option 3 will require less forest clearance than Option 2, it was considered unfeasible due to significantly higher construction cost than Option 2.

3 ESIA METHODOLOGY

The collection of data on the biophysical, socio-economic and cultural characteristics of the proposed project site was conducted by specialists from technical disciplines including hydrology, terrestrial ecology, sociology, and natural resources engineering. Methods used included visual observation and recording, laboratory analyses and on-site measurement of environmental parameters as detailed in the following sections. The results of the baseline studies conducted in the various locations within the Project area are provided in Section 5.6.

3.1 SCOPING OF POTENTIAL ENVIRONMENTAL IMPACTS

The potential environmental impacts of the project were identified initially through a scoping exercise, covering the pre-construction (PC), construction (C), and operation (O) phases. The scoping process identified the impacts that are likely to be of most importance and eliminated those that are of little concern.

Scoping was conducted by referring to the current environmental status, opinions of stakeholders and JICA's "Guidelines for environmental and social considerations (2010)", which provides a list of items to be considered in the scoping process. The potential impacts of each scoping item were rated in accordance to the following criteria:

A+/-: Significant positive/negative impact is expected.
B+/-: Positive/negative impact is expected to some extent.
C+/-: Extent of positive/negative impact is unknown.
D: No impact is expected

Table 3-1shows the results of the scoping including the rationale behind the rating. Note that the alleviating effects of mitigation measures were not considered in the evaluation.

Table 3-1: Results of the scoping exercise

	Item	Phase	Rating	Rationale
1	Air pollution	C	B-	Heavy construction works are potential sources of air pollution (e.g. dust and exhaust gases).
		O	D	There are no notable air pollution sources.
2	Water pollution	C	B-	Runoff from the construction sites may pollute the surface waters nearby (e.g. New Mukono and Buloba). Uncontrolled discharge of concrete wash water.
		O	D	There are no notable water pollution sources.
3	Soil pollution	C	B-	Soil may be contaminated through spills of hazardous substances.
		O	D	There are no notable soil pollution sources.
4	Waste	C	B-	Various types of construction wastes will be generated (e.g. cleared vegetation, concrete debris, removed transmission cable and insulators, wood, waste oil)
		O	B-	Waste will be generated from maintenance activities (e.g. transmission oil).
5	Noise/vibration	C	B-	Heavy construction works (e.g. grading works) are potential sources of noise pollution.
		O	D	There are no notable noise pollution sources.
6	Ground subsidence	C, O	D	There are no activities that may cause ground subsidence.
7	Offensive odour	C, O	D	There are no notable odour sources.

	Item	Phase	Rating	Rationale
8	Bottom sediment	C, O	D	There are no notable sediment pollution sources.
9	Conservation area	PC, C	B-	Part of the Nandagi Forest Reserve will be affected due to the construction of New Mukono substation and associated transmission lines.
		O	D	There are no activities that may have adverse impact on conservation areas.
10	Ecosystem, flora/fauna	PC, C	B-	Flora and fauna in the Nandagi Forest Reserve may be affected due to the construction of New Mukono substation and associated transmission lines. Flora and fauna in and around the Buloba substation and associated transmission lines may be affected.
		O	D	There are no activities that may have adverse ecosystem impacts.
11	Hydrology	C	B-	The new access road of New Mukono substation will cross over a small river. The flow of the river will be temporarily diverted during installation of culverts.
		O	D	There are no activities that may have adverse impacts.
12	Topography	C	B-	There will be some alteration of topography in the new substation sites (Buloba and New Mukono).
		O	D	There are no activities that may cause alteration of existing topography.
13	Involuntary resettlement	PC	B-	There will be some loss of land, crops, structures, etc. due to land acquisition for the new substations and transmission lines (Buloba, New Mukono and Kawaala). However, involuntary resettlement is likely to be small scale even if required.
14	Vulnerable social groups (poor, indigenous people etc.)	PC	C	Vulnerable social groups will be identified through ARAP study.
15	Livelihood, living environment	PC	B-	Land acquisition of the new substations and transmission lines (Buloba, New Mukono) will result in loss of farmland and plantations.
		C, O	B-	Livelihood and living standard of the PAPs may worsen if not appropriately compensated and rehabilitated.
16	Land use	PC	B-	Farmland and plantations in the new substations sites (Buloba, New Mukono) will be converted into substation land and transmission line corridor.
17	Local resource	C	D	Raw construction materials (e.g. cement, aggregates) are planned to be procured locally but only from licensed suppliers.
		O	D	There are no activities that may have adverse impacts on local resources.
18	Water use	C, O	D	There are no activities that may have adverse impacts on water use.
19	Social infrastructures and services	C	B-	The use of access road at the New Mukono site may be temporarily restricted.
		O	B+	The local community will have an improved access road at the New Mukono site.
20	Social institutions	C, O	D	There are no activities that may have adverse impacts on social institutions.

	Item	Phase	Rating	Rationale
21	Misdistribution of benefit and losses	C, O	D	There are no activities that may cause misdistribution of benefit and losses.
22	Local conflicts of interest	C, O	D	There are no activities that may cause local conflicts of interest.
23	Cultural heritage	C, O	D	There are no cultural heritages around the project area.
24	Landscape	C	B-	There will be slight changes to current landscape at the new substation sites (Buloba, New Mukono) and transmission lines.
		O	D	There are no activities that may affect the landscape.
25	Gender	C, O	D	There are no activities that may trigger gender issues.
26	Children's rights	C, O	D	There are no activities that may violate children's rights.
27	Infectious diseases (HIV/AIDS etc.)	C	B-	There may be risk of spreading infectious diseases due to influx of construction workers.
		O	D	The risk of spreading infectious diseases is low.
28	Occupational safety	C, O	B-	There is a moderate risk of occupational accidents (e.g. high-place work, electrocution).
29	Accidents	C	B-	Accidents may occur due to construction activities (e.g. truck movement).
		O	D	The risk of accidents is low.

PC: Pre-construction phase, C: Construction phase, O: Operation phase
A+/-: Significant positive/negative impact is expected.
B+/-: Positive/negative impact is expected to some extent.
C+/-: Extent of positive/negative impact is unknown.
D: No impact is expected

3.2 EIA STUDIES

Based on the results of the scoping exercise, baseline studies for the bio-physical and socio-economic environments were undertaken in the various locations within the Project area.

3.2.1 Air Quality

Baseline airborne particulate measurements were taken within the existing substations in Kawaala, Mutundwe and Bujagali; and the proposed Buloba and Mukono substations, and at sensitive receptor sites (Figure 3-1to Figure 3-5).The measurement locations were pre-selected for various reasons, as summarised in Table 3-2. Baseline particulate measurements were also undertaken along Bombo road, Mityana road, Hoima road and Jinja-Kampala highway. Ambient total suspended particulates (TSP) as well as PM_{10} and $PM_{2.5}$ measurement readings were taken in these areas using a pre-calibrated *Casella Microdust*® dust/aerosol monitor which uses infra-red dispersion technology to give digital dust readings mounted on a tripod 1-1.5 m above ground level.

Instrument used: CASELLA MicroDust to measure dust (TSP)

At each point on site, measurements were made over a ten (10) minute sampling period. The integrated average reading was observed to stabilise within a few minutes at all locations, so the ten-

minute average was considered to be a representative spot reading. The PM_{10} and $PM_{2.5}$ measurements were made in similar fashion to the total suspended particulates measurements but with the appropriate filters, adaptors and pump fitted to the equipment's probe.

3.2.2 Ambient Noise

Ambient noise readings were taken within the existing substations in Kawaala, Mutundwe and Bujagali; and the proposed Buloba and Mukono substations, and at sensitive receptor sites (Figure 3-1 to Figure 3-5). The measurement locations were pre-selected for various reasons, as summarised in Table 3-2. Baseline ambient noise measurements were also undertaken along Bombo road, Mityana road, Hoima road and Jinja-Kampala highway using a *Casella CEL-621C2* sound level meter, which was calibrated and mounted on a tripod 1.0 - 1.5 m above ground level. Readings were also taken at identified receptors near to the proposed project infrastructure. Between three and four readings were taken at each location. Background noise was monitored over a ten (10) minute period at each point on site.

Instrument used: CASELLA CEL-621C2/K1 Integrating 1/3 Octave Band Sound Level Meter (Class 2)

3.2.3 Electro-magnetic Field (EMF)

Baseline EMF readings were taken at locations surrounding within the existing substations in Kawaala, Mutundwe and Bujagali to determine the EMF levels (Figure 3-1 to Figure 3-5)). The measurement locations were pre-selected for various reasons, as summarised in Table 3-2. The RF Field Strength Meter is directional and detects only the component of the electric field which has the same polarization as the long axis of the meter. To complete measurements at a single location, it was therefore aligned to lie in the north-south, east-west and finally vertical axes with average readings being recorded while the equipment remained in the above positions.

Instrument used: RF Field Strength Meter

Table 3-2: Rationale for selecting measurement locations for Air Quality, Noise and EMF

Sub-station	Location (UTM 36N Coordinates)	Rationale for positioning air quality, noise and EMF measurements.
Buloba	432122E, 28384N	Baseline for proposed sub-station site.
	432122E, 28581N	Nuns' residence. Nearest likely/present receptors during

Sub-station	Location (UTM 36N Coordinates)	Rationale for positioning air quality, noise and EMF measurements.
		construction and operation phase.
	432130E, 28709N	Madinah Nursery School. Likely receptors during construction phase.
	431938E, 28977N	Homestead. Likely receptors during construction phase.
	431873E, 28847N	Homestead/grocery kiosk. Likely receptors during construction phase.
Mukono	480605E, 41823N	NFA camp. Likely receptors during construction phase.
	480527E, 42663N	Proposed sub-station perimeter. Baseline for proposed sub-station site.
	478224E, 44127N	Homestead. Likely receptors during construction phase.
	477419E, 44615N	Homestead. Likely receptors during construction phase.
Kawaala	448764E, 37072N	Substation fence line. Baseline before proposed works. Likely receptors during construction phase
	448725E, 37077N	Baseline before proposed works.
	448785E, 37136N	Blessed Medical Clinic. Likely receptors during construction phase.
Bujagali	514953E, 55448N	Construction contractor's office block. Baseline before proposed works. Likely receptors during construction phase.
	515039E, 55312N	Security guards' booth. Baseline before proposed works. Likely receptors during construction phase.
	515078E, 55445N	Sub-station control building. Baseline before proposed works. Likely receptors during construction phase.
Mutundwe	448185E, 32427N	Homestead. Likely receptors during construction phase.
	448208E, 32518N	Homestead. Likely receptors during construction phase.
	448041E, 32484N	Homestead. Likely receptors during construction phase.
	448060E, 32413N	Homestead. Likely receptors during construction phase.

Figure 3-1: Air quality, noise and EMF measurement locations - Buloba Substation

Figure 3-2: Air quality, noise and EMF measurement locations - Mukono Substation

Figure 3-3: Air quality, noise and EMF measurement locations - Kawaala Substation

Figure 3-4: Air quality, noise and EMF measurement locations - Bujagali Substation

Figure 3-5: Air quality, noise and EMF measurement locations - Mutundwe Substation

3.2.4 Water Quality

Water quality sampling was conducted at selected locations within the Project area (Table 3-3). For Buloba substation, the sampling was done in three locations i.e. at a borehole used by the community, unprotected spring used by the community, and pit left from clay mining for brick making (Figure 3-6). In Mukono, sampling was also done at three locations, all along River Kasala which flows about 400 m from the substation and about 200 m from a proposed tower location (Figure 3-7). The sampling locations were selected based on the proximity to the construction area, and hence the risk of water pollution as a result of Project construction activities.

Table 3-3: Water sampling locations

Sampling location	GPS Coordinates	Reason for selection of location
Buloba substation		
Station 1: Borehole	0431799E;0028822N	To establish baseline water quality of community ground water sources along the line route.
Station 2: Unprotected spring	0431558E;0029095N	To establish baseline water quality of community surface water sources along the line route.
Station 3: Brick making area	0431734E;0028845N	To establish baseline water quality of community surface water sources along the line route
Mukono substation		
Station 1: Upstream of planned substation	0480795E;0042153N	To establish baseline water quality upstream of planned developments
Station 2: Downstream of planned substation	0480819E;0042248N	To establish baseline water quality downstream of planned developments
Station 3: At road culvert; upstream of Station 1	0480684E;0041786N	To establish baseline water quality at the crossing of the access road over the River Kasala; at this location is a mix of water from a neighbouring steel factory.

Figure 3-6: Water sampling locations in Buloba SS project area

Figure 3-7: Water sampling locations in Mukono SS project area

One sample was collected at each location in sterilized plastic bottles of 1000 ml volume. Collected samples were stored at 4°C and transported to NWSC laboratory in Bugolobi for physio-chemical analysis the same day. In-situ measurements of some physio-chemical characteristics were also undertaken with a multi-probe water quality meter (HANNA HI 9828) as shown in Figure 3-8 to Figure 3-11. The measured parameters included pH, Temperature (°C), Dissolved Oxygen, DO (mg/L), Electrical Conductivity, EC (µS/cm), Total Dissolved Solids, TDS (ppm), Oxidative Reduction Potential, ORP (mV), and Salinity.

Figure 3-8: Multiparameter water quality meter (HANNA HI 9828) used to measure up to 13 different water parameters

Figure 3-9: On-site analysis of a water sample in Buloba Project area

Figure 3-10: Collection of a water sample at spring along TL route in Buloba Project area

Figure 3-11: Collection of a water sample at River Kasala along TL route in Mukono Project area

3.2.5 Biological Environment

The terminology used in the species categorization includes Critically Endangered (most at risk of extinction), Endangered and Vulnerable (i.e. vulnerable to extinction). Data deficient describes species are those for which sufficient data is not available to allow it to be assessed (but are highly likely to be threatened). Species assessed at the Ugandan level are indicated as regionally assessed. Other categories include, the near threatened (to be kept under review as a change in circumstance could lead their status to change rapidly), Least Concern for species widespread and whose numbers are not

declining significantly, and not applicable where the species is considered never to have occurred in Uganda (misidentification, change of nomenclature for the species, or a vagrant).

3.2.5.1 Vegetation

The vegetation of an area is the total plant cover of that area or 'an assemblage of plants growing together in a particular location'. The flora of an area is the sum of the plant species in an area. "Flora" refers to the species composition of the vegetation.

The vegetation and flora field surveys were preceded by a review of literature. From literature, the distribution of vegetation types (Langdale-Brown *et al*., 1964), plant species within the Lake Victoria Basin (FTEA volumes 1952 to 2012), and their conservation status (IUCN 2016, Kalema 2008, Kalema & Beentje 2012) were established. It was essential to do this beforehand in order to identify the unique, threatened, rare and other cases of conservation concern species and habitats known or anticipated to occur in the areas of the proposed transmission line and sub-station.

Objectives

The objectives of the flora survey were to:

a) Identify and characterize the habitat types within the project areas;
b) Assess the richness and diversity of the vegetation traversed by the respective power line routes;
c) Assess the presence of invasive species and get them mapped;
d) Identify ecologically sensitive sites along the respective power line routes;
e) Identify impact of the proposed transmission lines and propose mitigation measures; and
f) Identify any data gaps with a view of filling them for completion of the environmental baseline study.

Data collection

The survey of vegetation and flora along the proposed transmission line and sub-station was carried out in April 2016 in Buloba Project area and in May 2016 in the Mukono Project area, just as the season's rains were beginning. A preliminary examination of the whole length of the proposed inter-connecting transmission lines and the sub-stations, from one end to the other, was made using *Google Earth*. This was meant to identify the range of land use and habitat variation and diversity of vegetation types within the project area. The maps of the proposed transmission line route and the sub-station prepared by the developer were examined alongside the *Google Earth* satellite images. The two map sets, i.e. *Google Earth* satellite imagery and developer's maps were examined to select suitable study sites in the wake of possible land use changes over time. The sample sites were identified considering their naturalness, ecological sensitivity and habitat variability with a view of capturing as wide a range of the vegetation types along the line as possible. The selection included sites expected to be having ecologically sensitive habitats such as wetlands. All these sample sites were geo-referenced. The sample points were located on the ground using Global Positioning System (GPS). The studied areas were characterized by describing the vegetation type basing on the floristic and landscape features observed in the different sites.

At each site, the zero point was taken as a central point and an area the radius of 30 m surveyed. All species of plants encountered and their growth forms were identified and recorded. The plants that could not easily be identified in the field were collected as vouchers for subsequent determination and deposition in the Makerere University Herbarium (MHU). The Angiosperm Phylogeny Group (APGIII)

(2009) system of classification was followed. Geographical coordinates and altitude were recorded at every point of sampling. The percentage cover of each species at the site was visually estimated. Estimation of percentage cover was done by making a vertical projection of the approximate outline of the individual plant's crown, or total foliage, on the ground. The percentage cover was then worked out by summing the total projected area over all the individuals belonging to a given species within the 30 m radius area. Conservation status of species was derived from IUCN (2016) and Kalema & Beentje (2012).

Buloba Study area

The proposed new transmission line and sub-station covering a stretch of nearly 2 km and a corridor of 75 m was surveyed for vegetation and flora. Figure 3-12 to Figure 3-16 show the different sections of the project area that were surveyed. The surveyed belt will be subjected to impact on vegetation, flora and habitats that will be crossed by the line. Key habitat components that may be compromised or lost have been identified and proposed possible mitigation measures to minimize the impact as well.

Figure 3-12: Buloba - East end of the transmission line close to the Kampala-Masaka highway

Figure 3-13: Buloba - *Pycreus* wetland grading into drier ground closer to the sub-station site

Figure 3-14: Buloba - Survey locations at the Sub-station site

Figure 3-15: Buloba - Transmission line crossing degraded wetland areas closer to west end

Figure 3-16: Buloba - West end of the transmission line

Mukono Study area

The transmission line will traverse part of Nandagi Forest Reserve which has a total of 442 ha and is under management of the National Forestry Authority (NFA). The proposed new transmission line and sub-station covering a stretch of nearly 5 km and a corridor of 75 m was surveyed for vegetation and flora. The vegetation types traversed by the proposed transmission line in Mukono Project area include Piptadeniastrum-Albizia-Celtis Medium Altitude forest and Forest/ Savanna Mosaic. The sampling locations for vegetation surveys within the Project area are indicated in Figure 3-17 to Figure 3-22.

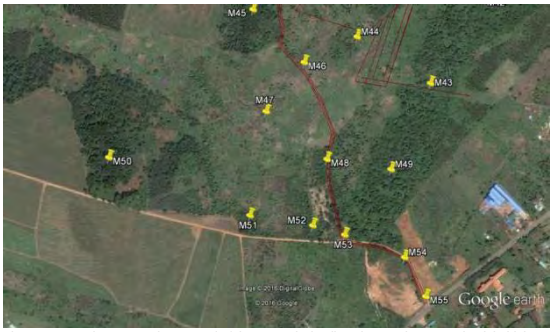


Figure 3-17: Mukono - South East end of the transmission line close to the Kampala-Jinja highway

Figure 3-18: Mukono - South East end of the transmission line in the substation area

Figure 3-19: Mukono - Transmission line traversing Nandagi Forest Reserve

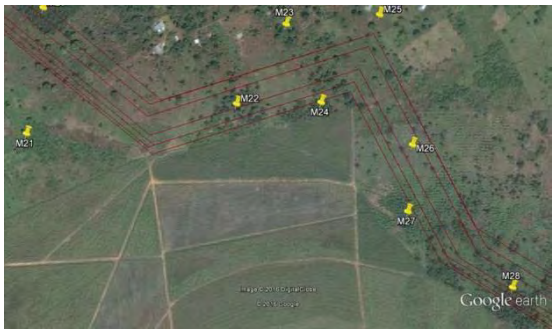


Figure 3-20: Mukono - Transmission line crossing cultivated areas closer to North West end

Figure 3-21: Mukono - Transmission line closer to West end

Figure 3-22: Mukono - West end of the transmission line

3.2.5.2 Invertebrates (Lepidoptera and Odonata)

The concept of using certain animal groups as bio-indicators for assessing environmental response to human-induced disturbance is established for a variety of taxa including plants (Lwanga, 1996), mammals (Dickson, 1996), birds (Fleishman 2002) and invertebrates (De vries, 1997). Invertebrates have numerical dominance with groups such as Lepidopterans and Odonates that are quite sensitive even to a very slight perturbation (Begon *et al*., 2006). Lepidopterans and Odonates are probably the best-known invertebrate taxa with an estimated 56,793 and 5680 species respectively worldwide (Foottit & Adler, 2009). They therefore have a prominent place in conservation programmes and biodiversity assessments (Midgley, 2002).

Objectives

i) Assess the diversity and conservation status of invertebrates in the project area using butterflies, dragonflies and damsel flies as focal groups
ii) Assess the current level of human disturbances that affect the focal organisms
iii) Draw conclusions and recommendations with regard to impacts likely to emanate from the installation activities of the electricity transmission systems.

Data collection

Butterflies, dragon flies and damsel flies were sampled by walking transect of 2 km through the project area at a slow pace of (~1km/h) for 6 hours. This timed transect walk is vital for assessing species richness of butterflies and dragonflies (De Vries, 1999). Each Butterfly, Dragon fly and Damsel fly seen within a virtual 5m observation cube projected ahead of the observer was counted and representative species collected (Pellet, 2007). Further attention was given to anthropogenic disturbances to the habitats (e.g. marshes, open waters and bush lands) vital for the survival of many individuals in these taxonomic groups. Throughout the survey period efforts were made to count and note all species seen without duplication of specimens. Individuals were either identified by sight from the field or captured and packed for closer examination in the laboratory at Makerere University Museum.

Ecotype characterisation

Ecotypes were used for butterflies. The criterion used to distribute butterflies into ecotypes was obtained from Davenport *et al.* (1996) and Kronstad (2009). In this criterion species were assigned letters ("F"), ("f"), ("O"), ("W"), ("M"), ("S") and ("U") according to whether they are forest dependant, forest edge, open habitat, wide spread, migratory, swamp specialist and butterflies of unknown habitat preference respectively. The percentage richness of butterfly ecotype is also presented. Dragonflies and Damsel flies were also assigned to their most preferred habitats according to (Foottit & Adler, 2009).

Study areas

Figure 3-23 shows the survey locations in the Buloba Project area. The locations spread to cover the all the footprint of the planned Buloba component and the neighbouring areas.

Figure 3-23: Buloba Invertebrates Survey locations

Mukono

The study area outside Nandagi Forest reserve is located in Nama 2 village (Figure 3-24) and those inside the forest reserve are located in Nandagi village (Figure 3-25). Majority of the points in Nama 2 village were within fields of cultivation and fallow lands.

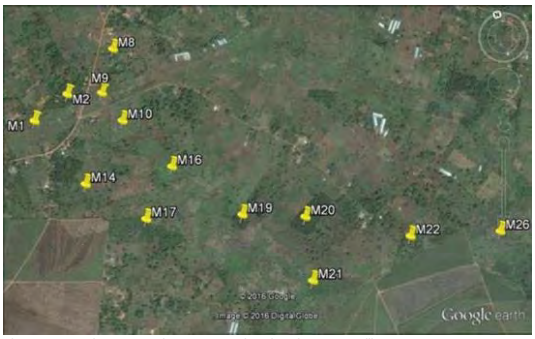


Figure 3-24: Mukono Invertebrates Survey locations in Nama 2 village.

Nandagi forest reserve is composed mainly of plantations from trees of *Terminalia* sp., *Eucalyptus* sp. and *Pinus* sp. The reserve is bordered by a long wetland stretch from one end of lower elevation, small scale agriculture fields from the other and sugar cane plantation from the end of higher elevation.

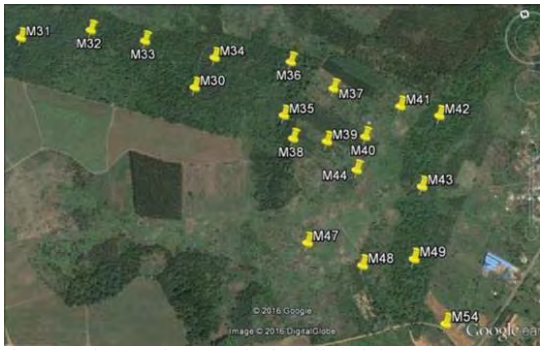


Figure 3-25: Mukono Invertebrates Survey locations inside Nandagi Forest reserve.

3.2.5.3 Herpetiles

Background

Reptiles are often grouped together with amphibians and termed as "Herpetiles". 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. Herpetiles 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 herpetilian 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).

Objectives

The objectives of the study were to;

i) Carry out detailed baseline survey on amphibians and reptiles (herpetiles) within and around the project area.

ii) Produce a species list for herpetiles giving their conservation status.

iii) Identify the likely impacts arising from the implementation of the proposed power line and substation.

iv) Recommend mitigation measures to the negative impacts the above activities may cause.

Methods

The common methods available for surveying amphibians are reviewed in Heyer et al. (1994). Field data was obtained by conducting a survey of amphibians and reptiles in and around the project area. The methods used were; opportunistic surveys, Visual Encounter Surveys and audio/acoustic surveys.

i. Opportunistic Observations

Opportunistic observations/searches were used to maximize the number of species encountered anywhere and at any time in the study area. This method involved recording any amphibian or reptilian species encountered anywhere and at any time in the project area. This method was useful in adding on species list for both amphibians and reptiles.

ii. Visual Encounter Surveys (VES)

Visual encounter survey method is commonly used to determine the species richness of an area Heyer *et al*. (1994), to compile a species list and to estimate relative abundances of species within an assemblage. This involved walking through the project area systematically searching and recording species and numbers of amphibians and reptiles. It involved turning logs or stones, inspecting retreats, watching out for surface-active species listening and or recording any amphibians calling.

iii. Audio/Acoustic Surveys

This is survey based on listening to sound produced by the amphibians. Males of many anuran species vocalize. Sexually mature male frogs and toads call to attract mates and establish territories. Consequently, vocal species can be identified by their distinctive unique calls, and an approximation of their relative abundance can be estimated by the number of calls heard. Several stops were made in the project sites, to listen, identify and record any frogs or toads heard calling.

iv. Local Consultations

Local people are a valuable source of information since they are constantly in touch with their environment and encounter species as they interact with the environment.

v. Data processing

Taxonomy used follows that of Schiotz, A. (1972) and Drewes *et al*. (2006). A species list was compiled per sampling point to identify the richest site. Species of conservation importance were cross-checked following International Union for Conservation of Nature (IUCN) red list data base. Data presentation is in tables and graphs.

The reptiles and amphibians were identified using standard reference books available namely; Schiotz (1972) and Drewes *et al*. (2006). The IUCN red list was used in the species categorization of the amphibians and reptiles.

Study area

Buloba

The study was conducted in Mpigi district Kiringente sub county, where a total of 21 locations divided into 6 survey areas (Figure 3-18 and Figure 3-19) were surveyed for presence and activity of amphibians and reptiles. The area is a mosaic of fallow lands, marshes, gardens and settlements.

Figure 3-26: Buloba Herpetiles Study areas near Kampala-Masaka road

Figure 3-27: Buloba Herpetiles Study areas farther westwards showing survey locations

Mukono

The project will be implemented in Nama village, Mukono district. The main power station will be in Nandagi forest reserve (Figure *3-28*), a remnant patch of Mabira forest reserve. Some of the project sites are in communities, cultivated areas and plantation forests (Figure 3-29).

Figure 3-28: Mukono Herpetiles Survey points within the Nandagi forest reserve

Figure 3-29: Mukono Herpitiles Survey points within cultivated and settlement areas

3.2.5.4 Birds

Objectives

The surveys for this report were conducted to:

i) Assess what birds occurred in the area.
ii) Assess occurrence and extent of critical habitats for the species.
iii) Identify the existence of species of conservation concern (based on the Global IUCN categorization and the regional threat assessments).

iv) Assess potential impacts on the two groups by the proposed development.

Methods

Birds were recorded using Timed Species Counts (TSCs), described in the literature (Freeman *et al.*, 2003). Essentially, all birds seen or heard are recorded in the order in which they are detected, and scored out of six (for the first ten minutes), with the score decreasing step by step to 1 for the final ten minutes of a one-hour count. In this study, time was limited, and therefore counts were few, and so the results are simply given as averages. That said though, the foot print of the project area is also small meaning that more survey time would probably not be a reasonable investment. The locations for the birds' survey at Mukono are indicated in Figure 3-30.

The birds recorded have been categorized in various ways, using some of the criteria indicated in Table 3-4 and widely used in evaluation of the avifauna in Uganda. Although all categories are shown in the table, not all of them were relevant for the species recorded. Of some importance, are the forest generalists, 'F' which cannot survive without forest. The 'f' species are those that only occasionally visit forest, and typically only forest edge. Together with FF species, these three categories describe what are described as 'tree species'.

Table 3-4: Bird descriptors

Threat categories	G-EN	globally endangered
	G-VU	globally vulnerable
	R-VU	regionally vulnerable
	R-NT	regionally near threatened
	R-RR	species of regional responsibility
Habitat	E	papyrus endemic
	e	Papyrus near-endemic
	W	waterbird
	w	bird often found ear water
	FF	forest specialist
	F	forest generalist
	f	Forest visitors
	G	species characteristic of grassland
Migrants	P	Palearctic migrants
	A	Afrotropical migrants, migrating within Africa

Figure 3-30: Mukono bird survey locations

3.2.5.5 Mammals

Objectives

The surveys for this report were conducted to:

i) Assess what mammals occurred in the area.
ii) Assess occurrence and extent of critical habitats for the species.
iii) Identify the existence of species of conservation concern (based on the Global IUCN categorization and the regional threat assessments).
iv) Assess potential impacts on the two groups by the proposed development.

Methods

The general project area is very much human impacted and most of the natural vegetation converted either for agriculture, brick making, clay mining and general vegetation cover simplification. To record mammal presence, the survey team looked for signs (prints and faecal material) of mammals' occurrence, actual observation and adjudging of the suitability of an area for species of small mammals.

3.2.6 Socio-Economic Assessment

a) Document Review

A review of documents such as the Uganda Bureau of Statistics (UBOS) Abstract (2014), and National Population and Housing Census (2014) were used to obtain statistical information on the socio-economic characteristics of Kampala district as a whole, and Central division in particular.

b) Consultation and Disclosure

Stakeholder consultation and disclosure are essential for acceptance and ownership of the proposed project. Relevant and adequate project information was provided to stakeholders to enable them understand the project risks, impacts and opportunities. Meetings were held between November 2015 and April 2016.

- Interviews with local administration (district administration and local LC leaders).

- Consultation with local communities along line route and substation location.
- Focus group discussions and formal meetings.

A simple stakeholder analysis was undertaken to determine the likely relationship between stakeholders and the Project as shown in Table 3-5. The results of the analysis provided an indication of the level and methods of consultation and engagement appropriate to each stakeholder group during the life of the Project.

Table 3-5: Results of Stakeholder Analysis

Stakeholder Group	Impact / Interest Rating	Influence Rating
Key Government Agencies	HIGH/MEDIUM The environmental and social (E&S) aspects of the Project are relevant to the fields of interest of several government agencies from the perspectives of monitoring and oversight.	HIGH Some key agencies could influence the implementation of the Project.
Local Interested and Affected Entities and/ or their representatives	HIGH/MEDIUM Maybe affected during the construction and operational phases of the Project	MEDIUM/ HIGH The stakeholder can influence the scope and timing of the ESIA and/or the project's design process.
Non-Governmental Entities	LOW A number of useful entities that have dealt with similar issues as experienced in this Project; but the stakeholder will experience very few effects as a result of the project.	LOW These stakeholders have very little control over the project.

As a result of the stakeholder analysis, stakeholders were identified and consulted on the respective project components within their locations and/or areas of specialisation. The consultations were undertaken between November 2015 and May 2016. The following entities were considered key stakeholders to be consulted for the reasons indicated in Table 3-6.

Table 3-6: Stakeholders Engaged and their Interest in the Project

Stakeholder	Interest in Project	Dates of meeting
Mukono District	Location of New Mukono substation and 132 kV TL route (Leaders and community members)	19/11/2015; 30/04.2016;
National Forestry Authority (NFA)	Project impact on forest reserves (Nandagi, Kifu, and Namyoya)	16/03/2016; 5/04/2016
Uganda Wildlife Authority (UWA)	Impacts on Jinja Wildlife Sanctuary	20/11/2015
Buganda Land Board (BLB)	Check if any of the Project areas are under the BLB	24/11/2015
Department of Environmental Affairs (DEA)	Project impact on general environment, especially wetlands	01/12/2015
Ministry of Gender, Labour and Social Development (MGLSD)	Occupational Health and Safety concerns of workers during project implementation	25/05/2016

Stakeholder	Interest in Project	Dates of meeting
Kawempe Division, Kampala	Location of Kampala North substation (Leaders and community members)	03/12/2015
Mpigi District	Affected communities of Buloba substation works (Leaders and community members)	12/11/2015; 27/01/2016; 30/03/2016; 04/05/2016; 10/05/2016
Lubaga Division, Kampala	Affected communities of Kawaala (Namungoona) substation works (Leaders and community members)	25/11/2015; 29/03/2016

3.3 IMPACT ASSESSMENT

3.3.1 Impact Description

Describing a potential impact involved an appraisal of its characteristics, together with the attributes of the receiving environment. Relevant impact characteristics included whether the impact is:

- Adverse or beneficial;
- Direct or indirect;
- Short, medium, or long-term in duration; and permanent or temporary;
- Affecting a local, regional or global scale; including trans-boundary; and
- Cumulative (such an impact results from the aggregated effect of more than one project occurring at the same time, or the aggregated effect of sequential projects. A cumulative impact is "the impact on the environment which results from the incremental impact of the action when added to other past, present and reasonably foreseeable future actions").

Each of these characteristics is addressed for each impact. Consideration of the above gives a sense of the relative intensity of the impact. The sensitivity of the receiving environment was determined by specialists based on the baseline data collected during the study.

3.3.2 Impact Evaluation

Each impact is evaluated using the criteria listed in Table 3-7. To provide a relative illustration of impact severity, it is useful to assign numerical or relative descriptors to the impact intensity and receptor sensitivity for each potential impact. Each is assigned a numerical descriptor of 1, 2, 3, or 4, equivalent to very low, low, medium or high. The severity of impact was then indicated by the product of the two numerical descriptors, with severity being described as negligible, minor, moderate or major, as illustrated in Table 3-9. This is a qualitative method designed to provide a broad ranking of the different impacts of a project. Illustrations of the types of impact that were assigned the different grades of severity are given in Table 3-8.

Table 3-7: Classification of impact evaluation

Classification	Description
Extent	Evaluation of the area of occurrence/influence by the impact on the subject environment; whether the impact will occur on site, in a limited area (within 2 km radius of the site); locally (within 5 km radius of the site); regionally (district wide, nationally or internationally).

Classification	Description
Persistence/Duration	Evaluation of the duration of impact on the subject environment, whether the impact was temporary (<1 year); short term (1 – 5 years); medium term (5 – 10 years); long term (>10); or permanent.
Social Context / Sensitivity or Potential for Stakeholder Conflict	Assessment of the impacts for sensitive receptors in terms of ecological, social sensitivity and such things as rare and endangered species, unusual and vulnerable environments, architecture, social or cultural setting, major potential for stakeholder conflicts. The sensitivity classification is shown below: ***High sensitivity:*** Entire community displacement, destruction of world heritage and important cultural sites, large scale stakeholder conflict, etc. ***Medium sensitivity:*** Displacement of some households, moderate level of stakeholder concern ***Low sensitivity:*** No displacements, no potential for stakeholder conflict.
Regulatory and Legal Compliance	Evaluation of the impact against Local and International legislative requirements. ***High:*** Prohibition terms for specific activities/emissions. Major breach of regulatory requirements resulting in potential prosecution or significant project approval delays. ***Medium:*** Potential breach of specific regulatory consent limits resulting in non-compliance. ***Low:*** No breach of specific regulatory consent limits anticipated.
Overall Impact rating (Severity)	Using a combination of the above criteria, the overall severity of the impact was assigned a rating Severe, Substantial, Moderate, Minor and negligible. Refer to Table 3-5 for broad categories of impact for each rating. **Note:** These are just guidelines that will constitute professional judgement required in each individual case.

3.3.3 Intensity of Impact

The scale of intensity is defined on the basis of ecological-toxicological studies and expert judgment and is presented in Table 3-8.

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Table 3-8: Intensity scale gradation for environmental impacts

Scale of Impact Intensity	Criterion	Score
Very low	Environmental changes are within the existing limits of natural variations	1
Low	Environmental changes exceed the existing limits of natural variations. Natural environment is completely self-recoverable.	2

Medium	Environmental changes exceed the existing limits of natural variations and results in damage to the separate environmental components. Natural environment remains self-recoverable.	3
High	Environmental changes result in significant disturbance to particular environmental components and ecosystems. Certain environmental components lose self-recovering ability.	4

3.3.4 Impact Significance

Impact significance is determined from an impact significance matrix (Table 3-9) which compares intensity of the impact against the sensitivity of the receiving environment. Impact significance criteria are as follows:

- ***Major:*** These denote that the impact is unacceptable and further mitigation measures must be implemented to reduce the significance. Shaded red in the Table 3-9.
- ***Moderate:*** Impacts in this region are considered tolerable but efforts must be made to reduce the impact to levels that are as low as reasonably practical. Shaded orange in the impact significance matrix.
- ***Minor:*** Impacts in this region are considered acceptable. Shaded blue.
- ***Negligible:*** Impacts in this region are almost not felt. Shaded green.

Table 3-9: Matrix for determination of impact significance

		Sensitivity of Receptor			
		Very low 1	Low 2	Medium 3	High 4
Intensity of Impact	Very low 1	1 Negligible	2 Minor	3 Minor	4 Minor
	Low 2	2 Minor	4 Minor	6 Moderate	8 Moderate
	Medium 3	3 Minor	6 Moderate	9 Moderate	12 Major
	High 4	4 Minor	8 Moderate	12 Major	16 Major

More details of impact significance are presented in Table 3-10.

3.3.5 Cumulative Impacts

Cumulative effects manifest when socio-environmental conditions are already or will be affected by past or reasonably probable future development or activities. The ESIA identified current, past and probable future similar activities that may compound socio-environmental conditions in the project area.

3.3.6 Mitigation and residual significance

Mitigation measures are designed in order to avoid, reduce, mitigate, or compensate for adverse environmental and social impacts and inform the Environmental and Social Management Plan (ESMP).

3.4 ENVIRONMENTAL AND SOCIAL MANAGEMENT AND MONITORING PLANS

An Environmental and Social Management and Monitoring Plan (ESMP) and an Environmental and Social Monitoring Plan (ESMoP) were developed to guide implementation of the proposed mitigation measures in an effective manner to ensure sustainability of the project development throughout its life. The ESMP summarizes the planned mitigation measures against the anticipated environmental impacts, the responsibility for its implementation and supervision, and estimated cost. The ESMoP describes the monitoring methodology, responsibility for its implementation and estimated cost.

Table 3-10: Illustration of significance values that would apply to various impacts

	Major impact	Moderate impact	Minor
Legislative compliance	Expected non-compliance with national regulatory standards or good industry practice (e.g. IFC Performance Standards)	Potential for non-compliance with national regulatory standards or good industry practice.	Expected compliance with national regulatory standards or good industry practice, or no regulations apply
Biophysical environment	▪ Impairment of forest ecosystem with no expectation of recovery within 20 years. ▪ Effect contrary to the objectives of management plans for internationally or nationally protected populations, habitats or sites with no expectation of recovery within 5 years. ▪ Environmental changes giving rise to issues of public or international concern. Impacts that harm human health, or damage a site of historic, cultural or archaeological value. ▪ Long-term (>10 years) and widespread changes to habitat or ecosystems features or functions that reduce its integrity, affect the ability to sustain valued components and may require extensive intervention. The habitat/ecosystem may not recover to its baseline state. ▪ Disturbance of a sufficient portion of the biogeographic population of a species to cause a decline in abundance, distribution or size of the genetic pool such that the population of the species, and other species dependent on it, will not recover naturally to former levels. ▪ Major loss or major alteration to an internationally designated site whereby key elements will be fundamentally changed. ▪ Incident that requires mobilization of	▪ Impairment of Forest ecosystem with expectation of recovery within 10 years. ▪ Effect contrary to the objectives of management plans for internationally or nationally protected populations, habitats or sites with expectation of recovery within 1-5 years. ▪ Disturbance of a sufficient portion of the biogeographic population of a species to cause a decline in abundance, distribution or size of the genetic pool such that the population of the species, and other species dependent on it, will not recover within several generations. ▪ Major loss or major alteration to a locally designated site whereby key elements will be fundamentally changed. ▪ Injury or death of an IUCN listed "Vulnerable" species. ▪ Incident that requires mobilization of national/company response equipment. ▪ Major change to the visual quality, setting and feeling associated with a rare or unique locally recognized landscape. ▪ Fundamental change to hydrology and hydrogeology resulting in temporal changes to the watershed.	▪ Impairment of Forest ecosystem with expectation of recovery within 5 years. ▪ Ecosystem change is within the range of natural variation, but may be detectable; or ecosystem change that is unlikely to be noticed; or change resulting in positive, desirable of beneficial effects on an ecosystem. ▪ Reduction in ecosystem or habitat integrity, but recovery to baseline state is expected within 2-5 years with minimal intervention. ▪ Disturbance of a bio-geographic population or individuals of a species resulting in a decline in abundance or distribution over one or two generations, but that does not change the integrity of the population of the species or populations of other dependent species. ▪ Incident that requires mobilization of onsite response equipment and crews. ▪ A noticeable but not fundamental change to hydrology or hydrogeology. ▪ The development will not affect the key characteristics that contribute to the distinctiveness and/or value of the landscape.

	Major impact	Moderate impact	Minor
	international response equipment and crews. ▪ Injury or death of an IUCN listed "Endangered" species. ▪ Major change to the visual quality, setting and feeling associated with a rare or unique (inter)nationally recognized landscape. ▪ Widespread and permanent change to hydrology and hydrogeology in an internationally or nationally designated site.		
Social environment	▪ Damage to social, cultural or economic activity considerably beyond programme lifetime. ▪ Long term or life threatening health effects that may increase mortality rates. ▪ Physical resettlement (as defined in IFC PS 5) of a community. ▪ Changes that differentially negatively affects the life chances (access to health care/medicines) of vulnerable groups (disabled, elderly, female-headed households and those living below officially poverty or subsistence levels). ▪ Damage to a site of international cultural importance or national site where damage is likely to provoke protest/unrest. ▪ Damage to a site of national cultural importance or local site where damage is likely to provoke protest/unrest. ▪ Unplanned in-migration flows sufficient to cause exceedance of the capacity of numerous components of physical or social infrastructure. ▪ Increases of cultural conflict likely not to be contained within existing social control norms.	▪ May adversely affect the economic and social wellbeing of residents for the duration of the programme. ▪ Raises issues of limited public concern. ▪ Physical resettlement (as defined in IFC PS 5) one or more household/businesses. ▪ Reduction in assets, or access to assets, such that economic displacement (as defined in IFC PS 5) affects five or more individuals, households or businesses. ▪ Job losses in small communities very limited alternative opportunities in the near – medium term (within one year of job losses). ▪ Changes likely to prejudice success of an existing policy or plan. ▪ Changes that differentially affects the livelihoods of vulnerable groups (disabled, elderly, female-headed households and those living below poverty or subsistence levels). ▪ Damage to a site of local or regional cultural importance. ▪ Medium to long-term (>1 year) financial loss to businesses where recovery may be difficult. ▪ Unplanned in-migration flows sufficient to	▪ Negative effect within existing fluctuation of the society or economy. ▪ Reduction in assets, or access to assets, such that economic displacement (as defined in IFC PS 5) affects 1-4 individuals, households or businesses. ▪ Job losses in a community able to adapt and provide alternative job opportunities in the near – medium term (within one year). ▪ Short-term (<1 year) financial loss to owners of businesses where recovery is likely. ▪ Unplanned in-migration not expected to cause infrastructure capacity exceedance. ▪ Decline in access to health care facilities and acquisition of treatment.

	Major impact	Moderate impact	Minor
		cause exceedance of the capacity of at least one component of infrastructure. ▪ Increases in incidences of cultural conflict, but expected to be contained within existing social control norms. ▪ Movement of development traffic through very sensitive areas (e.g. near schools, hospitals) or that may exceed carrying capacity of roads. ▪ Movement of development traffic through community areas or having the potential to add unsuitable loadings to the infrastructure. ▪ Increased public exposure to health threats that may increase morbidity rates.	

4 POLICIES, LEGISLATION AND INSTITUTIONAL STRUCTURE

4.1 INTRODUCTION

There are a number of national regulations and international standards that set the requirements for conducting the ESIA and RAP for the proposed Project. The main Ugandan laws applicable to the ESIA studies are:

i) **National Environmental Act (Cap 153):** The National Environmental Act established the National Environment Management Authority (NEMA), and entrusts it with responsibility to ensure compliance with the EIA process in planning and execution of infrastructure development projects.

ii) **Environmental Impact Assessment Regulations (1998):** This and associated EIA Guidelines guide the ESIA process in Uganda from scoping through detailed assessment to review and eventual decision-making by NEMA in consultation with relevant lead agencies.

In regard to resettlement (and the Resettlement Action Plan - RAP), Uganda does not currently have national RAP guidelines but the legislations applicable to land ownership are outlined below:

iii) ***Land Act Cap 227 (1998):*** This avers that land belongs to the people and due compensation must be made before private assets are affected by development projects/ infrastructure.

iv) ***Land Acquisition Act (1965):*** This is an old piece of legislation developed to make provision for compulsory acquisition of land for public purposes but it also requires in several sections (2-12) that compensation be made to property owners affected by the Project.

In absence of RAP guidelines, these studies are conducted basing on financiers' resettlement requirements such as JICA, World Bank, IFC, AFD and AfDB social safeguard policies which are commonly used for RAP studies of development projects in Uganda.

The ESIA study will include a detailed analysis of the electricity sector laws, regulations and institutions, and hence applicable permits required for the Project to be implemented. Some of the applicable laws are delved into in the following sections.

4.2 NATIONAL POLICY FRAMEWORK

4.2.1 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: The proposed project is listed as 10(b) – electricity transmission lines; 10(c) – electrical substations in the Third Schedule of the National Environment Act Cap 153 (that was developed based on this Policy) and must undertake mandatory ESIA in line with the Policy.

4.2.2 The Energy Policy, 2002

The goal of this policy is 'to meet the energy needs of Uganda's population for social and economic development in an environmentally sustainable manner'. The policy recognises Uganda's vast energy potential and the direct correlation between the country's energy supply and economic and social development through sectors such as industry, health, transport, education, water resources, agriculture, forestry, decentralisation and land use. The Policy also recognises that the development projects in the energy sector have significant impacts on the environment and, therefore, sets out to integrate the economic and social development with environmental protection and conservation for sustainable development.

Objective five (5) of the Policy aims at managing energy-related environmental impacts and it states that the Government will ensure that environmental considerations are given priority by energy suppliers and users to protect the environment and put in place a monitoring mechanism to evaluate compliance with established environmental protection guidelines. To meet the above objective, Government is required to:

- Promote the use of alternative sources of energy and technologies which are environmentally friendly;
- Sensitise energy suppliers and users about the environmental issues associated with energy;
- Work towards the establishment and acceptance of broad targets for the reduction of energy-related emissions that are harmful to the environment and energy users;
- Note issues of extension of power to and across the countryside; and
- Promote efficient utilisation of energy resources.

Relevance to this Project: The proposed development of this Project is in line with the objectives of the Policy to meet the increasing energy needs of the GKMA.

4.2.3 Forestry Policy, 2001

The forestry policy puts an emphasis on the ecological and socio-economic importance of protecting the country's forest resources and promotion of forest regeneration strategies. Implementation of the Policy is a responsibility of the National Forestry Authority (NFA), which also provides guidelines for management of forest reserves, community forests and private forests.

The Forest Policy entails provisions for safeguard and conservation of forests so as to ensure sufficient supplies of forest products, protect water resources, soils, fauna and flora. The policy also mandates government with responsibility to control illegal practices, monitor best practice, measure environmental and social impacts.

Relevance: This Project is aimed at the improvement of the efficiency of the electricity transmission system in the GKMA, which will in turn improve grid reliability and hence meet the increasing energy needs of the GKMA population. This is in line with the objectives of this Policy since forest depletion has been linked to increasing energy demand (Uganda is heavily dependent on biomass as an energy

source). The success of this Project will serve to reduce on the dependency of biomass as a fuel in the GKMA.

4.2.4 National Water Policy, 1999

The objective 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 the safe storage, treatment and disposal of waste, which could pollute water and impact public health.

Relevance: This policy is relevant to the Project as it requires avoidance of contamination of watercourses traversed by the transmission line during Project implementation during the construction and O&M phases.

4.2.5 Wetlands Policy, 1995

The national policy on conservation and management of wetlands aims at curtailing loss of these resources and ensuring that their benefits are equitably distributed to all people of Uganda. The Wetlands Policy calls for:

- Sustainable use to ensure that benefits of wetlands are maintained for the foreseeable future;
- Environmentally sound management of wetlands to ensure that other aspects of the environment are not adversely affected;
- Equitable distribution of wetland benefits;
- Application of environmental impact assessment procedures on all activities to be carried out in a wetland to ensure that wetland development is well planned and managed.

In order to operationalize the policy and to provide a legal framework for its implementation, wetland related issues have been adequately incorporated into the National Environmental Act, Cap 153.

Relevance: This policy is relevant to the Project as the proposed transmission 132 kV TL from Nalubaale ss – Kampala North ss traverses wetlands in some areas. The 132 kV and 220 kV for the new proposed Buloba substation also traverse a swampy area.

4.2.6 Fisheries Policy, 2004

Policy Area No. 8 (environment and fisheries) seeks to ensure that adverse environmental impacts on fisheries are minimized including pollution of watercourses by industrial and infrastructural development.

Relevance: This policy is relevant to the Project as the proposed 132 kV TL from Nalubaale ss – Kampala North ss and the 132 kV and 220 kV for the new proposed Buloba ss traverse wetlands in some areas, which could be habitats for small fisheries resources.

4.2.7 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.

Relevance to this Project: Some components of this Project will require land acquisition to allow for implementation, while others will not. The upgrade of the 132 kV TL from the new Mukono ss to Kampala North ss, upgrade of Mutundwe and Bujagali substations will not require land take since the TL corridor and substations are in existence.

This Project will require land acquisition for upgrade of the Kawaala ss and the construction of the new Buloba and Mukono substations. It is estimated that less than 200 land owners will be affected by the Project implementation, and as such, an Abbreviated Resettlement Action Plan (ARAP) will be conducted in line with the objectives of this Policy.

4.2.8 National Gender Policy, 1997

The overall goal of this policy is to mainstream gender concerns 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. Thus, in the context of the power sector, this policy aims to address imbalances which arise from existing gender inequalities and promotes participation of both women and men in all stages of the energy project cycle, equal access to, and control over significant economic resources and benefits.

Relevance to this Project: This Project will require labour during construction, and O&M 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.

4.2.9 Uganda's Vision 2040

In 'Vision 2040' Uganda sets goals to achieve ranging from political, economic, social, energy and environment, by the year 2040. With respect to environmental goals, Ugandans aspired to have sustainable social-economic development that ensures environmental quality and preservation of the ecosystem. Vision 2040 recognises energy as a key driver of the economic development and notes that for Uganda to shift from a peasantry to an industrialized and urban society, it must be propelled by electricity as a form of modern energy. It estimates that Uganda will require 41,738 MW of electricity by the year 2040, thus increasing its electricity consumption per capita to 3,668 kWh. Furthermore access to the national grid must significantly increase to 80%. A significant population in informal settlements of Kampala City still lack connection to electric power. Yet still, those who have access to power in the City experience outages and unstable supply.

Relevance to this Project: The implementation of the proposed Project is in line with aspirations of Vision 2040 to improve access and reliability of electricity supply to the Ugandan population. This Project will serve the GKMA in particular.

4.2.10 Electronic Waste (e-Waste) Management Policy for Uganda, 2012

Poorly disposed electronic or electrical waste (e-Waste) can lead to adverse human health and environmental impacts due to toxic substances such as mercury, nickel, lithium, polychlorinated

biphenyls (PCB), Polyvinyl Chloride (PVC), cobalt and lead. The Electronic Waste (e-Waste) Management Policy was developed to mitigate this impact and safeguard the nation's human health and environment.

The guiding principles of the Policy are:

i) Ensuring human life and environmental protection: The government shall put in place mechanisms that will increase the safety of citizens and the environment against the threat of hazardous materials released into the environment through improper e-waste disposal.
ii) Taking into consideration of the impact of globalization on manufacture, usage and disposal of used electrical and electronic equipment.
iii) Ensuring consumer awareness in usage and disposal of e-waste.

Relevance to this Project: Expansion and upgrade of the substation will generate electrical waste that requires reuse/ proper disposal to avoid negative health and environmental impacts. The construction and O&M phases of the Project implementation, especially the substation components, will generate e-waste. This e-waste will be handled in line with the guiding principles of this Policy, as well as industry accepted best practice.

4.2.11 Occupational Health and Safety (OHS) Policy

This policy seeks to:

- Provide and maintain a healthy working environment
- Institutionalize OHS in the power-sector policies, programs and plans
- 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 sectorial regulations and policies. The Statement also takes into recognition the Energy Policy and 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 power line and substations construction crews and subsequently, maintenance personnel. This also will 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.

4.2.12 HIV/AIDS Policy, 1992

In Uganda 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 responsible for labour) 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 managed 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 infection 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 construction, there may be an influx of people into the project area possibly resulting into sexual fraternisation and a risk of HIV/AIDS spread. These requirements are expected to be fulfilled by the construction contractors or their subcontractors.

Relevance to this Project: This policy is relevant to the project if implementation of proposed transmission line and the substations results in in-migration into project communities by people seeking construction jobs and possibly sexual fraternisation associated with HIV/AIDS risk.

4.3 NATIONAL LEGISLATIVE FRAMEWORK

4.3.1 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.

On land tenure regimes and transfer of land, the Constitution prescribes tenure regimes in accordance with rights and interests held in land. Article 237 of the Constitution, 1995, vests land in the citizens of Uganda and identifies four land tenure systems, namely: customary, freehold, mailo and leasehold. Understanding these systems (detailed in section 4 of the Land Act, 1998) is vital for compensation of households to be affected by the project. These tenure systems are outlined below:

Customary tenure: In this tenure, land is owned in perpetuity and tenure is governed by rules generally accepted as binding and authoritative by the class of persons to which it applies (that is, "customary regime is not governed by written law"). Customary occupants are occupant of former public land, and occupy the land by virtue of their customary rights; they have proprietary interest in the land and are entitled to certificates of customary ownership. Certificates for customary ownership are issued by the District Land Board, through application to the Parish Land Committee.

Freehold tenure: This tenure derives its legality from the Constitution. It involves the holding of land in perpetuity or for a period less than fixed by a condition and enables the holder to exercise, subject to the law, full powers of ownership.

Leasehold tenure: Lease tenure is created either by contract or by operation of the law. It is a form of tenure under which the landlord or lessor grants the tenant or lessee exclusive possession of the land, usually for a defined period and in return for a rental fee. The tenant has security of tenure and a proprietary interest in the land.

The Constitution and the Land Act also protect "rights of spouses and children" with regard to land transactions. The head of household must acquire the consent of spouse and children prior to any sale of land on which the family ordinarily resides.

Mailo land tenure: The Mailo land tenure system is a feudal ownership introduced in Buganda by the British in 1900 under the Buganda Agreement. "*Mailo*" is a Luganda word for "mile" as the original grants under the agreement were measured in square miles. Prior to the 1975 Land Reform Decree, Mailo land was owned in perpetuity by individuals and by the Kabaka (hereditary King). Persons, who lived on this land, as well as new entrants, were legally protected to live on and use the land, but they were obliged to pay "*busuulu*" (a form of tax).

The Mailo land tenure system:

- Derives its legality from the Constitution and its incidents from the written law;
- Involves the holding of land in perpetuity;
- Permits separation of ownership of land from ownership of developments thereon made by a lawful or bona fide occupant;
- Enables the holder to exercise all powers of ownership, subject to the rights of those persons occupying the land at the time of the creation of the *mailo* title and their successors.

Relevance to this Project: The construction and operation of the proposed project will have an impact on some aspects of the environment and these will be dealt with in a manner that upholds the Constitutional provision for a clean and healthy environment. Any land take for purposes of this proposed project development will be in line with the constitutional provision for equitable compensation to affected land owners.

4.3.2 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 proposed project is listed in the Third Schedule as 10(b) – electricity transmission lines; 10(c) – electrical substations as a project that must conduct an EIA before implementation. This ESIA study is in fulfilment of this requirement.

4.3.3 The Electricity Act, Cap 145

The Electricity Act, 1999 aims at bringing about an enabling environment for the transformation of the electricity sector. The main objective of the Act is to regulate the generation, transmission, distribution, sale, export, import and distribution of electricity in Uganda. The Act established the Electricity Regulation Authority, which has the mandate to regulate generation, transmission and distribution of electricity in the country, and as such, provides requisite licences.

Section 68 of the Act provides guidelines placement of electricity supply lines on land, stating that a developer shall as much as possible minimise damage to the environment and shall ensure prompt payment of fair and adequate compensation to all interested persons for any damage or loss sustained by construction of electricity supply infrastructure. Section 69 of the Act requires a developer where a licensee authorised by the Authority intends to enter land under the management or control of the Uganda Land Commission or a District Land Board, the licensee shall give thirty days' notice to the Uganda Land Commission or a District Land Board, stating the nature and extent of the acts intended to be undertaken.

Relevance to this Project: The client will obtain any required licences in line with the provisions of this Act. Any land take for the Project will also be done in line with the provisions of this Act.

4.3.4 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 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: Some components of this Project will require land acquisition to allow for implementation, while others will not. The upgrade of the 132 kV TL from Nalubaale ss to Kampala North ss, upgrade of Mutundwe and Bujagali substations will not require land take since the TL corridor and substations are in existence.

This Project will require land acquisition for upgrade of the Kawaala ss and the construction of the new Buloba and Mukono substations. It is estimated that less than 200 land owners will be affected by the Project implementation, and as such, an Abbreviated Resettlement Action Plan (ARAP) will be conducted in line with the provisions of this Act.

4.3.5 National Forestry and Tree Planting Act, 2003

The National Forestry and Tree Planting Act is an Act to provide for the conservation, sustainable management and development of forests for the benefit of the people of Uganda; to provide for the declaration of forest reserves for purposes of protection and production of forests and forest produce; to provide for the sustainable use of forest resources and the enhancement of the productive capacity of forests; to provide for the promotion of tree planting; to consolidate the law relating to the forest sector and trade in forest produce; to establish a National Forestry Authority; to repeal the Forests Act, Cap. 147 and the Timber (Export) Act Cap. 151.

Some of the purposes of this Act are to:

a) Create an integrated forest sector that will facilitate the achievement of sustainable increases in economic, social and environmental benefits from forests and trees by all the people of Uganda;
b) Guide and cause the people of Uganda to plant trees;
c) Ensure that forests and trees are conserved and managed in a manner that meets the needs of the present generation without compromising the rights of future generations by safeguarding forest biological diversity and the environmental benefits that accrue from forests and trees;
d) Encourage public participation in the management and conservation of forests and trees;
e) Ensure that environmental benefits, costs and values are reflected in strategies and activities relating to forestry.

Section 38 of the Act requires that 'A person intending to undertake a project or activity, which may, or is likely to have a significant impact on a forest, shall undertake an environmental impact assessment'.

Relevance to this Project: The Mukono component of this Project requires approximately 7 ha of forest to be cleared to allow for the transmission line corridor. This ESIA included the discussion of this component on Nandagi forest. NFA was also closely consulted during the consultation process of this Project.

4.3.6 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, and operation and maintenance phases. Any injury or illness resulting from Project related activities will be subject to conditions of the Workers' Compensation Act.

4.3.7 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 years may be employed; including for light work under the supervision of an adult aged over eighteen years and the work shall not interfere with the child's education.

Relevance to this Project: This Project will require workers during construction, and operation and maintenance phases. The working conditions and workers' welfare, including child labour will be governed by the provisions of this Act.

4.3.1 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.

In particular, Section 8 of 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. 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 for all staff on the labour laws including the provisions on child labour before starting works. The contractor will consult and involve the respective District labour officers to ensure that there is compliance on no child labour during construction of the substations and associated transmission lines. 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.*

4.3.2 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. The respective district local government officials will be responsible for monitoring the conduct of contractors for the duration of the Project construction phase .It will be the responsibility of such officials to ensure that the contractors procured do not have any dealings in illegal activities including prostitution. The contractor will be required to have a grievance management committee to address any such issues reported and/or identified. Guidance notes will need to be prepared to analyse the different cases and proposed mitigation action.

4.3.3 Occupational 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). Every workplace must be kept in a clean state, free from effluent arising from any drains and sanitary facilities (Section 46). 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 client and 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.

4.3.4 Historical Monument Act, 1967

The Act provides for the preservation and protection of historical monuments and objects of archaeological, paleontological, ethnographical, traditional or historical interest. The Act makes provision for penalties for any person who destroys, alters, defaces, removes, repairs, injures, or imperils any preserved or protected or discovered object.

Relevance to this Project: The Project will be implemented with adherence to the provisions of this Act. One of the Plans developed as part of this ESIA study will be a 'Chance Finds Procedure'. This will serve to guide the developers and contractors on the procedure to follow if any objects of historical concern are identified during Project implementation.

4.3.5 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 ones below directly related to the proposed project:

i. To initiate and formulate policy;
ii. To set service delivery standards;
iii. To monitor the general administration and provision of services in the divisions;
iv. To enact legislation for the proper management of the capital city;
v. To promote economic development in the capital city;
vi. To construct and maintain roads;
vii. To construct and maintain major drains;
viii. To install and maintain street lights;
ix. To organize and manage traffic;
x. To carry out physical planning and development control;
xi. To monitor the delivery of services within its area of jurisdiction;
xii. To assist in the maintenance of law, order and security;

Relevance to this Project: The 132 kV TL from Nalubaale ss ends up at Kampala North ss, which is within Kampala City, and therefore under the jurisdiction of KCCA. The other component of the Project within KCCA jurisdiction is the Kawaala ss. The Project will be implemented in liaison with KCCA to obtain any required permits for the commencement of works.

4.3.6 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 was 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 the GKMA area, covering the districts of Kampala, Wakiso, Mukono and Buikwe. The respective districts have Physical Planning Units that will have to be consulted to ensure that the Project implementation is in line with the district plans.

4.4 NATIONAL REGULATIONS

4.4.1 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 has been conducted with the guidance of these regulations.

4.4.2 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. The acceptable noise at construction sites corresponding limits are 75 dBA and 65 dBA for day and night time levels respectively.

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

4.4.3 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 and O&M phases of the Project, all of which are expected to generate various types and volume of waste. The Project implementation will be conducted in a manner to meet the minimum requirements of these Regulations and those of international industry best practice.

4.4.4 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 operationalises 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.

4.4.5 The Electricity (Primary Grid Code) Regulations, 2003

This Code shall be complied with by all generation licensees ("generator"), the Grid System Operator ("System Operator"), the distribution licensees ("distributor") and consumers connected to the High Voltage Transmission Grid (HVTG) ("big consumer") in the course of their respective businesses. Section 1 and 2 of The Code contains rules and procedures for the efficient management (generation, transmission and distribution) of the electric supply industry in Uganda, taking into account a wide range of operational conditions that are likely to be encountered under normal and exceptional circumstances.

Relevance to this Project: UETCL will operate the proposed substations and associated infrastructure, including power lines, in compliance with the guidelines and requirements of these regulations.

4.4.6 National Environment (Minimum Standards for Management of Soil Quality) Regulations, 2001

Section 12 of this Act requires compliance with prescribed measures and guidelines for soil conservation for the particular topography, drainage and farming systems, contravention of which constitutes an offence.

Relevance to this Project: These regulations will be relevant in regard to prevention of soil contamination by construction and O&M activities of the proposed project.

4.4.7 National Environment (Wetlands, River Banks and Lakeshores management) Regulations, 2000

These regulations provide principles for sustainable use and conservation of wetlands, riverbanks and lakeshores. River Kasala at Mukono needs to be protected from the project activities.

Relevance to this Project: UETCL will operate the proposed substations and associated infrastructure, including power lines, in compliance with the guidelines and requirements of these regulations. Relevance of these regulations to the EIA study is embedded in the following requirements:

- *EIA is mandatory for all major activities on wetlands, riverbanks and lakeshores,*
- *Measures should be put in place for protection of wetlands, riverbanks and lakeshores such as prevention of soil erosion, siltation and water pollution.*

4.5 INSTITUTIONAL FRAMEWORK

4.5.1 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 Officers and Local Environment Committees at local government level, which undertake inspection, monitoring and compliance enforcement on its behalf.

Relevance to this Project: NEMA will review the EIA prepared for this Project. Approval entails prescription of certain environmental performance conditions that the project operator must fulfil including environmental monitoring. An EIA approval certificate is issued upon payment of fees prescribed by Schedule Three of The Environmental Impact Assessment Regulations, 1998.

4.5.2 Ministry of Energy and Mineral Development (MEMD)

The Ministry is responsible for the energy sector, dealing specifically with policy formulation, policy implementation and monitoring. In 1999, following approval by the cabinet of the Power Sector Reform and Privatization Strategy and enactment of a new electricity law (The Electricity Act, 1999), Electricity Regulatory Authority (ERA) was established to regulate the energy sector. Thus, while the MEMD formulates policy, ERA is charged with the mandate of regulating the energy sector independent of the Ministry.

Relevance to this Project: MEMD is the responsible supervisory agency for this Project. Implementation of the Project is by UETCL which is a technical corporate entity under this Ministry.

4.5.3 Electricity Regulatory Authority (ERA)

ERA is a corporate body established to oversee implementation of the Electricity Act 1999. Under the Act, ERA is mandated to review proposed investments in the energy sector and guide the promoters through implementation. The main functions of ERA include:

- Issuing licenses for generation, transmission, distribution, of electricity processing applications for investors in the energy sector;
- Enforcement of requirement under the Act to ensure compliance with regulations;
- Establishing tariffs, reviewing, and approving rates of investment in the electricity sector;
- Advising the minister regarding the need for electricity projects; and
- Developing and enforcement of energy standards.
- ERA will ensure that, the operations costing of energy from the planned line project will be in accordance with its set standards and tariffs.

Relevance to this Project: ERA will have a regulatory role in the implementation of this Project.

4.5.4 Uganda Electricity Transmission Company Limited (UETCL)

Uganda Electricity Transmission Company Limited (UETCL) is a Public Limited Company which was incorporated in March 2001 as a result of the power sector reform and liberalization policy that unbundled Uganda Electricity Board (UEB) into successor companies. The Company operates under policy guidance of the Ministry of Energy and Mineral Development. UETCL's mission is to dispatch, transmit quality and reliable bulk power in a viable and efficient manner; be an efficient and commercially focused single buyer actor and; mitigate emergency power situations in Uganda. The mandate of UETCL is to develop and implement national strategic plan as the appointed "Single Buyer Actor" in the power market. UETCL operational licenses require it to:

- Operate its Operation of High Voltage Transmission Grid (HVTG) facilities in compliance with the Grid code that involves promoting and developing policies and programs to achieve high level quality and reliable HVTG services in accordance with the Electricity Act.
- Operate the national power system with the objective of dispatching available electricity to meet load requirements at the lowest cost for customer service, maintaining system integrity and reliability.

- Purchase power to provide continuous and economic supply of electricity to meet the load requirement for customers served directly or indirectly from HVTG facilities at lowest reasonable cost.
- Import and export electricity power to neighbouring countries pursuant to the terms of the agreement(s) for such international power transactions.

Relevance to this Project: UETCL is the project developer of the planned Project and components, therein. UETCL will, therefore, be responsible for the construction, and operation and maintenance of this Project.

4.5.5 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 during this study as a Stakeholder to give guidance on the OHS aspects of this Project. During the implementation of the Project, the Department of OHS will also be responsible for compliance of the project activities and working environment with the provisions of the Occupational Safety and Health Act, 2006.

4.5.6 National Forestry Authority (NFA)

The National Forestry and Tree Planting Act of 2003 created NFA as a semi-autonomous body responsible for management of central forest reserves. NFA divided the country into sectors and manages forest reserves through its sector managers.

This institution is responsible for protection of central forest reserves in Uganda, with the stated goals of maintaining an integrated forest sector that achieves sustainable increases in the economic, social, and environmental benefits from forests and trees by all the people of Uganda especially the poor and vulnerable. The NFA provides direction and guidance on all aspects of a Project that potentially impact on Uganda's forest resources some of which are within the proposed transmission line route.

Relation to project: One of the components of this project (Upgrade of 132 kV TL from Nalubaale ss to Kampala North substation) traverses three forest reserves (Mabira, Namyoya and Kifu in Buikwe and Mukono districts). The implementation of this Project will be done in consultation with NFA to ensure that the national laws governing work in forest reserves are upheld throughout the construction and O&M phases of the Project.

4.5.7 Wetlands Management Department

Directorate of Environment Affairs (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 Project: Some sections of the proposed transmission line route for the Buloba substation component are located within wetlands. The Department was consulted as part of this ESIA to obtain recommendations on the best way to develop the Project in this area sustainably, taking adequate consideration for the wetlands.

4.5.8 Ministry of Tourism, Wildlife and Antiquities

The mandate of the Ministry of Tourism, Wildlife and Antiquities (MTWA) is derived from Article 189 and Sixth Schedule of the Constitution of the Republic of Uganda (1995), Uganda Wildlife Act Cap 200, Uganda Tourism Act, 2008, Historical Monuments Act, 1967 and Universities and Other Tertiary Institutions Act, 2006.

The Ministry is in charge of formulating and implementing policies, strategies, plans and programs that promote tourism, wildlife and cultural heritage conservation for socio-economic development and transformation of the country". This Ministry is the custodian of:

- The Museums and Monuments Policy, Historic Monuments Act
- The Uganda Tourism Act
- The Tourism Policy
- Formulate Museums, Research and Monuments Guidelines

Relevance to this Project: The Ministry is responsible for preservation of the country's assets of cultural, historic and archaeological value. Any 'chance finds' discovered during the implementation of this Project will be turned over to this Ministry, in line with the national legislation.

4.5.9 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: Some areas comprising the Project (Kampala North and Kawaala substations) are 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 some permits and licenses associated with project development (as listed in Table 4-1).

KCCA BYELAWS, REGULATIONS, ORDINANCES AND STRATEGIC PLAN

Kampala Capital City Authority (KCCA) has enacted several byelaws targeting improvement of various socio-economic and environmental conditions in the city, several of which outlined below and discussed thereafter, are applicable to the 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) Byelaws *[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 4-1below.

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

Legal Instrument		Requirement and Relation to the Project
Bylaws		
a	The Public Health (Building) Rules *[Statutory Instrument 281—1]*	**Requirements:** S.24: "*Drainage of site*": The project site should be effectually drained to the satisfaction of the local authority. S.29. "*Access lanes and passages*". The local authority has power in every case to determine whether any road or road reserve is an access or passage and its decision shall be final. S.38: *Scaffolding*. Proper scaffolds shall be provided for all work that cannot safely be done on or from the ground or from part of the building or from a ladder. S.39: "*Precautions against fire*". A building in which more than ten persons reside or are employed at any one time shall: (a) be constructed of fire-resisting materials; (b) be provided with a sufficient number of fire escapes; (c) be provided with a secondary means of access; (d) have fire-resisting floors, stairs, staircases and passages; and **Relation to the Project:** i) The project must ensure that any storm water generated by additional built footprint is adequately drained to avoid flooding at or near the site. ii) The project or contractor shall not advertise or allow advertisements on site hoardings during construction unless permitted by KCCA.

Legal Instrument		Requirement and Relation to the Project
b	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. **Relation to the 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		
a	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 the project:** Any subcontractors, associations or groups hired by the project or its contractors must be duly licensed by KCCA to carry out business.
b	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. **Relation to the Project:** The project should ensure proper solid waste management provision of waste collection/ storage containers for *construction waste* (during construction phase) and *repair/ maintenance waste* during the O&M phase.
Regulations		
	The Traffic and Road Safety	**Requirement:** S14.: "*Offences and penalties*"

Legal Instrument		Requirement and Relation to the Project
	(Parking of Motor Vehicles) Regulations, 2001.	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; **Relation to the project:** Project vehicles both during construction an operation must be parked in accordance with these regulations in a manner that does not disrupt traffic flow pose risk of public accidents or damage existing roads and road infrastructure.
Permits		
	Permits below from KCCA will be required by the project: i) Excavation permit ii) Renovation permit iii) Hoarding and scaffolding permit	

4.6 ACQUISITION OF PERMITS

Implementation of the Project will require UETCL to obtain the necessary permits in line with Ugandan laws. Table 4-2provides a list of the identified permits that UETCL will obtain before implementation of the proposed transmission system improvement Project. UETCL will work with the various government agencies and identify and obtain any other permits deemed necessary for Project implementation.

Table 4-2: Permits to be acquired for Project implementation

Permit	Responsible Agency	Reason for Permit
Water abstraction permit	DWRM	≠ Water abstraction for construction works from natural water courses. *In the event that any of the natural water courses is used for abstraction of water for construction, for example River Kasala in Mukono; this permit will be necessary.*
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. *The transmission lines associated with the Buloba and New Mukono substations traverse sections of swamp. In Mukono, one of the towers connecting*

Permit	Responsible Agency	Reason for Permit
		to the existing 132 kV line from Nalubaale substation is proposed close to River Kasala.
Permit for excavation	KCCA	≠ Excavation of cable trench for Kawaala substation renovation
Permit for hoarding and scaffolding	KCCA	≠ Hoarding will be required for the renovation works at Kawaala substation because it is very close to residential homes surrounding it.
Permit for renovation	KCCA	≠ Kawaala substations are only to be upgraded as part of the Project.
Permit for Architectural and Structural Plans approval	Respective District Physical Planning Offices	≠ Construction of new substations for the Buloba and Mukono Project Components

4.7 JICA Guidelines for Environmental and Social Considerations

The Japan International Cooperation Agency (JICA) is an independent governmental agency that implements Official Development Assistance of Japan. JICA assists the economic and social growth of developing countries and promotes international cooperation through various financial aid schemes. In 2010 JICA adopted a new set of Guidelines for Environmental and Social Considerations (ESC Guidelines) to ensure that its assistance will lead to sustainable development.

The ESC Guidelines place the burden of responsibility for bearing environmental considerations on the proponents of the Project, in this case, Yachiyo Engineering Co., Ltd. JICA is, however, responsible for confirmation of the implementation of ESC by the project proponents through an Environmental review and supervision of monitoring.

The basic principles of the ESC Guidelines are:

≠ ***ESC are a pre-requisite for JICA's assistance*** - When JICA reviews a project proposal and finds that the project could have a negative impact on the environment or society, it advises project proponents to provide appropriate ESC. If the negative impact of the project cannot be avoided or mitigated to an acceptable level, JICA will not support its implementation.

≠ ***Respect human rights for inclusive development*** - A development project should aim for the fair distribution of its benefits and must not burden or exclude some stakeholders for the sake of others. The project proponents must respect the rights of all people concerned, and pay special attention to vulnerable social groups such as women, the elderly, the poor, people with disabilities, indigenous peoples, ethnic minorities, and other minority groups to ensure that they are involved in decision-making processes and that they benefit from the project.

≠ ***Avoid adverse impacts*** - Priority should be given to the avoidance of adverse impacts on the environment or society. Minimization or mitigation of impacts should be considered only if

avoidance is not feasible and if the benefit of the project outweighs the cost of mitigation measures. To this end, the project proponents must assess the environmental and social impacts at the earliest possible stage of planning, and implement ESC measures in accordance with the ESC Guidelines.

In addition, ESC in a JICA Project must comply with:

- ***The host country's laws, standards, policies and plans*** - ESC in a JICA project must comply with the laws, standards, policies, and plans of the host country. If the standard set by the host country differs from the international standard, the project proponents are advised to adopt the standard that better serves the purpose of attaining a higher level of ESC.

- ***The World Bank's Safeguard Policies*** - ESC in a JICA project must be in line with the World Bank's Safeguard Policies including Operational Policy on Environmental Assessment (OP 4.01), Natural Habitats (OP 4.04), Involuntary Resettlement (OP 4.12), Indigenous Peoples (OP 4.10), or other relevant policies.

- ***Internationally accepted standards*** - International standards, treaties, and declarations should also be applied as appropriate.

Table below summarises a gaps analysis between JICA and Uganda's ESIA regulatory requirements from which it is seen that no notable gap exists in principle objectives in regard to process, impacts to assess, stakeholder engagement and information disclosure.

The ESC Guidelines categorize projects depending on the magnitude of the potential impact on the environment or society. The categories are listed below:

Category A for projects that are likely to have significant adverse impacts on the environment or society; e.g. impacts that are irreversible, complicated, or unprecedented, and impacts that are difficult to assess; projects for sectors that involve large scale infrastructure development, activities that involve large scale involuntary resettlement or a project that takes place inside or adjacent to a sensitive area. Appendix 3 of the ESC Guidelines provides a list of Category A projects.

Category B for projects that may have adverse impacts on the environment or society, but these impacts are less significant than those of Category A projects. These impacts are site-specific; few, if any, of them are irreversible; in most cases, they can be mitigated more readily than Category A projects. Responsibilities of the project proponents include the planning and monitoring of necessary ESC activities. ESC procedures such as Initial Environmental Examination and stakeholder participation may be required, depending on the scale and nature of the adverse impacts.

Category C for projects likely to have minimal or no adverse impact on the environment or society.

Category FI for projects for which JICA provides funds to a Financial Intermediary, which in turn implements sub-projects that may have adverse impacts on the environment or society, but these impacts cannot be identified in detail prior to JICA's approval. If there is a sub-project that can be categorized as Category A, it needs to go through the same procedure as a Category A

project including JICA's environmental review and information disclosure prior to its implementation.

Relation to the Project:

Based on above categories, this proposed improvement of the Greater Kampala transmission system improvement is a ***Category B*** project, and this ESIA study is in fulfilment of JICA ESC requirements.

5 ENVIRONMENTAL AND SOCIAL BASELINE

This chapter provides a description of environmental and socio-economic baseline conditions in the proposed project area. A detailed socio-environmental baseline assessment will be done during the ESIA but sections below provide preliminary site investigations and observations made during the scoping exercise. A baseline overview of conditions in project districts is provided to give context to observations made during the scoping study. The proposed Greater Kampala transmission system improvement project will cover Kampala, Wakiso, Mpigi, Mukono and Buikwe districts. The 132 kV TL from Nalubaale ss to Kampala North ss traverses the Kampala, Wakiso, Mukono, and Buikwe districts.

5.1 KAMPALA DISTRICT

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 habitat destruction, pollution, occupational health risks, deforestation and wetland destruction. Figure 5-1 shows the geographical location of Kampala in Uganda. Figure 5-2 and Figure 5-3 show the locations of Kawaala and Mutundwe substations in Kampala respectively.

5.1.2 Administrative Units

In 2010 the Ugandan government passed the Kampala Capital City Authority Act which established Kampala Capital City Authority to administer Kampala 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 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 and Figure 5-1show administrative structure of Kampala city. The 132 kV TL from Nalubaale ss to Kampala North ss traverses Nakawa and Kawempe divisions (Figure 5-1).

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
Rubaga	13	131
Total	100	802

Source: Updating Kampala Structure Plan and Upgrading the Kampala GIS Unit, KCCA, 2012

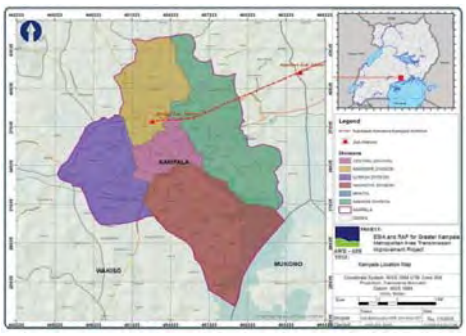


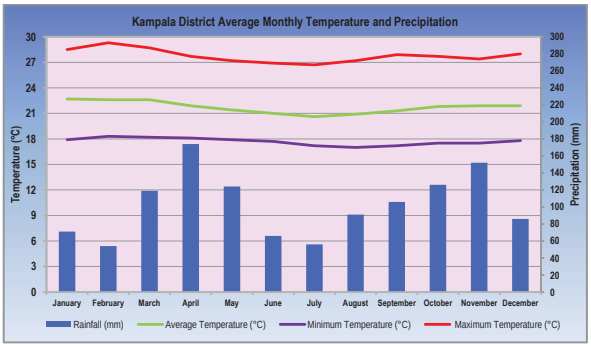
Figure 5-1: Location of Kampala and its divisions

Figure 5-2: Location of Kawaala Substation

Figure 5-3: Location of Mutundwe substation

5.1.3 Climate of Kampala

Kampala features a tropical wet and dry climate. However, due to the 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. 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 2 rainy seasons. Figure 5-4 shows climate (rainfall and temperature) of Kampala district.



Source: World Meteorological Organization, Climate-Data.org for mean temperatures

Figure 5-4: Rainfall and Temperature of Kampala District

5.1.4 Topography

Kampala is located 1,120 metres above sea level within a series of hills of flat summits and undulating slopes culminating ending into broad valleys dissected by perennial streams/channels. Topography varies in a general east to west direction.

5.1.5 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**.** The soil types along the transmission route are ferralitic and ferrisols (Figure 5-5).

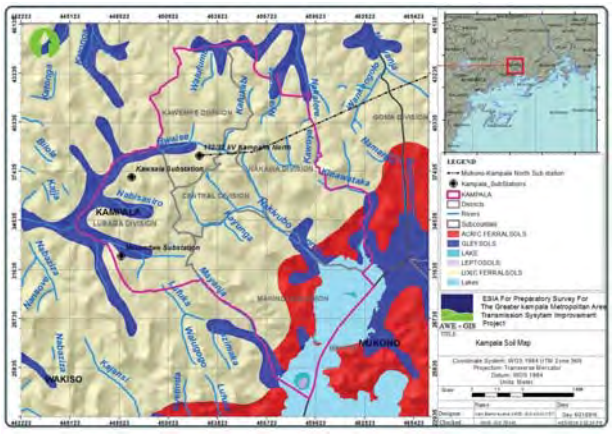


Figure 5-5: Soils types along 132 kV Transmission Line (Nalubaale SS - Kampala North SS)

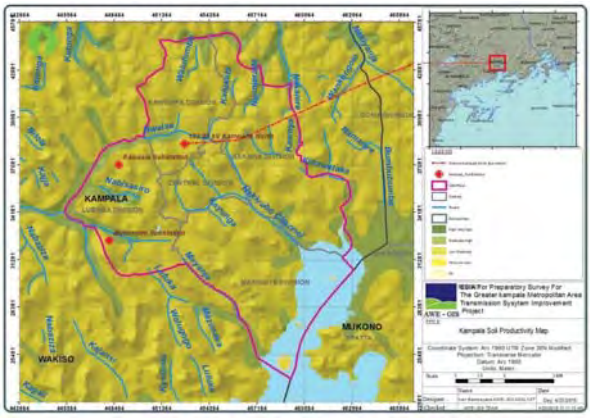


Figure 5-6: Soil Productivity in Kampala District

5.1.6 Demographics

According to the 2014 national census figures, Kampala then had a population of approximately 1,516,210 (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%. 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 by 2025. Table 5-3 provides the population of Kampala by division.

Table 5-2: Population of Kampala District by Sex, Residence and Population Type

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 pre-eminent urban centre throughout the period 1991 - 2014. However, the proportion of Kampala city to the total urban population has declined steadily from 41% in 1991 to 25% 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%), followed by Hoima Municipality (10.7%), Mukono Municipality (10.4%), Masindi Municipality (8.9%), Mbarara Municipality (8.6%) and Kasese Municipality (5.3%). All these except Wakiso Town Council had boundary changes between 2002 and 2014. The other urban centres had growth rates lower than 5% per annum, which is deemed normal for an urban centre.

Table 5-3: Kampala Population by Division

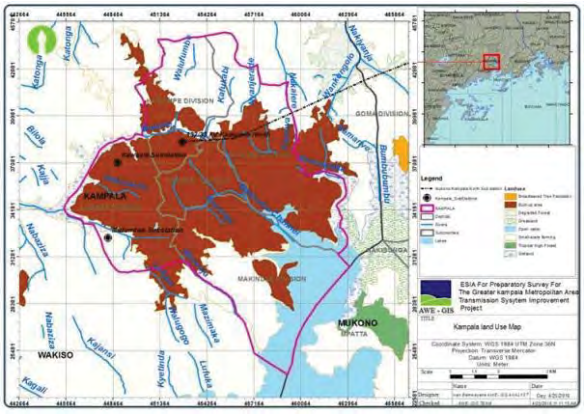
Division	Households		Population		Total
	Number	Average size	Males	Females	
Central	23,205	3.2	41,107	38,682	79,789
Kawempe	94,574	3.5	159,800	78,512	338,312
Makindye	110,224	3.5	188,537	206,739	395,276
Nakawa	84,793	3.6	154,841	163,606	18,447
Rubaga	105,991	3.6	178,353	206,033	384,386

Source: Census Report 2014

5.1.7 Land Use and Land Tenure System

5.1.7.1 Land Use

Most of the areas within Kampala where the Project components are located are mainly built up areas (Figure 5-7). The transmission lines also traverse areas that are mostly degraded wetlands and small scale farming plots.



Source: KCCA GIS unit

Figure 5-7: Land use within Kampala

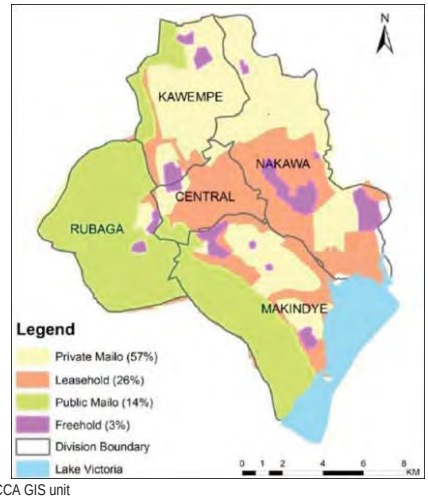
5.1.7.2 Land Tenure System

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 (Section 4.3.1). 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 land owners and rights of bonafide / lawful occupant (Kibanja holder) who own developments on land. Generally, the rights of Kibanja occupants are contested and poorly administered, while the rights for land under Leasehold tenure are fairly well managed. Kibanja holders are lawful occupants in a mailo land tenure system, having the right to use and develop land as agreed with the landlord. A general indication of land holding under different land tenure systems in Kampala is mapped in Figure 5-8.

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 existing 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.

Over 60% of the Great Kampala Metropolitan Area (GKMA) 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 predominant extent 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).



Source: KCCA GIS unit

Figure 5-8: Distribution of Land tenure systems in Kampala

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:

The Metropolitan Core - the City Centre;
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;

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 Kampala Towns; 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). 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 KCCA 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.

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 project site is located in a commercial area surrounded by commercial buildings and market.

5.1.8 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% 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% respectively. A trend analysis indicates a slight increase in the literacy rate over the years for persons 10 years and above from 69% in 2005/06 to 71% in 2012/13. Table 5-4 indicates the literacy levels in Kampala city while Table 5-5 presents the number of schools within various Divisions of Kampala.

Table 5-4: Literacy rates for population aged 10 years and above

Years	Male	Female	Average
2005/2006	92	90	91
2009/2010	95	90	92
2012/2013	95	92	93

Source: UNHS 2005/06, UNHS 2009/10 and UNHS 20012/13, Uganda Bureau of Statistics

Kampala has had its number of primary school pupils 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 5-5: Number of the various categories of schools per administrative division

Division	Pre-Primary Schools	Primary Schools	Secondary Schools	Tertiary School
Rubaga	201	273	83	13
Makindye	173	213	65	04
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

5.1.9 Health and Sanitation

Health facilities within Kampala City are presented in Table 5-6. With 1332 health facilities, the private sector is a key player in the provision of health services in Kampala. Number of Health units in Kampala was 200 in the years 2007 and 2009 and in 2010 there were 250. Table 5-7 presents information relating to typical health indicators for Kampala. Malaria is the leading cause of mortality in Kampala.

Table 5-6: Health facilities within Kampala City

Kampala	Numbers
Government	20
NGO	40
Private	1332
Total	1392

Source: UBOS Report 2014

Table 5-7: 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 (years)	56.4
	Cause for specific mortality rates
Malaria	15%
Diarrhoea Diseases	12.3%
Respiratory Tract Infections	9.9%

Health Indicators	Kampala
HIV/AIDS	8.1%

Source: OVC Service Provider Mapping Report, 2008

5.1.10 Economic Activities

Kampala's main source of income is through employment, trading in non-agricultural products and agricultural produce; with 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 as shown in Table 5-8.

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	4.2
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.

5.2 WAKISO DISTRICT

5.2.1 Geographical location

Wakiso District is a district in Central Uganda that engulfs Kampala, Uganda's capital city. Wakiso District lies in the Central region bordering with Mpigi, Luwero, Nakaseke and Kiboga districts in the North; Mukono in the East, and Kalangala district to the South (Figure 5-5). Wakiso covers a total area of 2,807.7 square kilometres.

5.2.2 Administrative Units

The district is sub-divided into lower administrative units and composed of 19 lower level local governments and several administrative units. Over time, the number of sub counties/Town Councils and lower level administrative units has continuously increased and turned into town councils and cells with the aim of making administration and delivery of services easier. The numbers of administrative units in the district as at December 2008 are given below in Table 5-9 while Figure 5-9 shows the district's sub counties. The 132 kV TL from Nalubaale Substation to Kampala North ss traverses only through Kira sub county in Wakiso district (Figure 5-9).

Table 5-9: Showing administrative units in Wakiso District

Administrative Unit	Number in District
County	2
Municipality	1
Town Councils	4
Sub-counties	9

5.2.3 Climate

Climate in Wakiso is warm and wet with relatively high humidity. These conditions favour rapid plant growth and also encourage disease out breaks. Proximity to Lake Victoria has a bearing on production activities.

5.2.4 Topography

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

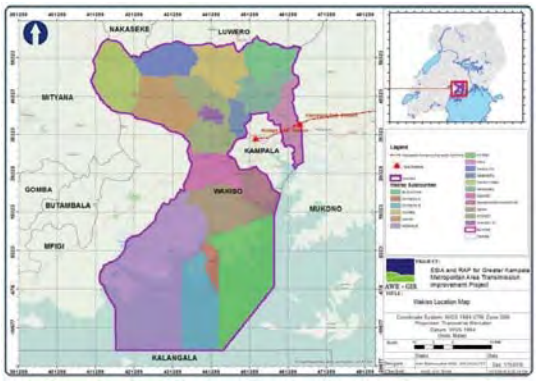


Figure 5-9: Location of Wakiso District and its sub counties

5.2.5 Geology and soils

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

Figure 5-10 shows the soil types along the transmission line route as luxic ferralsols. The soils are generally of low to moderate productivity (Figure 5-11) and are mainly sandy clay soils. The dominant soils types are red gravely loams with occasional murram reddish brown sandy loam on red clay loam and yellowish sands with quartz gravel. The soils in the wetlands include grey sands whose parent material is alluvium and hill wash, grey coarse sand from lake deposits, black and grey clays from river alluvium and peat sands and clay formed from papyrus residue and river alluvium.

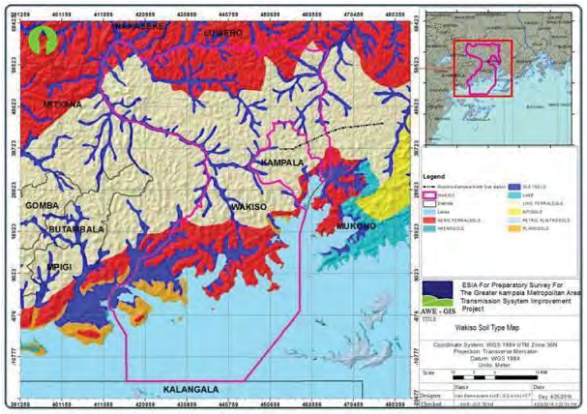


Figure 5-10: Soil types in Wakiso District

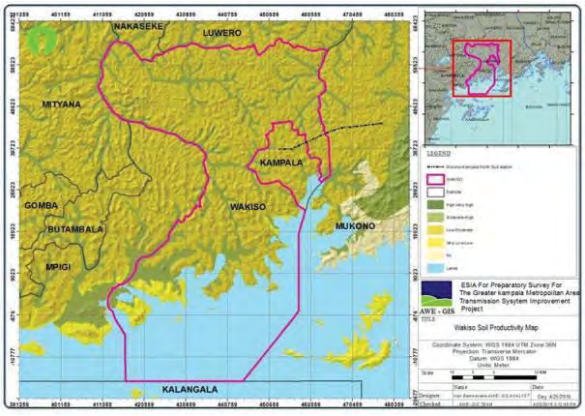


Figure 5-11: Soil Productivity in Wakiso District

5.2.6 Vegetation

The vegetation cover of Wakiso district is very varied. It ranges from medium altitude evergreen forest, through medium altitude moist semi-deciduous forests, savannahs, and swamps. Wakiso has over nineteen (19) government forest reserves with a total area of 6,773 ha. All the reserve forests have experienced illegal forest activities such as charcoal burning, encroachment, pit swaying and firewood cutting. The pressure on the forest reserves is due to high population density around the forest, abject poverty and the place being very near to the main market outlet (Kampala). The Forest mosaic is found in medium altitude. The most important and abundant element of this mosaic is a savannah like community, which consists of a mixture of forest remnant and incoming savannah trees with a grass layer dominated by *Pennisetum pupureum* (elephant grass). It occupies the largest area found in Kyadondo and Busiro. In addition, (90%) of vegetation of Wakiso district is savannah woodland.

5.2.7 Demographics

The population of Wakiso increased tremendously from 1991 to 2014 (Table 5-10). According to Uganda Bureau of Statistics, 2014 population in Wakiso was 2,007,700 in 2014 (Table 5-11).

Table 5-10: Wakiso District Population trend

Year	1991	2002	2014
Census	562,887	907,988	2,007,700

Source: UBOS, 2014

Table 5-11: Population of Wakiso District 2014

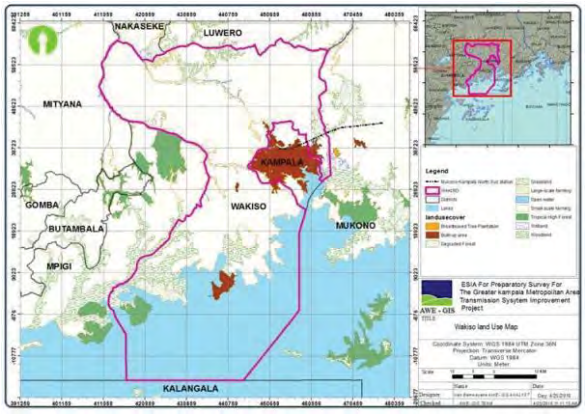
	2014
Males	952,781
Females	1,054,919
Total	2,007,700

Source: UBOS, 2014

5.2.8 Land Use and Land tenure System

5.2.8.1 Land Use

The transmission lines also traverse areas that are mostly small scale farming plots and degraded forests (Figure 5-12) within Wakiso.



Source: KCCA GIS unit

Figure 5-12: Land use within Wakiso

5.2.8.2 Land Tenure System

In Wakiso, land holdings currently fall under 4 categories: Mailo, introduced in Buganda in 1900 agreement and subsequently in 1967 constitution transformed some land into public land i.e. freehold tenures held by religious bodies for example in Gayaza. Leasehold system of land ownership is one, which grants the lessor exclusive usage and possession of the land for a specified period of time. Lastly, customary tenure the oldest system in the district mostly occupied by majority of the people.

5.2.9 Literacy and Education

Literacy is defined as the "the ability to read with understanding and write meaningfully in any language". The 2002 population census measured literacy for all persons 10 years and above. Table 5-12 shows that the literacy rates for persons aged 10 years and above was 67% compared to the national average of 70%. The PEAP targets to increase literacy levels to 80% by 2009/10. The female and male literacy rates for 2002 census were 62% and 72% respectively.

Table 5-12: Distribution of Literacy by Residence and Gender

	Male	Female	Total
Urban	91.7	87.2	89.3
Rural	69.2	58.3	63.7
District	71.8	62.0	66.9

Source: UBOS, 2014

5.2.10 Health

Morbidity is the incidence or frequency and severity of sickness and accidents in a well-defined class or classes of persons. Malaria was the most prevalent illness among the outpatient cases and child hood illness during the period 2002-2007. Other two common illnesses are ARI-pneumonia and Intestinal worms cases respectively. The outpatient proportional morbidity of the most common diseases in 2007 indicated that Malaria had 47.9% in persons under 5 years (children) and 26% in persons above 5 years, Intestinal worms 4.8% in persons under 5 years and 4.8% in persons above 5 years, ARI Pneumonia 10.1% in persons under 5 years and 2.7% in persons above 5 years, Diarrhoea Diseases 4% in persons under 5 years and 3.1% in persons above 5 years, and other OPD diagnosis had the rest of the percentage (Wakiso District Statistical Abstract, 2009).

The HIV/AIDS Control program has been running quite well, and has been funded mainly by the HIV/AIDS Multi-country AIDS Project (MAP), UPHOLD, and the Global Fund for Tuberculosis, Malaria and HIV/AIDS control. The HIV/AIDS services being provided by the district include; Voluntary Counselling and Testing for HIV services which are also offered at all Health Centre IVs in the District and in Luwunga Barracks Health Centre III, Entebbe, Mild may, and Kisubi hospitals. Free Anti-Retroviral Therapy is also available at all the Hospitals and the Health centre IVs with the exception of Kasangati HC where only the staff has been trained in handling ARVs. ARV services would very soon be extended to Kasangati Health Centre. Each of the above health facility carried out a minimum of four (4) outreaches per month within their catchment's area in 2007, for Voluntary Counselling and Testing services. However, it is important to stress that these services are free and are on a daily basis.

5.2.11 Hydrology

Wakiso District is generally endowed with adequate surface and sub-surface water reserves with numerous streams, rivers and wetlands both permanent and seasonal. Minor valleys have distinct seasonal swamps and rivers, which contain water especially during the wet season. The water table along these swamps is quite high. They are suitable for sinking shallow wells. Sub surface water

reserves occur in fissures and aquifers of the rocks. This is indicated by the number of boreholes, spring wells, tube wells and shallow wells, which have been drilled to harvest water for domestic supply.

5.2.12 Energy

Energy is a critical component for development and its consumption is one of the indicators of levels of development. The energy sector in Wakiso District is divided into four components namely petroleum (including paraffin), fuel wood, electricity and new renewable sources of energy for cooking and lighting.

5.3 MUKONO DISTRICT

5.3.1 Geographical location

Mukono district lies north of the equator in Central Region of Uganda 16 km East of Kampala City along Kampala-Jinja Highway. It is bordered by Luwero and Kayunga districts to the North, Kampala, Wakiso and Kalangala to the West, Buikwe to the East, and Lake Victoria to the South. Figure 5-13 shows the geographical location of Mukono district within Uganda, while Figure 5-14 shows Proposed Location of Mukono Substation and the 132 kV transmission line from Nalubaale substation to Kampala North substation traverses the sub counties of Nagojje, Nama and Goma in Mukono district.

5.3.2 Administrative Units

According to the District Development Plan (2010-2015), Mukono district is made up of two counties subdivided into 15 Sub-counties and five (5) Town Councils. It also has a total of 80 Parishes and 592 villages (Table 5-13).

Table 5-13: Mukono district local governments and administrative units

Counties	Local governments		Administrative Units	
	Sub Counties	Town/Urban councils	Parishes	Villages
Nakifuma	6	2	31	235
Mukono	9	1 Municipal council with Two Divisions & 1 Town board	49 (40 are rural)	357
Total	15	5	80	592

Source: Mukono District Development Plan 2010-2015

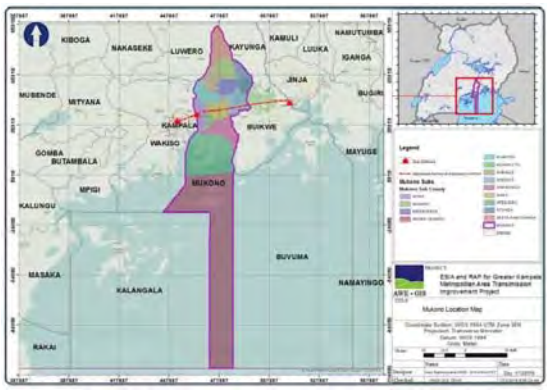


Figure 5-13: Location of Mukono district and its Sub counties

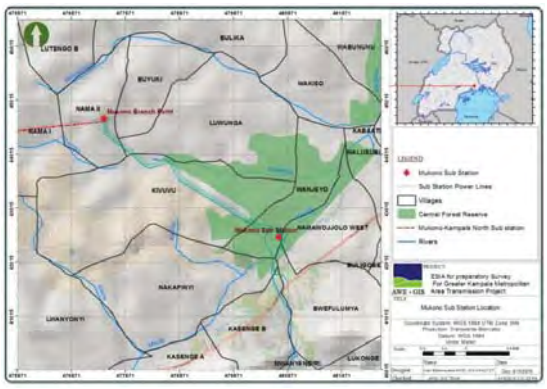


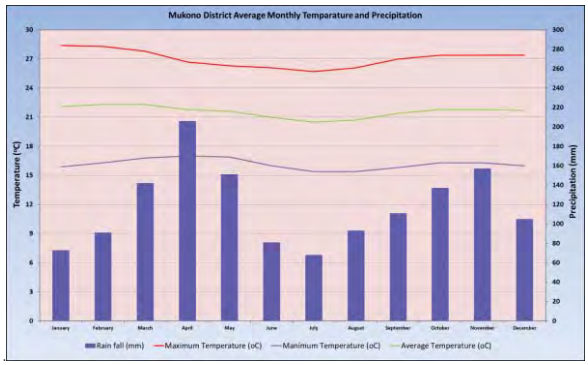
Figure 5-14: Proposed Location of Mukono Substation

5.3.3 Climate

Mukono district lies on a high plain (1000 m – 1300 m) above sea level with a tropical wet and mild dry climate characterised by slightly humid conditions (average 65%). The district has significant rainfall throughout the year with the driest month still having a lot of rainfall. The lakes Kyoga and Victoria as well as Mabira Forest influence the area climate. The driest month is July with accumulated precipitation of 67 mm while the wettest month is April, with an average precipitation of 201 mm. Available data indicates that Mukono district has rainfall distributed in two wet seasons with peaks in March-May and September-November (Figure 5-15). The district's average annual rainfall is 1390 mm distributed over 106 rain days.

The average annual temperature for Mukono district is 21.5°C with daily values mostly varying within 5°C. The warmest month of the year is March with an average temperature of 22.3°C. July has the lowest average temperature of 20.4°C.

Both relief and the climate provide a good potential for investment in cash and food crops, horticulture and floriculture on a commercial basis. Existing commercial farms in the district also provide a good background for experience sharing for those investors who want to venture in such areas.



Raw data source: Climate-Data.org

Figure 5-15: Temperature and precipitation of Mukono district

5.3.4 Topography

The northern part of the district is flat but the southern region consists of sloping land with many undulations. The transmission line traverses the district on the western side. The streams formed in the valleys form part of the early hierarchy orders for River Sezibwa stream network and most of them are altered natural drainage channels.

5.3.5 Geology and soils

5.3.5.1 Geology

There are two main rock systems in Mukono district, namely: a) pre-Cambrian rock formations; and b) Cainozoic rock formation.

a) Pre-Cambrian rock formations

The greatest part of Mukono district is composed of Precambrian rock system (associated with remnants of the lowland surface). This system is mainly wholly granitized or high to medium metamorphosed formations, consisting of undifferentiated gneisses and elements of partly granitized and metamorphosed formations.

b) Cainozoic rock formation

The western part of the district, stretching from the south and northwards, particularly associated with the Sezibwa River, is composed of Pleistocene to recent sediments, alluvium, black soils and moraines.

5.3.5.2 Soils

The soils within the project area are located on gentle slopes which are surrounded by wetlands. The soils are mainly ferrisols and the project area is surrounded by many activities such as agricultural, brick making, sand mining and industrial developments among others. The soils are categorised as low-moderate productivity (Figure 5-16). There are two main categories of soils in Mukono district namely: (a) Ferralitic; and (b) Ferrisols.

a) Ferralitic Soils

There are two categories of ferralitic soil types differentiated by the dominant colour, that is, those with dominant yellowish colour and those with dominant red colour. The soils with the dominant yellowish colour are mainly sandy loams located along the shores of Lake Victoria in Mukono District while dominant red colours are mainly sandy clay loams. Ferralitic soils are characterised by low agricultural productivity.

b) Ferrisols Soils

Ferrisols closely resemble the Ferralitic soils. They are however distinguished because they represent an earlier stage in the development of ferralitic soils. Ferrisols soils are mainly crystalline basic rocks which are well drained. Ferrisols soils are characterised by medium agricultural productivity.

Figure 5-16: Soil Productivity in Mukono District

5.3.6 Vegetation

According to Lansdale-Brown *et al* (1964), the natural vegetation of Mukono consists of the forest/savannah mosaic characterized by patches of dense forest in the lowlands and scattered trees, shrubs and grassland on raised ground. Natural forests on private land and government-controlled forests are a characteristic of this region. Urbanization of the district has destroyed some of these forests.

The wetland vegetation comprise of *Typha, Miscanthus, Hyparrhenia* species, some *Cyperus* species and creepers, mostly of family Convolvulaceae. Swamp forest tree species such as *Pseudospondias microcarpa*, *Mitragyna* species, *Tabernaemontana*, *Ficus* spp, and *Bridelia micrantha* and *Phoenix reclinata* shrub vegetation include some edible plants such as *Psidium guajava* and *Afromomum angustifolium*. Several species found here are utilized by the local community for food, fuel, building materials, medicines and raw materials for crafts.

5.3.7 Demographics

According to the Mukono five year DDP (2010- 2015), the 2002 population census final results put Mukono district's population at 423,052 and the projected population at 536,400 by mid-2011 population (Table 5-14). Available demographic information further shows that Mukono district local government has a high population growth rate of over 2.6% with an estimated population density of 495 persons per square kilometre.

Table 5-14: Mukono population and other Demographic Indicators per Sub-county

Sub-county	Elderly Population	Infant Population	Number of hh	Female	Male	Total Population	% of total population
Goma	2,008	1,369	10,849	28,900	28,300	57,200	11
Kimenyed de	1,839	1,239	6,869	20,300	19,200	39,500	7
Koome Islands	201	399	3,435	4,900	7,400	12,300	2
Kasawo	1,960	1,176	6,683	19,000	20,200	39,200	7
Kyampisi	1,749	968	6,615	18,300	17,900	36,200	7
Mukono T.C.	1,210	1,538	11,373	31,000	28,000	59,000	11
Nabbale	1,720	977	6,366	18,600	17,300	35,900	7
Nagojje	1,767	1,030	6,996	17,800	18,300	36,100	7
Nakisunga	2,383	1,342	9,570	25,300	24,700	50,000	9
Nama	1,853	1,060	8,035	21,000	20,900	41,900	8
Ntenjeru	2,700	2,070	13,930	35,400	34,900	43,400	8
Ntunda	852	474	3,025	8,400	8,600	17,000	3
Mpatta	-	-	-	-	0	14,100	3
Mpunge	-	-	-		0	12,800	2
Seeta-Namugang a	2,052	1,332	7,473	21,500	20,300	41,800	8
Total	22,332	15,493	102,682	270,400	266,000	536,400	100

Source: Mukono District Development Plan 2010– 2015

For the 2002 census, a larger proportion (56%) of the population was under 18 years indicating a young district with potentially many job-seeking youths. In 2002 (and more likely currently), there were more females than males in the district (50.2%), a situation that renders relevancy to involvement of women in the industrial workforce as recommended by the National Industrial Policy, 2008. Suffice it to note that the high urbanization rate of the district (17%) makes the district not only pedestal for industrialization but also a destination for youth in search of employment. Table 5-14 shows the population and other demographic indicators per Sub-county while Table 5-15 shows a contrasting analysis of selected demographic indicators of the district compared with the central region and the national level.

Table 5-15: Mukono Demographic comparisons as per 2002 Census

Factor	Mukono District	Central Region	National level
Population density	495 people per km2	175.7 people per Km2	124 people per km²
Annual Growth Rate	2.6%	2.6%	3.3%
Urbanization level	17%	25%	12%
Homeless population	2,113	5,051	29,949

Factor	Mukono District	Central Region	National level
Infant population below 1 year	15,493	244,994	1,007,407
Population under 5 years	142,438	1,33,633	4,544,423
Adolescents (10-24 years)	272,783	2,378,914	8,392,872
Population under 18 years	443,946	3,596,929	13,708,263
Adults above 18 years	351,447	2,978,496	10,733,821
Youth (18-30 years)	175,708	1,598,825	5,472,062
Elderly (60+ years)	38,975	291,799	1,101,039

Source: Mukono District Development Plan 2010– 2015

5.3.8 Land Use and Land tenure System

5.3.8.1 Land Use

Land in Mukono district is a very important aspect in human livelihood. The land is rich both in fertility and metability. It is partially surrounded by Lake Victoria and contains 56 islands within Lake Victoria. Mukono district engages in various activities for livelihood including agriculture, livestock rearing, brick making, lumbering. Table 5-16 presents main land use in Mukono district.

Table 5-16: Land use types in Mukono district

Land use	Units (km2)
District Area	10,211.03
Area under open-water/swamps	7,117
Forests	564.6
Area available for Agriculture	2,529.43
Area under cultivation	834.7

Source: District land board

5.3.8.2 Land Tenure System

The land tenure in Mukono district is categorized into: Registered free hold, Lease hold and Kibanja holders (Customary) which covers the largest area of the district. Table 5-17 indicates the land ownership acreage per tenure system in hectares. Majority of the farmers in Mukono district do not have land titles which does not guarantee security of land tenure.

Table 5-17: Mukono district Land ownership acreage per tenure system

Land Tenure System	Area (Ha)
Registered free hold	16,295
Lease hold	16,549
Kibanja (customary)	161,984

(Source: Uganda National Census of Agriculture and Livestock)

5.3.9 Literacy and Education

The education sector plays a vital role in promoting sustainable development through capacity building of the population in various skills, raising awareness on various issues of national importance and improving general standards of living. The education system aims at training children and adults in a range of skills from basic education. Uganda's education system includes formal and informal education comprising of training at primary, secondary and tertiary levels.

Enrolment in all institutions has drastically increased; more schools, institutions, colleges and a university (Mukono Christian University) have sprung up, mainly under private ownership. Universal Primary Education that was introduced in Uganda in 1997 has contributed to tremendous increment in Primary School enrolment.

The district has government and privately run institutions, attracting students from the immediate catchments, countrywide and from the East African region. The private sector plays a significant role in providing education infrastructure for the town council community. Table 5-18 presents the number of schools both primary and secondary in Mukono district.

Table 5-18: Number of schools in Mukono District

CATEGORY	NUMBER
Primary Schools	
Government Aided Primary Schools	216
Uncoded Primary School	14
Private Primary Schools	330
Secondary Schools	
Government Aided Secondary Schools	29
Private Secondary Schools	120

Source: Mukono District Development Plan 2010– 2015

5.3.10 Health

The delivery of effective health services is one of the pressing challenges facing Mukono district local government as well as Uganda in general. However, Mukono district is working hard to ensure that the health of the people in the district is good. The main objective in this is to reduce disease and disease related burden to enable the population participate in gainful economic activities. Currently the district has no government hospital; there is only one private, non-profit hospital (Nagalama Hospital) which is approximately 22 km from Mukono town. The area Member of Parliament donated an ambulance which improved the transfer of patients referred to the national referral hospital at Mulago in Kampala. Table 5-19 presents the categories of health facilities within Mukono district.

Table 5-19: Health facilities within Mukono district

Category	Government	NGO	Total
Hospital	00	01	01
Health Centre IV	03	01	04
Health Centre III	15	01	16

Category	Government	NGO	Total
Health Centre II	23	06	29
Total	41	9	50

The major health concerns of the district include malaria, pneumonia, respiratory diseases (a consequence of air pollution particularly from fossil fuel combustion and waste burning), waterborne diseases such as cholera and dysentery, and HIV/AIDs. Table 5-20 shows that malaria is the dominant disease representing 43.2% while skin diseases at 3.95% are the least prevalent.

Table 5-20: Prevalent diseases in Mukono District

Sr. No	Disease	Prevalence Rate
1	Malaria	43.2%
2	Respiratory diseases (cough or cold)	14.1%
3	Pneumonia	10.2%
4	Intestinal Worms	6.2%
5	Skin diseases	3.9%

Source: Mukono District Local Government Statistical Abstract, 2009

There is a high rate of HIV/AIDs prevalence in Mukono district. The Sero Behavior survey conducted by the Ministry of Health in 2011 indicates that the prevalence rate for Mukono district stands at 9% compared to the national HIV/AIDs prevalence which is at 7.3%.

5.3.11 Water

Access to safe water and sanitation is one of the key public services that determine the quality of life of the population. The district is endowed with enormous water resources, including Lake Victoria, River Nile and Sezibwa River, which drains 90% of the district. Safe water sources include piped system, water boreholes and protected springs, and as a result, approximately 73% of the population have access to safe water (Mukono District Development 2010-2015).

Mukono district local government is served by 2,694 domestic water points that include boreholes, shallow wells, protected springs, rain water harvesting tanks and public taps. At least 48 of these water points have been non-functional for over five years and are considered abandoned. The main water supply sources in the district are the protected springs, accounting for 54% of all water sources in the district. In addition, the district has eight piped systems (of which four are pumped – three ground water-based, one surface water-based) and four gravity flow schemes, serving approximately 18% of the population having access to safe water, while 82 % of the population is served by point water sources. Mukono Town water supply is managed by NWSC (Uganda Water Atlas, 2010).

5.3.12 Heritage sites

Mukono District has historical sites such as Ssezibwa Falls Resort, situated along River Ssezibwa, Namasole Palace Hill, situated at Ngogwe Hill. There is Ddolwe (Golola) Island on the east side of Lake

Victoria in Buvuma, Nabinyonyi Islands, situated on Lake Victoria at Buyaga Sub County towards Buvuma District.

Ssezibwa Falls

The sacred Black River Falls (Figure 5-17) is located 3 km off the Mukono – Jinja Highway in Ssezibwa, Mukono District. Ssezibwa Falls is recognized by its dynamic mixed heritage property, which has both natural and cultural landscape interpretations. The Black Falls provide beautiful scenery, with caves and a forest reserve that has more than 100 species of birds and a variety of plant species including the Ficus natalensis from which bark cloth is made. The cultural landscape comprises of caves of which one is used as a shrine where a traditional healer performs rituals and cultural ceremonies, an example of a living cultural heritage. In 1889, Kabaka Mwanga II planted the bark cloth tree to show his love for the site and subsequently, in 1954 Mutesa II planted more trees to enhance the site for leisure and recreation.

Source: State of the environment report for Uganda, 2006/2007

Figure 5-17: Ssezibwa Falls in Mukono District

5.3.13 Economic activities

The social economic dynamism being witnessed nationally and globally has as well affected the communities in Uganda and Mukono in particular. Locally developed/adapted policies like liberalization, privatization, and structural adjustment programs have had an effect on the employment, personal and household incomes and the productive sector in general. Most of the district is spatially covered by the leading mobile telecommunications networks. The following subsections detail the economic activities of Mukono District;

5.3.13.1 Industrialization

The district is one of the major industrial bases in the country with major industries concentrated in the following areas;

Mukono Town Council: Hosts Lwanyonyi – Industrial park, Kyetume abattoir and railway. This town council is as well blessed with other facilities such as hotels/facilities like Colline Hotel, Ankrah Foundation, Patron Hotel and other guest houses. The establishment of Christian University of Uganda has as well increased institutional and private sector activities in Mukono Town Council. Industries located in Lwanyonyi village in Mukono Town Council include and not limited to the following:

- Riley packaging plant
- Quality plastics Limited
- Nile steel and plastics limited
- North star quarries company limited

Seeta – Goma Sub-County: Hosts Namanve Industrial Zone with Century Bottling plant for soft drinks, African Poly bags producing polyethylene bags, Biyinzika Poultry breeders. Rider Hotel is magnificent 3-star hotel about 300 metres from the Kampala – Jinja Highway along Namilyango road. To date Uganda Investment Authority has given way to the construction of mineral water plant, steel rolling mill, cement depot, export trading warehouses and various other industries in Namanve.

All the above investments indicate that Mukono District is a suitable place for investment because;
The expected extension of piped water system to Mukono from Gaba water plant will provide adequate water supplies for industrial, institutional and domestic purposes, The existing industries in those mentioned areas provides infrastructure which facilitates benefits from economies of scale, The ability to access skilled labour which has historically developed from old industries, Cheap and easy means of transport to markets due to good roads like the Mukono-Kampala highway, Mukono – Kayunga road and the Kalagi – Gayaza road. The Industrial park at Lwanyonyi has in place infrastructure which requires an investor to invest little initial capital.

5.3.13.2 Agriculture

Besides a growing industrial base, the dominant economic activity in Mukono district is agriculture. Agriculture employs over 80% of the population and provides the bulk of the raw materials that feed the growing industrial facilities (Mukono District Development Plan 2010-2015). Partial commercial agriculture exists with farmers like SCOUL sugarcane plantations and tea estates. Commercial farming is characterized by use of migrant labour from West Nile living in labour camps characterized by poor housing, sanitation and with little pay. To date high value crops like vanilla, flowers have boosted and replaced the declining volumes of coffee. However, more farmers who have lost coffee need to be encouraged to take on such crops as a replacement. Subsistence agriculture is characterized by low acreage due to increasing family sizes and partitioning of land, low productivity per unit acre arising from deteriorating soil fertility over cultivation and soil erosion. The females provide most labour and yet the men take most of the biggest share of farm proceeds.

5.3.13.3 Fishing

This is the third largest economic activity in the District. Given that almost three quarters of Mukono's surface area is under water, this provides an adequate fish stock in the catchment area. To date a big number of fish processing industries in Kampala are fed by fish from Mukono. The distribution of landing and available facilities is provided in the District situation analysis.

5.3.14 Road network

According to the District Development Plan, the intensive and quality road network is the backbone of social economic activities in Mukono district. Mukono District has a total motor able feeder road network of about 759 km, and 700 km of community access road normally known as Bulungi Bwansi. The access roads connect rural communities to the sub-county and the district roads connect sub-counties to the district. The only two tarmac roads in Mukono (Kampala-Jinja highway and Mukono-Kayunga road) are national roads under the jurisdiction of UNRA. The transmission line runs parallel to the main Kampala-Jinja highway.

5.3.15 Energy

The energy sources in the district fall into four main categories namely: wood fuel, petroleum products, hydro-electricity and renewable resource like solar energy and biogas. Wood fuel accounts for 96% of the total energy used in the district (Mukono District Development Plan). This has resulted into rampant deforestation and attendant excessive loss of tree cover. Increased demand for wood fuel is due to slow adoption of biogas and solar energy technologies, increased electricity tariffs, high cost of petroleum products and slow rate of rural electrification. The communities use mainly wood fuel and both hydro-electricity for domestic purposes and lighting. The major source of industrial energy at the project area is Hydro Electric Power (HEP) off the national grid and back up usually provided by generators.

5.4 BUIKWE DISTRICT

5.4.1 Geographical location

Buikwe District is a district in the Central Region of Uganda. It is named after its 'chief town', Buikwe, where the district headquarters are located. Buikwe is located approximately 55 kilometres, by road, east of Kampala, Uganda's capital and largest city. This location lies approximately 12 kilometres, by road, southeast of Lugazi, the nearest large town. Figure 5-18 shows the location of Buikwe district in Uganda while Figure 5-19 shows the location of Bujagali Substation.

5.4.2 Administrative Units

Buikwe District has 1 County (i.e. Buikwe) with 8 rural Sub-counties, and 4 Town Councils. The sub-counties are: Buikwe, Kawolo, Najja, Najjembe, Ngogwe, Nyenga, Ssi-Bukunja, and Wakisi; while the Town Councils are: Buikwe, Lugazi, Njeru, and Nkokonjeru. Under these lower Local Governments, there are 65 parishes / wards and 470 Village Councils (Table 5-20). The 132 kV transmission line from Nalubaale ss to Kampala North ss traverses the sub counties of Njeru TC, Wakisi and Najjembe in Buikwe district (Figure 5-18).

Table 5-21: Buikwe Local Governments and Administrative Units

County	Sub-counties	Town Councils	Parishes	Wards	Villages	Zones
Buikwe	8	-	51	14	384	-
	-	4	-	-	-	86
Total	8	4	51	14	384	86

Source: Office of the Chief Administrative Officer / Buikwe District

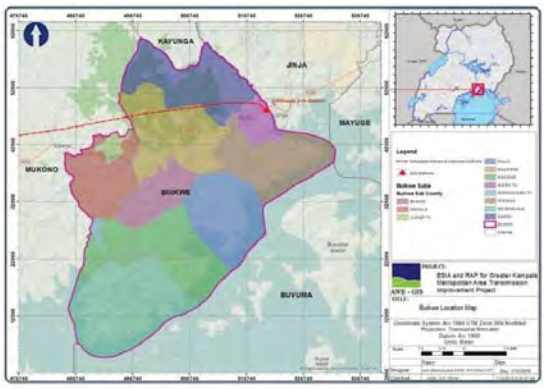


Figure 5-18: Location of Buikwe district and its sub counties

Figure 5-19: Location of Bujagali Substation

5.4.3 Climate

The climate here is tropical. There is a great deal of rainfall in Buikwe, even in the driest month. In Buikwe, the average annual temperature is 21.4°C. In a year, the average rainfall is 1371 mm. The driest month is January, with 69 mm of rain. The greatest amount of precipitation occurs in April, with an average of 193 mm. The climate of Buikwe District is heavily influenced by lakes Kyoga and Victoria as well as Mabira Forest. The district has significant rainfall throughout the year with the driest month still having comparatively more rainfall than most parts of the country.

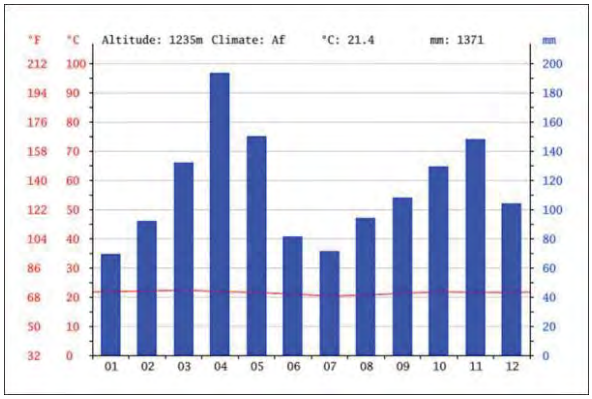


Figure 5-20: Precipitation of Buikwe District

March is the warmest month of the year. The temperature in March averages 22.3 °C. The lowest average temperatures in the year occur in July, when it is around 20.3 °C.

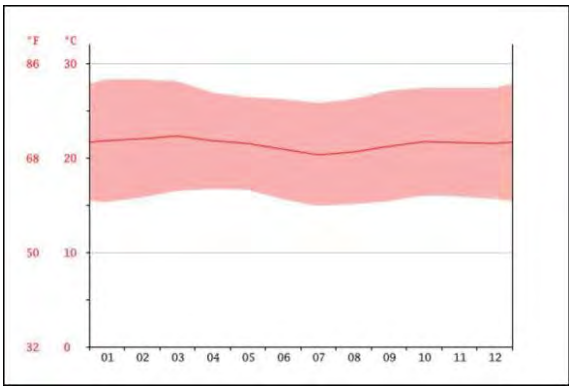


Figure 5-21: Temperature of Buikwe District

5.4.4 Topography

The northern part of the district is flat but the southern region consists of sloping land with great many undulations; 75% of the land is less than 600 in slope (Buikwe District Statistical Abstract 2014/15). Most of Buikwe District lies on a high plateau (1000-1300 m above sea level) with some areas along Sezibwa River below 760 m above sea level, Southern Buikwe is a raised plateau (1220-2440 m) drained by River Sezibwa and River Musamya.

5.4.5 Geology and soils

There are two main categories of soils namely; Ferralitic soils and Ferrisols. The soil types are described as the Buganda catena located in Najjembe, Kawolo and Lugazi; Kyebe catena located in Ngogwe, Nyenga, Njeru and Buikwe; Kifu series located in Buikwe, Nyenga, Najjembe, Wakisi and Kawolo; and Sangfo series located in Buikwe, Najja, Ssi, Nkokonjeru and Ngogwe.

In Mabira forest reserve, it comprises of red soils with incipient laterisation on the slopes and black clay soils in the valley bottoms. According to NatureUganda (2011), there are four principal members of this catena which are described as follows, starting with those at the highest altitude within Mabira forest reserve:

Shallow Lithosols of the highest ridge crests consisting of grey and grey brown sandy loams overlying brashy, yellowish or reddish brown loam with laterite or quartzite fragments and boulders.

Red Earths (Red Latosols) which cover most of the land surface and are strikingly apparent in the large conical termitaria dotting a rather monotonously green landscape. The soil profile consists of up to 30 cm of brown sandy or clay loam overlying uniform orange-red clay to a depth of 3 m or more.

Grey Sandy Soils appearing at the base of the slopes of the catena these may be derived from hill-wash or river alluvium. Underlying the sandy top soils are fine sandy clays of a very pale grey colour mottled to orange brown.

Grey clay usually water logged and occupied by papyrus stand at the base of the catena. Below this are sandy and even pebbly clays. Despite the waterlogged condition for most of the year, surface peat accumulation is rarely more than a few inches thick. The last two members of the catena are very acidic in reaction (pH 3.8 – 4.8) and are deficient in all plant nutrients except sulphur and magnesium.

5.4.6 Vegetation

Generally, the vegetation cover is of the forest/ savannah mosaic characterized by patches of dense forest in the south and scattered trees in shrubs and grassland of the north. Natural forests on private land and government-controlled forests are a characteristic of this region. The wetland vegetation comprise of *Typha, Miscanthus, Hyparrhenia* species, some *cyperaceous* and creepers, mostly convolvulaceae. Swamp forest tree species such as *Pseudospondias microcarpa, Mitrogyra species, Tarbementana, Ficus* spp, *Bridelia micrantha* and *Phoenix reclinata* shrub vegetation include some edible plants such as *Psidium guajava* and *Afromomum angustifolium*. The several species found in the district are utilised by the local community for food, fuel, building materials, medicines and raw materials for especially for crafts.

5.4.7 Demographics

The 2014 national population census conducted by UBOS provided the first results for Buikwe since it attained district status in July 2009. Table 5-22 shows the district's population statistics by sex and sub county. Table 5-23 provides the average household size by sub county.

Table 5-22: Population statistics of Buikwe District by sex and sub county

Sub county / Town Council	Total Households	Population			Sex Ratio
		Male	Female	Total	
Buikwe Sub county	3,965	8,613	9,034	17,647	95.3
Kawolo Sub county	9,692	20,242	20,154	40,396	100.4
Najja Sub county	10,307	22,481	23,871	46,352	94.2
Najjembe Sub county	8,165	16,798	16,612	33,410	101.1
Ngogwe Sub county	8,080	17,997	18,129	36,126	99.3
Nyenga Sub county	10,804	24,278	25,385	49,663	95.6
Ssi-Bukunja Sub county	6,643	13,012	12,596	25,608	103.3
Wakisi Sub county	9,262	20,091	20,941	41,032	95.9
Buikwe Town Council	3,859	7,881	8,752	16,633	90.0
Lugazi Town Council	9,849	19,057	20,426	39,483	93.3
Njeru Town Council	1,6502	38,765	42,287	81,052	91.7

Sub county / Town Council	Total Households	Population			Sex Ratio
		Male	Female	Total	
Nkokonjeru Town Council	2,273	4,228	4,776	9,004	88.5
Grand Total (District)	99,401	213,443	222,963	436,406	95.7

Source: Buikwe District LG Statistical Abstract, 2015

Buikwe district has an area of 1209 square kilometres and hence a population density of 361 persons per sq.km of land in the year 2014. The population density increased from 256 persons per sq.km in the year 2012.

Table 5-23: Average Household size by sub county

Sub county / Town Council	Number of Households	Population	Average HH Size
Buikwe Sub county	3,965	17,647	4.4
Buikwe Town Council	3,859	16,633	4.3
Kawolo Sub county	9,692	40,396	4
Lugazi Town Council	9,849	39,483	3.6
Najja Sub county	10,307	46,352	4.5
Najjembe Sub county	8,165	33,410	4
Ngogwe Sub county	8,080	36,126	4.4
Njeru Town Council	1,6502	81,052	4.2
Nkokonjeru Town Council	2,273	9,004	3.7
Nyenga Sub county	10,804	49,663	4.5
Ssi-Bukunja Sub county	6,643	25,608	3.8
Wakisi Sub county	9,262	41,032	4.4

Source: Buikwe District LG Statistical Abstract, 2015

5.4.8 Land Use and Land tenure System

Land tenure systems differ across Uganda and tenure practices are a mixture of traditional practice, colonial regulations and post-colonial legislation. Land tenure refers to the way land is owned, occupied, used and disposed of within a community. A properly defined and managed land tenure system is essential to ensure balance and sustainable development. Until 1975 there were four types of land tenure systems in Uganda, customary, mailo, freehold and leasehold, (NEMA, 1996). Tenure systems are not confined to particular farming systems and may encompass several farming systems.

Customary land tenure is the most dominant in Uganda, whereby land is owned and disposed of in accordance with customary regulations. Specific rules vary according to ethnic groups and regions. This tenure system also exists on its own as communal land ownership. Customary land tenure was the only land tenure system in operation before colonial rule in the late 19th century. Up to the time of the Land Reform Decree in 1975, land held under customary tenure constituted about 75% of all the land in Uganda (EPRC, 1997). Principal categories of customary tenure are:

a) Communal/tribal tenure where ownership of land occupied by the community or tribe is vested in the paramount tribal leader as owner, who holds it in trust for the entire group.

b) Clan/family tenure where land is vested in the head of the group as owner or trustee for the entire group.

Customary tenure does not recognise individual ownership of land. It only recognises the rights of the individual to possess and use land subject to superintendence by his family, clan or community. The disadvantage is that it does not encourage record keeping, often making it difficult to resolve land use disputes. Environmentally the main disadvantage is that it generates little personal interest in the status of land resources (tragedy of the commons) leading to mismanagement and degradation (NEMA, 1996).

Mailo tenure was introduced as a result of the 1900 Buganda Agreement. Under this agreement, 9000 sq. miles of land were divided between the Kabaka, other notables and the Protectorate government. This area represented half the estimated area of Buganda. The basic unit of sub division was a square mile, hence the name mailo. Initially there were two categories, private mailo and official mailo. In the case of official mailo, grants of land were 17 attached to specific offices in the Buganda government. They could not be subdivided or sold but passed intact from original office holder to his successor. In private mailo, the owner held rights in the land akin to those of freehold and could dispose of land as he wished. Official mailo land was transformed into public land in 1967, with the abolition of kingdoms. Under this system land is held in perpetuity and a certificate of title is issued (EPRC, 1997).
In freehold tenure, ownership is also in perpetuity and a certificate of title is issued. The system was originally established to address limited and specific requirements or requests such as by religious organisations. Freehold tenure was also granted by the Toro Agreement of 1900, Ankole agreement of 1901 and Bunyoro Agreement of 1903. The Crown Lands Ordinance of 1903 gave the British colonial administration power to alienate land in freehold.

Leasehold is where land is held based on agreement between lessor and lessee. There are two types of leasehold tenure agreements, private leases given to individual landlords and official or statutory leases given to individuals and or corporate groups under public act terms. The advantage of the leasehold system is that the lessor can attach conditions to leases and has the right to revoke ownership in case of abuse.

The different land tenure systems affect land use and land management in a variety of ways and have environmental implications.

5.4.9 Literacy and Education

Currently within Buikwe Town Council (BTC) primary and secondary schools are divided into government and private schools. There are currently 19 Primary schools in BTC (nine of which are government aided) and 6 secondary schools (one of which is a government aided).

The key difference between government and private schools is that government aided schools are funded by the state and private schools are funded by private entrepreneurs. The main allocation of

government funding can be seen through; Universal Primary Education fund (UPE), Schools Facility Grant (SFG), teacher salaries, desks & textbooks.

According to the Ministry of Education and Sports (MoES), the primary net school intake rate in the district is 61% and secondary school is 28%. Student-classroom ratio stands at 36 and teacher-student ratio at 17(UBOS 2012). The ratios are low mostly due to absenteeism, distance and disease. The dropout rate for the girl child is 67 % largely due to poor sanitation and hygiene related conditions.
Performance in schools is very low. For example, in 2010 out of 5,024 PLE pupils only 35 passed in grade one, citing similar reasons as above (Kabala Kiwumulo 2012).

5.4.10 Health

Proximity to healthcare facilities is essential in case of occupational accidents during either construction or operation of proposed Washing station. Buikwe district has a number of health facilities that serve the population with a distribution indicated below. Currently the district has one government hospital, and four private hospitals. Table 5-24 classifies the distribution of health facilities within the district.

Table 5-24: Health infrastructure (categories)

Category	Ownership			Total
	Government	PNFP	PFP	
Hospital	1	3	1	5
H/C IV	0	0	0	0
H/C III	12	12	1	13
HC II	17	12	13	35
Total	30	30	15	53

Source: DHO's office - Buikwe

5.4.11 Infrastructure

Buikwe District has two predominant means of transport, namely; water and road. Water transportation of fish and people helps to connect islands and landing sites. This in return has boosted the fishing industry. Some areas are accessible by a ferry but motorised boats ease access to remote and otherwise inaccessible areas.

The transmission line traverses the district parallel to Jinja - Kampala highway, a major tarmac along East Africa's Northern Transport Corridor. However, feeder roads penetrate the district's hinterland where pickup trucks, motorcycles, and bicycles are mostly used to transport goods and people. Generally, some of the parts of the transmission line are accessible by road and this will promote easy access to the line.

5.4.12 Energy

The energy sources in the district fall into four main categories namely: wood fuel, petroleum products, hydro-electricity and renewable resource like solar energy and biogas. Wood fuel accounts for 96% of the total energy used in the district. The communities use mainly wood fuel and hydro-electricity for domestic purposes in cooking and lighting respectively. The major source of industrial energy at the project area is Hydro Electric Power (HEP) off the national grid and back up is usually provided by generators.

5.5 MPIGI DISTRICT

5.5.1 Geographical location

Mpigi District is bordered by Wakiso District to the north and east, Kalangala District to the south, Kalungu District to the southwest, Butambala District to the west and Mityana District to the northwest as shown in Figure 5-22 while Figure 5-23 shows the location of Buloba substation in the district.

5.5.2 Administrative Units

The district was made up of three counties namely; Butambala, Gomba and Mawokota. Butambala and Gomba counties were up graded to districts leaving Mawokota as the only county in Mpigi District. The county is further subdivided into seven (07) sub counties of Buwama, Kamengo, Kiringente, Mpigi, Mpigi Town Council, Muduma and Nkozi. The proposed Buloba substation is located in Kiringente sub county as shown in Figure 5-22. Table 5-25 shows the administrative units of the District.

Table 5-25: Administrative units of Mpigi District

County	No. Sub County	No. Parishes	No. Villages
Mawokota	07	56	386

Source: Planning Unit Mpigi

The county, parish and village are administrative units while the district and sub-counties are local governments which are self-accounting and are corporate bodies. The headquarters of the district is located in Mpigi Town council, about 35kms from Kampala the capital city of the country, 2kms off Masaka highway.

5.5.3 Climate

Mpigi district is known to have a bimodal rainfall pattern with two rainfall seasons, the first during March – May and the second during September-November; and the remaining months are generally dry. It receives a mean annual rainfall of 1320 mm though in many areas of the Lake Victoria zone it is between 1750 and 2,000 mm. The average monthly days of rainfall are thirteen. The minimum temperature in the district is 11 °C while the maximum recorded is 33.3 °C.

5.5.4 Topography

The district lies in the central plateau of Uganda, which comprises undulating hills with deeply incised valleys. The hill summits lie between 1,182 and 1,341 meters above sea level. Seasonal and permanent streams drain much of the low-lying areas. The underlying rocks mainly comprise rocks of Precambrian age that are highly weathered. The most dominant rocks being of the Buganda-Toro system.

5.5.5 Geology and soils

Soils are mainly of the Buganda Catena and are combinations of clay and sandy loams resulting in sandy clay loams. The soils are relatively fertile and favourable for crop production (SOER/Mpigi NEMA 1997).

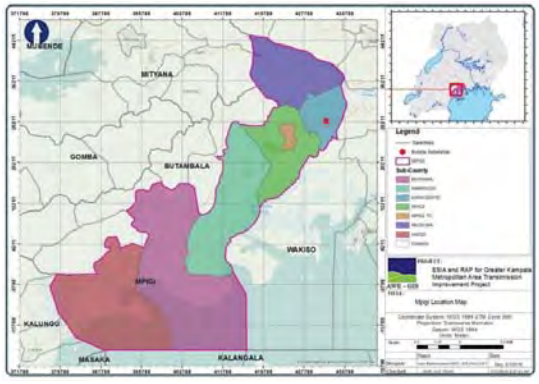


Figure 5-22: Location of Mpigi District and its sub counties

Figure 5-23: Location of Buloba substation in Mukono district

5.5.6 Vegetation

The District is endowed with natural forests, wetlands and water bodies which contribute to the economic well-being of the communities in and around the District. The forest resource in the district is comprised of natural forests both gazetted and private, and plantation forests that can be categorized as tropical high forests, savannah woodlands, broad leaf plantation forests and conifer plantations (NEMA Mpigi 2010). Mpigi has two sites Protected as Wetlands of International Importance (Ramsar sites), Mabamba wetland in Kammengo Sub County and Nabajjuzi wetland in Kabulasoke Sub County.

5.5.7 Demographics

The population size of the district is 251,512 (UBOS 2014).

Table 7.6.3a: Households and Population by Sub county/ Town Council/Urban Division and Sex, 2014

District	Sex		Residence		Population type		Total
	Males	Females	Urban	Rural	Household	Non Household	
Mpigi	125,314	126,198	44,724	207,238	244,780	6,732	251,512

Source: UBOS 2014.

Table 7.6.3b: Households and Population by Sub county/ Town Council/ Urban Division and sex, 2014.

District	County	Sub county	Households		Population		Total
			Number	Average size	Males	Females	
Mpigi	Mawokota	Buwama	12,406	4.0	25,228	25,045	50,273
	Mawokota	Kammengo	8,863	4.2	19,456	18,834	38,290
	Mawokota	Kiringente	5,532	3.7	11,309	11,378	22,687
	Mawokota	Kituntu	4,993	4.5	11,318	11,159	22,477
	Mawokota	Mpigi Town Council	10,567	4.1	21,991	22,283	44,274
	Mawokota	Muduuma	7,616	3.9	15,462	14,941	30,403
	Mawokota	Nkozi	10,279	4.1	20,550	22,558	43,108

Source: UBOS 2014.

5.5.8 Land Use and Land tenure System

The district has a favourable climate for crop production. The main crops grown are food crops, including sweet potatoes, beans, cassava, groundnuts, sorghum, maize, bananas, soybeans, Irish potatoes, and cash crops including coffee, cotton, tea, sugar cane and various fruits and vegetables. The district lies in the coffee-banana farming system with a few places practicing animal grazing.

Table 5-26: Land use in Mpigi District

Land-use type	Hectares	Percentage
Tropical high forests	69,140	13.36

Land-use type	Hectares	Percentage
Conifer plantations	520	0.0010
Woodlands, bush land and grassland	160,390	31.00
Papyrus/Reed swamps	14,830	2.87
Small-scale uniform land	256,590	51.34
Large-scale uniform land	3,460	0.67
Built-up areas	3,430	0.66

Source: Mpigi District Environmental Profile report 1997 (NEMA 1997).

5.5.9 Literacy and Education

The district has a large number of education institutions as summarized in Table 5-27, Table 5-28 and Table 5-29.

Table 5-27: Number of primary schools by ownership per county, Sub County and parish

Category	Number
Government aided primary schools is at	266
Private primary schools is at	104
Government aided secondary schools is at	17
Private secondary schools is at	51

Source: DEO's office

Table 5-28: Number of technical schools by ownership

County	Sub county	No. of technical School Government Ownership	Private Ownership
Mawokota	Buwama		1

Source: DEO's office

Table 5-29: Number of technical colleges by ownership per constituency

Ownership	No. of Technical College
Government	2
Private	1

5.5.10 Health

The health sector comprises of health and environmental departments (Mpigi District Statistical Abstract 2009). The district is sub-divided into two health sub-districts, namely Mawokota North and Mawokota South. The health facilities for both government and non-government distributed in the district are given in Table 5-30. The diseases responsible for morbidity and ill health are ranked in Table 5-31.

Table 5-30: Health Facilities by Type and Location

Health Sub-district	Pop.	Referral Hospital		Referral HC IV		Health Centre III		Health Centre II	
		Public	NGO	Public	NGO	Public	NGO	Public	NGO
Mawokota North	100,683	-	-	1	-	5	2	6	5
Mawokota South	92,179	-	1	-	-	4	1	8	-
		-	1	1	-	9	3	14	5

Source: Health Report Mpigi FY 2009

Table 5-31: Top ten commonest illnesses by percentage

Illness	Percentage (%)
Malaria	31
Intestinal worms	15
Pneumonia	10
Skin diseases	7
Diarrhoea not blood	3
Dental disease condition	3

Source: Health Report Mpigi FY 2009/10

5.5.11 Water Resources

The district has a number of safe water sources in each constituency as summarized in Table 5-32.

Table 5-32: Percentage of safe water coverage (compare 5 or 3 years with national coverage)

Constituency	Average distance to safe water (km)	Piped (popn.)	Boreholes No.	Others		District water level coverage
				SW	SP	
Mawokota North						
Muduuma	2	3,300	16	25	29	
Mpigi Town Council						
Kiringente	2		5	27	47	
Kammengo	2		12	89	60	
Average/Total	1.5	3,300	33	141	136	50
Mawokota South						
Nkonzi	2.5		13	65	0	
Buwama	2		6	102	28	
Kituntu	2.5		5	67	13	
Average/Total	2.33	0	24	234	41	50

Source: District Water Officer Mpigi
SW – Shallow Wells SP – Springs

5.6 SITE SPECIFIC BASELINE

5.6.1 Buloba Substation and Associated Transmission Lines

5.6.1.1 Hydrology and Water Quality

5.6.1.1.1 Hydrology

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

5.6.1.1.2 Water Quality Results and Analysis

Table 5-33 shows the results of the in-situ measurements taken against the National (Untreated) Potable Water Standards provided in APPENDIX 8 while Table 5-34 indicates the results of the laboratory analysis. The NWSC laboratory analysis certificates are attached in APPENDIX 3.

Table 5-33: In-situ Measurements Results – Buloba Project Area

Parameters	Units	Station 1 (Borehole)	Station 2 (Unprotected spring)	Station 3 (Brick making area)	National Standards for Potable Water (Untreated)
pH		6.3	5.94	7.3	6.5 - 8.5
Temperature	°C	25.39	24.44	27.91	20 - 30
Dissolved Oxygen	mg/l	1.3	1.71	1.85	ns
Electrical Conductivity	µS/cm	81	24	112	ns
Total Dissolved Solids	ppm	41	12	56	1200
ORP	mV	-130.3	-138.7	-150.1	ns
Salinity	PSU	0.04	0.01	0.05	ns

Table 5-34: Laboratory Analysis Results – Buloba Project Area

Parameters	Units	Station 1 (Borehole)	Station 2 (Unprotected spring)	Station 3 (Brick making area)	National Standards for Potable Water (Untreated)
pH		5.7	6.5	5.5	6.5-8.5
Total Dissolved Solids	mg/l	59	89	18	1200

Parameters	Units	Station 1 (Borehole)	Station 2 (Unprotected spring)	Station 3 (Brick making area)	National Standards for Potable Water (Untreated)
Total Nitrogen	mg/l	0.9	1.3	1.2	20
Total Phosphorous	mg/l	0.1	0.2	0.2	10
Total Suspended Solids	mg/l	60	13	10	0
COD	mg/l	14	13	18	ns
Fat, Oil & Grease	mg/l	0.8	0.3	5.3	ns

Note: ns – Not specified

The laboratory analysed results indicated on the whole, a generally acceptable water quality in terms of the physicochemical characteristics. The highlighted figures in the table show those parameters that did not meet the national standards as provided in APPENDIX 8.

The results indicated a high value for total suspended solids across all three stations and a low pH at Stations 1 and 3. Suspended solids are expected to be high in surface water sources; however, the cause for this in the borehole sample needs further investigation.

5.6.1.2 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 5-35: Results of baseline air quality measurements - Proposed Buloba site

Location (UTM 36M coordinates)	Total Suspended Particulates (µg/m³)	PM_{10} (µg/m³)	$PM_{2.5}$ (µg/m³)	Notes
432122E, 28384N	1	ND	ND	Proposed sub-station site. Warm sunny weather
432122E, 28581N	1	ND	ND	Nuns' residence. Warm sunny weather
432130E, 28709N	1	ND	ND	Madinah Nursery School. Warm sunny weather
431938E, 28977N	1	ND	ND	Homestead. Warm sunny weather.
431873E, 28847N	1	ND	ND	Homestead/grocery kiosk. Dry sunny weather

Inference from measurements:

In the draft national air quality standards, the limit for total suspended particulates is 300 µg/m³ (APPENDIX 7). The limits for PM_{10} and $PM_{2.5}$ are not specified in the draft National Standards. No detectable levels of PM_{10} and $PM_{2.5}$ were encountered at any of the measurement locations. These

measurements indicate a generally pristine environment with respect to air quality. These values are quite low compared to the draft national standard of 300µg/m³ because of the weather season (wet) during which the measurements were taken.

5.6.1.3 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 noise level audit of the project area.

Table 5-36: Results of ambient noise measurement - Proposed Buloba site

Location	Sound Pressure Level dB(A)				Notes
	L_{Max}	L_{eq}	L_{90}	L_{50}	
432122E, 28384N	62.5	46.2	40.5	42.5	Distant highway traffic. Chirping birds. Rustling leaves. Aircraft flying overhead.
432122E, 28581N	71.5	50.8	38.0	41.5	Distant highway traffic. Chirping birds. Rustling leaves.
432130E, 28709N	78.8	58.4	41.0	52.5	Madinah Nursery School. Pupils reciting in classrooms. Chirping birds. Rustling leaves.
431938E, 28977N	64.6	43.9	37.5	40.0	Homestead. Chirping birds. Rustling leaves. human conversations.
431873E, 28847N	78.3	56.4	40.0	45.5	Homestead/grocery kiosk. Chirping birds. Human conversations.

Inference from measurements:

The NEMA L_{Aeq} standard specifies a day-time limit of 50 dB(A) for residential areas (APPENDIX 6). From this sample of 5 measurement locations, 3 of these locations had an L_{Aeq} above the national limit. This is an indication of an environment already impinged by human activity in relation to noise levels.

5.6.1.4 EMF

The purpose of these measurements is to establish a baseline reference with respect to EMF levels within the project area to which any future related project impacts can be compared. It is not an EMF level audit of the project area.

Table 5-37: Baseline EMF Measurements - Proposed Buloba site

Location	Radio frequency radiation strength (µW/cm²)			Notes
	Horizontal	Vertical	Longitudinal	
432122E, 28384N	0.011	0.015	0.022	Proposed sub-station site.
432122E, 28581N	0.016	0.008	0.029	Nuns' residence.
432130E, 28709N	0.008	0.018	0.009	Madinah Nursery School.
431938E, 28977N	0.019	0.010	0.021	Homestead.
431873E, 28847N	0.012	0.012	0.018	Homestead/grocery kiosk.

Inference from measurements:

Uganda does not have any known regulatory radio frequency electromagnetic force (EMF) exposure standards. However, International Commission on Non-Ionizing Radiation Protection's (ICNIRP) safety limit is 10 W/m² or 1000 µW/cm², implying that the EMF levels at Buloba are much lower than the ICNIRP safety limit.

5.6.1.5 Terrestrial Ecosystem

5.6.1.5.1 Flora

Vegetation Types

The proposed Project area is placed under *Celtis-Piptadeniastrum* Evergreen Forest Ecological Zone. According to Langdale-Brown *et al.* (1964), the area potentially occupied a mosaic of forest regeneration stages, fire climax *Pennisetum purpureum* grasslands and other post-cultivation communities. It is also characterized by mature forest stands. The soils are often rich deep clay loams. Annual rainfall ranges from 1100 to 1500 mm. Langdale-Brown *et al.* (1964) mapped the area traversed by the proposed transmission line as being covered with the following vegetation types:

i. *Cyperus papyrus* Swamp (X1)
ii. Forest/Savanna Mosaic at Medium altitude (F2)
iii. *Piptadeniastrum-Albizia-Celtis* Medium Altitude Moist Evergreen Forest (C2)

a) Wetland

The Project area close to the Kampala-Masaka highway still has wetland habitats, with intact patches in parts. The most intact parts are *Miscanthus-Loudetia-Kotschya* permanent swamp and *Alchornea-Phoenix-Triumfetta-Aframomum* swamp forest (Figure 5-24). However, many parts of the wetland appeared degraded and it was no longer *Cyperus papyrus* as mapped by Langdale-Brown *et al.* (1964) but rather *Miscanthus* dominated.

During the course of the field surveys, a number of wetland habitats were recorded along the proposed transmission line, especially close to the Kampala-Masaka highway. These were all permanently flooded wetlands. The permanent wetlands were mostly composed of *Typha* spp., (Figure 5-25), *Leersia hexandra*, *Miscanthus violaceus* and *Pycreus nitidus* (Figure 5-26). In open pools of water are the purely aquatic species of plant such as *Nymphaea nouchali* var *caerulea* (Figure 5-27).

Figure 5-24: Degraded *Alchornea-Phoenix-Aframomum* swamp forest (A - Figure 5-29); 4th April 2016

Figure 5-25: *Typha* swamp at 36 N 431873 28537; 4th April 2016 (C - Figure 5-29)


Figure 5-26 *: Miscanthus* swamp at 36 N 432643 27722 (left) and at 36 N 431698 29004 (right); 4th April 2016 (E and D - Figure 5-29)


Figure 5-27*: Pycreus* with *Nymphaea nouchali* var. *caerulea* at 36 N 432587 27656; 4th April 2016 (B - Figure 5-29)

b) Forest/Savanna Mosaic at Medium altitude

This kind of vegetation is transitional vegetation that emerges as a result of clearing and general degradation of the original forest. This kind of vegetation was not detectable or was so only to a very limited extent within the project area, most of it having been decimated.

c) Swamp Forest

These are special forested swamps where there is water flooding and with vegetation adapted to conditions of Oxygen deficiency (Langdale-Brown *et al*., 1964). Within the project area, this vegetation type was found in the western end of the transmission line. The dominant plant species in this vegetation is *Raphia farinifera*, a common swamp forest species in central Uganda (Figure 5-28).


Figure 5-28 *: Raphia farinifera* swamp forest at 36 N 431622 29061, 36 N 431511 29104 near end of the transmission line with pylons for Kawanda-Masaka 220 kV Project already partly erected farther away (F and G - Figure 5-29).

Figure 5-29: Ecological study locations

d) *Piptadeniastrum-Albizia-Celtis* Medium Altitude Moist Evergreen Forest.

The natural vegetation of *Piptadeniastrum-Albizia-Celtis* Medium Altitude Moist Evergreen Forest has also nearly completely disappeared owing to major land use changes that have led to conversion of natural habitat and their modification (Forest Department, 2003). The area has been converted to cultivation (Figure 5-25) with patches of planted exotic Eucalyptus woodlots (Figure 5-31).

e) Cultivation areas

The cultivation areas are mainly used for subsistence farming systems of banana inter cropped with other crops (Figure 5-30). They are also intercropped with trees especially *Maesopsis eminii* and others for fruit such as *Persea americana* and *Mangifera indica*. Weeds are very common, both in active cultivation and fallows (Figure 5-30), with such species as *Imperata cylindrica*, *Melinis repens*, *Bidens pilosa*, *Digitaria abyssinica*, *Euphorbia heterophylla*, *Galinsoga parviflora*. *Persea americana* (Avocado) and *Artocarpus heterophyllus* (Jack fruit) trees were also a common occurrence.

The biodiversity conservation value of these areas is therefore low as most species are crops and weeds. However, because farmers tend to plant fruit trees such as mangoes and jack fruits, the volume of woody vegetation in such areas tends to be moderate and this might need consideration for possible compensation.


Figure 5-30: Banana mixed cultivation system with *Maesopsis eminii* and *Mangifera indica* at 36 N 431971 28477 (Left) and cultivated area within the sub-station site (Right) (H- Figure 5-29).

f) Planted Eucalyptus Woodlots

Woodland is a plant community in which the crowns of trees may form a light canopy, often with gaps, and the crowns not interlaced, leafless at certain times of the year (Langdale-Brown *et al*., 1964, Pratt *et al*., 1966). It is a stand of evergreen and/or deciduous trees at least 8 m tall, to 15 m or at most 18 m (Trapnell & Langdale-Brown, 1972) with a canopy cover of 40%, and a ground layer usually dominated by grasses and other herbs (White ,1983). Some sections of planted Eucalyptus Woodlots were identified in the proposed Project area as shown in Figure 5-31.


Figure 5-31: Eucalyptus woodlot in background adjacent to *Miscanthus-Loudetia-Cyperus* wetland in foreground at 36 N 431698 29004 (left) and at 36 N 431933 28544 and 36 N 431873 28537 (right). (I and J - Figure 5-29)

Flora and species richness

The level of naturalness and intactness of the ecosystems traversed by the proposed transmission line is variable. The wetland near Kampala-Masaka highway is fairly intact and one of the most natural habitats for flora and fauna. The wetland closer to the end of the transmission line at the other end is also one of the more intact habitats, but is more degraded than the wetland near the highway.

Areas on higher ground around the proposed sub-station site and up to the wetland at the west end are under active or fallow cultivation. They are thus heavily degraded or totally converted and supporting cultivated plants with very little wild flora. Human modification of the habitats is thus high. Most species encountered are accordingly common ones, and weeds of cultivation. The surveyed sites yielded a total of 87 plant species in 79 genera and 38 families in the sampled areas altogether. The detailed list is provided in APPENDIX 2, Table B1.

Growth Forms

The growth form which registered the highest species richness was Herbs followed by Trees (Figure 5-32). The woody species (Trees and Shrubs) together contributed 46.6% of the species. In terms of species, the woody plants occurred in nearly the same proportion as the non-woody plants. The woody species that were most abundant in terms of cover were: *Phoenix reclinata*, *Alchornea cordifolia*, *Kotschya africana* and *Eucalyptus* sp. in that order, while the most abundant non-woody species were *Pycreus nitidus*, *Miscanthus violaceum*, *Leersia hexandra* and *Typha domingensis* as shown in Table 5-38.

Table 5-38: The top most abundant species by cover in the Buloba project area

Abundance Rank	Species	IUCN conservation status	Origin
Woody species			
1	*Phoenix reclinata*	Not assessed	Indigenous

Abundance Rank	Species	IUCN conservation status	Origin
2	*Alchornea cordifolia*	Not assessed	Indigenous
3	*Kotschya africana*	Not assessed	Indigenous
4	*Eucalyptus sp.*	NA (Not fully determined)	Exotic and planted
5	*Raphia farinifera*		Indigenous
Non-woody species			
1	*Pycreus nitidus*	Not assessed	Indigenous
2	*Miscanthus violaceum*	Not assessed	Indigenous
3	*Leersia hexandra*	Not assessed	Indigenous
4	*Typha domingensis*	Least Concern ver 3.1	Indigenous
5	*Aframomum angustifolium*	Least Concern ver 3.1	Indigenous

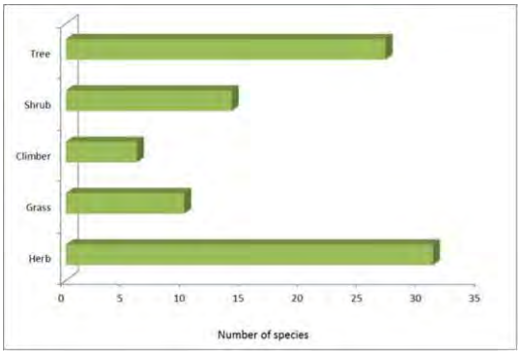


Figure 5-32: The distribution of plant species along the proposed transmission line and sub-station by their growth form

Ecologically sensitive sites

Sensitivity of ecosystems within the project area was assessed in order to identify sites that need to be managed more carefully than others. Sites that are ecologically sensitive have little tolerance to disturbance and have little resilience. The sensitive sites identified are swamps and swamp forest and all such sites identified across the entire proposed power line are presented in Table 5-39 and Figure 5-36

Table 5-39: Ecologically sensitive/fragile sites and habitats along the proposed power route and substation

Vegetation	Site(s)	Reasons for sensitivity
Miscanthus-Loudetia Swamp	36 N 432587 27656, 36 N 431654 28966, 36 N 432643 27722, 36 N 432602 27708, 36 N 431698 29004, 36 N 431622 29061	Permanent wetland with fragile soils and water table
Raphia farinifera swamp forest	36 N 431511 29104	Moderately high biomass of mature trees and other woody plants
Pycreus swamp	36 N 432489 27945, 36 N 432444 27996, 36 N 432465 28018	Permanent wetland with fragile soils and water table

Owing to disturbance, some parts of the natural habitats have been degraded. One of the human activities causing this degradation is brick-making (Figure 5-33) and burning of wetlands (Figure 5-34) which are important habitats. Dumping of waste in the wetlands is another cause of degradation (Figure 5-34).

Figure 5-33: Brick making in wetland habitats at 36 N 432719 27771 (top) and at 36 N 431754 28777 (bottom) (A and B - Figure 5-35).

Figure 5-34 : Wetland burning at 36 N 432278 28184 and evidence of dumping of waste in *Miscanthus-Typha* wetland at 36 N 431754 28777 (C and D Figure 5-35).

Figure 5-35: Locations where wetland degradation was observed

Figure 5-36: Ecological Sensitive locations

Plant species of conservation consideration

No plant species of conservation significance were recorded within or around the project area, neither along the proposed transmission line nor in the sub-station area. It is, however, important to note that the survey was carried out once, and only at the end of the wet season. This might have influenced the records as some species (annuals) are only seasonal.

Although no species of conservation significance were encountered, some plant species worth consideration were observed in the area. These include the following:

a) The tree species *Maesopsis eminii* is on Uganda's National Forestry Authority 'Reserved Species' list, and is therefore protected from exploitation and threat to its habitats. It is a fast-growing species used for fire wood and timber. It was not abundant within the project area and was recorded near the sub-station site at 36 N 432224 28254.

b) The invasive species *Lantana camara* (Figure 5-37) is a result of introduction in Uganda, with a large potential to suppress the indigenous species of plants (Cronk & Fuller, 1995, 2001, Global Invasive Species Programme, 2003, Johnstonne & Githongo 1997). It was recorded from only one area at 36 N 432719 27771, but at very low level of abundance (APPENDIX 2, Table B1). *Lantana camara* thrives with disturbance (Cronk & Fuller 2001, Duggin & Gentle 1998). Its presence makes the indigenous flora in any given area susceptible to suppression effects (Cronk & Fuller 2001, Global Invasive Species Programme, 2003, Howard, 2009, Howard & Matindi, 2003). The Lake Victoria Basin has been pointed out as having a number of exotic plant invasions (Lake Victoria Basin Commission, 2007).

Figure 5-37: Invasive *Lantana camara* at 36 N 432719 27771 (mapped Figure 5-38)

Figure 5-38: Locations of plant species worth consideration

5.6.1.5.2 Fauna

A. Invertebrates (Lepidoptera and Odonata)

Ecotype groups among Butterflies

The area was dominated by butterflies that prefer open expanses ('O'), the wide spread species ('W') and forest edge/bush dwellers ('f') while least records were made for migrants (M). The proportion of butterflies that are swamp specialist ('S') was low (10%) a scenario probably caused by the high levels of agriculture and brick making which are negative correlates with species diversity (Akite, 2008). Forest specialists (F) and species of unknown habitat preference (U) had equal percentages (7%). Figure 5-39 shows the percentage abundances of the butterfly ecotypes encountered during the study.

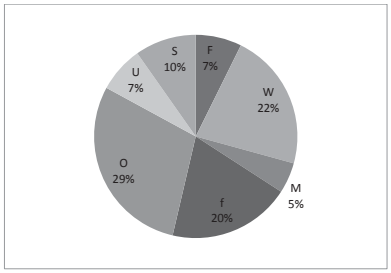


Figure 5-39: Percentage abundance of ecotype groups in the survey area

Dragonflies and Damsel flies

The richness of dragonflies and damselflies was poor in the survey area with only six individuals of order odonata to which both dragon flies and Damsel flies belong. Table 5-40 shows the individuals encountered their published preferred habitats as well as their current conservation status according to IUCN (van Swaay, 2010).

Table 5-40: Dragon flies and Damsel flies encountered in the survey area

Species	Common name	Preferred habitat	Conservation status
Palpopleura lucia	Lucia widow	W	LC
Orthetrum chrysostigma	Epaulet skimmer	W	LC
Crocothemis erythraea	Scarlet dragon fly	S	LC
Trithemis arteriosa	Red-veined drop wing	S	LC
Pseudagrion hageni	Migrant hawker	S	LC
Trithemis kirbyi	Orange-winged dropwing	S	LC
Key: W-wide spread S-Swamp			

Human activity impacts

Much of the human activities in the area whose biggest part is a wetland are through mixed gardens and small scale Eucalyptus plantations. Brick making represented by bricks lay to dry and mud ditches containing open water follow. Figure 5-40 shows the major human activities ranked in terms of prevalence in the survey area.

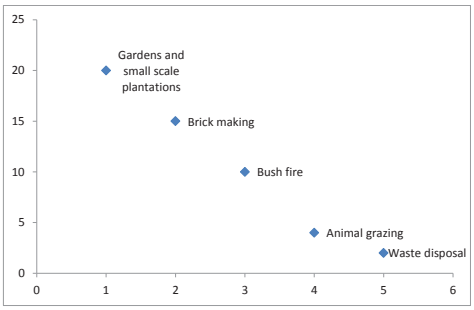


Figure 5-40: A rank of the level of human activities in the survey vs prevalence

B. Herpetiles

Point B1-B3 (432771E, 27790N - Figure 5-42**)**

The vegetation at this point is characterised by marshy vegetation which is degraded with extensive clay mining for brick making (Figure 5-41). The excavated areas with time fill up with water providing a suitable environment for breeding of amphibians. A total of 47 individuals of herpetiles were recorded at this point representing 18 species. 14 amphibians including *Xenopus victorianus*, *Amnirana galamensis*, *Haplobatrachus occipitalis*, *Ptychadena mascareniensis* (Figure 5-43), *Hemisus guineensis* and *Phrynobatrachus natalensis* of which *P.natalensis* (19%) was the most abundant followed closely by *P.mascareniensis* (15%) APPENDIX 2, Table B3; 4 reptiles which are *Mabuya striata*, *Phylothamnus semivariegatus*, *Phylothamnus angolensis* and *Mabuya maculirabris* (APPENDIX 2, Table B3;).

Figure 5-41: Ponds created as a result of clay mining in the project area

Figure 5-42: Herpetiles Sampling Locations - Buloba

Point B4-B6 (432360E, 28041 -Figure 5-42**)**
The point is characterised with a degraded marshy vegetation, saturated grasses and evidence of cattle grazing with one permanent stream flowing through at point 432326 E, 28082N. A total of 31 individuals of herpetiles were recorded around this point representing nine species i.e. six amphibians which are; *Hyperolius viridiflavus*, *Ptychadena mascareniensis*, *Amietophrynus maculates*, *Hyperolius cinnamomeoventris*, *Haplobatrachus occipitalis* and *Amientia angolensis* where *P.mascareniensis* (26%) and *H.viridiflavus* (23%) were the most abundant; and three reptiles which are *Phylothamnus angolensis*, *Leptotyphlops scutifrons* and *Mabuya maculirabris* (APPENDIX 2, Table B3).

Substation (432153E, 28313N - Figure 5-42**)**
The vegetation of this area is a mixture of gardens and fallow lands. A total of 19 individuals were recorded from this point representing 10 species (three amphibians and seven reptiles). Amphibians recorded were *Amietophrynus maculatus*, *Amietophrynus regularis* and *Hyperolius viridiflavus* (APPENDIX 2, Table B3). Reptiles recorded included *Mabuya maculirabris* (26%) which was the most abundant followed by *Mabuya striata* (21%), *Acanthocercus atricolis* and *Bitis arietans* a common species in arable lands (APPENDIX 2, Table B3)

B16-B23 (431811E, 28797N - Figure 5-42**)**
This point is dominated by marshes, gardens and fallow lands, with substantial evidence of clay mining for brick making. A total of 43 individuals of herpetiles were recorded representing 15 species (10 amphibians and 5 reptiles) (APPENDIX 2, Table B3). Amphibians recorded here included *Haplobatrachus occipitalis* (19%) which was the most abundant followed by *Hyperolius viridiflavus* and *Ptychadena mascareniensis* (12%); *Ptychadena ancheate*, *Kassina senegalensis* and *Xenopus victorianus*. Reptiles recorded were *Mabuya maculirabris*, *Drysdalia coronoides*, *Lamprophis fuliginosus*, *Phylothamnus angolensis* and *Mabuya striata*.

Figure 5-43: *Ptychadena mascareniensis* one of the most abundant Species in the project area

B18-B24 (431693E, 29067N - Figure 5-42**)**
The vegetation at this point is characterised by fallow lands, eucalyptus plantation and degraded marshy vegetation with extensive clay mining for brick making. A total of 28 individuals of herpetiles were recorded around this point representing 12 species (seven amphibians and five reptiles). Amphibians recorded included *Amientia angolensis*, *Hyperolius cinnamomeoventris*, *Xenopus victorianus* and *Haplobatrachus occipitalis* which were the most abundant with 21% (APPENDIX 2,). Reptiles recorded included *Bitis arietans*, *Leptotyphlops scutifrons* and *Naja melanoleuca* (APPENDIX 2, Table B3).

B20-B22 (431402E, 29157N - Figure 5-42**)**
This point is dominated by gardens and fallow lands with a water point which locals use for domestic water, the point is also utilized by amphibians for breeding. A total of 23 individuals of herpetiles were recorded representing 11 species (three amphibians and eight reptiles). Amphibians recorded are, *Amietophrynus regularis*, A*mietophrynus maculatus* and *Hyperolius viridiflavus*. Reptiles recorded included *Mabuya maculirabris*, *Bitis arietans* and *Psammophis mossambicus*. *Hyperolius viridiflavus* was the most abundant with 26% followed by both *Mabuya maculirabris* and *Acanthocercus atricolis* with 13% APPENDIX 2, Table B3).

Species of conservation concern
The species encountered during the study are widely distributed in Uganda and in other countries. No species of conservation concern were encountered or recorded.

C. Birds
For the time invested, there was a surprisingly rich diversity of birds recorded in the project area. APPENDIX 2, Table B4 lists the species recorded using the TSC method. A total of 60 species were recorded of which, a total of 34 (APPENDIX 2 and Table 5-41) have particular habitat preferences. No globally-threatened species were observed. The species' preferred habitats and migratory status are indicated in APPENDIX 2, Table B4.

Table 5-41: Numbers of species recorded with particular habitat preferences

Habitat preference	Number of species
F	5
f	16
fW	2
W	7
WW	4
Grand Total	**34**

In total 21 species are dependent on the presence of some tree stand either as forest generalists or forest visitors. Majority of the species recorded are fairly widely occurring and are not classified under any of the IUCN threat categories globally or locally. One species, The Great White Egret *Casmerodius albus* listed as Vulnerable at the East Africa regional level (Bennun *et al.* 2000), was recorded.

Based on the mean scores for the birds recorded (APPENDIX 2, Table B4), and using a mean score of three as the cut-off, 16 of the recorded species, occurred fairly regularly in the counts and may be

described as fairly common in the project area. The Common Bulbul (*Pycnonotus barbatus*) and Fan tailed Widowbird (*Euplectes axillaris*), although of no particular conservation concern, were the commonest of all species recorded.

The project area has an area of degraded swamp vegetation, some bush and cultivated areas. The majority of species recorded are those that would survive in human modified landscapes except perhaps for the three F species (APPENDIX 2, Table B4).

Three species of birds of prey (Lizard Buzzard *Kaupifalco monogrammicus*, Long crested Eagle *Lophaetus occipitalis*, Black-shouldered Kite *Elamus caeruleus*) were recorded in the project area. The presence of top predators such as these indicates the presence of their prey base which would be comprised of small vertebrates (rodents, shrews, lizards and amphibians). From the mean scores for these species (APPENDIX 2, Table B4), the three species were not very numerous.

Several waterbirds (APPENDIX 2, Table B4) were also recorded. The survival of such species is dependent on presence of open water and/or wetland habitats, the disappearance of which could affect the survival of such species. Four species (Common Squaco Heron, Great Egret, White-faced Whistling Duck, and Malachite Kingfisher) are dependent on the water/wetland habitats and could therefore be affected by alteration or disappearance of their preferred habitat.

Species of conservation concern
One species; Great Egret *Casmerodius albus* is the only species recorded that is listed as Vulnerable at the regional level.

D. Mammals
Several species of small mammals would have the ability to survive in even degraded wetland habitats as well as agro-ecosystems. If we had had time to trap, it is very possible that we would have recorded a good number of species. Based on the knowledge of small mammal ecology and the nature of the land cover, the list of rodents in Table 5-42 is considered a potential partial list of species that could occur in the uncultivated parts of the area to be impacted.

Table 5-42: Mammal species for the project area

Order	Species	IUCN conservation status
Primate	Vervet Monkey *Chlorocebus aethiops.*	LC
Carnivora	Side Stripped Jackal *Canis adustus*	LC
	Marsh Mongoose *Atilax paludinosus*	LC
	Egyptian Mongoose *Herpested ichneumon*	NA
	White tailed Mongoose *Ichneumia albicauda*	LC
Rodentia	Shaggy swamp rat *Dasymys incomtus*	LC
	Harsh furred Mouse *Lophuromys aquilus*	LC
	Harsh furred Mouse *Lophuromys sikapusi*	LC
	Nile grass rat *Arvicanthis niloticus*	LC
	Zebra Mouse *Lemniscomys striatus*	LC

Species of conservation concern

None of the mammal species recorded is of particular conservation concern.

5.6.1.6 Land Use

Figure 5-45 shows the different types of land use in the Project area. Most of the area was undeveloped land, with a few sections cultivated (food crops and planted forests). Other land uses included brick making in the swampy areas. Figure 5-44 also shows some of the crops on the land within the project area.

Figure 5-44: Planted forests (A and C), Swamp (B) and Maize garden (D)

Figure 5-45: Land use in the proposed Buloba Component Project area

5.6.1.7 Topography

The area around the Project site is mostly a low-lying area with an altitude between 1170 m and 1190 m above sea level.

5.6.2 New Mukono Substation and Associated Transmission Lines

5.6.2.1 Hydrology and Water Quality

5.6.2.1.1 Hydrology

The site is drained by a number of small tributaries that form part of the bigger Ssezibwa drainage network as indicated in Figure 5-46. The drainage system in the project area can be described as dendritic. Results from site visits and observation of local topography, site geology and weather conditions, noticeable perennial streams could be observed in the area (Figure 5-47). The project area consists of gently sloping valleys. The project is located 500 m to 1000 m on the left bank of river Kasala. River Kasala flows in a north then joins River Kisamba which flows southerly through Nandagi forest reserve. Privately dug drains have been established in the nearby fields to drain off excess water.

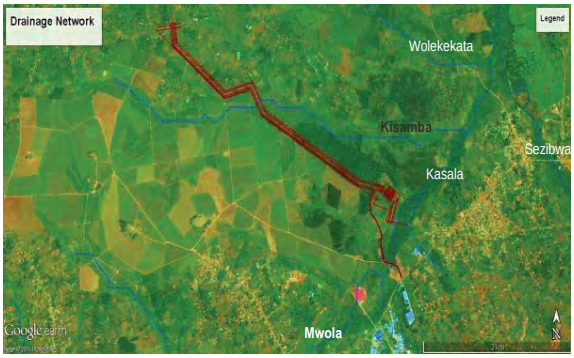


Figure 5-46: Drainage Network in the Project Area

Though the vegetation in some sections of the catchments of Kasala and Kisamba has been degraded, the potential to runoff is only limited to agricultural field due to poor soil conservation practices. However surface runoff especially at substation site can consist of overland flow during the construction phase of the project. In addition there were no signs of localized flooding; the water stays within the range of the vegetation along the streams since the floodplains have not been encroached on yet.

5.6.2.1.2 Surface water abstraction

There are no major abstractors upstream or downstream of the project area. There were no signs of surface water runoff management facilities. However there are upstream before the project site factories discharge effluent into streams. Based on the water quality results obtained at 3 points (Upstream before project site, downstream after project site and at point where the stream is joined by other streams. A generally acceptable water quality in terms of the physicochemical characteristics expect total nitrogen levels which never met the national standards. High value for total suspended solids across all three sampling locations. Suspended solids are expectedly high in surface water sources and particularly in these locations which were surrounded by dense vegetation.

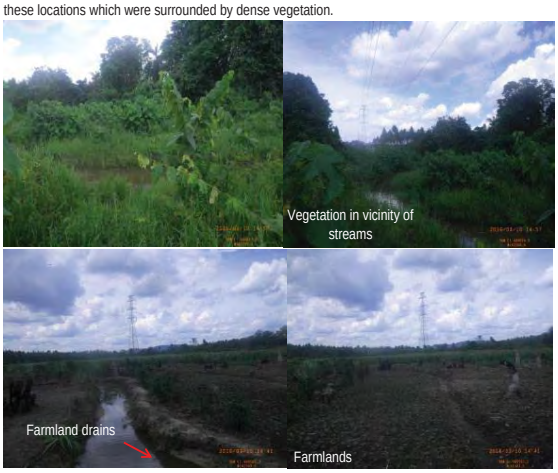


Figure 5-47: Surface water courses in the Project area

5.6.2.1.3 Water Quality Results and Analysis

Table 5-43 shows the results of the in-situ measurements taken against the National (Untreated) Potable Water Standards provided in APPENDIX 8 while Table 5-36 indicates the results of the laboratory analysis. The NWSC laboratory analysis certificates are attached in APPENDIX 3.

Table 5-43: In-situ Measurements Results – Mukono component

Parameters	Units	Station 1 (Upstream)	Station 2 (Downstream)	Station 3 (Culvert crossing)	National Standards for Potable Water (Untreated)	Japanese standard for river water (Class D waters*)
pH		7.23	7.33	7.7	6.5-8.5	6.0-8.5
Temperature	°C	22.50	22.58	22.86	20-30	ns
Dissolved Oxygen	mg/l	4.74	4.96	4.90	ns	>2
Electrical Conductivity	µS/cm	126	126	144	ns	ns
Total Dissolved Solids	ppm	63	63	72	1200	ns
ORP	mV	-117.0	-129.3	-132.2	ns	ns
Salinity	PSU	0.06	0.06	0.07	ns	ns

*: Industrial water class II, agricultural water (please refer to http://www.env.go.jp/en/water/wq/wp.pdf for details)

Note: ns – Not specified

Table 5-44: Laboratory Analysis Results – Mukono Project Area

Parameters	Units	Station 1	Station 2	Station 3	National Standards for Potable Water (Untreated)
pH		7.7	7.5	7.6	6.5-8.5
Total Dissolved Solids	mg/l	29	26	33	1200
Total Phosphorous	mg/l	2.2	0.8	0.4	10
Total Suspended Solids	mg/l	15	17	27	0
COD	mg/l	39	27	23	ns
Fat, Oil & Grease	mg/l	2	15	17	ns

Note: ns – Not specified

The laboratory analysed results indicated on the whole, a generally acceptable water quality in terms of the physicochemical characteristics. The highlighted figures in the table show those parameters that did not meet the national standards as provided in APPENDIX 8.

The results indicated a high value for total suspended solids across all three sampling locations. Suspended solids are expectedly high in surface water sources and particularly in these locations which were surrounded by dense vegetation.

5.6.2.2 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 5-45 presents the results of the baseline air quality measurements along the proposed Mukono line route.

Table 5-45: Results of baseline air quality measurements - Proposed Mukono line route

Location (UTM 36M coordinates)	Total Suspended Particulates (µg/m³)	PM_{10} (µg/m³)	$PM_{2.5}$ (µg/m³)	Notes
480605E, 41823N	1	ND	ND	NFA camp. Cool dry weather.
480527E, 42663N	1	ND	ND	Proposed sub-station perimeter. Motorcycle traffic. Warm sunny weather.
478224E, 44127N	1	ND	ND	Homestead. Warm sunny weather.
477419E, 44615N	1	ND	ND	Homestead. Distant motorcycle traffic. Warm sunny weather.

Inference from measurements:
In the draft national air quality standards, the limit for total suspended particulates is 300 µg/m³ (APPENDIX 7). The limits for PM_{10} and $PM_{2.5}$ are not specified in the draft National Standards. No detectable levels of PM_{10} and $PM_{2.5}$ were encountered at any of the measurement locations. These measurements indicate a generally pristine environment with respect to air quality. These values are quite low compared to the draft national standard of 300µg/m³ because of the weather season (wet) during which the measurements were taken.

5.6.2.3 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 5-46 presents the results of the baseline noise level measurements taken along the proposed line route.

Table 5-46: Results of baseline noise level measurements - Proposed Mukono line route

Location	Sound Pressure Level dB(A)				Notes
	L_{Max}	L_{eq}	L_{90}	L_{50}	
480605E, 41823N	60.6	49.1	45.5	48.5	NFA camp. Chirping birds. Distant highway traffic. Human conversation.
480527E, 42663N	67.0	45.2	34.5	38.5	Proposed sub-station perimeter. Motorcycle traffic. Chirping birds.
478224E, 44127N	72.3	47.2	34.5	38.0	Homestead. Crowing cockrel. Human conversations. Chirping birds.
477419E, 44615N	76.2	45.6	36.5	40.0	Homestead. Distant motorcycle traffic. Human conversations. Chirping birds.

Inference from measurements:
The NEMA L_{Aeq} standard specifies a day-time limit of 50 dB(A) for residential areas (APPENDIX 6). From this sample of 4 measurement locations within and near to the boundary/fence line of the substation/transmission line, none of these locations had an L_{Aeq} above the national limit. This is an indication of a pristine environment in relation to noise levels.

5.6.2.4 EMF

The purpose of these measurements is to establish a baseline reference with respect to existing EMF strength within the project area to which any future related project impacts can be compared. It is not an EMF strength audit of the project area. Table 5-47 presents the results of the baseline EMF measurements along the proposed line route.

Table 5-47: Baseline EMF Measurements - Proposed Mukono line route

Location	Radio frequency radiation strength (µW/cm²)			Notes
	Horizontal	Vertical	Longitudinal	
480605E, 41823N	0.010	0.010	0.016	NFA camp
480527E, 42663N	0.015	0.013	0.009	Proposed sub-station fence line
478224E, 44127N	0.008	0.013	0.007	Homestead
477419E, 44615N	0.014	0.019	0.011	Homestead.

Inference from measurements:
Uganda does not have any known regulatory radio frequency electromagnetic force (EMF) exposure standards. However, International Commission on Non-Ionizing Radiation Protection's (ICNIRP) safety limit

is 10 W/m² or 1000 µW/cm², implying that the EMF levels at Mukono are much lower than the ICNIRP safety limit.

5.6.2.5 Terrestrial Ecosystem

5.6.2.5.1 Flora

Vegetation Types

Langdale-Brown *et al.* (1964) recognized one ecological zone covering this stretch: Zone 7 = the ecological zone of *Celtis-Piptadeniastrum* Evergreen Forest. This ecological zone covers the north eastern shore of Lake Victoria within which the proposed project area falls. The more pristine vegetation in the general landscape of this the project area was forest and wetland. The vegetation type was characterized by Langdale-Brown *et al.* (1964) as *Piptadeniastrum-Albizia-Celtis* Medium Altitude forest in mixture with Forest/Savanna Mosaic. Mabira Central Forest Reserve, about 10 km east of the project area, is the more natural in the general landscape. It is an Important Bird Area (IBA) (Byaruhanga *et al.*, 2001, NatureUganda, 2010). Nandagi Forest is much more degraded with exotic plantation and clear evidence of cultivation in many parts.

Langdale-Brown *et al.* (1964) mapped the area traversed by the proposed transmission line and sub-station as being covered with the following vegetation types:

i) *Piptadeniastrum-Albizia-Celtis* Medium Altitude Moist Evergreen Forest (C2)
ii) Forest/ Savanna Mosaic at Medium altitude (F2)

These have on the whole, been decimated to only relics and degraded patches or even totally converted areas. There is a lot of cultivation and post-cultivation in the entire area, including within the boundaries of Nandagi Forest Reserve. Most of the natural vegetation has been lost or badly degraded and impoverished. The types of vegetation still observable in the project area include those described below:

i. Wetland

The Lake Victoria Basin wetlands are suitable habitats for a wide range of flora such as *Phoenix reclinata* (Date Palm), *Cyperus papyrus* (Papyrus), *Typha* spp. (Bulrushes), several grass species e.g. *Loudetia phragmitoides* and *Miscanthus violaceum*. These wetlands fringing the Lake Victoria shores are considered the most productive ecosystems in the basin (Lake Victoria Basin Commission 2007). Within the project area, wetlands were observed in the low lying areas, e.g. close to the Kampala-Jinja highway where there were still wetland habitats, with intact permanent patches in parts (Figure 5-48). There were other parts of the project area with wetland habitats but many of these were already degraded with human activity. The relatively more permanent wetlands were mostly composed of *Cyperus papyrus* (Figure 5-48), *Leersia hexandra* and *Pycreus nitidus* (Figure 5-49) and occasionally with *Typha* sp. (Figure 5-50). Most of them are degraded (Figure 5-50 and Figure 5-51) with only a few small fairly intact patches.

Figure 5-48 *Cyperus papyrus* swamp at 36 N 480707 041772; 7th May 2016 – (mapped in Figure 5-53)

Figure 5-49 *Pycreus nitidus-Leersia* swamp

Figure 5-50 Degraded wetland at 36 N 477792 44156 (1415) with *Typha* sp. (right) – (mapped in Figure 5-53)

Figure 5-51: Degraded wetland patch at 36 N 480670 42363 (mapped in Figure 5-53)), just outside the sub-station site; 7th May 2016

i. Forest / Savanna Mosaic at Medium altitude

This kind of vegetation is transitional, it emerges as a result of clearing and general degradation of the original forest. This kind of vegetation was not detectable or was so only to a very limited extent within the project area, most of it having been decimated.

ii. Swamp Forest

These are special forested swamps where there is water flooding and with vegetation adapted to conditions of Oxygen deficiency (Langdale-Brown *et al*., 1964). Within the project area, this vegetation type was found mainly in the eastern end of the project area. The dominant plant species in this vegetation is *Phoenix reclinata*, a common swamp forest species in central Uganda (Figure 5-52).

Figure 5-52 Degraded *Phoenix* swamp forest at 36 N 480886 42227 (left) and close to sugar cane plantation at 36 N 478051 43761; 6th May 2016 - – (mapped in Figure 5-54)

Figure 5-53: Sample location of wetlands

Figure 5-54: Location of swamp forests in the Project area

iii. Piptadeniastrum-Albizia-Celtis Medium Altitude Moist Evergreen Forest

The natural vegetation of *Piptadeniastrum-Albizia-Celtis* Medium Altitude Moist Evergreen Forest has also nearly all disappeared owing to major land use changes that have led to conversion of natural habitat and their modification (Forest Department 2003). But riverine forest may be found in some areas of Nandagi Forest Reserve e.g. at 36 N 480708 041796 (Figure 5-55) and non-riverine forest e.g. at 36 N 480364 42438 Figure 5-56). There are also very small forest relics left in a sea of cultivation, e.g. at 36 N 477345 44859 near the western end of the proposed transmission line (Figure 5-57).

Figure 5-55 Riverine forest at 36 N 480708 041796; 7th May 2016 – (mapped in Figure 5-54)

Figure 5-56 Forest in Nandagi Forest Reserve at 36 N 480364 42438 (left) and at 36 N 480464 42552 (right); 6th May 2016– (mapped in Figure 5-54)

Figure 5-57 Forest relic at 36 N 477345 44859 near the western end of the proposed transmission line; 6th May 2016 – (mapped in Figure 5-54)

iv. Cultivation areas

Most of the project area is currently under cultivation (Figure 5-58 - Figure 5-60) and consequently, most of the trees have been felled.

The cultivation is mainly subsistence farming of mixed crops. They are also intercropped with trees especially *Maesopsis eminii* and others for fruit such as *Persea americana* and *Mangifera indica*. Weeds are very common, both in active cultivation and fallows. These areas have a low biodiversity conservation value as most species are crops and weeds.

Figure 5-58: Cultivation at 36 N 477455 44880 (1412) May 6th 2016

Figure 5-59 Fallow at 36 N 477472 44656 (left) and 36 N 477201 44619; May 6th 2016

Figure 5-60 Cultivation at 36 N 477201 44619 and near the sub-station site at 36 N 480591 42505; May 6th 2016

v. Exotic planted woodlots

A number of exotic plantations of variable size are observable within the project area (Figure 5-64), including within the Nandagi Forest Reserve. The main species planted are of *Pinus (*Figure 5-61), *Eucalyptus* (Figure 5-62) and *Terminalia superba* (Figure 5-63). Because these are managed and maintained for commercial timber gains, they do not support much biodiversity as the natural regeneration of vegetation underneath is suppressed.

Figure 5-61 *Pinus* plantation at 36 N 480364 42438 and 36 N 480454 42651 in Nandagi Forest Reserve; 7th May 2016

Figure 5-62 *Eucalyptus* plantation at 36 N 480744 42482

Figure 5-63 *Terminalia* plantation in wetland at 36 N 478789 43740; 6th May 2016

Figure 5-64: Location of exotic planted woodlots

Flora and species richness

The level of naturalness and intactness of the ecosystems traversed by the proposed transmission line and sub-station is variable. The Nandagi Forest Reserve has variable ecological integrity in different parts, some fairly intact, but most are degraded forest while others are totally converted. Nonetheless, this forest reserve still provides the least degraded habitat within the project area. Most of the wetlands have either been totally lost or badly degraded. It is the papyrus wetlands closer to the forest reserve headquarters which is more intact. Areas on higher ground around the proposed sub-station site are under exotic plantation. The rest of the areas have been subjected to high human modification and are under active or fallow cultivation with very little wild flora and hence low biodiversity value. The surveyed sites yielded a total of 180 plant species in 146 genera and 61 families in the sampled areas altogether (APPENDIX 2, Table M1).

Growth Forms

The growth form which registered the highest species richness was Trees followed by Herbs (Figure 5-65). The woody species (Trees and Shrubs) together contributed nearly half (49.4%) of the species richness. Therefore, in terms of species, the woody plants occurred in nearly the same proportion as the non-woody plants. In terms of cover, however, the Trees and Grasses were the most abundant (Figure 5-66).

Herbs were thus represented by many species of plants but their cover was lower than of Grasses even though the latter were represented by a considerably lower number of species than Herbs.

The woody species that were most abundant in terms of cover were: *Pinus* sp., *Eucalyptus* sp., *Terminalia superba* in that order (Table 5-48). The most abundant non-woody species were *Leersia hexandra*, *Desmodium adscendens,* and *Acalypha ornata.*

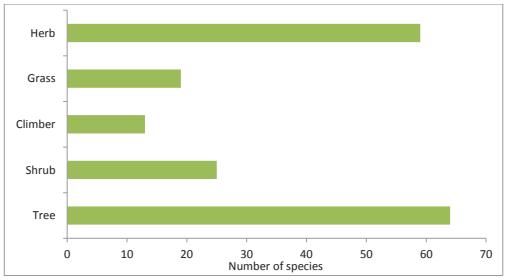


Figure 5-65: The distribution of plant species by their growth form

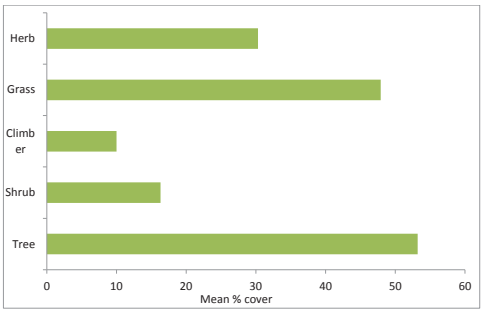


Figure 5-66: Mean cover of the plants by life form

Table 5-48: The top most abundant species by cover in the Mukono project area

Abundance Rank	Species	IUCN conservation status	Origin
Woody species			
1	*Pinus* sp.	NA (Not fully determined)	*Exotic*
2	*Eucalyptus* sp.,	NA (Not fully determined)	*Exotic*
3	*Terminalia superba*	Not assessed	*Exotic*
4	*Toona* sp.	NA (Not fully determined)	*Exotic*
5	*Alchornea coridfolia*	Not assessed	*Indigenous*
Non-woody species			
1	*Leersia hexandra*	Not assessed	*Indigenous*
2	*Desmodium adscendens*	Not assessed	*Indigenous*
3	*Acalypha ornata*	Not assessed	*Indigenous*
4	*Panicum maximum*	Not assessed	*Indigenous*
5	*Renealmia congolana*	Not assessed	*Indigenous*

Ecologically sensitive sites

The level of sensitivity of habitats within the project area was assessed so that sites that need to be managed more carefully than others may be identified. Sites that are ecologically sensitive have little tolerance to disturbance and have little resilience. The sensitive sites identified are wetlands and forest as presented in Table 5-49 and indicated in Figure 5-68.

Table 5-49: Ecologically sensitive / fragile sites and habitats along the proposed power transmission line and sub-station

Vegetation	Reasons for ecological sensitivity
Swamp	Permanent wetland with fragile soils and water table
Swamp forest	Moderately high biomass of mature trees and other woody plants
Forest	Woody biomass

Owing to disturbance, some parts of the natural habitats have been degraded, many severely. One of the human activities causing this degradation is tree felling (Figure 5-67).

Figure 5-67 *Maesopsis eminii* tree felled

Figure 5-68: Mukono - Locations of ecologically sensitive sites

Areas with restricted range, endemic, rare and threatened species

Only one plant species of conservation significance was recorded within the project area, *Jacaranda mimosifolia* (see Figure 5-77 for the observed location). This species is globally threatened and assessed by IUCN as Vulnerable (VU B1+2ac). In Uganda, this species is not a protected species and may be used for firewood and occasionally timber. A single individual tree of this species was recorded at 36 N 478452 43817, in post cultivation/fallow area. It is, however, important to note that the survey was carried out once, and only during the wet season. This might have influenced the records as some species (annuals) are only seasonal. Other plant species for consideration are given in Table 5-50.

Table 5-50: Other plant species of conservation consideration

Scientific name	Common name	IUCN / National conservation status
Milicia excelsa	African teak (Mvule tree)	Lower risk/ Near threatened ver 2.3.
Maesopsis eminii	Umbrella tree	'Reserved Species' on Uganda's National Forestry Authority
Lantana camara	Wild-sage	Invasive species, an introduced and now naturalized species in Uganda
Broussonetia papyrifera	Paper mulberry	Not yet been assessed for the IUCN red list. Invasive species
Mimosa pigra	The giant sensitive tree	Not yet been assessed for the IUCN red list. Invasive species
Ricinus communis	Castor bean	Not yet been assessed for the IUCN red list. Invasive species

Figure 5-69: Location of species for consideration

No species of conservation significance were encountered. Nonetheless, some plant species worth consideration were observed in the area (Table 5-50). The invasive tree *Broussonetia papyrifera* (Figure 5-70) is abundant in the Nandagi Forest Reserve but also at 36 N 480580 42005 (M48), 36 N 480454 42651 (M35), 36 N 480058 42839 (M34) and 36 N 479631 43100 (M32) all in the Nandagi Forest Reserve. Other invasive species recorded from the area were *Mimosa pigra* (Figure 5-71) and *Ricinus communis* (Figure 5-72), both of which were at low abundance (Table 5-50). Location of the invasive species are indicated in Figure 5-73.

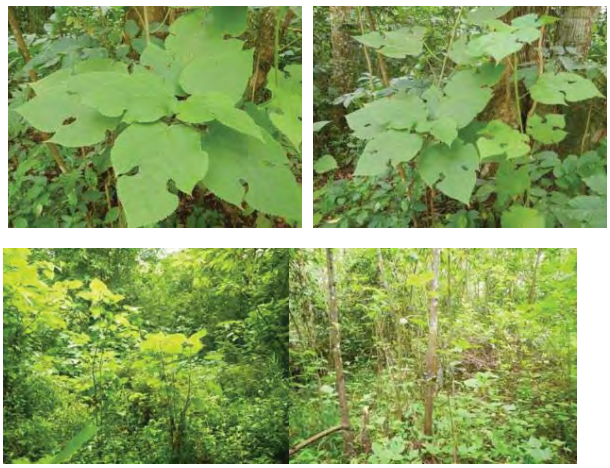


Figure 5-70 Invasive *Broussonetia papyrifera* at 36 N 477345 44859 (top) and in Nandagi Forest (bottom); 6th May 2016

Figure 5-71 Invasive *Mimosa pigra* at 36 N 480805 41722; 7th May 2016

Figure 5-72: Invasive *Ricinus communis* at 36 N 477472 44656; May 6th 2016

Figure 5-73: Mukono - Location of sites with invasive species

5.6.2.5.2 Fauna

A. INVERTEBRATES (Lepidoptera and Odonata)

Species richness

A total of 82 butterfly species were registered from 407 butterflies that were encountered during the survey inside and outside Nandagi Forest reserve. Of these, 55 species belong to family *Nymphalidae,* eight to *Hesperiidae*, 11 to *Pieridae*, five to *Lycaenidae* and three of which two are swallowtails to *Papilionidae*. APPENDIX 2, Table M2 shows the sub families, common names for some butterflies, conservation status and location of the site from which each butterfly was recorded during the survey. Of the species recorded 30 were only found inside and 17 outside the forest reserve while 35 were found in both areas. 16 species of Dragonflies were recorded from 56 individuals that were encountered during the survey. APPENDIX 2, Table M2 shows the common names, habitat preferences and conservation status for each dragonfly recorded. The conservation level at national level in Uganda is according to WCS (2016). These have not yet been assessed by IUCN.

Habitat Characterization

The butterflies' sample was dominated by forest specialists ('F'), followed by wide spread species ('W') and then forest edge/bush dwellers ('f'). Butterflies that are swamp specialist ('S') were represented by only two individuals. All ecotypes were represented and *Figure 5-74* shows the percentage abundances of the butterfly ecotypes encountered during the study.

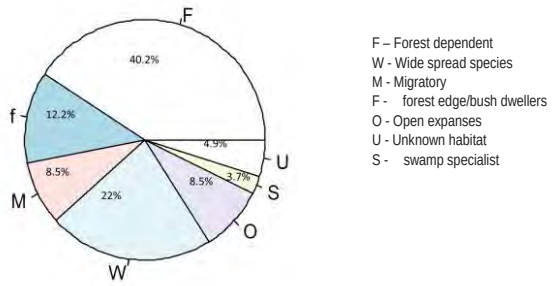


Figure 5-74: Percentage abundance of ecotype groups among Butterfly species

Discussion and Conclusion

Habitat destruction and alteration are the greatest threats to wild species throughout the world (Begon et al, 2006). They alter and destroy biotopes as well as habitats from which butterflies obtain the vital resources. Therefore efforts have to be made such that amidst any form of development biodiversity is protected especially species that are threatened. As illustrated in the table some of the species are of high conservation regard. *Papilio dardanus* (VU) and *Papilio demodocus* (NT) are globally threatened due to restricted range and wide spread habitat loss (SANBI, 2009). However, both species can survive

in cultivated fields despite being poor competitors even in these fields. Therefore, much as these butterflies can with stand some degree of disturbance and manipulation there range shall continue to decrease with increase of poorly managed activities especially to the forested areas. *Euphaedra rex* (VU), *Neptis trigonophora* (VU) and *Caenides dacena* (EN) are all not globally threatened but are Nationally Threatened and on Uganda list (WCS, 2016). They therefore need great conservation attention in Uganda, even though they may be widespread and unthreatened globally. The former three species were all recorded from forested sites within the forest reserve at Nandagi implying that there survival will actually depend on how much regard is put to this location during construction.

The species that are Nationally Threatened in Uganda (APPENDIX 2, Table M2) are either Forest of Eucalyptus Plantation dwellers. They therefore need well wooded habitats. The impact on them will therefore mainly arise from destruction of such habitats that are well stocked with woody plants. The mitigation to this main impact of habitat loss is minimizing as much as possible cutting down of wooded areas. Only target areas that may not be avoided should be cut. It is important to educate the project workers about the need to keep trees as much as practical. Secondly, the developer should consider off-setting cutting of trees in the Forest Reserve by supporting restoration of this reserve in parts that have been degraded in the past. Trees should be planted on advice of NFA.

B. Herpetiles

A total of 16 species of herpetiles were recorded in the project area; four reptiles and 12 amphibian species.

Amphibians

Amphibian diversity

A total of twelve amphibian species belonging to three families and seven genera were recorded in the project area (*Table 5-51*). All identified Amphibian species belong to Order *Anura.* According to Channing (2001), order *Anura* has the most surviving species with about 4,000 members worldwide. It consists of several families of frogs and toads (Channing, 2001). Family *Ranidae* constitute the highest number (6) of species (Table *5-51*) encountered while *Bufonidae* and *Hyperolidae* had two and four species respectively (Table *5-51*). The richness of family *Ranidae* is attributable to the agility of members which enable them escape and cross the matrices of disturbed landscape. The most common species was mascarene grass frog followed by common toad and eastern groove-crowned bullfrog. Forest White-lipped Frog, Anchieta's Rocket Frog and natal puddle frog were detected once, suggesting their sensitivity to disturbance.

Table 5-51 Amphibian species recorded in the project area and their associated numbers

English name	Family	Species	Number of individuals	IUCN conservation status
Flat backed toad	Bufonidae	*Amietophrynus maculatus*	3	LC
Common toad	Bufonidae	*Amietophrynus regularis*	7	LC
Striped Leaf-folding Frog	Hyperolidae	*Afrixalus quadrivittatus*	1	LC
Common Reed Frogs	Hyperolidae	*Hyperolius*	4	LC

English name	Family	Species	Number of individuals	IUCN conservation status
		viridiflavus		
Forest White-lipped Frog	Ranidae	*Amnirana albolabris*	1	LC
Cinnamon bellied reed frog	Hyperolidae	*Hyperolius cinnamomeoventris*	1	LC
Eastern groove-crowned bullfrog	Ranidae	*Hoplobatrachus occipitalis*	6	LC
Dwarf Puddle Frog	Ranidae	*Phryanobatrachus mababiensis*	4	LC
Kivu reed frog	Hyperolidae	*Hyperolius kivuensis*	1	LC
Natal puddle frog	Ranidae	*Phrynobatrachus natalensis*	1	LC
Anchieta's Rocket Frog	Ranidae	*Ptychadena anchietae*	1	LC
Mascarene grass frog	Ranidae	*Ptychadena mascareniensis*	13	LC

Species richness

Generally, low species richness registered in the project area is potentially due to intensive agricultural activities in and around would be suitable habitats. The species accumulation curves (Figure 5-75) (a) indicates that no new species was detected beyond M44 and that there was survey completeness indicated by flattening of the curve. However, Figure 5-75 (b) reveals that an asymptote was not reached and that increasing sampling effort would result into more species. This is indicated by the confidence intervals. This therefore suggests that the decision made should not only be based on observed species but to also consider those not detected in the survey.

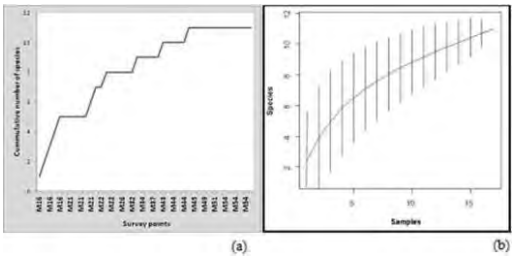


Figure 5-75: Species accumulation curves; (a) species accumulation curve based on observed richness and (b) species accumulation curve using random method based on estimated richness.

Site richness

Of all the sites surveyed, some did not yield any species; however, of those in which species were encountered, M21 was the richest followed by M16 (Figure 5-76). M21 and 16 are both degraded

wetlands in broad valleys. This suggests that these areas are unique and project activities should not exceed the set standards to ensure conservation of the habitats and species therein.

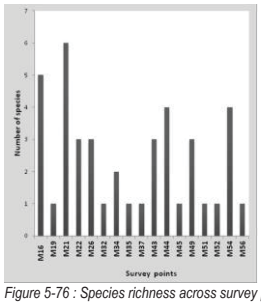


Figure 5-76 : Species richness across survey points.

Reptiles

Reptile Diversity

A total of four reptile species were recorded in the project area belonging to three families and four genera. The species encountered include Blue-headed tree agama, Orange headed agama, striped skink and a terrapin (Table 5-52). Reptiles in this part of the country seem to be facing serious threats from cultivators; both subsistence and commercial agriculture. This is evident with respect to several eucalyptus and pine plantations amidst cultivated areas. This must have contributed to the low population densities of reptiles in the area. Some species of snakes such as *Phylothamnus angolensis, Bitis arietans* and *Phylothamnus semivariegatus* are widely distributed and are known to exist within this region and the area surveyed represents their preferred habitats (IUCN, 2014).

Table 5-52 Reptile species list in the project area

Common name (English name)	Family	Species	Number of individuals	IUCN conservation status
Blue-headed Tree Agama	*Agamidae*	*Acanthocercus atricollis*	1	LC
Red headed agama	*Agamidae*	*Agama agama*	2	LC
Striped Skink	*Scincidae*	*Mabuya striata*	2	LC
Terrapin	*Pelomedusidae*	*Pelomedusa subrufa*	1	LC

C. BIRDS

The proposed project area has a variety of land cover types that included different agricultural systems, bordered by a mono culture of sugarcane, plantations of Eucalyptus and Pine, bush, fallow and secondary forest (the details of these are given in the flora section of the report). Together these provide a wide range of habitats for biodiversity, although we don't expect that there will be many

species that are for example forest specialists or wetland specialists since these habitats are largely human impacted and converted.

The surveys recorded a total of 99 species of birds over a two-day period (APPENDIX 2, Table M4). A good number of the species recorded are rather common and widely occurring in most parts of Uganda. 58 species (Table *5-53*) are species with particular habitat affinities/ preferences with the majority being species associated with forest habitats either as forest specialists or at worst requiring the presence of a tree stand. No globally-threatened species were observed.

Table 5-53 Number of species recorded with particular habitat preferences

Habitat preference	Number of species
F	13
FF	3
f	27
fW	2
fWW	1
W	8
WW	4
Grand Total	**58**

The species enclosed in the red rectangle (APPENDIX 2, Table M2) are species of birds of prey/ raptors. A total of seven species of these were recorded in the project area representing a fairly rich diversity of raptors. Table 5-54 is only a small segment of the species list presented in APPENDIX 2, Table M4. In Table 5-54 the species that were recorded in at least 5 or more of the sampling locations are presented. In total these represent 15 species, the majority of which are associated with a presence of trees or some level of forest dependence. This list is taken to represent the commoner more widely occurring species in the proposed project area.

Table 5-54: The most common of the species recorded

Atlas number	Species	Habitat affinity	Number of points at which species was recorded
355	Blue-spotted Wood Dove	f	13
732	Common Bulbul	f	13
837	Grey-backed Camaroptera	f	12
1266	Bronze Mannikin		12
1140	Fan-tailed widowbird	W	9
1170	Lesser Masked weaver		8
1122	Scarlet-chested Sunbird	f	7
860	Winding Cisticola	W	6
1112	Olive sunbird	FF	6
1230	Black -crowned waxbill	f	6
129	Lizard Buzzard	f	5
459	Speckled Mousebird		5
955	Black & white Shrike-flycatcher	f	5

Atlas number	Species	Habitat affinity	Number of points at which species was recorded
1175	Vieillot's Black Weaver	f	5
1290	Yellow Fronted Canary		5

Species of conservation concern

The majority of the species recorded are ones that are fairly widely occurring and are not classified under any of the IUCN threat categories globally or locally. Table 5-55 lists five species of conservation concern. Grey Crowned Crane (*Balearica regulorum*) and Grey Parrot (*Psittacus erithacus*) are classified as Endangered and Vulnerable under the IUCN Red List respectively. At the regional level, the above two species are considered Near threatened and the rest of the species Regional Responsibility, being that the largest portion of their range or populations are in the East African region. The locations where the threatened species were observed are indicated in Figure 5-77.

Table 5-55 List species of conservation concern in the proposed project area

Atlas number	Common name	IUCN conservation status	Regional Conservation status	Habitat	Number of points at which species was recorded
639	White-headed saw-wing	LC	R-RR	f	2
194	Grey Crowned Crane	EN	R-NT	WW	1
371	Grey Parrot	VU	R-NT	FF	1
539	Spot flanked barbet	LC	R-RR		1
875	Grey-capped Warbler	LC	R-RR	fWW	1

The Grey Parrot is a forest dependent species seemed to have a nest right at the reserve headquarters, highlighting the importance of large mature trees for this species. Grey Crowned Cranes which are wetland species were recorded overflying the project area and no wetland of significant extent will be traversed by the proposed project developments. Seven species of birds of prey (APPENDIX 2, Table M4) were recorded in the project area. The presence of top predators such as these indicates the presence of their prey base which would be comprised of small vertebrates (rodents, shrews, lizards and amphibians). Based on the survey records, only the Lizard Buzzard was recorded more times (having been recorded in 5 of the survey areas).

Figure 5-77: Mukono – IUCN Threatened Species observed Locations

D. MAMMALS

The landscape upon which the footprint of the project is planned to be covers parts of Nandagi CFR as well as adjacent community land. A good proportion of the land area is under different kinds of farming practices including tree growing and other crops. The core section of Nandagi CFR that has some regenerating forest cover is quite small and is also very much frequented by local people. In these kinds of scenarios, the area is not to be expected to have many surviving species of large mammals.

A three day trapping regime for small mammals in the Nandagi CFR in early May 2016 yielded four species of small mammals (Table *5-56*) with an overall abundance of *Praomys jacksoni* (the soft furred forest mouse). All four species are forest species.

Table 5-56 Relative abundance of small mammals of Nandagi CFR

Species	Number captured	IUCN Status
Hybomys univitatus	1	Not assessed
Lophuromys aquilus	5	Least concern
Mus mahomet	4	Least concern
Praomys jacksoni	57	Least concern
Total	**67**	

The high numbers of individuals captured in three days regardless of species suggest the existence of a healthy population of small mammals in the regenerating sections of Nandagi CFR where the trapping was done. If trapping was to be done in other parts of project area, it is likely that several other species would have been recorded.

Table 5-57: Other mammal species recorded in the project area

Order	Species	IUCN Status
Artiodactyla	Bush buck *Tragelaphus scriptus*	Least concern
	Bush duiker *Sylivicapra grimmia*	NA
Carnivora	Large Grey Mongoose *Herpestes ichneumon*	Least concern
	Marsh Mongoose *Atilax paludinosus*	Least concern
	Slender Mongoose *Herpestes sanguineus*	Least concern
	African Civet *Civettictis civetta*	Least concern
Primates	Vervet Monkeys *Chlorocebus aethiops*	Least concern
	Uganda Mangabey *Lophocebus ugandae*	Not yet assessed
Rodentia	Alexander's Bush squirrel *Paraxerus alexandri*	Least concern
	Northern Savanna Gerbil *Tatera valida*	Not in the catalogue of life
	Stripped Ground squirrel *Xerus erythropus*	Least concern

Specials of Conservation Concern

All mammal species recorded are of fairly common widely occurring species in Uganda. None of the mammal species recorded is given a high threat category by IUCN.

One particular species however – the Uganda Mangabey *Lophocebus ugandae* deserves particular mention given that it is a species endemic to Uganda and most of its previous known range being in the forests fringing Lake Victoria. A lot of these forests have been cleared or are now of greatly reduced extent. The survival of this species may therefore require particular attention quite soon. The presence of this species in Nandagi CFR was a record of three individuals and also from reports of members of the local community. It is likely therefore that there is only a very small population surviving in part of the proposed project area.

5.6.2.6 Conservation Areas

a) Background

Forest management in Uganda has been decentralised and recentralised a number of times since Independence in 1962. The changes often came as a result of policies adopted by different governments in the management of public affairs. Until the late 1990s, forest management in Uganda was mainly a public matter, more or less confined to forest reserves (FRs). Before 1967, there was a vibrant local government forestry service, which ran local forest reserves (LFRs), especially under the kingdoms that had built strong coherent government systems from the colonial days. At that time, LGs had powers to decide on development priorities for their areas. Nevertheless, the central government (CG) was still responsible for managing some of the forest reserves.

In 1967, the Ugandan government adopted a republican constitution, which centralized virtually all government decision-making powers. Consequently, all local forest reserves (LFRs) became central forest reserves (CFRs). In 1993, the government adopted the policy of decentralisation. This also decentralised Forest Reserves. But it soon became clear that the Local Governments were not yet ready to take on forest management responsibilities fully. They needed revenue to run more urgent activities like education, water, and health, which had also been decentralised. So, they set about harvesting the forests with little consideration for planned management. Therefore, forest reserves were recentralised in 1995, but this time through subsidiary legislation, rather than the principal law. This turned out to be a rather unpopular move in Local Government circles. As a result, the LGs challenged the legal basis (albeit outside the law courts) for recentralizing the forest reserves and maintained pressure on the central government to decentralise them again.

In 1995, Uganda adopted a new constitution. This constitution embraced the 1993 decentralisation policy fully but it remained ambivalent regarding management of forests. Since then the LGs have been asking the CG to hand over all FRs to them, arguing (probably correctly) that the law vested only FR policy in the CG. On the other hand, the CG (especially the forest department) argued (probably correctly also) that the LGs did not have the capacity and sufficient will to manage FRs professionally.

The National Forestry and Tree Planting Act of 2003 maintained the 1998 state of affairs but this time it created a semi-autonomous National Forestry Authority (NFA) out of the forest department. While the forest department had been responsible for all aspects of forestry in the country, the NFA was created with the responsibility to manage only central forest reserves only.

The communities living close to forest reserves in the past have demonstrated a wealth of indigenous knowledge on forest resources and resource management. They have established guidelines for fire regimes, tree cutting and grass harvesting. They expressed their dependence on the forest in terms of four major needs: security, agricultural land, water and income. They also identified the following other values derived from the forest:

- Vegetable foods (leaves, tubers, fruit);
- Honey, termites and wild meat;
- Wood for building, fuel and income generation;
- Place of worship;
- Gums, resins and fibres;
- Herbs and medicines;
- Grass for thatching huts; and
- Pasture for livestock.

While appreciating the values of the forest, there is a need to recognize and mitigate threats, including:

- Encroachment for agricultural land;
- Over cutting of trees for building and fencing;
- Over grazing;
- Uncontrolled bush fires;
- Cutting of trees to harvest honey;
- Over use leading to loss of water sources.

b) Ecological and environmental functions of Central forest Reserves

i. **Protection of fragile ecological landscapes**: This includes steep hills, lakeshores, river banks and wetlands; the vegetation's may range from closed natural forests to more open woodlands and even grasslands. Some of these CFRs have been planted with forest plantations and others will be planted as private sector investment gains momentum. They prevent flush floods, landslides, soil erosion, and the subsequent blockages of water system essential for generation of hydro-power, processing of industries human consumption and livestock survival, among others.

ii. **Conservation of Biological diversity**: These CFRS are part of the network of critical areas that is necessary to enable the protected areas in Uganda to sustain viable populations of these species (animals and plants) that are endangered or threatened. Again vegetation in these reserves ranges from closed natural forest (especially in the Albertine rift and lake Victoria-Kyoga Albert regions) to more open woodlands and even grasslands (especially in eastern and northern regions of Uganda. Other CFRS in this category include those which are not very rich in biodiversity but they serve the important function of connecting biodiversity- rich zones so that the animals and plants can be mobile. They are also known as Biodiversity corridors. Disconnected from each other the biodiversity areas may cease to be viable on their own; the species may fail to cross-breed and thus eventually disappear from the face of the earth forever.

iii. **Maintenance of Environmental health**: These reserves are found mainly in urban centres where they help to clean the air of the noxious gases generated in the busy urban life. These are often located in wetland and along rivers that meander through the urban centres and therefore serve the important functions of purifying the water on which the poorer sections of the urbanities depend.

iv. **Protection of watersheds**: These forests may be natural or planted but they serve the important function of protecting the source of underground water those re-charge lakes, rivers springs and wells. The CFRs ringing Lake Victoria are an example without these forests, the economy of the country as we know it today would grind to a halt.

c) Nandagi Central Forest Reserve

Nandagi Central Forest Reserve is located in the central region of Uganda in Mukono District, Sub - county and in Namawojjolo Local Council (Figure 5-78). It is 479 ha in size and a serves as Catchment Forest of rivers Ssezibwa and Kasala. River Ssezibwa feeds into Lake Kyoga, making it an important tributary. Ecologically, it serves as a biodiversity repository for plants and birds. It also recharges and stabilizes the water balance making it very important from a hydrological perspective.

Nandagi CFR is managed subject to the provisions of the National Forestry and Tree Planting Act of 2003, and its management and control are vested in the National Forestry Authority (NFA) under section 52(1) of the same Act. [1]Nandagi was first gazetted in 1948 with an area of 477 ha with statutory order LN. No.4. It was re-gazetted with an area of 479 ha in 1962 LN No. 78. Table 5-58 shows legal status and Gazettement for central forest reserves, and in particular that of Nandagi CFR.

Table 5-58: Legal Status and Ownership of Mabira Forest CFRs from 1st Gazettement

Name of CFR	Year of first gazettement	Subsequent gazettements	Remarks
Mabira & Namakupa	Legal notice (LN) No. 87 of 1932 with an area of 29,592 Ha	LN No. 41 of 1948	Second gazettement, size increase 30,003ha for the two reserves
		LN No. 78 of 1962	LN No. 78 of 1962 for Mabira CFR area of 29,974
		DO	Namakupa was separated from Mabira and gazetted with an area of 280ha
Nandagi	LN. No. 41 of 1948 with an area of 477ha	LN No. 78 of 1962	Nadagi was re-gazetted with an area of 479ha.
Kalagala falls, Namawanyi/Namananga	Statutory instrument (SI) No. 176 of 1968		Kalagala Falls, Namawanyi/Namananga as LFRs

Source: SI 1998 No.63. The Forest Reserve (Declaration) order 1998
Boundary plan of former Forestry Department (FD) as gazetted in SI 1998 No.63.

Figure 5-78: Mukono – Spatial extent of Nandagi Forest Reserve

d) Current Activities

The activities done in Nandagi Central Forest Reserve include:

i. Indigenous tree and bamboo nursery

The nursery raises seven hundred thousand (700,000) seedlings annually mainly for community under the government's community tree planting program (CTPP) and most of these seedlings are given out for free to communities and distributed country wide. More so the nursery has created employment to communities neighbouring the forest.

ii. Private tree planting / farming

The forest has about 100 tree farmers, who have planted both broad leaved and conifer plantations. This has also demonstrated the 'prosperity for all' campaign for the government.

iii. Research plots

The forest has four research plots of both broad leaved and conifer species earmarked for training purposes.

iv. Seed stand

There is also a *Terminalia* species seed stand for seed collection which helps in propagating more tree crops.

e) Management Plan

The forest is managed in accordance with the Forest Act and management plan for a sustainable forest cover which includes among others:

- ≠ Private tree farmers should meet the required standards i.e. have fire lines to control forest fires, roads for accessibility, carry out silvicultural operations, plant high quality seedling for optimum growth etc.
- ≠ Conservation of wetlands, rivers and indigenous trees for sustainable use.
- ≠ Manage and raise tree seedlings and bamboo.
- ≠ Maintain and re-open forest boundaries.
- ≠ Forest conservation through conservation education and involve forest edge communities in protecting the forest through collaborative forest management (CFM).

f) Species List

APPENDIX 2, provides the detailed list of the species altogether in the Nandagi Central Forest Reserve. The conservation status for each species is indicated.

5.6.2.7 Land Use

The project area has a long history of protected and gazetted areas. However these have primarily been reduced and utilized for agricultural purposes and establishment of industrial parks (factories) with the Mukono Industrial Park within proximity of the Project area. The vegetation has been maintained along the streams however strongly depleted in the catchment areas. The land use/cover in project area is mainly commercial and subsistence farmlands, plantation forest and natural forest. Swamps and wetlands are predominant in the lowland valleys. A strip of natural vegetation and swamp lies between the proposed site and stream.

The crops grown in the Project area are mostly sweet potatoes, cassava, maize, fallow and large sections of planted forest as shown in Figure 5-79.

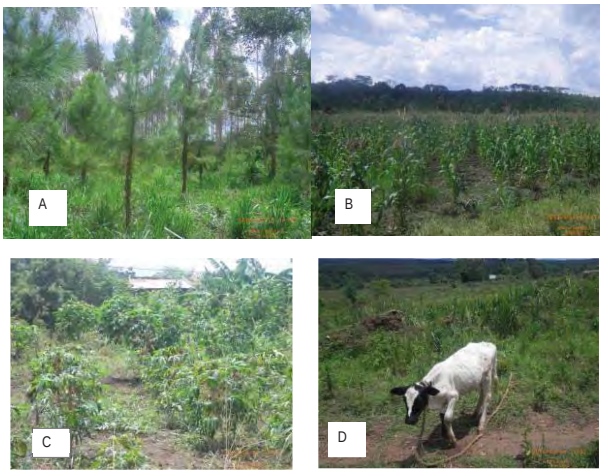


Figure 5-79: Planted forest (A), Maize plantation (B), Cassava (C), Cattle grazing in area under fallow (D)

5.6.2.8 Topography

Areas around the project area have high plains composed of remnants of low land. The altitude ranges from 1099 m to 1300 m above seas level with some areas along river Sezibwa about 760 m. The mean elevation around the project area was 1138 m while minimum and maximum elevations were 1090 m and 1266 m respectively with standard deviation of 29.4. The low lands for part of vast wetland system for whole Mukono district.

5.6.3 Kawaala Substation

5.6.3.1 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 5-59: Results of Baseline Air Quality Measurements – Kawaala SS

Location (UTM 36M coordinates)	Total Suspended Particulates (µg/m³)	PM_{10} (µg/m³)	$PM_{2.5}$ (µg/m³)	Notes
448764E, 37072N	3	ND	ND	Substation fence line. Warm sunny weather. Southerly breeze.
448725E, 37077N	1	ND	ND	Warm sunny weather.
448785E, 37136N	8	1	ND	Blessed Medical Clinic. Warm sunny weather. Vehicular traffic. Maize mill activity.

Inference from measurements:

At only one out of three measurement locations were detectable levels of PM_{10} (1µg/m³) encountered. These measurements indicate a generally pristine environment with respect to air quality.

5.6.3.2 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 noise level audit of the project area.

Table 5-60: Results of Ambient Noise Measurements - Kawaala SS

Location	Sound Pressure Level dB(A)				Notes
	L_{Max}	L_{eq}	L_{90}	L_{50}	
448764E, 37072N	68.2	47.8	41.0	44.0	Homestead. Distant public address system. Chirping birds. Human conversations.
448725E, 37077N	63.4	47.3	39.0	43.0	Distant public address system. Chirping birds. Distant construction activity.
448785E, 37136N	77.2	56.6	48.5	51.5	Blessed Medical Clinic. Maize mill activity. Vehicular traffic. Human conversations.

Inference from measurements:

The NEMA L_{Aeq} standard specifies a day-time limit of 50 dB(A) for residential areas. From this sample of 3 measurement locations, 1 of these locations had an L_{Aeq} above the national limit. This is an indication of an environment already mildly impinged by human activity in relation to noise levels.

5.6.3.3 EMF

The purpose of these measurements is to establish a baseline reference with respect to EMF levels within the project area to which any future related project impacts can be compared. It is not an EMF level audit of the project area.

Table 5-61: Results of Baseline EMF levels - Kawaala SS

Location	Radio frequency radiation strength (μW/cm²)			Notes
	Horizontal	Vertical	Longitudinal	
448764E, 37072N	0.059	0.043	0.055	Sub-station fence line.
448725E, 37077N	0.038	0.021	0.042	Sub-station fence line. Transmission lines overhead
448785E, 37136N	0.027	0.029	0.031	Blessed Medical Clinic.

Inference from measurements:
Uganda does not have any known regulatory radio frequency electromagnetic force (EMF) exposure standards. However, International Commission on Non-Ionizing Radiation Protection's (ICNIRP) safety limit is 10 W/m² or 1000 μW/cm², implying that the EMF levels at Kawaala are much lower than the ICNIRP safety limit.

5.6.4 Bujagali Substation

5.6.4.1 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 5-62: Results of Baseline Air Quality Measurements – Bujagali SS

Location (UTM 36M coordinates)	Total Suspended Particulates (μg/m³)	PM_{10} (μg/m³)	$PM_{2.5}$ (μg/m³)	Notes
514953E, 55448N	1	ND	ND	Construction contractor's office block. Warm sunny weather.
515039E, 55312N	1	ND	ND	Security guards' booth. Warm sunny weather.
515078E, 55445N	2	ND	ND	Sub-station control building. Warm sunny weather.

Inference from measurements:
At none of the three measurement locations were detectable levels of PM_{10} and $PM_{2.5}$ encountered. These measurements indicate a generally pristine environment with respect to air quality. These values are quite low compared to the draft national standard of 300μg/m³ because of the weather season (wet) during which the measurements were taken.

5.6.4.2 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 noise level audit of the project area.

Table 5-63: Results of Ambient Noise Measurements - Bujagali SS

Location	Sound Pressure Level dB(A)				Notes
	L_{Max}	L_{eq}	L_{90}	L_{50}	

Location	Sound Pressure Level dB(A)				Notes
	L_{Max}	L_{eq}	L_{90}	L_{50}	
514953E, 55448N	70.8	49.8	40.5	44.5	Construction contractor's office. Human conversations. Chirping birds.
515039E, 55312N	60.6	45.7	41.5	44.5	Security guards' booth. Chirping birds
515078E, 55445N	68.1	49.7	45.0	46.0	Sub-station control building. Onsite vehicular traffic. Human conversations. Distant river roar.

Inference from measurements:
The NEMA L_{Aeq} standard specifies a day-time limit of 50 dB (A) for residential areas. From this sample of 3 measurement locations within the boundary/fence line of the substation, none of these locations had an L_{Aeq} above the national limit. This is an indication of a pristine environment in relation to noise levels.

5.6.4.3 EMF

The purpose of these measurements is to establish a baseline reference with respect to ambient RF EMF strength within the project area to which any future related project impacts can be compared. It is not an RF EMF audit of the project area.

Table 5-64: Results of Baseline EMF levels - Bujagali SS

Location	Radio frequency radiation strength (μW/cm²)			Notes
	Horizontal	Vertical	Longitudinal	
514953E, 55448N	0.017	0.016	0.017	Contractor's office block
515039E, 55312N	0.027	0.0025	0.019	Security guards' booth.
515078E, 55445N	0.058	0.048	0.029	Homestead.

Inference from measurements:
Uganda does not have any known regulatory radio frequency electromagnetic force (EMF) exposure standards. However, International Commission on Non-Ionizing Radiation Protection's (ICNIRP) safety limit is 10 W/m² or 1000 μW/cm², implying that the EMF levels at Bujagali Substation are much lower than the ICNIRP safety limit.

5.6.5 Mutundwe Substation

5.6.5.1 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 5-65: Results of Baseline Air Quality Measurements - Mutundwe SS

Location (UTM 36M coordinates)	Total Suspended Particulates (μg/m³)	PM_{10} (μg/m³)	$PM_{2.5}$ (μg/m³)	Notes

Location (UTM 36M coordinates)	Total Suspended Particulates (μg/m³)	PM_{10} (μg/m³)	$PM_{2.5}$ (μg/m³)	Notes
448185E, 32427N	1	ND	ND	Homestead. Vehicular traffic exiting from sub-station. Warm sunny weather
448208E, 32518N	5	1	1	Homestead. Warm sunny weather
448041E, 32484N	1	ND	ND	Homestead. Easterly breeze. Warm sunny weather
448060E, 32413N	1	ND	ND	Homestead. Warm sunny weather.

Inference from measurements:
At only one out of four measurement locations were detectable levels of PM_{10} (1μg/m³) and $PM_{2.5}$ (1μg/m³) encountered. These measurements indicate a generally pristine environment with respect to air quality. These values are quite low compared to the draft national standard of 300μg/m³ because of the weather season (wet) during which the measurements were taken. PM_{10} and $PM_{2.5}$ being detected at one of the nearby homesteads is indicative of a much finer fraction of dust/aerosols being locally present in the air compared to other locations where measurements were made.

5.6.5.2 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 noise level audit of the project area.

Table 5-66: Results of Ambient Noise Measurements - Mutundwe SS

Location	Sound Pressure Level dB(A)				Notes
	L_{Max}	L_{eq}	L_{90}	L_{50}	
448185E, 32427N	66.7	44.3	40.0	42.0	Homestead nearest to substation entry gate. Transformer hum. Pedestrian conversations. Exiting vehicular traffic.
448208E, 32518N	70.1	48.6	40.5	43.5	Homestead. Human conversations. Chirping birds. Crowing cockrel.
448041E, 32484N	66.2	50.8	47.5	48.5	Homestead. Transformer hum. Human conversations. Chirping birds
448060E, 32413N	67.4	49.5	47.5	48.5	Homestead. Transformer hum. Human conversations. Chirping birds. Distant 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 4 measurement locations, only one of these locations had an L_{Aeq} above the national limit. This is an indication of an environment already mildly impinged by human activity in relation to noise levels.

5.6.5.3 EMF

The purpose of these measurements is to establish a baseline reference with respect to EMF levels within the project area to which any future related project impacts can be compared. It is not an EMF level audit of the project area.

Table 5-67: Results of Baseline EMF Measurements - Mutundwe SS

Location	Radio frequency radiation strength (μW/cm²)			Notes
	Horizontal	Vertical	Longitudinal	
448185E, 32427N	0.021	0.027	0.032	Homestead nearest to entry gate.
448208E, 32518N	0.021	0.018	0.029	Homestead.
448041E, 32484N	0.058	0.048	0.029	Homestead.
448060E, 32413N	0.025	0.031	0.024	Homestead.

Inference from measurements:
Uganda does not have any known regulatory radio frequency electromagnetic force (EMF) exposure standards. However, International Commission on Non-Ionizing Radiation Protection's (ICNIRP) safety limit is 10 W/m² or 1000 μW/cm², implying that the EMF levels at Mutundwe Substation are much lower than the ICNIRP safety limit.

6 PUBLIC DISCLOSURE AND STAKEHOLDER CONSULTATIONS

6.1 OBJECTIVES OF PUBLIC CONSULTATION

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 ESIA process, 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
- ≠ Obtain primary baseline data.

6.2 CONSULTATION MEETINGS AND KEY ISSUES RAISED

A number of consultative meetings were held with relevant stakeholders in lead government agencies, local community leaders and community members in the respective Project areas between November 2015 and April 2016 as scheduled in Table 3-6 in Section 3.2.6. Figure 6-1 shows pictures of some of the meetings held in the various Project areas, Table 6-1 provides a summary of the findings from the stakeholder consultations while APPENDIX 9 provides a detailed record of the discussions and attendance for each meeting.

Nama II, Buyuki and Luwunga zones (30/04/2016)

Wanjeyo, Kivuvu and Bwefulumya villages (30/04/2016)

Nandagi Forest Reserve Commercial Foresters (10/05/2016)

Kawaala Substation community (29/03/2016)

Buloba SS Community (30/03/2016)

Figure 6-1: Meetings held with stakeholders with an interest in the Project

Table 6-1: Summary of key issues raised during stakeholder engagement

Issue	Views discussed
Electricity Supply	Issue raised by: Community members Will power supply from the new lines and sub-stations be able to connect for community domestic use? *Response: No, the transmission lines are high voltage lines and the local community will not be able to tap directly. However, the improvement in substation equipment will serve to improve on the efficiency of electricity supply in the entire GKMA, including the Project area.*

Issue	Views discussed
Employment benefits	Issue raised by: Community members Will community members be prioritized for jobs on the Project, especially non-technical work? *Response: The Consultant will recommend that UETCL obliges the contractors to hire some local community residents, according to their levels of skill.*
Project start	Issue raised by: Community members What is the project duration and when is it expected to commence? *Response: The Project is still at the Preparatory stage, while UETCL is looking for funds from the Government of Japan. The ESIA and RAP fall into the required studies before the funds can be approved. Once the funds are approved, the Project will then be able to start.*
Compensation	Issue raised by: Community members Projects take place but compensation delays for a long time and this affects the PAPs because their plans are put on hold and they incur losses in the process. If assessment has been done but compensation is eventually not done and the project is aborted. How would the PAPs be compensated after sacrificing their properties and not undertaking any developments as a result? Will PAPs be permitted to use the land after the project has been implemented? *Response: No, the corridors will be purchased at 100% and once UETCL has purchased the land, the PAPs will be expected to give up all rights to the land.*
Economic Displacement	Issue raised by: Brick making community - Kawaala Will the project give time for the brick making to be completed before the project can commence? *Response: A grace period will be given by UETCL, within which time it is expected that the brick makers will sell off their bricks and possibly move the business to a new location.*

Issue	Views discussed
Project through Nandagi CFR	Issue raised by: National Forestry Authority (NFA) Nandagi is located outside the nursery bed, the land was given to tree farmers by NFA, so the land belongs to NFA, but the trees belong to individual farmers. It is also managed by NFA. Since it is government land, an offset fee is paid. NFA will dialogue with UETCL regarding the offset. Biodiversity evaluation of the forest should be part of the ESIA study. *Response: The procedure recommended by NFA , regarding compensation and offsetting the forest reserve will be followed.*
Traffic management	Issue raised by: Kawempe Division, Office of the Town Clerk For traffic along major roads, will diversions be required? *Response: No, re-conductoring will not require traffic diversion since the trucks with cable winches and tensioners will not have to access each tower.*
Transmission line reserves	Issue raised by: Kawempe Division, Office of the Town Clerk Local leaders within the area –Mulago III Parish of the Kamwokya area where people have encroached should be engaged. *Response: Local leaders within all the Project areas will be involved in the Project, particularly in sections where land acquisition is required.*
Community Health and Safety	Issue raised by: Kawempe Division, Office of the Town Clerk How will encroachers in the transmission line corridor be handled, especially in the event of an accident? *Response: Safety precautions will be taken throughout the Project. For the re-conductoring, safety nets will be used to ensure that all people on the ground are safe, in the event of falling equipment or parts.*
Occupational Health and Safety	Issue raised by: OSH Department, Ministry of Gender, Labour and Social Development ▪ The Contractors should have plans for safety, in line with the OSH Act, 2006. UETCL will be responsible for ensuring that the contractors conduct their activities in line with these Plans. MGLSD will be responsible for doing safety inspections at the construction sites to ensure compliance. ▪ Contractor should provide workers with adequate personal protective equipment after risk assessment has been done (PPE); ▪ The contractor will be required to register the site as a workplace before commencement of work; ▪ After 6 months any workplace should have a safety committee. *Response: Noted.*

Issue	Views discussed
Ecological conservation	Issue raised by: Wetlands Management Department The areas of wetland destroyed during construction need to be restored to as near as possible to the original after construction. The vegetation cleared especially trees should be replaced with the indigenous species to that area. Response: This recommendation will be given in the ESIA report so that contractors are aware of their obligations towards restoration activities.

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 the respective District headquarters where the Project is located. The Environmental Impact Statement shall also be placed on UETCL's 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 UETCL, organise and conduct public hearings on dates and locations that would be publicised in the media.

7 ENVIRONMENTAL AND SOCIAL IMPACTS ASSESSMENT AND MITIGATION MEASURES

PRE-CONSTRUCTION AND CONSTRUCTION PHRASE

7.1 POSITIVE IMPACTS

7.1.1 Income to material/ equipment suppliers and contractors

Construction of the New Mukono and Buloba substations and upgrading of Kawaala, Mutundwe and Bujagali substations will involve civil, electrical and mechanical works which will require sourcing of requisite materials both locally and internationally. Construction of the transmission lines will require cement and aggregates for pylon foundations, transfer cables, conductors and metallic beams.

Material such as steel, timber, aggregates, reinforcement bars and cement are available locally and this will be an opportunity for the local service suppliers to benefit financially from the project. This will be a temporary direct financial benefit for suppliers and transporters. The electrical and mechanical equipment might not be locally available and have to be imported. This presents financial benefit for local and foreign suppliers- a short-term but significant socio-economic benefit.

Enhancement Measure

Earth materials for example, murram, aggregate (stones and sand) are obtained from quarry operations. Conscious or unwitting purchase of these materials from unlicensed operations indirectly supports, encourages and promotes environmental degradation at illegal quarry sites and can cause medium to long-term negative impacts. It will therefore be a contractual obligation for contractors to procure construction materials from legitimate or licensed sources.

7.1.2 Employment and Skills Training

The construction of the Buloba and New Mukono substations will require workers with various levels of skill, including skilled, semi-skilled and unskilled labour. Contractors will be required for construction of substation facilities, civil works, construction of onsite building and the transmission lines. Electrical and mechanical expertise will be required for the upgrade of the Kawaala, Mutundwe and Bujagali substations as well as re-conductoring of the 132 kV transmission lines from Mukono branch point – Kampala North substation, Kampala North Substation – Mutundwe Substation, and Kampala North to Lugogo Substation.

While skilled labour required will be from specialised national and international contractors, semi-skilled and unskilled labour will be obtained from Ugandans depending on the nature of work and availability of the required labour. This will be a temporary direct and reversible impact for the duration of the construction phase.

Enhancement Measure

Wherever feasible, local people will be considered for job opportunities commensurate with their level of skills. Adequate occupational health and safety standards will be provided to ensure the work environment is conducive. The onus will be on the Contractor to ensure that children under the age of twelve are not employed at the site and any children above fourteen years are not given physically demanding work and work under adult supervision as per restrictions of the Employment Act 2006.

The Contractors will be obligated to fight the ills of child labour, and as such, will be liable for any offences such as Child Labour amongst the contractors' workers, in line with the provisions of the Children's Act and Penal Code Act (Sections 4.3.1 and 4.3.2 respectively).

7.1.3 Benefit to local retail businesses

It is expected that the construction and upgrade of the substations and transmission lines, expected to last at least two years, will necessitate a workforce of about 20 people (Section 2.2.4). The workforce, construction crews will require food, accommodation and sundries most of which will be provided by local retail shops. This will present a short-term economic benefit for local business owners.

Enhancement Measures

i) Contractors and subcontractors will encourage their workers to support businesses that conduct their businesses in line with national laws. 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.

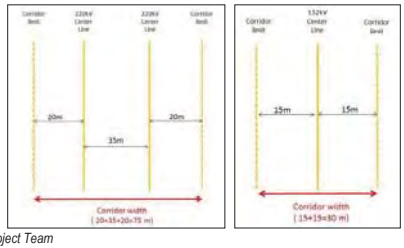
ii) During the sensitization meetings with local communities, the local residents need to be informed about the Project and how their businesses can benefit from the Project.

7.2 NEGATIVE IMPACTS – CONSTRUCTION OF SUBSTATIONS

7.2.1 Buloba Substation and Associated Transmission Lines

7.2.1.1 Permanent Land Take / Involuntary Resettlement

Land acquisition will be required for securing land of Buloba substation and the transmission line corridor[1]. The two 220 kV transmission lines will share their corridor and the combined corridor width will be 75 m while the 132 kV transmission line will have a corridor width of 30 as shown in Figure 7-1. Table 7-1 shows the approximate surface area of the required land acquisition. Land acquisition for the access road will not be required as it will be aligned within the 132 kV transmission line corridors.



Source: JICA Project Team

[1] The land lying under the transmission line corridor will be wholly acquired by UETCL without wayleaves. The standard corridor width of 132 kV and 220 kV transmission lines are 30 m and 40 m respectively.

Figure 7-1: Width of the 220 kV (left) and 132 kV (right) transmission line corridors

Table 7-1: Approximate surface area of land acquisition – Buloba substation

Component	Surface area (m²)
Substation	44,100
220 kV transmission line corridor	67,500
132 kV transmission line corridor	24,000
Total	**135,600**

Source: JICA Project Team

Impact Significance

Sensitivity of receptor is rated medium because peoples' sentiments about giving up land are very strong. The proposed substation site and transmission line route are majorly used for subsistence agriculture, and other considerably larger sections of land under fallow.

The intensity of impact of land take is rated medium since the land will be permanently taken and the current users have to find alternate parcels of land in which to continue their subsistence agriculture and other activities for which the land in question is currently being used.

Impact significance will therefore be moderate.

		Sensitivity of Receptor			
		Very low	Low	Medium	High
		1	2	3	4
Intensity of Impact	Very low 1	1 Negligible	2 Minor	3 Minor	4 Minor
	Low 2	2 Minor	4 Minor	6 Moderate	8 Moderate
	Medium 3	3 Minor	6 Moderate	9 Moderate	12 Major
	High 4	4 Minor	8 Moderate	12 Major	16 Major

Mitigation Measure

i) For the 2 x 220 kV transmission lines in Buloba site, the width of the transmission line corridors will be minimized through corridor sharing.

ii) All PAPs will be provided fair and adequate compensation and assistance (e.g. allowances and livelihood restoration programs) until their livelihood and incomes are restored to at least pre-project levels, in accordance to the Project's ARAP. The ARAP will be based on Ugandan laws and in compliance to JICA Guidelines on Environmental and Social Consideration.

iii) Additional assistance will be provided to vulnerable social groups if any are identified, for example child-headed homes, homes of elderly people.

iv) Internal and external monitoring will be implemented and a grievance mechanism established.

Adoption of the above mitigation measures will reduce impact intensity to "low" level resulting in a residual impact of moderate significance.

7.2.1.2 Economic Displacement

Economic displacement is defined as the loss of assets or access to assets that leads to loss of income sources or means of livelihood as a result of project-related land acquisition or restriction of access to natural resources. The project site has both perennial and seasonal crops, woodlot and abandoned gardens.

Impact Significance

The sensitivity of the receptor is rated medium because the land to be taken up by the project was reported as a secondary source of income by majority of the PAPs who are either teachers at nearby schools such as St. Lawrence Paris Palais, or work at the nearby trading Centre at Nakirebe.

The intensity of the impact is rated low since the land is used for farming only to supplement the income of the owners, and they will have to find alternate parcels of land to cultivate.

Therefore, the rating for impact significance is major.

		Sensitivity of Receptor			
		Very low	Low	Medium	High
		1	2	3	4
Intensity of Impact	Very low 1	1 Negligible	2 Minor	3 Minor	4 Minor
	Low 2	2 Minor	4 Minor	6 Moderate	8 Moderate
	Medium 3	3 Minor	6 Moderate	9 Moderate	12 Major
	High 4	4 Minor	8 Moderate	12 Major	16 Major

Mitigation Measures

i) Promptly compensate economically displaced persons for loss of assets at full replacement cost.

ii) Provide replacement property (for example, agricultural or commercial sites) of equal or greater value, or cash compensation at full replacement cost where appropriate, to persons with legal rights or claims to land which are recognised or recognisable under the national law.

iii) Provide assistance that will off-set any loss of a community's commonly held resources.

iv) This could take the form of initiatives that enhance the productivity of the remaining resources to which the community has access, in-kind or cash compensation for loss of access or provision of access to alternative sources of the lost resource.

v) Compensate economically displaced persons who are without legally recognisable claims to land for lost assets (such as crops and other improvements made to the land) other than land, at full replacement cost. The client is not required to compensate or assist opportunistic settlers who encroach on the project area after the cut-off date.

vi) Provide additional targeted assistance (for example, credit facilities, training, or job opportunities, seed livestock, farm inputs) and opportunities to improve or at least restore their

income-earning capacity, production levels, and standards of living to economically displaced persons whose livelihoods or income levels are adversely affected.

vii) Provide transitional support to economically displaced persons, as necessary, based on a reasonable estimate of the time required to restore their income-earning capacity, production levels, and standards of living.

Adoption of the above mitigation measures will reduce impact intensity to "very low" level resulting in a residual impact of minor significance.

7.2.1.3 Impact on Air Quality

The construction phase will involve activities such as construction of the control building, foundations for gas insulated switchgears, transformers, and towers. These activities have the potential to produce fugitive dust emissions that could pollute the ambient air quality. A number of equipment and machinery such as tippers, delivery vehicles will also be used during the construction and these are likely to produce fugitive emissions. Delivery vehicles carrying materials such as murram and sand also have the potential to generate dust emissions as they deliver, load and offload material (supplies and debris). Considering that the project construction phase is expected to last about two (02 years) as shown in the tentative schedule in Section 2.2.3, the impact on air quality during the construction phase will be a temporary, direct and reversible impact.

Impact Significance

The sensitivity of the receptors is ranked medium since baseline air quality measurements revealed that the environment is generally pristine with respect to air quality since no detectable levels of PM_{10} and $PM_{2.5}$ were encountered (Table 5-28). The Project area is sparsely populated, with the proposed site surrounded majorly by bush, gardens and a few residential homes. Similarly the transmission line route is majorly gardens, planted forests and bush (Section 5.6.1.6).

The intensity of the impact will be low since the impact will be short term and reversible, lasting only the duration of the construction period.

Medium receptor sensitivity and low impact intensity results in moderate impact significance.

		Sensitivity of Receptor			
		Very low	Low	Medium	High
		1	2	3	4
Intensity of Impact	Very low 1	1 Negligible	2 Minor	3 Minor	4 Minor
	Low 2	2 Minor	4 Minor	6 Moderate	8 Moderate
	Medium 3	3 Minor	6 Moderate	9 Moderate	12 Major
	High 4	4 Minor	8 Moderate	12 Major	16 Major

Mitigation Measures

i) Keeping exposed soil surfaces in damp condition by water spraying and material stockpiles covered when not in use.
ii) Use of well-maintained vehicles and machines. Vehicles and machines emitting excessive pollutants (e.g. black soot) to be removed until repaired.
iii) Use of closed/covered trucks when transporting dusty materials.
iv) Switching off engines of construction vehicles and machines when not in use.
v) To mitigate against dust emissions, control measures such as regular sprinkling of water on dusty areas and temporary access roads; and observing set speed limits among other measures will be implemented; the use of PPE will also be established to minimize the impact of the duct, where it occurs.

Adoption of the above mitigation measures will reduce impact intensity to "very low" level resulting in a residual impact of minor significance.

7.2.1.4 Water Pollution

Removal of vegetation cover in the ROW, wayleaves and substation site whose root systems bind the soil may increase the risk of erosion by water or wind in the project area. Earthworks when constructing tower foundations near and/or within swamps or near streams could increase sediment load in watercourses, mainly around tower footings if within the wetland.

During rainy seasons (months of March and April, and September to November), the loss of moisture-retaining function of the vegetation will lead to increased surface run-off, carrying with it eroded soil particles that will ultimately end up in water sources within the Project area. The fuels (mainly diesel) and lubricating oils required for operating construction equipment have the potential to contaminate soil and the wetland located in the project area, if they leak or are spilled during handling or use. Transportation of pollutants by runoff would affect wetland and local community water sources. Other waste sources with the potential to pollute water sources in the Project area if not handled properly include concrete wash water and general waste.

Impact significance

The laboratory analysed results of the water samples collected in the Project area indicated on the whole, a generally acceptable water quality in terms of the physicochemical characteristics, although a high value for total suspended solids and low pH were detected (Section 5.6.1.1). For this reason, the receptor sensitivity of the water resources in the area is rated medium.

The proposed substation site is not close to any surface water sources. However, a section of the line route traverses wetland (Section 5.6.1.5.1). Considering that 10 m x 10 m bases will be constructed for the towers, at a spacing of 30 – 40 m apart, any impact on water resources as a result of the Project's construction will be of low intensity since the Project footprint is small and the Project duration relatively short (construction of a concrete base for the transmission tower, including excavation and casting concrete would require about 5 days). However, if not properly managed, the effects of water pollution could be felt even after the construction period.

Therefore the significance of this impact is moderate.

		Sensitivity of Receptor			
		Very low	Low	Medium	High
		1	2	3	4
Intensity of Impact	Very low 1	1 Negligible	2 Minor	3 Minor	4 Minor
	Low 2	2 Minor	4 Minor	6 Moderate	8 Moderate
	Medium 3	3 Minor	6 Moderate	9 Moderate	12 Major
	High 4	4 Minor	8 Moderate	12 Major	16 Major

Mitigation measures

<u>Discharge of concrete wash water</u>

i) Discharge of untreated concrete wash water to surface waters (e.g. rivers, lakes) to be strictly prohibited.
ii) Concrete wash water (e.g. from concrete mixer and pump trucks) to be discharged only at designated facilities (e.g. facilities with wash water treatment system).
iii) Recycling of wash water will be done as far as practical.

<u>Soil erosion and run-off from construction site</u>

i) Avoid removing short vegetation and grass along the transmission line corridor as far as it does not hinder construction works.
ii) Implementation of temporary erosion control measures (e.g. silt fence, erosion mats) especially where construction sites are near surface water.
iii) Drainage management of run-off from the Project sites throughout the construction period.
iv) Revegetation of exposed slopes immediately after construction is completed.
v) Construction of retaining walls for exposed slope protection if necessary.
vi) Construction of adequate and efficient drainage channels at the substation site, which will provide proper drainage for the substation during operation.
vii) Stockpiles and temporarily removed topsoil to be stored in a location and manner to prevent soil runoff into surface waters.

<u>Pollution sources (oil and human waste)</u>

i) Spillage of hazardous liquids (e.g. oil) to be prevented by implementing spill prevention measures (see "Soil pollution" section below for details).
ii) Installation of portable toilets for construction workers.

Adoption of the above mitigation measures will reduce impact intensity to "very low" level resulting in a residual impact of minor significance.

7.2.1.5 Soil Erosion and Degradation

Clearance of vegetation at the proposed site will have the potential to contribute to soil erosion through the agents of wind and running water. Activities such as earthworks, construction of the proposed substation and associated facilities, spillage or uncontrolled release of potentially polluting material such as concrete wash water, fuels (oils, diesel, hydraulic fluid, or lubricants) or paint during construction could also contribute to soil degradation.

Earthworks when constructing tower foundations near and/or within swamps or near streams could increase sediment load in watercourses, mainly around tower footings if within the wetland. Localised soil contamination would also arise from irresponsible waste management on site. During construction, erosion could take place as a result of change in ground cover, cut and fill, or poor erosion control practices which increase the soil erosion potential.

Impact Significance

The sensitivity of receptor to occurrence of soil erosion during the construction phase, especially during rainy and windy periods will be medium because the terrain is gently sloping and any spills would not cover a great area extent. Moreover, the Project footprint is small (approx. 13 acres required for the substation). A water point (Figure 5-45) used as a community water source is located where eroded material may be deposited.

The impact intensity is medium considering that if soil degradation actually occurred, it would have an impact on soil productivity yet the land is largely used for subsistence agriculture.

Therefore the impact significance is moderate.

		Sensitivity of Receptor			
		Very low	Low	Medium	High
		1	2	3	4
Intensity of Impact	Very low 1	1 Negligible	2 Minor	3 Minor	4 Minor
	Low 2	2 Minor	4 Minor	6 Moderate	8 Moderate
	Medium 3	3 Minor	6 Moderate	9 Moderate	12 Major
	High 4	4 Minor	8 Moderate	12 Major	16 Major

Mitigation measures

Prior to construction, a Construction Environmental Management Plan (CEMP) will be prepared by the contractor and submitted to the Supervising Consultant for approval. A range of appropriate erosion and sediment control measures will be contractually required to be implemented during the construction of the substation, tower bases and the new access road, to minimise the potential for environmental harm on soils and local receiving waters.

These measures would be installed prior to, or in conjunction with, the commencement of construction activities such as site preparatory works (i.e. involving the removal or clearing of vegetation, initial earthworks) or the main earthworks. Specific management measures relating to soils and water would be documented in a sub plan Soil and Water Management Plan (SWMP) including an Erosion and Sediment Control Plan (ESCP).

The following specific principles will be used on site for erosion and sediment control, which would in turn help to avoid storm water and soil contamination:

i) Regular inspection of vehicles and machines for oil and fuel leaks. Leaking vehicles and machines to be removed until repaired.
ii) Spill response kit (e.g. absorbents) to be readily available at the construction site.

iii) Hazardous substances to be stored only in specialized/labelled containers and designated storage facility.
iv) Storage facility to be located as far as possible from sensitive areas (e.g. groundwater wells, surface water) and well secured from the public.
v) Storage and handling facilities of hazardous liquid to be bunded with an impermeable base.
vi) Posting of warning signs at the storage facility.
vii) Hazardous materials only to be handled by trained staff.

Adoption of the above mitigation measures will reduce impact intensity to "low" level resulting in a residual impact of minor significance.

7.2.1.6 Impact on Wetlands

As detailed in Section 5.6.2.5.1, the Project area close to the Kampala-Masaka highway still has wetland habitats, with intact patches in parts. There were also sections of forested swamps within the Project area, particularly near the end of the proposed transmission line where the line will join with the Kawanda-Masaka 220 kV on-going Project.

Widening of the existing access road to the proposed substation site will be done in the section closest to the Kampala-Masaka highway, while towers will be built in both sections of swamp and swamp forest within the Project area. Implementation of the requisite construction activities through the sections of wetland has the potential to degrade the wetland, if not managed in an environmentally conscious manner. Contamination of the wetland (swamp and swamp forest) could be as a result of spillage of fuels, oils and lubricants from Project vehicles and equipment; or dumping of filling material into the wetland to provide for access for delivery of workers, materials and equipment. Earthworks when constructing tower foundations near and/or within swamps or near streams could increase sediment load in watercourses, mainly around tower footings if within the wetland.

Impact significance

The receptor sensitivity is accessed as medium because while many parts of the wetland appeared degraded (brick making is a common activity near the Masaka-Mbarara highway, and cultivation within the wetland is common towards the Kawanda-Masaka 220 kV line), there were sections of natural wetland, especially towards the Kawanda-Masaka 220 kV line.

Impact intensity is also rated medium since the construction activities such as excavation of tower foundations, casting of concrete tower bases, mounting of the tower sections, and the other necessary construction activities within the swampy sections will have an impact on the wetlands and the life supported within the wetland.

Therefore, the impact significance is moderate.

		Sensitivity of Receptor			
		Very low	Low	Medium	High
		1	2	3	4
Intensity of Impact	Very low 1	1 Negligible	2 Minor	3 Minor	4 Minor
	Low 2	2 Minor	4 Minor	6 Moderate	8 Moderate
	Medium 3	3 Minor	6 Moderate	9 Moderate	12 Major

	High 4	4 Minor	8 Moderate	12 Major	16 Major

Mitigation measures

i. Access through sections of wetland, particularly undisturbed wetland, will be minimised as much as possible.
ii. Where access through sections of wetland could not be avoided, restoration activities will be undertaken at the end of the construction period, to ensure sustainable development of the Project area. A detailed restoration plan is provided in APPENDIX 12.
iii. As part of its overall pollution response plan, the Contractor shall have an Oil Spill Contingency Plan which has a number of controls and procedures for minimising or preventing accidental discharge of hydrocarbons (fuel, oils, and lubricants). The Plan will detail measures such as:
    - 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.
    - A drainage ditch will be constructed around tower sites closest to the wetland and channelled to a drainage retention pit equipped with oil interceptors; the ditches and pond will also be lined. These measures will minimise sediment load into the water course and the existing wetland.
iv. Unnecessary removal of vegetation during construction will be avoided. The stripped topsoil from the tower footing areas will be retained on site for later reinstatement upon completion of tower erection.
v. All stock piled material will be protected from being washed away by rain run-off and wind by covering and bunding the edges.

7.2.1.7 Noise and Vibrations

During the construction of the substation, noise and vibrations may be generated from heavy trucks ferrying materials and equipment to the site, earth movers as well as concrete mixers and generators being used at the site. Noise and vibrations will be a temporary and reversible impact ending with completion of construction activities.

Impact significance

The receptor sensitivity is assessed as low because the proposed substation site and transmission line route are sparsely populated. The area is largely residential and in a rural setting, with large areas of green bush and plantations. The proximity of the substation site to the Grail Sister's Church will be taken into consideration as the construction works progress, with the Sisters being informed about the work schedule, particularly on Sundays when they are most likely to be utilizing the Church at the premises.

Baseline noise measurements in the area indicated an environment already impinged by human activity in relation to noise levels, since three of the five sample locations had noise levels above the national limit for residential areas (Table 5-36). For this reason the intensity of the impact will be low, considering that the residents in the area are already accustomed a degree of noise levels. Noise generated during the construction phase would be short-term, only lasting the duration of the construction activities.

With a low sensitivity of the receptor and low intensity of the impact, the impact significance will be minor.

		Sensitivity of Receptor			
		Very low	Low	Medium	High
		1	2	3	4
Intensity of Impact	Very low 1	1 Negligible	2 Minor	3 Minor	4 Minor
	Low 2	2 Minor	4 Minor	6 Moderate	8 Moderate
	Medium 3	3 Minor	6 Moderate	9 Moderate	12 Major
	High 4	4 Minor	8 Moderate	12 Major	16 Major

Mitigation measures

i) In principal, noisy construction works to be limited to normal working hours and no operation on Sundays and public holidays. The Contractors on site and Operators at the substation must be aware of, and adhere to, the regulatory noise limits for a construction site in a residential area (60 dBA (L_{eq}) daytime and 40 dBA (L_{eq}) night-time during construction) and 60 dBA during operation) as provided for by the National Environment (Noise Standards & Control) Regulations, 2003.
ii) Noisy equipment to be located as far as possible and aligned to be directed away from sensitive receptors.
iii) Vehicles and machinery to be equipped with exhaust mufflers and well maintained.
iv) Additional noise suppression measures (e.g. covering of noisy units) to be implemented if noise levels at nearest sensitive receptor consistently exceeds national noise standard or in case of consistent complaints.
v) Construction workers to be provided with appropriate PPE such as ear plugs and ear muffs for protection against excessive noise.
vi) Construction machines and vehicles to be turned off when not in use.

Adoption of the above mitigation measures will ensure residual impact of minor significance.

7.2.1.8 Improper Management of Construction Waste

During transmission line and substation construction, waste will be generated, including vegetation stripped from right of way, soil excavated from tower foundation sites, packaging waste (cement bags, paper, polyethene sheets, and wood pallets), metal scrap, wire cuttings, wooden planks, polyethene sheets, PET water bottles and waste oil from construction equipment or vehicles.

Improper handling and disposal of construction waste could impair site hygiene and aesthetics and create a potential breeding ground for vermin. Construction litter increases the potential for on-site personnel injury and soil contamination. Soil contamination will be short-term only manifesting during construction the phase of the project but reversible when these activities are completed. Contamination would be localised in spatial extent, limited to spots where waste is inappropriately dumped or incidental

fuel or oil spills occur. This would be a negative impact but short-term and reversible with good construction waste management practices.

Impact significance

The sensitivity of the receptor to this impact is medium based on experience with other transmission line and substation construction projects especially when workers are not sensitised about responsible waste management practices.

Impact intensity will be low due to the localised impact extent, low quantities of waste expected and the short construction duration; therefore significance is predicted to be moderate.

		Sensitivity of Receptor			
		Very low	Low	Medium	High
		1	2	3	4
Intensity of Impact	Very low 1	1 Negligible	2 Minor	3 Minor	4 Minor
	Low 2	2 Minor	4 Minor	6 Moderate	8 Moderate
	Medium 3	3 Minor	6 Moderate	9 Moderate	12 Major
	High 4	4 Minor	8 Moderate	12 Major	16 Major

Mitigation measures

i) Maximization of reuse and recycling.
ii) Storage of waste only in designated waste containers and areas. Waste will be sorted to ensure appropriate final disposal.
iii) Storage of hazardous wastes in specialized/labelled containers.
iv) Wastes to be handled and disposed only by NEMA-authorized waste management entities.
v) Strict prohibition of littering and implementation of awareness programs for the construction workers.
vi) Daily clean-ups at the construction sites.
vii) The construction contractor will be required to submit Construction Waste Management Plan (WMP) to UETCL and other necessary organizations for approval.

Adoption of the above mitigation measures will reduce impact intensity to "very low" level resulting in a residual impact of minor significance.

7.2.1.9 Change in Landscape

The proposed site location is currently used for farming, and is surrounded by similar gardens of matooke, sweet potatoes, cassava and such crops, as well as fallow. The transmission line corridor is similar in nature, with sections that are swampland at the start and towards the end. Construction of the substation will change the landscape in the area, from a green vegetated one to a built one.

Impact significance

The sensitivity of the receptor will be medium since the area is generally a rural setting with buildings breaking the green scenery. A nun's convent (Grail Sisters) complex is located about 200 m from the proposed site. However, the project areas already have existing transmission lines which are accustomed to observers.

The impact intensity will be medium because even though the change brought about by the change in landscape will be major, it is expected that even without the substation, the landscape would have changed considering the high rate at which land in the area has been bought by potential developers. This is exemplified by the large parcel of land that was sold off by SEMA properties to about 20 or more individuals who were planning to put up structures, as revealed in consultation meetings (APPENDIX 9). Therefore, the impact significance is rated moderate.

		Sensitivity of Receptor			
		Very low	Low	Medium	High
		1	2	3	4
Intensity of Impact	Very low 1	1 Negligible	2 Minor	3 Minor	4 Minor
	Low 2	2 Minor	4 Minor	6 Moderate	8 Moderate
	Medium 3	3 Minor	6 Moderate	9 Moderate	12 Major
	High 4	4 Minor	8 Moderate	12 Major	16 Major

Mitigation Measures

i) Site restoration (e.g. revegetation) to be implemented immediately after construction is completed.
ii) Creation of green belt, if necessary.

7.2.1.10 Risks Associated with Social Interaction with Construction Workers

The construction workforce for the Project will likely interact with the communities along the substation site and transmission line route during construction. Interaction between the residents and construction workers will be inevitable since the area is mostly residential. The location of the construction workers' areas of abode will be within the community and therefore some resources will be shared. This social interaction between the workers and the community could result in fraternization that could be sexual. 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.

Impact Significance

The receptor sensitivity is rated low because the proposed substation site and transmission line route are sparsely populated, and in a rural setting, with residents homes removed from the site. Most of the Project area is through farmland and hence social interaction with the community members is not expected to be extensive.

The intensity of the impact is rated medium because if the construction workers have high potential to misbehave within the local community, or introduce and/or encourage vices such as prostitution, sexual

promiscuity, gambling, child labour, etc., there could be repercussions that would last longer than the construction period.

Therefore the impact significance is rated moderate.

		Sensitivity of Receptor			
		Very low	Low	Medium	High
		1	2	3	4
Intensity of Impact	Very low 1	1 Negligible	2 Minor	3 Minor	4 Minor
	Low 2	2 Minor	4 Minor	6 Moderate	8 Moderate
	Medium 3	3 Minor	6 Moderate	9 Moderate	12 Major
	High 4	4 Minor	8 Moderate	12 Major	16 Major

Mitigation Measures

i) Holding of awareness programs for the construction workers.
ii) Preparation of Code of Conduct to be strictly followed by the workers.
iii) Contractor to undertake HIV/AIDS Management campaigning including Training, distribution of quality Contraceptives and Voluntary Counselling and Testing among workers and adjacent communities and schools.

Adoption of the above mitigation measures will reduce impact intensity to "low" level resulting in a residual impact of minor significance.

7.2.1.11 Occupational and Community Health and Safety Risks

Construction of the proposed Buloba substation and associated transmission line will involve moving heavy equipment and materials through settlements, trading centres and residential areas. This potentially poses accident risk to the general public and construction workers. Fatal accidents could arise from unskilled operation of heavy construction machinery, unsatisfactory safety guidelines around the construction site or falling from line's lattice towers when workers neglect requisite equipment (e.g. safety latches). Minor injuries would be reversible but effects such as permanent disability or electrocution of workers during line testing resulting in fatalities are irreversible. Considering that transmission line construction workers would most likely be household heads, this impact would not only affect workers but also their immediate and extended families.

Impact significance

The sensitivity of the human receptor, especially in the event of fatal accidents is high, although would be low for minor injuries.

The potential hazards present during the installation and testing of such equipment and parts as the transformer and switchgear, include working at heights, exposure to high voltage electricity. However, the impact intensity is rated low since the system is not power loaded during any construction works.

Therefore the impact significance is moderate.

		Sensitivity of Receptor			
		Very low	Low	Medium	High
		1	2	3	4
Intensity of Impact	Very low 1	1 Negligible	2 Minor	3 Minor	4 Minor
	Low 2	2 Minor	4 Minor	6 Moderate	8 Moderate
	Medium 3	3 Minor	6 Moderate	9 Moderate	12 Major
	High 4	4 Minor	8 Moderate	12 Major	16 Major

Mitigation measures

i) Compliance to JICA's "The Guidance for the Management of Safety for Construction Works in Japanese ODA Projects", as well as the provisions in Uganda's OSH Act 2006.
ii) Implementation of safety training programs for all workers.
iii) Provision of appropriate Personal Protective Equipment (PPE).
iv) Holding of regular tool box meeting to discuss safety.
v) Lockout - tag out procedures to be clearly displayed on site and followed.
vi) Contractor to deploy an HSE Officer approved by UETCL.
vii) Contractor to provide appropriate safety signage at high risk locations (e.g. near fuel tanks) including ancillary work sites.
viii) The construction contractor will be required to submit an Occupational Health and Safety Plan (OHSP) to UETCL and other necessary organizations for approval. The Plan will include the 'Fire and Emergency Management Plan' and 'First Aid Kits and Tool Box Talks' for which templates are provided in APPENDIX 10 and APPENDIX 11 respectively.

Adoption of the above mitigation measures will reduce impact intensity to "low" level resulting in a residual impact of minor significance.

7.2.1.12 Traffic Accidents and Disruption

The proposed location site is approximately 25 km away from Kampala City, along the Masaka-Mbarara highway (Figure 7-2) in Mpigi district. During construction, delivery trucks transporting equipment and supplies may cause traffic flow impairment on the busy Kampala-Masaka highway. The situation may be worsened during the festive season of December – January, or dates coinciding with school children reporting to school or from boarding school (Masaka-Mbarara Highway is an access to many major schools with big population such as Kings College Buddo, Nabbingo Girls School, and the St. Lawrence Schools, in particular Paris Palais which is close to the proposed site) since the highway is usually very busy during such times.

Figure 7-2: Major access road to proposed Project site

Impact Significance:
Sensitivity of the receptor is rated medium since the Kampala-Masaka highway is usually a busy road and hence pedestrians are accustomed to handling large volumes of traffic.

The intensity of temporary traffic disruption on Kampala-Masaka highway during construction is rated low, since increase in traffic due to the project is not expected to be high, the Project construction period will be of a short duration and delivery of materials to a convenient storage yard near the proposed route could greatly alleviate the added congestion on the road due to the Project activities.

A receptor sensitivity rating of medium and an impact intensity rating of low result in a significance rating of moderate.

		Sensitivity of Receptor			
		Very low	Low	Medium	High
		1	2	3	4
Intensity of Impact	Very low 1	1 Negligible	2 Minor	3 Minor	4 Minor
	Low 2	2 Minor	4 Minor	6 Moderate	8 Moderate
	Medium 3	3 Minor	6 Moderate	9 Moderate	12 Major
	High 4	4 Minor	8 Moderate	12 Major	16 Major

Mitigation Measures

i) Strict compliance to speed limits on major roads and by use of speed humps on non-major access roads.
ii) Contractor to undertake daily Tool Box Talks for Workers
iii) Avoid, as far as practical using roads with high risk of accidents.
iv) Vehicle motion alarm to be installed on all construction vehicles.
v) Placement of contractor flagmen and appropriate safety/warning signs in high risk locations (e.g. 'Heavy Trucks Turning', 'Road Diverted', 'Half Road Closed', etc.).
vi) Contractor to maintain a Health and Accident register
vii) The construction contractor will be required to submit a Traffic Management Plan to UETCL and other necessary organizations for approval.
viii) Contractor to Deploy a qualified Site Nurse and Doctor-On-Call
ix) Contractor to set-up a Site Clinic for treatment of minor ailments. However, other cases shall be referred for specialized management
x) Contractor to provide a well-stocked First Aid Kit

Adoption of the above mitigation measures will reduce impact intensity to "very low" level resulting in a residual impact of minor significance.

7.2.1.13 Temporary Disruption of Electricity Supply

The new Buloba substation will have to be brought 'on-line' after the construction of the substation and towers. A number of technical checks will be necessary during the process of connecting the substation and the associated transmission lines to the grid. This will result in disruption of electricity supply in the areas that will be connected to the new Buloba substation, such as areas fed by the Kaburasoke and Mutundwe substations since the new substation will be connected to the existing Mutundwe-Kaburasoke 132 kV transmission line.

Impact Significance
The receptor sensitivity is rated medium since the Mutundwe – Kaburasoke 132 kV transmission line majorly feeds residential areas with little commercial and industrial activity, whose peak times are outside normal construction hours, and can thus easily be arranged not to coincide and hence minimize disruptions.

The intensity of the impact is rated low since the electricity supply distribution is only expected to be interrupted towards the end of the construction period, when substation has to be brought 'online'. The impact will be short term and reversible in nature.

Therefore, the impact significance is moderate.

		Sensitivity of Receptor			
		Very low	Low	Medium	High
		1	2	3	4
Intensity of Impact	Very low 1	1 Negligible	2 Minor	3 Minor	4 Minor
	Low 2	2 Minor	4 Minor	6 Moderate	8 Moderate
	Medium 3	3 Minor	6 Moderate	9 Moderate	12 Major
	High 4	4 Minor	8 Moderate	12 Major	16 Major

Mitigation Measures

i) Construction works will be planned in manner to minimize duration of power outage.
ii) If power outage is unavoidable, it will be communicated to the public and facilities (e.g. hospital) in advance. Outages will be planned in co-ordination with UMEME, and give at least 2 weeks' notice for the occurrence of outages.
iii) Overhead line work to be designed and carried out in a way to avoid interference with existing power lines and maintaining safe separation distances from existing distribution lines.

Adoption of the above mitigation measures will reduce impact intensity to "very low" level resulting in a residual impact of negligible significance.

7.2.1.14 Impact on Ecological Environment

The ecological baseline studies conducted in the project area on plants, invertebrates (butterfly and dragon fly), herpetiles (amphibians and reptiles), birds and mammals, showed no threat to the globally or locally threatened species categorised under the IUCN red list. Most of the impact on the flora and

fauna will arise from loss of vegetation that will be cleared to make way for the Project. Loss of vegetation will result in a loss of habitat for the fauna in the Project area.

A. Flora and Vegetation

***Loss and degradation of habitat*:** The transmission line mainly crosses wetlands and agro-systems, with some sizeable areas of natural vegetation. The wetland habitats still harbour plant and other forms of biodiversity that is bound to be affected by the proposed activities of the power line construction. The nearly 2 km long transmission line is proposed to have a 75 m corridor. This corridor will be cleared of vegetation, thus leading to loss or degradation of habitat for biodiversity.

Reduction in abundance (cover) of some species of woody biomass: The vegetation clearance mentioned above will mostly affect the mature trees, which are seed sources for natural regeneration. This will cause a faster reduction in cover of woody vegetation along the transmission line. The site at higher risk of being affected is the *Raphia* swamp forest at the west end of the project area. This site has large and mature trees of *Raphia farinifera* that can grow to 25 m high (Kalema & Beentje 2012) and those within the corridor of the transmission line will be cut down. Others, to a lesser extent are the drier ground around the sub-station site with scattered large trees of *Maesopsis eminii*, *Mangifera indica*.

***Proliferation of invasive plant species*:** At least one species of invasive plant (*Lantana camara*) occurs in the areas traversed by the proposed transmission line. This poses a threat to the indigenous plant species which are already decimated and susceptible. Invasive plant species are fugitive, with a "weedy tendency" i.e. ecological adaptation to open, disturbed, or unstable environments – they are adapted to disturbed or open habitats. The activities of the transmission line are very likely to increase disturbance in the environment, thus inducing prolific growth of invasive species of plants. There is also a risk of introducing other invasive plant species during the construction phase of the project.

Impact Significance
The sensitivity of the receptor is rated low as there are not many densely wooded areas along the route and the sub-station site is essentially under active or fallow cultivation. In addition, sections in the proposed Project area are degraded as a result of human activities such as brick making, burning of wetlands and dumping of waste into the wetlands.

The intensity of the impact is rated high because the flora and vegetation environment will take a relatively long time to recover. This is because:

i) Nearly all areas that will be subjected to heavy disturbance.
ii) There will be a reduction on the woody plant cover as a result of the tree cutting, especially in the Swamp Forest at the west end of the proposed transmission line where there are big Raphia trees.
iii) There will be impairment of ecosystem service provision due to their degradation, mainly from the more intact and natural vegetation of swamp forest and swamps.

Therefore, the rating for impact significance is moderate.

		Sensitivity of Receptor			
		Very low	Low	Medium	High
		1	2	3	4
Intensity of Impact	Very low 1	1 Negligible	2 Minor	3 Minor	4 Minor
	Low 2	2 Minor	4 Minor	6 Moderate	8 Moderate
	Medium 3	3 Minor	6 Moderate	9 Moderate	12 Major
	High 4	4 Minor	8 Moderate	12 Major	16 Major

Mitigation Measures

i) Revegetation of exposed surfaces (e.g. cut and fill slopes) to be done by native plant species only, and immediately after works are completed to minimize chance of colonization by invasive species.
ii) Removal of invasive species if observed along the revegetation sites.
iii) Implementation of environmental awareness programs for the construction workers, with special focus on threatened species.
iv) Strictly prohibit hunting and poaching of wild life and cutting of trees.
v) Prevention and minimization of pollution (e.g. noise, water) through strict implementation of planned pollution control measures.

Adoption of the above mitigation measures will reduce impact intensity to "low" level resulting in a residual impact of minor significance.

B. Invertebrates

Impact significance

The area was found to be low in terms of species diversity for both orders Lepidoptera (Butterflies) and Odonata (Dragon flies and Damsel flies). All species encountered in the area were of Least Concern (LC) according to the IUCN red list of conservation species.

The impact intensity is rated high because intensity of the transmission system involves massive earth works through excavations and installation of electric power lines which usually involves vegetation clearance. This may escalate ecosystem degradation especially to the surviving pristine habitats.

Therefore, the impact significance is moderate for the invertebrates.

		Sensitivity of Receptor			
		Very low	Low	Medium	High
		1	2	3	4
Intensity of Impact	Very low 1	1 Negligible	2 Minor	3 Minor	4 Minor
	Low 2	2 Minor	4 Minor	6 Moderate	8 Moderate
	Medium 3	3 Minor	6 Moderate	9 Moderate	12 Major
	High 4	4 Minor	8 Moderate	12 Major	16 Major

Mitigation Measures

i) Invasions of plant communities will be monitored and when sited must be halted since such invasions drastically reduce food resources for invertebrates.
ii) Storage of construction materials near the water stream and the swamp will be avoided.
iii) It will be good practice to have flower producing plants inside and on the fence of the infrastructure if the expanse taken up is to remain useful to invertebrates especially butterflies.

Adoption of the above mitigation measures will reduce impact intensity to "low" level resulting in a residual impact of minor significance.

C. Herpetiles

Impact significance

The sensitivity of the receptor is rated low because species encountered during the study are widely distributed in Uganda and in other countries. No species of conservation concern were encountered or recorded.

Most of the negative impacts will be during the project implementation phase, where there will be vegetation clearance, excavation and human presence. Such activities distort the ecosystem by removing cover used by animals to hide from predators. During vegetation clearance and excavation, some slow moving species such as chameleons and some frogs are killed. The impact intensity is therefore rated high. Therefore, this impact significance is moderate.

		Sensitivity of Receptor			
		Very low	Low	Medium	High
		1	2	3	4
Intensity of Impact	Very low 1	1 Negligible	2 Minor	3 Minor	4 Minor
	Low 2	2 Minor	4 Minor	6 Moderate	8 Moderate
	Medium 3	3 Minor	6 Moderate	9 Moderate	12 Major
	High 4	4 Minor	8 Moderate	12 Major	16 Major

Mitigation Measures

i) Flush throughout the entire area before vegetation clearance at key work sites, this gives time for slow animals to escape.
ii) Sensitize workers about the role of these animals in the ecosystem and the need to conserve them.

Adoption of the above mitigation measures will reduce impact intensity to "low" level resulting in a residual impact of minor significance.

D. Birds

The potential negative impacts on birds as a result of the Project would include:

iii) Habitat loss – This will result where vegetation that forms the matrix environment for the animals will be cleared to install power transmission poles.
iv) Collision with the power line: - The new line will introduce a perpendicular structure off the existing high voltage transmission line along Masaka road and this could be a potential trap in the flight path of the birds.

Impact significance

No globally-threatened species were observed in the Buloba Project area. 21 species encountered are dependent of the presence of some tree stand either as forest generalists or forest visitors. The majority of species recorded are those that would survive in human modified landscapes except perhaps for the five F species which cannot survive without forest (Yellow-rumped Tinker bird *Pogoniulus bilineatus*, Green Hylia *Hylia prasina,* African Emerald Cuckoo *Chrysococcyx cupreus,* and Great blue Turaco *Corythaeola cristata).* In addition, several water birds were also recorded and these are dependent on the presence of open water and/or wetland habitats. Four species (Common Squaco Heron, Great Egret, White-faced Whistling Duck, and Malachite Kingfisher) are dependent on the water/wetland habitats and could therefore be affected by alteration or disappearance of their preferred habitat. The receptor sensitivity is therefore medium.

The construction will require vegetation clearance, increased activity, and noise levels in the area that will disrupt the birds breeding activities. The impact intensity is ranked low because it will only last for the duration of the construction activities. Therefore, the impact significance will be moderate.

		Sensitivity of Receptor			
		Very low	Low	Medium	High
		1	2	3	4
Intensity of Impact	Very low 1	1 Negligible	2 Minor	3 Minor	4 Minor
	Low 2	2 Minor	4 Minor	6 Moderate	8 Moderate
	Medium 3	3 Minor	6 Moderate	9 Moderate	12 Major
	High 4	4 Minor	8 Moderate	12 Major	16 Major

Mitigation Measures

i) Deliberate efforts need to be made to avoid unnecessary cutting of trees in the operation areas. The developer needs to have a sensitization campaign for its workers so that they appreciate the value and role of trees in biodiversity conservation.
ii) Activities will be restricted only to the areas that must be disturbed to avoid unnecessary vegetation removal.
iii) All project workers will be sensitized to minimize damage to vegetation and flora. The workers and communities shall also be sensitized about the dangers and threats the invasive species pose to biodiversity and ecosystem stability.
iv) Closely monitor and supervise the operations to ensure compliance.

v) Circumvent the natural vegetation wherever possible.

Adoption of the above mitigation measures will reduce impact intensity to "very low" level resulting in a residual impact of minor significance.

E. Mammals

Impact Significance

Owing to the nature of the landscape and that it is already heavily human impacted; there was no record of large mammals in the Project area. The only species that was physically seen were the monkeys, while for the carnivores their presence was based on faecal material (for the Jackal). Owing to such a low presence of mammals in the area, the receptor sensitivity will be low.

The duration of the construction activities will be short, and therefore interference of the mammals' activities and habitats small. For this reason, the impact intensity is rated low.

Therefore, the impact significance is rated minor.

		Sensitivity of Receptor			
		Very low	Low	Medium	High
		1	2	3	4
Intensity of Impact	Very low 1	1 Negligible	2 Minor	3 Minor	4 Minor
	Low 2	2 Minor	4 Minor	6 Moderate	8 Moderate
	Medium 3	3 Minor	6 Moderate	9 Moderate	12 Major
	High 4	4 Minor	8 Moderate	12 Major	16 Major

Mitigation Measures

i) Deliberate efforts need to be made to avoid unnecessary cutting of trees in the operation areas. The developer needs to have a sensitization campaign for its workers so that they appreciate the value and role of trees in biodiversity conservation.
ii) Activities be restricted only to the areas that must be disturbed to avoid unnecessary vegetation removal.
iii) All project workers be sensitized to minimize damage to vegetation and flora. The workers and communities shall also be sensitized about the dangers and threats the invasive species pose to biodiversity and ecosystem stability.
iv) Closely monitor and supervise the operations to ensure compliance.
v) Circumvent the natural vegetation wherever possible

Adoption of the above mitigation measures will ensure residual impact of minor significance.

7.2.1.15 Climate Change Impacts

There will be vegetation clearance at the substation site as well as along the transmission line route and access roads to enable access to the site by equipment and crews. Biomass loss reduces carbon sinks necessary for carbon sequestration.

Loss of biomass is a negative impact since it reduces natural carbon sinks that would trap carbon dioxide from the atmosphere. Carbon dioxide gas is a greenhouse gas that contributes to global warming hence climate change. A tree taller than five (5) meters can absorb about 21 kg of carbon dioxide annually therefore biomass loss will be a negative and long-term impact. It is also noted that exhaust emissions from construction equipment would also generate carbon dioxide emissions but this would be short-term and comparatively insignificant.

Impact Significance

The receptor sensitivity is rated low because of a combination of factors. The impact of the loss of biomass from the Project area will make a contribution to the loss of carbon sinks, but climate change is brought about by a combination of factors over a very long term. Project works will be localized with limited adverse impact on rainfall, temperature or humidity in the project area. In addition, the Project will increase the efficiency of power supply which could increase the use of electricity and hence reduce the dependency on biomass as a fuel source, and in this way contribute to the loss of trees. Also, a relatively small area will be cleared in the substation site and along the transmission line corridor.

Impact intensity is assessed as high since climate change has long term impacts that are irreversible in nature, and have a domino effect on most of the other natural resources such as water, temperature and aquatic life.

Therefore, the significance of climate change impact due to the Mukono transmission line is rated moderate on a local, national, and regional scale.

		Sensitivity of Receptor			
		Very low	Low	Medium	High
		1	2	3	4
Intensity of Impact	Very low 1	1 Negligible	2 Minor	3 Minor	4 Minor
	Low 2	2 Minor	4 Minor	6 Moderate	8 Moderate
	Medium 3	3 Minor	6 Moderate	9 Moderate	12 Major
	High 4	4 Minor	8 Moderate	12 Major	16 Major

Mitigation measure

UETCL will adopt a proactive approach of being involved in reforestation programs using indigenous species with local communities in the project affected area, or supporting tree-planting as a compensatory measure for vegetation cover lost during development of transmission line projects. This off-setting undertaking will be explored through discussion with the National Forestry Authority (NFA).

Adoption of the above mitigation measures will reduce impact intensity to "very low" level resulting in a residual impact of negligible significance.

7.2.1.16 Impact on Physical Cultural Resources

Since the Project will be developed from a green field, there is potential for discovery of physical cultural resources during its implementation, especially activities involving earthworks and excavation. One burial site within the general Project area was identified on the Grail Sister's Property at 36N 432089 E 28583 N, but will not be affected by the Project (Figure 7-3).

Figure 7-3: Location of Grail Sisters' Burial Site within Project Area

Impact Significance

The sensitivity of the receptor is rated low because the Project site is largely disturbed with agricultural practices in gardens, tree planting and residential settlements within the Project area (Section 5.6.1.6). Therefore the possibility of chance finds is limited.

The impact intensity is rated medium because of potential for damage that would occur to any physical cultural resources, if not properly managed or if not identified at an early stage.

The impact significance is therefore rated moderate.

		Sensitivity of Receptor			
		Very low	Low	Medium	High
		1	2	3	4
Intensity of Impact	Very low 1	1 Negligible	2 Minor	3 Minor	4 Minor
	Low 2	2 Minor	4 Minor	6 Moderate	8 Moderate
	Medium 3	3 Minor	6 Moderate	9 Moderate	12 Major
	High 4	4 Minor	8 Moderate	12 Major	16 Major

Mitigation Measures

A Chance Finds Procedure has been developed (APPENDIX 13) as part of the ESMP, to guide the handling of any chance finds during Project implementation. In particular, if any physical cultural resources are found;

i. Cease work immediately to avoid any further damage if chance finds are stumbled upon;

ii. The identifier must immediately inform his/her Site Supervisor of the discovery;
iii. Access to the site must be controlled and the site secured;
iv. The Site Supervisor must notify the responsible authorities, including the Ministry of Tourism, Wildlife and Antiquities;
v. 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;
vi. Consultations to determine relocation costs; and
vii. Relocation and replacement.

7.2.1.17 Improper Camp Decommissioning

Considering the small number of workers required it is unlikely that workers' camps will be built by the contractors. However, the necessity of these camps will be left to the Contractor's discretion.

There is a potential of negative socio-economic impacts if the contractor does not properly restore camp sites to original conditions at the end of construction operations. Derelict equipment, patches of contaminated soil and abandoned waste would not only cause environmental contamination but also social and public health impacts.

It is expected that camps closure might result in loss of jobs for some workers. There might also be challenges of remediation of patches of campsite contaminated by fuel/oil, disposal of construction waste or other waste streams and landscaping the camp site to original conditions. All of the above are negative, short- to medium-term but reversible impacts.

Impact significance

The sensitivity of the receptor is rated medium since the Project area is sparsely populated, with the biggest area being greenfield, with sections of gardens and wetland.

The impact intensity is rated very low considering that the number of workers required during the construction phase is small (estimated as 20 workers in Section 2.2.4), requiring a very small footprint for the workers' camp. If the number required is even less, it is possible that the contractor could decide not to construct a workers'' camp.

Therefore, impact significance is rated minor.

		Sensitivity of Receptor			
		Very low	Low	Medium	High
		1	2	3	4
Intensity of Impact	Very low 1	1 Negligible	2 Minor	3 Minor	4 Minor
	Low 2	2 Minor	4 Minor	6 Moderate	8 Moderate
	Medium 3	3 Minor	6 Moderate	9 Moderate	12 Major
	High 4	4 Minor	8 Moderate	12 Major	16 Major

Mitigation measures

Before closure of camps, the contractor should plan for the following elements:

iv) Requirements and procedure for removing equipment, waste and structures from the camp site;
v) Requirements and procedures to restore the site to original condition, leaving no visual alterations that would impact the landscape; and
vi) Description of how possible socio-environmental impacts will be minimised during decommissioning.

Decommissioning should remediate any onsite contamination and restore site to the maximum extent consistent with pre-project land use. During decommissioning and site restoration, the following issues should be addressed following a site restoration plan:

i) Hard pans (ground surfaces) such as at vehicle or equipment parking yards should be adequately scarified (surface broken up) to enable immediate vegetation re-growth.
ii) Avoid introduction of non-native plant species in the quest for rapid vegetation restoration. A properly scarified site would have native vegetation regrowth within 3 months without need for planting alien species. Any replanting effort should utilize native plant species from the campsite neighbourhood.
iii) Avoid leaving abandoned equipment on campsites.
iv) Remove or properly treat any existing solid waste and effluents.
v) Patches of ground contaminated with fuel/waste oil (e.g. at vehicle parking area, machine workshop areas, etc.) should be remediated.

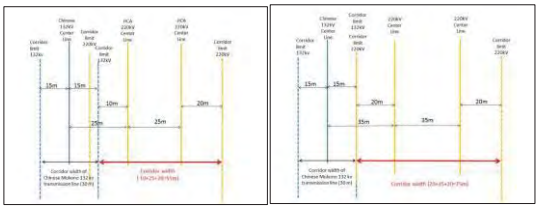
7.2.2 Mukono Substation and Associated Transmission Lines

7.2.2.1 Permanent Land Take

Land acquisition will be required for securing the 220 kV and 132 kV transmission line corridors and access road (land for the substation will be secured by the preceding 3x63 MVA, 132/33 kV Mukono Industrial Park substation).

To minimize land acquisition, the two 220 kV transmission lines will share their corridor as well as with the corridor of the Mukono Industrial Park substation 132 kV transmission line (30 m width). Figure 7-4 shows the corridor width that needs to be secured for the two 220 kV transmission lines. Note that the required corridor width is either 55 m or 75 m depending on the transmission section.

Although the new 132 kV transmission line will only require a corridor width of 30 m, an additional 30 m width will be secured for future development of an additional 132 kV transmission line. Table 7-2 shows the approximate surface area of the required land acquisition.



Source: JICA Project Team

Figure 7-4: Corridor width required for the 220 kV transmission line (left: 55 m, right 75 m)

Table 7-2: Approximate surface area of land acquisition – Mukono substation

Component	Surface area (m^2)
220 kV transmission line corridor	315,000
132 kV transmission line corridor	24,000
Access road	9,600
Total	**348,600**

Source: JICA Project Team

Impact Significance:

Sensitivity of receptor is rated high since even though the footprint of the project is relatively small, the proposed transmission line route is located within the Nandagi Central Forest Reserve, with various sections being used for subsistence agriculture, planted forest and natural forest.

The intensity of impact of land take during the construction period is medium since a relatively small land will be permanently taken and the current users have to find alternate parcels of land in which to continue their subsistence agriculture, tree planting, and other activities for which the land in question is currently being used.

Impact significance will therefore be major.

		Sensitivity of Receptor			
		Very low	Low	Medium	High
		1	2	3	4
Intensity of Impact	Very low 1	1 Negligible	2 Minor	3 Minor	4 Minor
	Low 2	2 Minor	4 Minor	6 Moderate	8 Moderate
	Medium 3	3 Minor	6 Moderate	9 Moderate	12 Major
	High 4	4 Minor	8 Moderate	12 Major	16 Major

Mitigation Measure

i) For the 2 x 220 kV transmission lines in Mukono site, the width of the transmission line corridors will be minimized through corridor sharing.

ii) All PAPs will be provided fair and adequate compensation and assistance (e.g. allowances and livelihood restoration programs) until their livelihood and incomes are restored to at least pre-project levels, in accordance to the Project's ARAP. The ARAP will be based on Ugandan laws and in compliance to JICA Guidelines on Environmental and Social Consideration.

iii) Additional assistance will be provided to vulnerable social groups if any are identified, for example child-headed homes, homes of elderly people.

iv) Internal and external monitoring will be implemented and a grievance mechanism established.

Adoption of the above mitigation measures will reduce impact intensity to "low" level resulting in a residual impact of moderate significance.

7.2.2.2 Economic displacement

Economic displacement is defined as the loss of assets or access to assets that leads to loss of income sources or means of livelihood as a result of project-related land acquisition or restriction of access to natural resources. The project site has both perennial and annual crops, and forest trees (mostly planted with a few natural sections – Section 5.6.2.5.1).

Impact Significance

The sensitivity of the receptor is rated medium because the land to be taken up by the project was reported as a secondary source of income by majority of the PAPs who use it for subsistence agriculture and the private forest farmers who planted trees as a long-term investment, hoping to sell the trees upon maturation.

The intensity of the impact is rated low since the land is used for farming only to supplement the income of the owners, as well as the long-term investment for the forest farmers who they will have to find alternate parcels of land to cultivate and grow trees, respectively.

Therefore, the rating for impact significance is major.

		Sensitivity of Receptor			
		Very low	Low	Medium	High
		1	2	3	4
Intensity of Impact	Very low 1	1 Negligible	2 Minor	3 Minor	4 Minor
	Low 2	2 Minor	4 Minor	6 Moderate	8 Moderate
	Medium 3	3 Minor	6 Moderate	9 Moderate	12 Major
	High 4	4 Minor	8 Moderate	12 Major	16 Major

Mitigation Measures

i) Promptly compensate economically displaced persons for loss of assets or access to assets at full replacement cost.

ii) Provide replacement property (for example, agricultural or commercial sites) of equal or greater value, or cash compensation at full replacement cost where appropriate, to persons with legal rights or claims to land which are recognised or recognisable under the national law.

iii) Provide assistance that will off-set any loss of a community's commonly held resources.

iv) This could take the form of initiatives that enhance the productivity of the remaining resources to which the community has access, in-kind or cash compensation for loss of access or provision of access to alternative sources of the lost resource.

v) Compensate economically displaced persons who are without legally recognisable claims to land for lost assets (such as crops, irrigation infrastructure and other improvements made to the land) other than land, at full replacement cost. The client is not required to compensate or assist opportunistic settlers who encroach on the project area after the cut-off date.

vi) Provide additional targeted assistance (for example, credit facilities, training, or job opportunities) and opportunities to improve or at least restore their income-earning capacity, production levels, and standards of living to economically displaced persons whose livelihoods or income levels are adversely affected. In case of businesses experiencing downtime or having to close as a result of project-related displacement, both the owner of the business and employees losing pay or employment are eligible for such assistance.

vii) Provide transitional support to economically displaced persons, as necessary, based on a reasonable estimate of the time required to restore their income-earning capacity, production levels, and standards of living.

Adoption of the above mitigation measures will reduce impact intensity to "very low" level resulting in a residual impact of minor significance.

7.2.2.3 Impact on Air Quality

The construction phase will involve activities such as construction of tower foundations and towers. These activities have the potential to produce fugitive dust emissions that could pollute the ambient air quality, especially the excavation of the foundations and delivery of materials such as sand, cement and coarse aggregates for the concrete mixtures. A number of equipment and machinery such as concrete mixers, and delivery vehicles will also be used during the construction and these are likely to produce fugitive emissions. Delivery vehicles have the potential to generate dust emissions as they deliver, load and offload material (supplies and debris). Considering that the project construction phase is expected to last about two (02 years), the impact on air quality during the construction phase will be a temporary, direct and reversible impact.

Impact significance

The Project area is sparsely populated, in a rural residential setting; with the proposed transmission line route currently covered by gardens, plantations and forest (natural and planted) (Section 5.6.2.5.1). Baseline air quality measurements revealed that the environment is generally pristine with respect to air quality since no detectable levels of PM_{10} and $PM_{2.5}$ were encountered (Table 5-45). Considering the scope of works involves construction of towers that are approximately 300 m apart, the sensitivity of the receptors is ranked low.

The intensity of the impact will be low since the impact will be short term and reversible, lasting only the duration of the construction period.

Low receptor sensitivity and medium impact intensity results in a minor impact significance.

		Sensitivity of Receptor			
		Very low	Low	Medium	High
		1	2	3	4
Intensity of Impact	Very low 1	1 Negligible	2 Minor	3 Minor	4 Minor
	Low 2	2 Minor	4 Minor	6 Moderate	8 Moderate
	Medium 3	3 Minor	6 Moderate	9 Moderate	12 Major
	High 4	4 Minor	8 Moderate	12 Major	16 Major

Mitigation Measures

i) Keeping exposed soil surfaces in damp condition by water spraying and material stockpiles covered when not in use.
ii) Use of well-maintained vehicles and machines. Vehicles and machines emitting excessive pollutants (e.g. black soot) to be removed until repaired.
iii) Use of closed/covered trucks when transporting dusty materials.
iv) Switching off engines of construction vehicles and machines when not in use.
v) To mitigate against dust emissions, control measures such as regular sprinkling of water on dusty areas and temporary access roads; and observing set speed limits among other measures will be implemented; the use of PPE will also be established to minimize the impact of the duct, where it occurs.

Adoption of the above mitigation measures will ensure residual impact of minor significance.

7.2.2.4 Water Pollution

The construction activities of the transmission lines (10 m x 10 m bases, at a spacing of 30 – 40 m apart) will have some influence on the hydrological response of the area in terms of runoff, siltation and risk of water pollution due to spillage of oils, fuels and lubricants from Project vehicles and machinery, as well as concrete wash water. Removal of part of the existing vegetation cover and replacement with areas of hard impervious surface will increase the amount of surface runoff. Excavation of pits for the tower foundations will involve piling of excavated soil before back-filling can be done. Exposure of such soil will be risk of soil erosion which could result in pollution of water courses such as River Kasala which is downstream of the proposed Project route. Earthworks when constructing tower foundations near and/or within swamps or near streams could increase sediment load in watercourses, mainly around tower footings if within the wetland.

a) Increased surface runoff

During construction, there is possibility of increased surface runoff due to compaction of soils and clearance of vegetation on and around the towers. The impervious surfaces will reduce the infiltration capacity of the subject site and increase the rate and volume of direct surface runoff. The increased flow rates will lead to over land erosion, channel erosion, sediment loading reaching watercourses. The impact is direct and short term.

b) Onsite generation of silt laden surface water runoff

During construction there is potential for generation of silt laden runoff due to:

- ≠ Removal of the surface vegetation cover and soil stripping to construct roads, temporary crane hard standings, sub-surface cabling, site compounds, turbine foundations and other infrastructure;
- ≠ Washed solids especially during heavy storms from excavations, handling, movement and storage of topsoil, subsoil and rocks.
- ≠ Dewatering excavations thereby increasing flow rate and consequent increased flooding downstream in receiving waters and drains.

c) Risk of accidental spills and pollution

During construction, there is always the inherent risk of accidental spills and water pollution resulting from the following:

- ≠ Spillage or leakage of oils and fuels from chemical and waste storage areas, construction machinery and vehicles, refuelling of machinery and vehicles onsite.
- ≠ Spillage or leakage from on-site toilet facilities.
- ≠ The use of concrete and cement in the construction of tower foundations. Cement is highly alkaline, any spillage into the surrounding streams/drains changes water quality of receiving waters.

Impact significance

The laboratory analysed results of the water samples collected in the Project area indicated on the whole, a generally acceptable water quality in terms of the physicochemical characteristics, although a high value for total suspended solids were detected at all sampling locations along the River Kasala which is downstream of the Project site (Section 5.6.2.1.2). For this reason, the receptor sensitivity of the water resources in the area is rated Medium since the Project could have an increasing effect on the suspended solids in the river. An increase in the sediment loading of the River Kasala could have impacts that last longer than the duration of the construction phase and water may be used for domestic purposes.

The intensity of the impact is also rated medium due the potential for actively exposing and loosening the soil surface during construction. One possible impact of increasing sediment loading could be invasion of emergent plants into the river course which would consequently result into flooding due to reduced depth. Reduced river depth would alter the aquatic life due to changed conditions.

Medium receptor sensitivity and medium intensity results in moderate impact significance.

		Sensitivity of Receptor			
		Very low	Low	Medium	High
		1	2	3	4
Intensity of Impact	Very low 1	1 Negligible	2 Minor	3 Minor	4 Minor
	Low 2	2 Minor	4 Minor	6 Moderate	8 Moderate
	Medium 3	3 Minor	6 Moderate	9 Moderate	12 Major
	High 4	4 Minor	8 Moderate	12 Major	16 Major

Mitigation measures

Discharge of concrete wash water

i) Discharge of untreated concrete wash water to surface waters (e.g. rivers, lakes) to be strictly prohibited.
ii) Concrete wash water (e.g. from concrete mixer and pump trucks) to be discharged only at designated facilities (e.g. facilities with wash water treatment system).
iii) Recycling of wash water will be done as far as practical.

Soil erosion and run-off from construction site

i) Avoid removing short vegetation and grass along the transmission line corridor as far as it does not hinder construction works.
ii) Implementation of temporary erosion control measures (e.g. silt fence, erosion mats) especially where construction sites are near surface water.
iii) Drainage management of run-off from the Project sites throughout the construction period.
iv) Revegetation of exposed slopes immediately after construction is completed.
v) Construction of retaining walls for exposed slope protection if necessary.
vi) Construction of adequate and efficient drainage channels at the substation site, which will provide proper drainage for the substation during operation.
vii) Stockpiles and temporarily removed topsoil to be stored in a location and manner to prevent soil runoff into surface waters.

Pollution sources (oil and human waste)

i) Spillage of hazardous liquids (e.g. oil) to be prevented by implementing spill prevention measures (see "Soil pollution" section below for details).
ii) Installation of portable toilets for construction workers.

Adoption of the above mitigation measures will reduce impact intensity to "very low" level resulting in a residual impact of minor significance.

7.2.2.5 Soil Erosion and Degradation

Clearance of vegetation at the proposed site will have the potential to contribute to soil erosion through the agents of wind and running water. Activities such as earthworks, construction of the proposed substation and associated facilities, spillage or uncontrolled release of potentially polluting material such as concrete wash water, fuels (oils, diesel, hydraulic fluid, or lubricants) or paint during construction could also contribute to soil degradation.

Earthworks when constructing tower foundations near and/or within swamps or near streams could increase sediment load in watercourses, mainly around tower footings if within the wetland.

Localised soil contamination would also arise from irresponsible waste management on site. During construction, erosion could take place as a result of change in ground cover, cut and fill, or poor erosion control practices which increase the soil erosion potential.

Impact significance

The sensitivity of the receptor to occurrence of soil erosion during the construction phase, especially during rainy and windy periods will be medium because of the proximity of the river Kasala to the Project site, given the area topography of the proposed site that gentle slopes.

Excavation of soil for the tower foundations will be short term, lasting through the initial phases of the construction period. Backfilling of the excavated soil will be done at least one week after casting the concrete. The duration of this impact will therefore be short term, although irreversible after the construction period. For this reason, the impact intensity is medium.

Therefore the impact significance is moderate.

		Sensitivity of Receptor			
		Very low	Low	Medium	High
		1	2	3	4
Intensity of Impact	Very low 1	1 Negligible	2 Minor	3 Minor	4 Minor
	Low 2	2 Minor	4 Minor	6 Moderate	8 Moderate
	Medium 3	3 Minor	6 Moderate	9 Moderate	12 Major
	High 4	4 Minor	8 Moderate	12 Major	16 Major

Mitigation measures

Prior to construction, a Construction Environmental Management Plan (CEMP) will be prepared by the contractor and submitted to the Supervising Consultant for approval. A range of appropriate erosion and sediment control measures will be contractually required to be implemented during the construction of the substation, tower bases and the new access road, to minimise the potential for environmental harm on soils and local receiving waters.

These measures would be installed prior to, or in conjunction with, the commencement of construction activities such as site preparatory works (i.e. involving the removal or clearing of vegetation, initial earthworks) or the main earthworks. Specific management measures relating to soils and water would be documented in a sub plan Soil and Water Management Plan (SWMP) including an Erosion and Sediment Control Plan (ESCP).

The following specific principles will be used on site for erosion and sediment control, which would in turn help to avoid storm water and soil contamination:

i) Regular inspection of vehicles and machines for oil and fuel leaks. Leaking vehicles and machines to be removed until repaired.
ii) Spill response kit (e.g. absorbents) to be readily available at the construction site.
iii) Hazardous substances to be stored only in specialized/labelled containers and designated storage facility.
iv) Storage facility to be located as far as possible from sensitive areas (e.g. groundwater wells, surface water) and well secured from the public.
v) Storage and handling facilities of hazardous liquid to be bunded with an impermeable base.
vi) Posting of warning signs at the storage facility.
vii) Hazardous materials only to be handled by trained staff.

Adoption of the above mitigation measures will reduce impact intensity to "very low" level resulting in a residual impact of minor significance.

7.2.2.6 Impact on Wetlands

As detailed in Section 5.6.2.5.1, wetlands were observed in the low lying areas, e.g. close to the Kampala-Jinja highway where there were still wetland habitats, with intact permanent patches in parts. There were other parts of the project area with wetland habitats but many of these were already degraded with human activity.

A few towers along the proposed transmission line route will be positioned with the section of wetland at the peripheral of Rive Kasala within the Project area. Implementation of the requisite construction activities through the sections of wetland has the potential to degrade the wetland, if not managed in an environmentally conscious manner. Contamination of the wetland (swamp and swamp forest) could be as a result of spillage of fuels, oils and lubricants from Project vehicles and equipment; or dumping of filling material into the wetland to provide for access for delivery of workers, materials and equipment.

Impact significance

The receptor sensitivity is accessed as medium because while many parts of the wetland appeared degraded there were sections of natural wetland, especially at the edge of River Kasala.

Impact intensity is also rated medium since the construction activities such as excavation of tower foundations, casting of concrete tower bases, mounting of the tower sections, and the other necessary construction activities within the swampy sections will have an impact on the wetlands and the life supported within the wetland.

Therefore, the impact significance is moderate.

		Sensitivity of Receptor			
		Very low	Low	Medium	High
		1	2	3	4
Intensity of Impact	Very low 1	1 Negligible	2 Minor	3 Minor	4 Minor
	Low 2	2 Minor	4 Minor	6 Moderate	8 Moderate
	Medium 3	3 Minor	6 Moderate	9 Moderate	12 Major
	High 4	4 Minor	8 Moderate	12 Major	16 Major

Mitigation measures

i. Access through sections of wetland, particularly undisturbed wetland, will be minimised as much as possible.
ii. Where access through sections of wetland could not be avoided, restoration activities will be undertaken at the end of the construction period, to ensure sustainable development of the Project area. A detailed restoration plan is provided in APPENDIX 12.
iii. As part of its overall pollution response plan, the Contractor shall have an Oil Spill Contingency Plan which has a number of controls and procedures for minimising or preventing accidental discharge of hydrocarbons (fuel, oils, and lubricants). The Plan will detail measures such as:

- 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.
- A drainage ditch will be constructed around tower sites closest to the wetland and channelled to a drainage retention pit equipped with oil interceptors; the ditches and pond will also be lined. These measures will minimise sediment load into the water course and the existing wetland.

iv. Unnecessary removal of vegetation during construction will be avoided. The stripped topsoil from the tower footing areas will be retained on site for later reinstatement upon completion of tower erection.

v. All stock piled material will be protected from being washed away by rain run-off and wind by covering and bunding the edges.

7.2.2.7 Noise and Vibrations

During the construction of the substation, noise and vibrations may be generated from heavy trucks ferrying materials and equipment to the site, earth movers as well as concrete mixers and generators being used at the site. Noise and vibrations will be a temporary and reversible impact ending with completion of construction activities.

Impact significance

The proposed transmission line route is sparsely populated, and mostly filled by forest (planted and natural), with only a small section populated to the North of the route (Section 5.6.2.7). Baseline noise measurements in the populated area indicated an environment already impinged by human activity in relation to noise levels, since three of the five sample locations had noise levels above the national limit for residential areas (Table 5-46). For this reason the receptor sensitivity is assessed as low considering that the residents in the area are already accustomed a degree of noise levels.

The intensity of the impact will be low since noise generated during the construction phase would be short-term and reversible, only lasting the duration of the construction activities.

With a low sensitivity of the receptor and low intensity of the impact, the impact significance will be minor.

		Sensitivity of Receptor			
		Very low	Low	Medium	High
		1	2	3	4
Intensity of Impact	Very low 1	1 Negligible	2 Minor	3 Minor	4 Minor
	Low 2	2 Minor	4 Minor	6 Moderate	8 Moderate
	Medium 3	3 Minor	6 Moderate	9 Moderate	12 Major
	High 4	4 Minor	8 Moderate	12 Major	16 Major

Mitigation measures

i) In principal, noisy construction works to be limited to normal working hours and no operation on Sundays and public holidays. The Contractors on site and Operators at the substation must be aware of, and adhere to, the regulatory noise limits for a construction site in a residential area (60 dBA (Leq) daytime and 40 dBA (Leq) night-time during construction) and 60 dBA during operation) as provided for by the National Environment (Noise Standards & Control) Regulations, 2003.
ii) Noisy equipment to be located as far as possible and aligned to be directed away from sensitive receptors.
iii) Vehicles and machinery to be equipped with exhaust mufflers and well maintained.
iv) Additional noise suppression measures (e.g. covering of noisy units) to be implemented if noise levels at nearest sensitive receptor consistently exceeds national noise standard or in case of consistent complaints.
v) Construction workers to be provided with appropriate PPE such as ear plugs and ear muffs for protection against excessive noise.
vi) Construction machines and vehicles to be turned off when not in use.

Adoption of the above mitigation measures will ensure residual impact of minor significance.

7.2.2.8 Improper Construction Waste Handling

During transmission line construction, waste will be generated, including vegetation stripped from right of way, soil excavated from pylon foundation sites, packaging waste (cement bags, paper, polyethene sheets, and wood pallets), metal scrap, wire cuttings, wooden planks, polyethene sheets, PET water bottles and waste oil from construction equipment or vehicles.

Improper handling and disposal of construction waste could impair site hygiene and aesthetics and create a potential breeding ground for vermin. Construction litter increases the potential for on-site personnel injury and soil contamination. Soil contamination will be short-term only manifesting during construction the phase of the project but reversible when these activities are completed. Contamination would be localised in spatial extent, limited to spots where waste is inappropriately dumped or incidental fuel or oil spills occur. This would be a negative impact but short-term and reversible with good construction waste management practices.

Impact significance

The sensitivity of the receptor to this impact is medium based on experience with other transmission line and substation construction projects especially when workers are not sensitised about responsible waste management practices.

Impact intensity will be medium due to the localised impact extent and the short construction duration; therefore significance is predicted to be moderate.

		Sensitivity of Receptor			
		Very low	Low	Medium	High
		1	2	3	4
Intensity of Impact	Very low 1	1 Negligible	2 Minor	3 Minor	4 Minor
	Low 2	2 Minor	4 Minor	6 Moderate	8 Moderate
	Medium 3	3 Minor	6 Moderate	9 Moderate	12 Major
	High 4	4 Minor	8 Moderate	12 Major	16 Major

Mitigation measures

i) Maximization of reuse and recycling.
ii) Storage of waste only in designated waste containers and areas. Waste will be sorted to ensure appropriate final disposal.
iii) Storage of hazardous wastes in specialized/labelled containers and facility.
iv) Wastes to be handled and disposed only by NEMA-authorized waste management entities.
v) Strict prohibition of littering and implementation of awareness programs for the construction workers.
vi) Daily clean-ups at the construction sites.
vii) The construction contractor will be required to submit Construction Waste Management Plan (WMP) to UETCL and other necessary organizations for approval.

Adoption of the above mitigation measures will reduce impact intensity to "low" level resulting in a residual impact of minor significance.

7.2.2.9 Existing Social Infrastructure

The use of the access road to the proposed substation site may be temporarily restricted due to the improvement works to be done on approximately 1.2 km of the road, up to the proposed substation entrance. The access road is a community road that is used by pedestrians, cyclists and motor vehicles, but gets narrower and with deep ruts towards the substation site. Works aimed towards improvement of this road will include the culvert crossing over River Kasala close to the Nandagi NFA Nursery bed.

Figure 7-5: Narrow and rutted sections of the access road to the substation site

Impact Significance

The receptor sensitivity is rated low because the volume of users on the road is small. A few pedestrians, NFA personnel, bicycles, motorcycles and motor vehicles were observed to use the access road on the days that field work was done in the area.

The intensity of the impact is rated low because considering the short length of the road (1.2 km), and the diversion that will be made at the culvert crossing on River Kasala, the road will continue to be in operation.

Therefore, the impact significance is rated minor.

		Sensitivity of Receptor			
		Very low	Low	Medium	High
		1	2	3	4
Intensity of Impact	Very low 1	1 Negligible	2 Minor	3 Minor	4 Minor
	Low 2	2 Minor	4 Minor	6 Moderate	8 Moderate
	Medium 3	3 Minor	6 Moderate	9 Moderate	12 Major
	High 4	4 Minor	8 Moderate	12 Major	16 Major

Mitigation Measures

i) The access road will be constructed in manner to minimize disturbance to local users (e.g. secure of one-lane width).
ii) Placement of traffic control officers if necessary.
iii) Local community to be informed beforehand if any restrictions occur.
iv) Placement of appropriate safety/warning signs in strategic locations (e.g. 'Heavy Trucks Turning', 'Road Diverted', 'Half Road Closed', etc.) shall be done during the construction period.

Adoption of the above mitigation measures will ensure residual impact of minor significance.

7.2.2.10 Change in Landscape

The proposed line route is currently used for farming on the northern part and forest on the Southern part of the route. Part of the footprint for Mukono component site lies within the Nandagi Central Forest Reserve. Construction of the towers and installation of the conductors will alter the appearance of the landscape. However, the northern and southern extreme ends of the proposed transmission route already have transmission lines traversing as shown in Figure 7-6.


Figure 7-6: Transmission lines to the extreme North (Left) and to the extreme South (right) of the proposed route

Impact significance

The sensitivity of the receptor will be medium since the line route is traversing a section of forest (Southern) and the rest of the route plantations and area under fallow (Northern section of route). However, the project areas already have existing transmission lines which are accustomed to observers.

The impact intensity will be medium because of the transmission line will be in existence for long time as per the life time of the project.

Therefore, the impact significance is rated moderate.

		Sensitivity of Receptor			
		Very low	Low	Medium	High
		1	2	3	4
Intensity of Impact	Very low 1	1 Negligible	2 Minor	3 Minor	4 Minor
	Low 2	2 Minor	4 Minor	6 Moderate	8 Moderate
	Medium 3	3 Minor	6 Moderate	9 Moderate	12 Major
	High 4	4 Minor	8 Moderate	12 Major	16 Major

Mitigation Measures

i) Site restoration (e.g. revegetation) to be implemented immediately after construction is completed.
ii) Creation of green belt, if necessary.

7.2.2.11 Risks Associated with Social Interaction with Construction Workers

The construction workforce for the Project will likely interact with the communities along the proposed transmission line route during construction. Interaction between the residents and construction workers will be inevitable, particularly in the Northern section of the line route since the area is mostly

residential. The location of the construction workers' areas of abode will be within the community and therefore some resources will be shared. This social interaction between the workers and the community could result in fraternization that could be sexual. 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.

Impact Significance

The receptor sensitivity is rated low because the proposed transmission line route is sparsely populated, and in a rural setting. The section of the route that traverses the residential area is through gardens and plantations and hence social interaction with the community members is not expected to be extensive.

The intensity of the impact is rated high because if the construction workers misbehave within the local community, or introduce and/or encourage vices such as prostitution, sexual promiscuity, gambling, child labour, etc., there could be repercussions that would last longer than the construction period.

Therefore the impact significance is rated moderate.

		Sensitivity of Receptor			
		Very low	Low	Medium	High
		1	2	3	4
Intensity of Impact	Very low 1	1 Negligible	2 Minor	3 Minor	4 Minor
	Low 2	2 Minor	4 Minor	6 Moderate	8 Moderate
	Medium 3	3 Minor	6 Moderate	9 Moderate	12 Major
	High 4	4 Minor	8 Moderate	12 Major	16 Major

Mitigation Measures

i) Holding of awareness programs for the construction workers.
ii) Preparation of Code of Conduct to be strictly followed by the workers.
iii) Contractor to undertake HIV/AIDS Management campaigning including Training, distribution of quality Contraceptives and Voluntary Counselling and Testing among workers and adjacent communities and schools.

Adoption of the above mitigation measures will reduce impact intensity to "low" level resulting in a residual impact of minor significance.

7.2.2.12 Occupational and Community Health and Safety

Construction of proposed transmission line associated with the Mukono Industrial Park substation, will involve moving heavy equipment and materials through settlements, trading centres and construction activities adjacent to residential areas. This potentially poses accident risk to the general public and construction workers. Fatal accidents could arise from unskilled operation of heavy construction machinery, unsatisfactory safety guidelines around the construction site or falling from line's lattice

towers when workers neglect requisite equipment (e.g. safety latches). Minor injuries would be reversible but effects such as permanent disability or electrocution of operation maintenance workers resulting in fatalities are irreversible. Considering that transmission line construction workers would most likely be household heads, this impact would not only affect workers but their immediate and extended families.

Impact significance

The sensitivity of the human receptor, especially in the event of fatal accidents is high, although would be low for minor injuries.

The potential hazards present during the installation and testing of such equipment and parts as the transformer and switchgear, include working at heights, exposure to high voltage electricity. However, the impact intensity is rated low since the system is not power loaded during any construction works.

Therefore the impact significance is moderate.

		Sensitivity of Receptor			
		Very low	Low	Medium	High
		1	2	3	4
Intensity of Impact	Very low 1	1 Negligible	2 Minor	3 Minor	4 Minor
	Low 2	2 Minor	4 Minor	6 Moderate	8 Moderate
	Medium 3	3 Minor	6 Moderate	9 Moderate	12 Major
	High 4	4 Minor	8 Moderate	12 Major	16 Major

Mitigation measures

i) Compliance to JICA's "The Guidance for the Management of Safety for Construction Works in Japanese ODA Projects" as well as the provisions in Uganda's OSH Act 2006.
ii) Implementation of safety training programs for all workers.
iii) Provision of appropriate Personal Protective Equipment (PPE).
iv) Holding of regular tool box meeting to discuss safety.
v) Lockout - tag out procedures to be clearly displayed on site and followed.
vi) Contractor to deploy an HSE Officer approved by UETCL.
vii) Contractor to provide appropriate safety signage at high risk locations (e.g. near fuel tanks) including ancillary work sites.
viii) The construction contractor will be required to submit an Occupational Health and Safety Plan (OHSP) to UETCL and other necessary organizations for approval. The Plan will include the 'Fire and Emergency Management Plan' and 'First Aid Kits and Tool Box Talks' for which templates are provided in APPENDIX 10 and APPENDIX 11 respectively.

Adoption of the above mitigation measures will reduce impact intensity to "low" level resulting in a residual impact of minor significance.

7.2.2.13 Traffic Accidents and Disruption

Construction of the 220 kV transmission lines and the 132 kV transmission line will involve activities that will require delivery of material such as cement, sand, coarse aggregates, steel trusses or members, as well as hauling away of debris from the Project area to the ultimate disposal location.

The delivery trucks transporting equipment and supplies may cause traffic flow impairment on the busy Kampala-Jinja highway, which is the most convenient access route (Figure 7-7). The Kampala – Jinja highway is known for its heavy traffic during rush hours in the morning, lunch hour and evening, especially the sections of Spear Junction, Bweyogerere, Kireka, and Mukono town. The additional construction traffic could have an added impact on this road that is already notorious for its jam.

Impact Significance

Sensitivity of the receptor is rated medium since the Kampala-Jinja highway is usually a busy road and hence pedestrians are accustomed to handling large volumes of traffic.

The intensity of temporary traffic disruption on Kampala-Jinja highway during construction is rated low, since increase in traffic due to the project is not expected to be high, the Project construction period will be of a short duration and delivery of materials to a convenient storage yard near the proposed route could greatly alleviate the added congestion on the road due to the Project activities.

A receptor sensitivity rating of medium and an impact intensity rating of low result in a significance rating of moderate.

		Sensitivity of Receptor			
		Very low	Low	Medium	High
		1	2	3	4
Intensity of Impact	Very low 1	1 Negligible	2 Minor	3 Minor	4 Minor
	Low 2	2 Minor	4 Minor	6 Moderate	8 Moderate
	Medium 3	3 Minor	6 Moderate	9 Moderate	12 Major
	High 4	4 Minor	8 Moderate	12 Major	16 Major

Figure 7-7: Access of Mukono substation site off Kampala-Jinja Highway

Mitigation Measures

i) Strict compliance to speed limits on major roads and by use of speed humps on non-major access roads.
ii) Contractor to undertake daily Tool Box Talks for Workers
iii) Avoid, as far as practical using roads with high risk of accidents.
iv) Vehicle motion alarm to be installed on all construction vehicles.
v) Placement of contractor flagmen and appropriate safety/warning signs in high risk locations (e.g. 'Heavy Trucks Turning', 'Road Diverted', 'Half Road Closed', etc.).
vi) Contractor to maintain a Health and Accident register
vii) The construction contractor will be required to submit a Traffic Management Plan to UETCL and other necessary organizations for approval.
viii) Contractor to Deploy a qualified Site Nurse and Doctor-On-Call
ix) Contractor to set-up a Site Clinic for treatment of minor ailments. However, other cases shall be referred for specialized management
x) Contractor to provide a well-stocked First Aid Kit

Adoption of the above mitigation measures will reduce impact intensity to "very low" level resulting in a residual impact of minor significance.

7.2.2.14 Temporary Disruption of Electricity Supply

The new Buloba substation will have to be brought 'on-line' after the construction of the substation and towers. A number of technical checks will be necessary during the process of connecting the substation and the associated transmission lines to the grid. This will result in disruption of electricity supply in the areas that will be connected to the new Mukono substation, such as areas fed by the existing Bujagali–Kawanda 220 kV transmission line located north of the substation, the existing Nalubaale—Kampala North 132 kV transmission line running south of the Bujagali–Kawanda 220 kV transmission line, which will be overpassed, and the existing Kira – Nalubaale - Lugogo 132 kV transmission line located south of the substation.

Impact Significance

The receptor sensitivity is rated high since the transmission lines to be affected by the electricity disruption are the major feeders into Kampala distribution areas from Nalubaale, Kira and Bujagali hydro power stations in Jinja.

The intensity of the impact is rated low since the electricity supply distribution is only expected to be interrupted towards the end of the construction period, when substation has to be brought 'online'. The impact will be short term and reversible in nature.

Therefore, the impact significance is moderate.

		Sensitivity of Receptor			
		Very low	Low	Medium	High
		1	2	3	4
Intensity of Impact	Very low 1	1 Negligible	2 Minor	3 Minor	4 Minor
	Low 2	2 Minor	4 Minor	6 Moderate	8 Moderate
	Medium 3	3 Minor	6 Moderate	9 Moderate	12 Major
	High 4	4 Minor	8 Moderate	12 Major	16 Major

Mitigation Measures

i) Construction works will be planned in manner to minimize duration of power outage.
ii) If power outage is unavoidable, it will be communicated to the public and facilities (e.g. hospitals, factories) in advance. Outages will be planned in co-ordination with UMEME, and give at least 2 weeks' notice for the occurrence of outages.
iii) Overhead line work to be designed and carried out in a way to avoid interference with existing power lines and maintaining safe separation distances from existing distribution lines.

Adoption of the above mitigation measures will reduce impact intensity to "very low" level resulting in a residual impact of negligible significance.

7.2.2.15 Impact on Ecological Environment

A. VEGETATION AND FLORA

The total forest area off Nandagi Forest Reserve taken by the transmission wayleave is 219,606.71 m² (54.266 acres). This will have the following impacts:

i) *Loss and degradation of habitat*: The transmission mainly crosses forest in the Nandagi Forest Reserve with considerable areas of natural and semi-natural vegetation. The swamp forest and swamp habitats cover a much small area, and many have been degraded already through cultivation. But these habitats still support plant and other forms of biodiversity that is bound to be affected by the proposed activities of the power line and sub-station. The nearly 6km long transmission line and its corridor will be cleared of vegetation, thus leading to loss or degradation of vegetation which is a suitable habitat for biodiversity.
ii) *Reduction in woody cover biomass*: Clearance of vegetation to create a passage for the transmission line will mostly affect the tall mature trees, particularly in the Nandagi Forest Reserve. Such mature trees are seed sources for natural regeneration in the forest. Their clearance will cause a reduction in cover of woody vegetation along the transmission line. Other sites at the same risk of being affected are the swamp forests of *Phoenix reclinata* at the east end of the project area which can grow to 10m high (Kalema & Beentje 2012). Others, to a lesser extent are the exotic plantations of *Eucalyptus* and *Pinus* around the sub-station site with large trees.
iii) *Proliferation of invasive plant species*: At least four species of invasive plant occur in the areas proposed to be traversed by the proposed transmission line and sub-station site. These include *Broussonetia papyrifera*, *Mimosa pigra*, *Ricinus communis* and *Lantana camara*. By far, the most widespread and abundant of these invasive species is *Broussonetia papyrifera*. This species is also common and widespread in Mabira Central Forest Reserve, having been introduced there many years ago (Kalema & Beentje 2012). It is also found outside the forest reserve. This poses a threat to the indigenous plant species which are already decimated and susceptible owing to the level of degradation and conversion in the area. Invasive plant species are fugitive, with a "weedy tendency" i.e. ecological adaptation to open, disturbed, or unstable environments – they are adapted to disturbed or open habitats. The activities of the transmission line are very likely to increase disturbance in the environment, thus inducing prolific growth of invasive species of plants. There is also a risk of introducing other invasive plant species during the construction phase of the project that may come in with the implements and trucks used in construction.
iv) Impairment of ecosystem service provision due to their degradation. These include ecological functions such as carbon storage, nutrient cycling, water and air purification, and maintenance of wildlife habitat.

Impact significance: The sensitivity of receptor to this impact during the construction of transmission line and its associated substation is high, especially that within the project area species of concern were observed. Impact intensity is considered high given that although a small area is to be cleared, the effects will last a long term (life time of the project) and the few species to be affected by vegetation clearance in both the power line corridor and the substation; hence resulting in a major severity.

		Sensitivity of Receptor			
		Very low	Low	Medium	High
		1	2	3	4
Intensity of Impact	Very low 1	1 Negligible	2 Minor	3 Minor	4 Minor
	Low 2	2 Minor	4 Minor	6 Moderate	8 Moderate
	Medium 3	3 Minor	6 Moderate	9 Moderate	12 Major
	High 4	4 Minor	8 Moderate	12 Major	16 Major

Mitigation measures

i) Revegetation of exposed surfaces (e.g. cut and fill slopes) to be done by native plant species only, and immediately after works are completed to minimize chance of colonization by invasive species.
ii) Removal of invasive species if observed along the revegetation sites.
iii) Implementation of environmental awareness programs for the construction workers, with special focus on threatened species.
iv) Strictly prohibit hunting and poaching of wild life and cutting of trees.
v) Prevention and minimization of pollution (e.g. noise, water) through strict implementation of planned pollution control measures.

Adoption of the above mitigation measures will reduce impact intensity to "low" level resulting in a residual impact of moderate significance.

B. INVERTEBRATES (Lepidoptera and Odonata)

There were two species of high conservation regard. *Papilio dardanus* (VU) and *Papilio demodocus* (NT) are globally threatened due to restricted range and wide spread habitat loss (SANBI, 2009). However, both species can survive in cultivated fields despite being poor competitors even in these fields. Therefore, much as these butterflies can withstand some degree of disturbance and manipulation to their range and shall continue to decrease with increase of poorly managed activities especially to the forested areas. *Euphaedra rex* (VU), *Neptis trigonophora* (VU) and *Caenides dacena* (EN) (WCS, 2016) need great conservation attention particularly for Uganda. The former three species were all recorded from forested sites within the forest reserve at Nandagi implying that, their survival will actually depend on how much regard is put to this location during construction.

Impact significance:

The sensitivity of receptor of impact to construction of transmission line and substation is high. Impact intensity is considered low, given the few species to be affected by vegetation clearance in the power line corridor and substation construction area and their possibility of survival in the cultivated fields; hence resulting in a moderate severity.

		Sensitivity of Receptor			
		Very low	Low	Medium	High
		1	2	3	4
Intensity of Impact	Very low 1	1 Negligible	2 Minor	3 Minor	4 Minor
	Low 2	2 Minor	4 Minor	6 Moderate	8 Moderate
	Medium 3	3 Minor	6 Moderate	9 Moderate	12 Major
	High 4	4 Minor	8 Moderate	12 Major	16 Major

Mitigation measures:

i) Invasions in the plant communities will be monitored and when sighted must be halted since such invasions drastically reduce food resources for invertebrates.

ii) Prevent as much as possible the staffing of construction materials in the reserve and the swamp. If not controlled, construction materials can change the environment and encourage invasions. Invasions will alter plant community structure and hence invertebrates' communities will be disrupted.

iii) It will be good practice to have flower producing plants inside and on the fence of the infrastructure if the expanse taken up is to remain useful to invertebrates especially butterflies

iv) Arrangements for maintaining the corridors through which electricity lines pass have to be put in place and with great care especially for forested areas in the reserve. This will reduce destruction and alteration of habitats.

Adoption of the above mitigation measures will reduce impact intensity to "very low" level resulting in a residual impact of minor significance.

C. HERPETILES

Human activities in any natural environment adversely affect amphibians and reptiles in many ways but most importantly by: 1) negatively destroying natural habitat, and favourably, by creating new habitats. The natural habitats are already modified into cultivated areas, settlements and trading centres. Most of the impacts will be due to vegetation clearance, road network and possibly waste disposal in the wetland system. The vital ecosystems which provided the amphibians with suitable habitats for foraging, protection and reproduction will be destroyed in the project areas, leaving herpetiles exposed to the harsh environmental conditions.

Anticipated impacts

Reptiles and amphibians are generally classified by the type of habitats they prefer or occupy. Therefore alterations of the habitat will imply destruction of species composition and their niche. Regarding the above context, the major impacts of the proposed project will most likely be:

iii. Continued loss and degradation of habitat

Since the greatest portion of land was already converted into agricultural fields, further clearance of vegetation is expected to aggravate habitat destruction. Among the habitats that will be affected are the remnant wetlands (wooded bush lands and the forest reserve) which are critical breeding and foraging sites species.

iv. Loss and reduction in abundance / cover of some species of non woody and woody biomass

This is usually during the project implementation phase, where there will be vegetation clearance, excavation and human presence. Such activities distort the ecosystem by removing cover used by herpetiles to hide from predators. During vegetation clearance and excavation, some slow moving species such as chameleons and some frogs are killed.

However, no Herpitile species of conservation concern were encountered during survey period.

Impact significance:

The sensitivity of receptor of impact to construction of transmission line and substation is high. Impact intensity is considered low, given the few species to be affected by vegetation clearance in the power line corridor and substation construction; hence resulting in a minor severity.

		Sensitivity of Receptor			
		Very low	Low	Medium	High
		1	2	3	4
Intensity of Impact	Very low 1	1 Negligible	2 Minor	3 Minor	4 Minor
	Low 2	2 Minor	4 Minor	6 Moderate	8 Moderate
	Medium 3	3 Minor	6 Moderate	9 Moderate	12 Major
	High 4	4 Minor	8 Moderate	12 Major	16 Major

Mitigation measures:

i) Restore the ecological state of the surrounding sites immediately after portions and / or all project activities in the area have been accomplished.

ii) The clearance of land will be minimized by limiting activities only to designated sites preferably the already cultivated ground.

iii) Encourage conservation and protection of the wetland systems, forests and other habitat patches. This will prevent direct pollution of swampy ecosystem and ensure a reasonable degree of reptiles and amphibian protection.

iv) All wastes will be managed according to the set standards by National Environment Authority.

v) Enrichment planting will be fostered in areas that will be degraded to facilitate natural vegetation regeneration which will ensure faunal species persistence.

Adoption of the above mitigation measures will reduce impact intensity to "very low" level resulting in a residual impact of minor significance.

D. MAMMALS

There were few species recorded in the proposed project area that are considered threatened. The Uganda Mangabey *Lophocebus ugandae* deserves particular mention given that it is a species endemic to Uganda and most of its previous known range being in the forests fringing Lake Victoria. A lot of these forests have been cleared or are now of greatly reduced extent.

It is acknowledged that the time that was available for the surveys was limited and that therefore more species could have been recorded in a longer survey campaign. However, it is also appreciated that animals have temporal patterns in habitat use which very much determine what species assemblages would be encountered from different survey campaigns.

Impact significance:

The sensitivity of receptor of impact to construction of transmission line and substation is high. Impact intensity is considered low, given the few species to be affected by the project activities; hence resulting in a moderate severity.

		Sensitivity of Receptor			
		Very low	Low	Medium	High
		1	2	3	4
Intensity of Impact	Very low 1	1 Negligible	2 Minor	3 Minor	4 Minor
	Low 2	2 Minor	4 Minor	6 Moderate	8 Moderate
	Medium 3	3 Minor	6 Moderate	9 Moderate	12 Major
	High 4	4 Minor	8 Moderate	12 Major	16 Major

Mitigation measures:

i) Restore habitats that could ultimately be exploited by the mammals thereby enhancing the biodiversity value of the area.

ii) Flush throughout the entire area before vegetation clearance at key work sites, this gives time for slow animals to escape.

Adoption of the above mitigation measures will reduce impact intensity to "very low" level resulting in a residual impact of minor significance.

E. BIRDS

In the survey conducted in Nandagi Forest Reserve, 5 species of birds listed at the regional level, two of them being Near Threatened (Grey Crowned Crane *Balearica regulorum* and Grey Parrot *Psittacus erithacus*). At the Global level the Crane is Endangered while the Parrot is Vulnerable. These two were only encountered in 1 of the survey points suggesting that they were not very numerous in the area. The project area is therefore of importance as part of their range and perhaps survival of the meta-population but probably not very critical for the survival of the species.

The possible impacts of the project on birds include the following:

i) Collision with the power line: - The new line will introduce a perpendicular structure off the existing high voltage transmission line from Bujagali and Owen Falls HPP and this could be a potential trap in the flight path of the birds.

ii) Habitat loss – This will result where vegetation that forms the matrix environment for the animals will be cleared to install power transmission poles.

Impact significance:

The sensitivity of receptor of impact to construction of transmission line and substation is high to the observation of the threatened species. Impact intensity is considered medium given the few species to be affected by forest clearance in the power line corridor and substation construction and that the clearance is not critical to the survival of the identified species; hence resulting in a major significance.

		Sensitivity of Receptor			
		Very low	Low	Medium	High
		1	2	3	4
Intensity of Impact	Very low 1	1 Negligible	2 Minor	3 Minor	4 Minor
	Low 2	2 Minor	4 Minor	6 Moderate	8 Moderate
	Medium 3	3 Minor	6 Moderate	9 Moderate	12 Major
	High 4	4 Minor	8 Moderate	12 Major	16 Major

Mitigation measure:

i) Restore habitats that could ultimately be exploited by the birds thereby enhancing the biodiversity value of the area.

ii) Avian flight diverters to prevent collision with the electric cable.

Avian flight diverters

AFTERGLOW and FIREFLY help to protect wildlife while saving time and money on power outages caused by bird streaks. The AFTERGLOW emits ultra violet light which birds see brightly in both day and night, and the FIREFLY works by hazing birds. Both devices are easily attached and removed with the Power Engineers Red Application Tool.

Adoption of the above mitigation measure will reduce impact intensity to "low" level resulting in a residual impact of moderate significance.

7.2.2.16 Impact on Nandagi Central Forest Reserve

Nandagi CFR serves as a catchment forest for rivers Ssezibwa and Kasala which eventually feed into Lake Kyoga. The forest also serves as a biodiversity repository for plants and birds. It also recharges and stabilizes the water balance making it very important from a hydrological perspective.

The CFR has an indigenous tree and bamboo nursery, private tree planting/farming, research plots, and seed stand. The part of the Project area within the forest reserve is majorly being used by the private tree farmers who planted the species of *Pinus*, *Eucalyptus* and *Terminalia superba* (Section 5.6.2.5.1)

Impact Significance

Clearing of the trees from Nandagi CFR will have some impact on the ecological functions of the forest, as well as the economic gain for the private farmers. However, the forest does not support much biodiversity since the trees are maintained for commercial timber gains and therefore do not support much biodiversity. Consideration of the current status of the CFR as degraded with exotic plantations and clear evidence of cultivation in many parts, and also the fact that the exotic tree plant species can be offset to an area identified to be within the Lake Kyoga catchment, and in particular the River Sezibwa catchment; the sensitivity of the receptor is accessed as medium.

The impact intensity is also assessed as medium because the changes in the ecological functions of the forest are recoverable after offsetting, within a period of 10 – 15 years, which is approximately how long it would take for the cut trees to grow back to their current level.

Therefore, the impact significance is rated moderate.

		Sensitivity of Receptor			
		Very low	Low	Medium	High
		1	2	3	4
Intensity of Impact	Very low 1	1 Negligible	2 Minor	3 Minor	4 Minor
	Low 2	2 Minor	4 Minor	6 Moderate	8 Moderate
	Medium 3	3 Minor	6 Moderate	9 Moderate	12 Major
	High 4	4 Minor	8 Moderate	12 Major	16 Major

Mitigation measures

i) The loss of forest and associated biodiversity will be compensated (offset) based on the "Forest Biomass and Biodiversity Assessment" undertaken by National Forest Authority (NFA) in conjunction with UETCL.
ii) Any threatened flora species (e.g. *Jacaranda mimosifolia*) that require cutting will be compensated by for example replanting its seed or seedling in a suitable alternative location.
iii) NFA and UETCL shall undertake forest restoration and other activities that shall enhance the management of the remaining Central Forest Reserves.
iv) Nandagi Indigenous Tree Nursery shall be supported to produce more seedlings for Forest restoration.
v) Compensation to private farmers for the planted trees based on the ARAP valuation survey.
vi) NFA shall undertake awareness activities and guide Licensee tree farmers to continue with Tree Planting projects.
vii) Provision of livelihood restoration assistance to the affected private farmers if necessary.

7.2.2.17 Climate Change Impacts

There will be vegetation clearance along the transmission line route and access roads to enable access to the site by equipment and crews. Approximately 7 ha of forest area will need to be cleared to allow for the transmission line route and desired corridor. Biomass loss reduces carbon sinks necessary for carbon sequestration.

Loss of biomass is a negative impact since it reduces natural carbon sinks that would trap carbon dioxide from the atmosphere. Carbon dioxide gas is a greenhouse gas that contributes to global warming hence climate change. A tree taller than five (5) meters can absorb about 21 kg of carbon dioxide annually therefore biomass loss will be a negative and long-term impact. It is also noted that exhaust emissions from construction equipment would also generate carbon dioxide emissions but this would be short-term and comparatively insignificant.

Impact Significance

The receptor sensitivity is rated medium because since climate change has long term impacts that are irreversible in nature, and have a domino effect on most of the other natural resources such as water, temperature, soils and aquatic life.

Approximately seven (7) hectare of forest will be cleared to make way for the Project. Impact intensity is assessed as low given the relatively small acreage of forest to be cleared. The impact of the loss of biomass from the Project area will make a contribution to the loss of carbon sinks, but climate change is brought about by a combination of factors over a very long term. Project works will be localized with limited adverse impact on rainfall, temperature or humidity in the project area. In addition, the Project will increase the efficiency of power supply which could increase the use of electricity and hence reduce the dependency on biomass as a fuel source, and in this way contribute to the loss of trees.

Therefore, the significance of climate change impact due to the Mukono transmission line is rated moderate on a local, national, and regional scale.

		Sensitivity of Receptor			
		Very low	Low	Medium	High
		1	2	3	4
Intensity of Impact	Very low 1	1 Negligible	2 Minor	3 Minor	4 Minor
	Low 2	2 Minor	4 Minor	6 Moderate	8 Moderate
	Medium 3	3 Minor	6 Moderate	9 Moderate	12 Major
	High 4	4 Minor	8 Moderate	12 Major	16 Major

Mitigation measure

UETCL will adopt a proactive approach of being involved in reforestation programs using indigenous species with local communities in the project affected area, or supporting tree-planting as a compensatory measure for vegetation cover lost during development of transmission line projects. This off-setting undertaking will be explored through discussion with the National Forestry Authority (NFA).

Adoption of the above mitigation measures will reduce impact intensity to "very low" level resulting in a residual impact of minor significance.

7.2.2.18 Impact on Physical Cultural Resources

Since the Project will be developed from a green field, there is potential for discovery of physical cultural resources during its implementation, especially activities involving earthworks and excavation. No physical cultural resources were identified during the field studies.

Impact Significance

The sensitivity of the receptor is rated low because the Project site is largely disturbed with agricultural practices in gardens, planted forests and a few residential settlements within the Project area (Section 5.6.2.7). Therefore the possibility of chance finds is limited.

The impact intensity is rated medium because of potential for damage that would occur to any physical cultural resources, if not properly managed or if not identified at an early stage.

The impact significance is therefore rated moderate.

		Sensitivity of Receptor			
		Very low	Low	Medium	High
		1	2	3	4
Intensity of Impact	Very low 1	1 Negligible	2 Minor	3 Minor	4 Minor
	Low 2	2 Minor	4 Minor	6 Moderate	8 Moderate
	Medium 3	3 Minor	6 Moderate	9 Moderate	12 Major
	High 4	4 Minor	8 Moderate	12 Major	16 Major

Mitigation Measures

A Chance Finds Procedure has been developed (APPENDIX 13) as part of the ESMP, to guide the handling of any chance finds during Project implementation. In particular, if any physical cultural resources are found;

i. Cease work immediately to avoid any further damage if chance finds are stumbled upon;
ii. The identifier must immediately inform his/her Site Supervisor of the discovery;
iii. Access to the site must be controlled and the site secured;
iv. The Site Supervisor must notify the responsible authorities, including the Ministry of Tourism, Wildlife and Antiquities;
v. 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;
vi. Consultations to determine relocation costs; and
vii. Relocation and replacement.

Adoption of the above mitigation measures will reduce impact intensity to "very low" level resulting in a residual impact of minor significance.

7.2.2.19 Improper Camp Decommissioning

Considering the small number of workers required it is unlikely that workers' camps will be built by the contractors. However, the necessity of these camps will be left to the Contractor's discretion.

There is a potential of negative socio-economic impacts if the contractor does not properly restore camp sites to original conditions at the end of construction operations. Derelict equipment, patches of contaminated soil and abandoned waste would not only cause environmental contamination but also social and public health impacts.

It is expected that camps closure might result in loss of jobs for some workers. There might also be challenges of remediation of patches of campsite contaminated by fuel/oil, disposal of construction waste or other waste streams and landscaping the camp site to original conditions. All of the above are negative, short- to medium-term but reversible impacts.

Impact significance

The sensitivity of the receptor is rated medium since the Project area is sparsely populated, with the biggest area being greenfield, with sections of gardens, wetland and forest.

The impact intensity is rated very low considering that the number of workers required during the construction phase is small (estimated as 20 workers in Section 2.2.4), requiring a very small footprint for the workers' camp. If the number required is even less, it is possible that the contractor could decide not to construct a workers'' camp.

Therefore, impact significance is rated minor.

		Sensitivity of Receptor			
		Very low	Low	Medium	High
		1	2	3	4
Intensity of Impact	Very low 1	1 Negligible	2 Minor	3 Minor	4 Minor
	Low 2	2 Minor	4 Minor	6 Moderate	8 Moderate
	Medium 3	3 Minor	6 Moderate	9 Moderate	12 Major
	High 4	4 Minor	8 Moderate	12 Major	16 Major

Mitigation measures

Before closure of camps, the contractor should plan for the following elements:

i) Requirements and procedure for removing equipment, waste and structures from the camp site;
ii) Requirements and procedures to restore the site to original condition, leaving no visual alterations that would impact the landscape; and
iii) Description of how possible socio-environmental impacts will be minimised during decommissioning.

Decommissioning should remediate any onsite contamination and restore site to the maximum extent consistent with pre-project land use. During decommissioning and site restoration, the following issues should be addressed following a site restoration plan:

vi) Hard pans (ground surfaces) such as at vehicle or equipment parking yards should be adequately scarified (surface broken up) to enable immediate vegetation re-growth.
vii) Avoid introduction of non-native plant species in the quest for rapid vegetation restoration. A properly scarified site would have native vegetation regrowth within 3 months without need for planting alien species. Any replanting effort should utilize native plant species from the campsite neighbourhood.
viii) Avoid leaving abandoned equipment on campsites.
ix) Remove or properly treat any existing solid waste and effluents.
x) Patches of ground contaminated with fuel/waste oil (e.g. at vehicle parking area, machine workshop areas, etc.) should be remediated.

Adoption of the above mitigation measures will reduce impact intensity to "very low" level resulting in a residual impact of minor significance.

7.3 NEGATIVE IMPACTS - UPGRADE OF SUBSTATIONS

7.3.1 Renovation of Kawaala Substation

Renovation will involve removing the existing facilities and replacement by new transformers, switchgears and control building. The existing overhead transmission line that connects to the Kampala North-Mutundwe 132 kV transmission line will also be replaced by installing new underground transmission cable of approximately 100 m length and corridor of 5 m.

7.3.1.1 Permanent Land Take

Although the substation land is already currently owned by UETCL, the area where the cable will be laid is owned by individuals who are squatters on Kabaka's land. The corridor to be acquired for the cable route is approximately 100 m long and 5 m wide. The layout of the cable route is presented in Figure 2-6.

Impact significance

The sensitivity of the receptor is rated medium because although the corridor to be acquired is relatively small (100 m long and 5 m wide), peoples' sentiments about giving up land are very strong. The only existing structure to be affected is a toilet constructed using semi-permanent materials (unburnt bricks and mortar).

The impact intensity is rated low since the corridor to be acquired is relatively small (100 m long and 5 m wide).

Therefore, the impact significance is moderate.

		Sensitivity of Receptor			
		Very low	Low	Medium	High
		1	2	3	4
Intensity of Impact	Very low 1	1 Negligible	2 Minor	3 Minor	4 Minor
	Low 2	2 Minor	4 Minor	6 Moderate	8 Moderate
	Medium 3	3 Minor	6 Moderate	9 Moderate	12 Major
	High 4	4 Minor	8 Moderate	12 Major	16 Major

Mitigation measures

i) Acquisition of land required for the project will be obtained after fair and adequate compensation by UETCL, within the confines of the provisions of the Laws of Uganda, as highlighted in Section 4.3 and JICA Guidelines for Environmental and Social Considerations summarized in Section 4.7.

ii) Additional assistance will be provided to vulnerable social groups if any are identified, for example child-headed homes, homes of elderly people.

iii) Internal and external monitoring will be implemented and a grievance mechanism established.

Adoption of the above mitigation measures will reduce impact intensity to "very low" level resulting in a residual impact of minor significance

7.3.1.2 Economic Displacement

There will be economic displacement in this area because five (05) of the six (06) identified PAPs use the land for brick making, and for majority it is their primary source of income.

Impact Significance

The sensitivity of the receptor is rated medium because although only a few the brick makers are using land, they reported brick making to be their primary source of income. However, only a small strip of the land will be acquired and the land owners can continue with their activities on the remaining section.

Intensity of the impact is rated low because only a small strip of the land will be acquired and the land owners can continue with their activities on the remaining section. In addition, brick markers should be able to continue making their brick both on neighbouring areas and at other locations.

Therefore the impact significance is moderate.

		Sensitivity of Receptor			
		Very low	Low	Medium	High
		1	2	3	4
Intensity of Impact	Very low 1	1 Negligible	2 Minor	3 Minor	4 Minor
	Low 2	2 Minor	4 Minor	6 Moderate	8 Moderate
	Medium 3	3 Minor	6 Moderate	9 Moderate	12 Major
	High 4	4 Minor	8 Moderate	12 Major	16 Major

Mitigation measures

i) Promptly compensate economically displaced persons for loss of assets or access to assets at full replacement cost.

ii) Provide replacement property (for example, agricultural or commercial sites) of equal or greater value, or cash compensation at full replacement cost where appropriate, to persons with legal rights or claims to land which are recognised or recognisable under the national law.

iii) Provide assistance that will off-set any loss of a community's commonly held resources.

iv) This could take the form of initiatives that enhance the productivity of the remaining resources to which the community has access, in-kind or cash compensation for loss of access or provision of access to alternative sources of the lost resource.

v) Compensate economically displaced persons who are without legally recognisable claims to land for lost assets (such as crops, irrigation infrastructure and other improvements made to the land) other than land, at full replacement cost. The client is not required to compensate or assist opportunistic settlers who encroach on the project area after the cut-off date.

vi) Provide additional targeted assistance (for example, credit facilities, training, or job opportunities) and opportunities to improve or at least restore their income-earning capacity, production levels, and standards of living to economically displaced persons whose livelihoods or income levels are adversely affected. In case of businesses experiencing downtime or having to close as a result of project-related displacement, both the owner of the business and employees losing pay or employment are eligible for such assistance.

vii) Provide transitional support to economically displaced persons, as necessary, based on a reasonable estimate of the time required to restore their income-earning capacity, production levels, and standards of living.

Adoption of the above mitigation measures will reduce impact intensity to "low" level resulting in a residual impact of minor significance.

7.3.1.3 Impact on Air Quality

Delivery vehicles carrying materials and equipment have the potential to generate dust emissions as they deliver, load and offload material (supplies and debris). Renovation of the control building may require demolishing some parts of the existing structure, which could also contribute to the increase in particulate matter. Considering the project which will last for a short time, the impact on air quality during the construction phase will be a temporary, direct and reversible.

Impact significance

The receptor sensitivity is rated high considering the proximity of the neighbouring houses to the substation fence line.

The intensity of the impact is rated low considering the small footprint of the substation site and the fact that the site is already cleared and levelled, and the area to be excavated for the cable is very small (approx. 100 m ling and 1 m wide). The impact will only be short term, lasting the duration of the renovation works, and reversible.

Therefore, the impact has a moderate significance.

		Sensitivity of Receptor			
		Very low	Low	Medium	High
		1	2	3	4
Intensity of Impact	Very low 1	1 Negligible	2 Minor	3 Minor	4 Minor
	Low 2	2 Minor	4 Minor	6 Moderate	8 Moderate
	Medium 3	3 Minor	6 Moderate	9 Moderate	12 Major
	High 4	4 Minor	8 Moderate	12 Major	16 Major

Mitigation measures

i) Keeping exposed soil surfaces in damp condition by water spraying and material stockpiles covered when not in use.
ii) Use of well-maintained vehicles and machines. Vehicles and machines emitting excessive pollutants (e.g. black soot) to be removed until repaired.
iii) Use of closed/covered trucks when transporting dusty materials.
iv) Switching off engines of construction vehicles and machines when not in use.
v) To mitigate against dust emissions, control measures such as regular sprinkling of water on dusty areas and temporary access roads; and observing set speed limits among other measures will be implemented; the use of PPE will also be established to minimize the impact of the duct, where it occurs.

Adoption of the above mitigation measures will reduce impact intensity to "very low" level resulting in a residual impact of negligible significance.

7.3.1.4 Soil Erosion and Degradation

During construction, erosion could take place as a result of a change in ground cover, cut and fill, or poor erosion control practices which increase soil erosion potential. The renovation of the Kawaala substation will cause soil erosion and degradation to an insignificant extent since there is already an existing structure in place.

Impact Significance

The sensitivity of receptor to occurrence of soil will be very low because the substation area is already levelled, compacted and covered with gravel. The section to be excavated for the cable is very small (approx. 100 m length and 1 m wide)

The intensity of the impact will be low because the duration of the upgrade will be relatively short (less than 2 years), and soil will only be exposed (after excavation for cable) for a very short time.

Therefore the impact significance is minor.

		Sensitivity of Receptor			
		Very low	**Low**	**Medium**	**High**
		1	**2**	**3**	**4**
Intensity of Impact	**Very low 1**	1 Negligible	2 Minor	3 Minor	4 Minor
	Low 2	2 Minor	4 Minor	6 Moderate	8 Moderate
	Medium 3	3 Minor	6 Moderate	9 Moderate	12 Major
	High 4	4 Minor	8 Moderate	12 Major	16 Major

Mitigation measures

Prior to construction, a Construction Environmental Management Plan (CEMP) will be prepared by the contractor and submitted to the Supervising Consultant for approval. A range of appropriate erosion and

sediment control measures will be contractually required to be implemented during the construction of the substation, tower bases and the new access road, to minimise the potential for environmental harm on soils and local receiving waters.

These measures would be installed prior to, or in conjunction with, the commencement of construction activities such as site preparatory works (i.e. involving the removal or clearing of vegetation, initial earthworks) or the main earthworks. Specific management measures relating to soils and water would be documented in a sub plan Soil and Water Management Plan (SWMP) including an Erosion and Sediment Control Plan (ESCP).

The following specific principles will be used on site for erosion and sediment control, which would in turn help to avoid storm water and soil contamination:

i) Regular inspection of vehicles and machines for oil and fuel leaks. Leaking vehicles and machines to be removed until repaired.
ii) Spill response kit (e.g. absorbents) to be readily available at the construction site.
iii) Hazardous substances to be stored only in specialized/labelled containers and designated storage facility.
iv) Storage facility to be located as far as possible from sensitive areas (e.g. groundwater wells, surface water) and well secured from the public.
v) Storage and handling facilities of hazardous liquid to be bunded with an impermeable base.
vi) Posting of warning signs at the storage facility.
vii) Hazardous materials only to be handled by trained staff.

Adoption of the above mitigation measures will reduce impact intensity to "very low" level resulting in a residual impact of negligible significance.

7.3.1.5 Noise and Vibrations

During the renovation of the substation, noise and vibrations may be generated from heavy trucks ferrying materials and equipment to the site. Noise and vibrations will be a temporary and reversible impact ending with completion of the renovation activities.

Impact Significance

Receptor sensitivity is rated medium since baseline noise measurements revealed that the environment is already mildly impinged by human activity in relation to noise levels (Section 5.6.4.2). Additionally, the substation is located in a residential area, and surrounded by residential houses on all four sides, some neighbouring houses less than 10 m from the substation fence line.

Figure 7-8: Showing proximity of houses to Kawaala SS fence line

The impact intensity is rated low because of the relatively short duration of the renovation activities, which will be taking place during the day time, and will be reversible upon Project completion.
Therefore, the impact significance is rated moderate.

		Sensitivity of Receptor			
		Very low	**Low**	**Medium**	**High**
		1	**2**	**3**	**4**
Intensity of Impact	**Very low 1**	1 Negligible	2 Minor	3 Minor	4 Minor
	Low 2	2 Minor	4 Minor	6 Moderate	8 Moderate
	Medium 3	3 Minor	6 Moderate	9 Moderate	12 Major
	High 4	4 Minor	8 Moderate	12 Major	16 Major

Mitigation measures

i) In principal, noisy construction works to be limited to normal working hours and no operation on Sundays and public holidays. The Contractors on site and Operators at the substation must be aware of, and adhere to, the regulatory noise limits for a construction site in a residential area (60 dBA (L_{eq}) daytime and 40 dBA (L_{eq}) night-time during construction) and 60 dBA during operation) as provided for by the National Environment (Noise Standards & Control) Regulations, 2003.
ii) Noisy equipment to be located as far as possible and aligned to be directed away from sensitive receptors.
iii) Vehicles and machinery to be equipped with exhaust mufflers and well maintained.
iv) Additional noise suppression measures (e.g. covering of noisy units) to be implemented if noise levels at nearest sensitive receptor consistently exceeds national noise standard or in case of consistent complaints.
v) Construction workers to be provided with appropriate PPE such as ear plugs and ear muffs for protection against excessive noise.

vi) Construction machines and vehicles to be turned off when not in use.

Adoption of the above mitigation measures will reduce impact intensity to "low" level resulting in a residual impact of minor significance.

7.3.1.6 Improper Waste Management

The substation renovation will involve installation of equipment which will come with various packaging material. Excavation for the underground cable will be done but the resulting soil will be backfilled. Management of all waste produced at the site will have to be carefully considered so as to avoid environmental degradation. Potential waste types include:

≠ E-Waste (including transformers, capacitors battery banks, transformer oil)
≠ General waste – domestic refuse (litter) generated by construction workers
≠ Packaging material such as plastic, paper, cables, conductors, etc.

Impact significance

The sensitivity of the receptor is rated low since the existing substation already produces similar waste that is currently being handled by the substation staff.

The impact intensity is rated as very low since the renovation activities are only expected to last a short duration and will be reversible upon Project completion.

Therefore, the impact significance is minor.

		Sensitivity of Receptor			
		Very low	**Low**	**Medium**	**High**
		1	**2**	**3**	**4**
Intensity of Impact	**Very low 1**	1 Negligible	2 Minor	3 Minor	4 Minor
	Low 2	2 Minor	4 Minor	6 Moderate	8 Moderate
	Medium 3	3 Minor	6 Moderate	9 Moderate	12 Major
	High 4	4 Minor	8 Moderate	12 Major	16 Major

Mitigation measures

i) Maximization of reuse and recycling.
ii) Storage of waste only in designated waste containers and areas. Waste will be sorted to ensure appropriate final disposal.
iii) Storage of hazardous wastes in specialized/labelled containers and facility.
iv) Wastes to be handled and disposed only by NEMA-authorized waste management entities.
v) Strict prohibition of littering and implementation of awareness programs for the construction workers.
vi) Daily clean-ups at the construction sites.

vii) The construction contractor will be required to submit Construction Waste Management Plan (WMP) to UETCL and other necessary organizations for approval.

Adoption of the above mitigation measures will ensure residual impact of minor significance.

7.3.1.7 Occupational and Community Health and Safety

The renovation of Kawaala substation, will involve moving heavy equipment and materials through settlements, trading centres and construction adjacent to residential areas, particularly through the Namungoona suburb where the substation is located. This has the potential to cause accidents to the general public and construction workers. Fatal accidents could arise from unskilled operation of construction machinery, unsatisfactory safety guidelines around the construction site. Minor injuries would be reversible but effects such as permanent disability or electrocution of operation maintenance workers resulting in fatalities are irreversible. The workers affected would most likely be household heads; this impact would not only affect workers but would go as far as affecting their immediate and extended families.

Impact significance

The sensitivity of the human receptor, especially in the event of fatal accidents is high, although would be low for minor injuries.

The potential hazards present during the installation and testing of such equipment and parts as the transformer and switchgear, include working at heights, working within an excavated trench, exposure to high voltage electricity. However, the impact intensity is rated low since the system is not power loaded during any construction works.

Therefore the impact significance is moderate.

		Sensitivity of Receptor			
		Very low	Low	Medium	High
		1	2	3	4
Intensity of Impact	Very low 1	1 Negligible	2 Minor	3 Minor	4 Minor
	Low 2	2 Minor	4 Minor	6 Moderate	8 Moderate
	Medium 3	3 Minor	6 Moderate	9 Moderate	12 Major
	High 4	4 Minor	8 Moderate	12 Major	16 Major

Mitigation measures

i) Compliance to JICA's "The Guidance for the Management of Safety for Construction Works in Japanese ODA Projects".
ii) Implementation of safety training programs for all workers.
iii) Provision of appropriate Personal Protective Equipment (PPE).
iv) Holding of regular tool box meeting to discuss safety.
v) Lockout - tag out procedures to be clearly displayed on site and followed.
vi) Contractor to deploy an HSE Officer approved by UETCL.

vii) Contractor to provide appropriate safety signage at high risk locations (e.g. near fuel tanks) including ancillary work sites.
viii) The construction contractor will be required to submit an Occupational Health and Safety Plan (OHSP) to UETCL and other necessary organizations for approval. The Plan will include the 'Fire and Emergency Management Plan' and 'First Aid Kits and Tool Box Talks' for which templates are provided in APPENDIX 10 and APPENDIX 11 respectively.

Adoption of the above mitigation measures will reduce impact intensity to "very low" level resulting in a residual impact of minor significance.

7.3.1.8 Traffic Accidents and Disruption

The substation is located in the outskirts of Kampala city and can be accessed either via the Northern bypass or Kasubi-Namungoona road (Figure 7-9), both of which are very busy. During construction phase, delivery trucks transporting equipment and supplies may cause traffic disruption on the adjoining roads to the project area. There is need to liaise with the traffic police to ensure a smooth traffic flow hence avoiding unnecessary delays most especially during rush hours.

Impact Significance:

Sensitivity of the receptor is rated medium since the Northern bypass and Kasubi-Namungoona roads are already congested with their current traffic.

The intensity of temporary traffic disruption on the access roads during construction is rated low since the increase in traffic due to the project is not expected to be high, project construction period will be of a short duration and if properly planned will have minimal impact on the road traffic.

A receptor sensitivity rating of medium and an impact intensity rating of low result in a significance rating of major.

		Sensitivity of Receptor			
		Very low	Low	Medium	High
		1	2	3	4
Intensity of Impact	Very low 1	1 Negligible	2 Minor	3 Minor	4 Minor
	Low 2	2 Minor	4 Minor	6 Moderate	8 Moderate
	Medium 3	3 Minor	6 Moderate	9 Moderate	12 Major
	High 4	4 Minor	8 Moderate	12 Major	16 Major

Figure 7-9: Access of Kawaala substation off major roads

Mitigation Measures

i) Strict compliance to speed limits.
ii) Contractor to undertake daily Tool Box Talks for Workers
iii) Avoid, as far as practical using roads with high risk of accidents.
iv) Vehicle motion alarm to be installed on all construction vehicles.
v) Placement of contractor flagmen and appropriate safety/warning signs in high risk locations (e.g. 'Heavy Trucks Turning', 'Road Diverted', 'Half Road Closed', etc.).
vi) Contractor to maintain a Health and Accident register
vii) The construction contractor will be required to submit a Traffic Management Plan to UETCL and other necessary organizations for approval.
viii) Contractor to Deploy a qualified Site Nurse and Doctor-On-Call
ix) Contractor to set-up a Site Clinic for treatment of minor ailments. However, other cases shall be referred for specialized management
x) Contractor to provide a well-stocked First Aid Kit

Adoption of the above mitigation measures will reduce impact intensity to "very low" level resulting in a residual impact of minor significance.

7.3.1.9 Temporary Disruption of Electricity Supply

Substation renovation may cause temporary power outages when connecting and testing the new transformers and switchgears. This will result in disruption of electricity supply in the areas that are connected to Kawaala substation through the three (03) 11 kV feeders.

Impact Significance

Significance of the impact will be high since the disruption of electricity supply at this substation will also affect the connected substations of Kampala North and Mutundwe and in effect the areas that these substations supply.

The intensity of impact is rated low because even though the power outage will disrupt many consumers and critical services in the GKMA, it will last short time and be planned such that the outages are during off-peak hours.

The impact significance will therefore be moderate.

		Sensitivity of Receptor			
		Very low	Low	Medium	High
		1	2	3	4
Intensity of Impact	Very low 1	1 Negligible	2 Minor	3 Minor	4 Minor
	Low 2	2 Minor	4 Minor	6 Moderate	8 Moderate
	Medium 3	3 Minor	6 Moderate	9 Moderate	12 Major
	High 4	4 Minor	8 Moderate	12 Major	16 Major

Mitigation Measures

i) Construction works will be planned in manner to minimize duration of power outage.
ii) If power outage is unavoidable, it will be communicated to the public and facilities (e.g. hospital) in advance. Outages will be planned in co-ordination with UMEME, and give at least 2 weeks' notice for the occurrence of outages.
iii) Overhead line work to be designed and carried out in a way to avoid interference with existing power lines and maintaining safe separation distances from existing distribution lines.

Adoption of the above mitigation measures will reduce impact intensity to "very low" level resulting in a residual impact of minor significance.

7.3.2 Upgrade of Bujagali Substation

7.3.2.1 Air Quality

Delivery vehicles carrying materials and equipment have the potential to generate fugitive dust emissions as they transport equipment to the site. Considering the project which will last for a short time, the impact on air quality during the construction phase will be a temporary, direct and reversible.

Impact significance

The receptor sensitivity is rated medium because baseline studies indicated that the Project area environment is generally pristine with respect to air quality (Section 5.6.5.1).

The intensity of the impact is rated very low because the air quality impact is expected to last for a very short duration, as the equipment is delivered and installed at the substation.

Therefore the impact significance is rated minor.

		Sensitivity of Receptor			
		Very low	Low	Medium	High
		1	2	3	4
Intensity of Impact	Very low 1	1 Negligible	2 Minor	3 Minor	4 Minor
	Low 2	2 Minor	4 Minor	6 Moderate	8 Moderate
	Medium 3	3 Minor	6 Moderate	9 Moderate	12 Major
	High 4	4 Minor	8 Moderate	12 Major	16 Major

Mitigation measures

i) Keeping exposed soil surfaces in damp condition by water spraying and material stockpiles covered when not in use.
ii) Use of well-maintained vehicles and machines. Vehicles and machines emitting excessive pollutants (e.g. black soot) to be removed until repaired.
iii) Use of closed/covered trucks when transporting dusty materials.
iv) Switching off engines of construction vehicles and machines when not in use.

v) To mitigate against dust emissions, control measures such as regular sprinkling of water on dusty areas and temporary access roads; and observing set speed limits among other measures will be implemented; the use of PPE will also be established to minimize the impact of the duct, where it occurs.

Adoption of the above mitigation measures will ensure residual impact of minor significance.

7.3.2.2 Noise and Vibrations

During the upgrade of the substation, noise and vibrations may be generated from heavy trucks ferrying materials and equipment to the site. Noise and vibrations will be a temporary and reversible impact ending with completion of upgrade activities.

Impact significance

The receptor sensitivity is rated medium because baseline studies indicated that the Project area environment is pristine in relation to noise levels (Section 5.6.5.2) and as such the noise from the upgrade activities will be a noticeable change. It should be noted that the substation is located within the fencing of the Bujagali Power Station.

The intensity of the impact is rated very low because the noise and vibration impact is expected to last for a very short duration, as the equipment is delivered and installed at the substation. The noise levels will return to their normal levels after the upgrade activities.

Therefore the impact significance is rated minor.

		Sensitivity of Receptor			
		Very low	Low	Medium	High
		1	2	3	4
Intensity of Impact	Very low 1	1 Negligible	2 Minor	3 Minor	4 Minor
	Low 2	2 Minor	4 Minor	6 Moderate	8 Moderate
	Medium 3	3 Minor	6 Moderate	9 Moderate	12 Major
	High 4	4 Minor	8 Moderate	12 Major	16 Major

Mitigation measures

i) In principal, noisy construction works to be limited to normal working hours and no operation on Sundays and public holidays. The Contractors on site and Operators at the substation must be aware of, and adhere to, the regulatory noise limits for a construction site in a residential area (60 dBA (Leq) daytime and 40 dBA (Leq) night-time during construction) and 60 dBA during operation) as provided for by the National Environment (Noise Standards & Control) Regulations, 2003.
ii) Noisy equipment to be located as far as possible and aligned to be directed away from sensitive receptors.
iii) Vehicles and machinery to be equipped with exhaust mufflers and well maintained.

iv) Additional noise suppression measures (e.g. covering of noisy units) to be implemented if noise levels at nearest sensitive receptor consistently exceeds national noise standard or in case of consistent complaints.
v) Construction workers to be provided with appropriate PPE such as ear plugs and ear muffs for protection against excessive noise.
vi) Construction machines and vehicles to be turned off when not in use.

Adoption of the above mitigation measures will ensure residual impact of minor significance.

7.3.2.3 Improper Waste Management

The upgrade of the substation will involve installation of equipment which will come with various packaging material. Management of such waste will have to be carefully considered so as to avoid environmental degradation. Potential waste types include:

≠ E-Waste (including transformers, capacitors battery banks, transformer oil)
≠ General waste – domestic refuse (litter) generated by construction workers
≠ Packaging material such as plastic, paper, cables, etc.

Impact significance

The sensitivity of the receptor is rated low since the existing substation already produces similar waste that is currently being handled by the substation staff.

The impact intensity is rated as very low since the upgrade activities are only expected to last a very short duration.

Therefore, the impact significance is minor.

		Sensitivity of Receptor			
		Very low	Low	Medium	High
		1	2	3	4
Intensity of Impact	Very low 1	1 Negligible	2 Minor	3 Minor	4 Minor
	Low 2	2 Minor	4 Minor	6 Moderate	8 Moderate
	Medium 3	3 Minor	6 Moderate	9 Moderate	12 Major
	High 4	4 Minor	8 Moderate	12 Major	16 Major

Mitigation measures

i) Maximization of reuse and recycling.
ii) Storage of waste only in designated waste containers and areas. Waste will be sorted to ensure appropriate final disposal.
iii) Storage of hazardous wastes in specialized/labelled containers and facility.
iv) Wastes to be handled and disposed only by NEMA-authorized waste management entities.
v) Strict prohibition of littering and implementation of awareness programs for the construction workers.
vi) Daily clean-ups at the construction sites.

vii) The construction contractor will be required to submit Construction Waste Management Plan (WMP) to UETCL and other necessary organizations for approval.

Adoption of the above mitigation measures will ensure residual impact of minor significance.

7.3.2.4 Occupational and Community Health and Safety

The upgrade of Bujagali substation will involve moving heavy equipment and materials through settlements, trading centres along either Jinja Road or Kayunga Road. This potentially poses accident risk to the general public and construction workers, especially if Jinja Road is used since it is a busy highway. Fatal accidents could arise from unskilled operation of heavy machinery, or during transportation of heavy or wide-load equipment such as the transformer.

Risks to the workers will include working with heavy machinery, lifting heavy loads and working at heights. Minor injuries would be reversible but effects such as permanent disability or electrocution of operation maintenance workers resulting in fatalities are irreversible. The workers affected would most likely be household heads; this impact would not only affect workers but their immediate and extended families as well.

Impact significance

The sensitivity of the human receptor, especially in the event of fatal accidents is high, although would be low for minor injuries.

The potential hazards present during the installation and testing of such equipment and parts as the transformer and switchgear, include working at heights, exposure to high voltage electricity. However, the impact intensity is rated low since the system is not power loaded during any construction works.

Therefore the impact significance is moderate.

		Sensitivity of Receptor			
		Very low	Low	Medium	High
		1	2	3	4
Intensity of Impact	Very low 1	1 Negligible	2 Minor	3 Minor	4 Minor
	Low 2	2 Minor	4 Minor	6 Moderate	8 Moderate
	Medium 3	3 Minor	6 Moderate	9 Moderate	12 Major
	High 4	4 Minor	8 Moderate	12 Major	16 Major

Mitigation measures

i) Compliance to JICA's "The Guidance for the Management of Safety for Construction Works in Japanese ODA Projects".
ii) Implementation of safety training programs for all workers.
iii) Provision of appropriate Personal Protective Equipment (PPE).
iv) Holding of regular tool box meeting to discuss safety.
v) Lockout - tag out procedures to be clearly displayed on site and followed.
vi) Contractor to deploy an HSE Officer approved by UETCL.
vii) Contractor to provide appropriate safety signage at high risk locations (e.g. near fuel tanks)

including ancillary work sites.

viii) The construction contractor will be required to submit an Occupational Health and Safety Plan (OHSP) to UETCL and other necessary organizations for approval. The Plan will include the 'Fire and Emergency Management Plan' and 'First Aid Kits and Tool Box Talks' for which templates are provided in APPENDIX 10 and APPENDIX 11 respectively.

Adoption of the above mitigation measures will reduce impact intensity to "very low" level resulting in a residual impact of minor significance.

7.3.2.5 Traffic Accidents and Disruption

The substation is located in Buikwe District, off Kayunga Road, which can also be accessed off Jinja Road. During construction, delivery trucks transporting equipment and supplies may cause disruption, especially if accessed off Jinja Road since Kayunga Road is not in good condition.

Impact Significance

Sensitivity of the receptor is rated high since the Jinja highway is usually a busy road and has a number of black spots. The road conveys traffic from Busia and Malaba borders, sugarcane trucks and other regular traffic. The alternative Kayunga Road is not in good condition, and might therefore not be a very good alternative, as it also presents safety risks since it's even narrower than Jinja Road. Access roads to Bujagali substation are shown in Figure 7-10.

The intensity of temporary traffic disruption on Jinja Road and Kayunga Road during construction is rated low since the Project construction period will be of a short duration and the upgrade will involve delivering a transformer and switchgears, which if properly planned will have minimal impact on the road traffic.

A receptor sensitivity rating of medium and an impact intensity rating of medium result in a significance rating of moderate.

		Sensitivity of Receptor			
		Very low	Low	Medium	High
		1	2	3	4
Intensity of Impact	Very low 1	1 Negligible	2 Minor	3 Minor	4 Minor
	Low 2	2 Minor	4 Minor	6 Moderate	8 Moderate
	Medium 3	3 Minor	6 Moderate	9 Moderate	12 Major
	High 4	4 Minor	8 Moderate	12 Major	16 Major

Figure 7-10: Access of Bujagali substation off major roads

Mitigation Measures

i) Strict compliance to speed limits.
ii) Contractor to undertake daily Tool Box Talks for Workers
iii) Avoid, as far as practical using roads with high risk of accidents.
iv) Vehicle motion alarm to be installed on all construction vehicles.
v) Placement of contractor flagmen and appropriate safety/warning signs in high risk locations (e.g. 'Heavy Trucks Turning', 'Road Diverted', 'Half Road Closed', etc.).
vi) Contractor to maintain a Health and Accident register
vii) The construction contractor will be required to submit a Traffic Management Plan to UETCL and other necessary organizations for approval.
viii) Contractor to Deploy a qualified Site Nurse and Doctor-On-Call
ix) Contractor to set-up a Site Clinic for treatment of minor ailments. However, other cases shall be referred for specialized management
x) Contractor to provide a well-stocked First Aid Kit

Adoption of the above mitigation measures will reduce impact intensity to "low" level resulting in a residual impact of minor significance.

7.3.2.6 Temporary Disruption of Electricity Supply

Substation upgrade may cause temporary power outages when connecting and testing the new transformer and switchgears. This will result in disruption of electricity supply in the areas that are connected to Bujagali substation.

Impact Significance

The sensitivity of receptor to this impact is high because it will be necessary to have the substation offline temporarily for workers' safety, and yet the substation's contribution to the stable power supply to GKMA is significant.

The intensity of impact is rated low because even though the power outage will disrupt many consumers and critical services in the GKMA, it will last short time and be planned such that the outages are during off-peak hours.

The impact significance will therefore be moderate.

		Sensitivity of Receptor			
		Very low	Low	Medium	High
		1	2	3	4
Intensity of Impact	Very low 1	1 Negligible	2 Minor	3 Minor	4 Minor
	Low 2	2 Minor	4 Minor	6 Moderate	8 Moderate
	Medium 3	3 Minor	6 Moderate	9 Moderate	12 Major
	High 4	4 Minor	8 Moderate	12 Major	16 Major

Mitigation Measures

i) Construction works will be planned in manner to minimize duration of power outage.
ii) If power outage is unavoidable, it will be communicated to the public and facilities (e.g. hospital) in advance. Outages will be planned in co-ordination with UMEME, and give at least 2 weeks' notice for the occurrence of outages.
iii) Overhead line work to be designed and carried out in a way to avoid interference with existing power lines and maintaining safe separation distances from existing distribution lines.

Adoption of the above mitigation measures will reduce impact intensity to "very low" level resulting in a residual impact of minor significance.

7.3.3 Upgrade of Mutundwe Substation

7.3.3.1 Air Quality

Delivery vehicles carrying materials and equipment have the potential to generate fugitive dust emissions as they transport equipment to the site. Considering the project which will last for a short time, the impact on air quality during the construction phase will be a temporary, direct and reversible.

Impact significance

The receptor sensitivity is rated medium because baseline studies indicated that the Project area environment is generally pristine with respect to air quality (Section 5.6.5.1).

The intensity of the impact is rated very low because the air quality impact is expected to last for a very short duration, as the equipment is delivered and installed at the substation.

Therefore the impact significance is rated minor.

		Sensitivity of Receptor			
		Very low	Low	Medium	High
		1	2	3	4
Intensity of Impact	Very low 1	1 Negligible	2 Minor	3 Minor	4 Minor
	Low 2	2 Minor	4 Minor	6 Moderate	8 Moderate
	Medium 3	3 Minor	6 Moderate	9 Moderate	12 Major
	High 4	4 Minor	8 Moderate	12 Major	16 Major

Mitigation measures

i) Keeping exposed soil surfaces in damp condition by water spraying and material stockpiles covered when not in use.
ii) Use of well-maintained vehicles and machines. Vehicles and machines emitting excessive pollutants (e.g. black soot) to be removed until repaired.
iii) Use of closed/covered trucks when transporting dusty materials.
iv) Switching off engines of construction vehicles and machines when not in use.
v) To mitigate against dust emissions, control measures such as regular sprinkling of water on dusty areas and temporary access roads; and observing set speed limits among other

measures will be implemented; The use of PPE will also be established to minimize the impact of the duct, where it occurs.

Adoption of the above mitigation measures will ensure residual impact of minor significance.

7.3.3.2 Noise and Vibrations

During the upgrade of the substation, noise and vibrations may be generated from heavy trucks ferrying materials and equipment to the site. Noise and vibrations will be a temporary and reversible impact ending with completion of upgrade activities.

Impact significance

The receptor sensitivity is rated medium because baseline studies indicated that the Project area environment is pristine in relation to noise levels (Section 5.6.6.2) and as such the noise from the upgrade activities will be a noticeable change. It should be noted that the substation is in a residential area, although the closest neighbours are more than 50 m away from the fence line.

The intensity of the impact is rated very low because the noise and vibration impact is expected to last for a very short duration, as the equipment is delivered and installed at the substation. The noise levels will return to their normal levels after the upgrade activities.

Therefore the impact significance is rated minor.

		Sensitivity of Receptor			
		Very low	Low	Medium	High
		1	2	3	4
Intensity of Impact	Very low 1	1 Negligible	2 Minor	3 Minor	4 Minor
	Low 2	2 Minor	4 Minor	6 Moderate	8 Moderate
	Medium 3	3 Minor	6 Moderate	9 Moderate	12 Major
	High 4	4 Minor	8 Moderate	12 Major	16 Major

Mitigation measures

i) In principal, noisy construction works to be limited to normal working hours and no operation on Sundays and public holidays. The Contractors on site and Operators at the substation must be aware of, and adhere to, the regulatory noise limits for a construction site in a residential area (60 dBA (L_{eq}) daytime and 40 dBA (L_{eq}) night-time during construction) and 60 dBA during operation) as provided for by the National Environment (Noise Standards & Control) Regulations, 2003.
ii) Noisy equipment to be located as far as possible and aligned to be directed away from sensitive receptors.
iii) Vehicles and machinery to be equipped with exhaust mufflers and well maintained.
iv) Additional noise suppression measures (e.g. covering of noisy units) to be implemented if noise levels at nearest sensitive receptor consistently exceeds national noise standard or in case of consistent complaints.

v) Construction workers to be provided with appropriate PPE such as ear plugs and ear muffs for protection against excessive noise.
vi) Construction machines and vehicles to be turned off when not in use.

Adoption of the above mitigation measures will ensure residual impact of minor significance.

7.3.3.3 Improper Waste Management

The upgrade of the substation will involve installation of equipment which will come with various packaging material. Management of such waste will have to be carefully considered so as to avoid environmental degradation. Potential waste types include:

≠ E-Waste (including transformers, capacitors battery banks, transformer oil)
≠ General waste – domestic refuse (litter) generated by construction workers
≠ Packaging material such as plastic, paper, cables, etc.

Impact significance

The sensitivity of the receptor is rated low since the existing substation already produces similar waste that is currently being handled by the substation staff.

The impact intensity is rated as very low since the upgrade activities are only expected to last a very short duration.

Therefore, the impact significance is minor.

		Sensitivity of Receptor			
		Very low	Low	Medium	High
		1	2	3	4
Intensity of Impact	Very low 1	1 Negligible	2 Minor	3 Minor	4 Minor
	Low 2	2 Minor	4 Minor	6 Moderate	8 Moderate
	Medium 3	3 Minor	6 Moderate	9 Moderate	12 Major
	High 4	4 Minor	8 Moderate	12 Major	16 Major

Mitigation measures

i) Maximization of reuse and recycling.
ii) Storage of waste only in designated waste containers and areas. Waste will be sorted to ensure appropriate final disposal.
iii) Storage of hazardous wastes in specialized/labelled containers and facility.
iv) Wastes to be handled and disposed only by NEMA-authorized waste management entities.
v) Strict prohibition of littering and implementation of awareness programs for the construction workers.
vi) Daily clean-ups at the construction sites.
vii) The construction contractor will be required to submit Construction Waste Management Plan (WMP) to UETCL and other necessary organizations for approval.

Adoption of the above mitigation measures will ensure residual impact of minor significance.

7.3.3.4 Occupational and Community Health and Safety

The upgrade of Mutundwe substation will involve moving heavy equipment and materials through settlements, trading centres that are residential in nature. This potentially poses accident risk to the general public and construction workers. Fatal accidents could arise from unskilled operation of heavy machinery, or during transportation of heavy or wide-load equipment such as the transformer.

Risks to the workers will include working with heavy machinery, lifting heavy loads and working at heights. Minor injuries would be reversible but effects such as permanent disability or electrocution of operation maintenance workers resulting in fatalities are irreversible. The workers affected would most likely be household heads; this impact would not only affect workers but their immediate and extended families as well.

Impact significance

The sensitivity of the human receptor, especially in the event of fatal accidents is high, although would be low for minor injuries.

In consideration of the low risk of potential hazards present during the installation and testing of switchgear, the impact intensity is rated low.

Therefore the impact significance is moderate.

		Sensitivity of Receptor			
		Very low	Low	Medium	High
		1	2	3	4
Intensity of Impact	Very low 1	1 Negligible	2 Minor	3 Minor	4 Minor
	Low 2	2 Minor	4 Minor	6 Moderate	8 Moderate
	Medium 3	3 Minor	6 Moderate	9 Moderate	12 Major
	High 4	4 Minor	8 Moderate	12 Major	16 Major

Mitigation measures

i) Compliance to JICA's "The Guidance for the Management of Safety for Construction Works in Japanese ODA Projects".
ii) Implementation of safety training programs for all workers.
iii) Provision of appropriate Personal Protective Equipment (PPE).
iv) Holding of regular tool box meeting to discuss safety.
v) Lockout - tag out procedures to be clearly displayed on site and followed.
vi) Contractor to deploy an HSE Officer approved by UETCL.
vii) Contractor to provide appropriate safety signage at high risk locations (e.g. near fuel tanks) including ancillary work sites.
viii) The construction contractor will be required to submit an Occupational Health and Safety Plan (OHSP) to UETCL and other necessary organizations for approval. The Plan will include the 'Fire

and Emergency Management Plan' and 'First Aid Kits and Tool Box Talks' for which templates are provided in APPENDIX 10 and APPENDIX 11 respectively.

Adoption of the above mitigation measures will reduce impact intensity to "low" level resulting in a residual impact of minor significance.

7.3.3.5 Traffic Accidents and Disruption

Mutundwe substation is accessed off Masaka Road, at Nalukolongo Market which is a busy commercial and residential area (Figure 7-11). During construction, delivery trucks transporting equipment and supplies may cause disruption at the junction along the highway.

Impact Significance

Sensitivity of the receptor is rated medium because although the access road is very busy, only a few trips will be required to deliver the Switchgear and other relevant parts for the installation.

The intensity of temporary traffic disruption on Kampala-Masaka highway during construction is rated very low since the Project construction period will be of a short duration and the upgrade will involve delivering a switchgear, which if properly planned should have minimal impact on the road traffic.

A receptor sensitivity rating of medium and an impact intensity rating of very low will result in a significance rating of minor.

		Sensitivity of Receptor			
		Very low	Low	Medium	High
		1	2	3	4
Intensity of Impact	Very low 1	1 Negligible	2 Minor	3 Minor	4 Minor
	Low 2	2 Minor	4 Minor	6 Moderate	8 Moderate
	Medium 3	3 Minor	6 Moderate	9 Moderate	12 Major
	High 4	4 Minor	8 Moderate	12 Major	16 Major

Figure 7-11: Access roads to Mutundwe substation

Mitigation Measures

i) Strict compliance to speed limits.
ii) Contractor to undertake daily Tool Box Talks for Workers
iii) Avoid, as far as practical using roads with high risk of accidents.
iv) Vehicle motion alarm to be installed on all construction vehicles.
v) Placement of contractor flagmen and appropriate safety/warning signs in high risk locations (e.g. 'Heavy Trucks Turning', 'Road Diverted', 'Half Road Closed', etc.).
vi) Contractor to maintain a Health and Accident register
vii) The construction contractor will be required to submit a Traffic Management Plan to UETCL and other necessary organizations for approval.
viii) Contractor to Deploy a qualified Site Nurse and Doctor-On-Call
ix) Contractor to set-up a Site Clinic for treatment of minor ailments. However, other cases shall be referred for specialized management
x) Contractor to provide a well-stocked First Aid Kit

Adoption of the above mitigation measures will ensure residual impact of minor significance.

7.3.3.6 Temporary Disruption of Electricity Supply

Substation upgrade may cause temporary power outages when connecting and testing the new switchgears. This will result in disruption of electricity supply in the areas that are connected to Mutundwe substation.

Impact Significance

The sensitivity of receptor to this impact is high because it will be necessary to have the substation offline temporarily for workers' safety, and yet the substation's contribution to the stable power supply to GKMA is significant.

The intensity of impact is rated low because even though the power outage will disrupt many consumers and critical services in the GKMA, it will last short time and be planned such that the outages are during off-peak hours.

The impact significance will therefore be moderate.

		Sensitivity of Receptor			
		Very low	**Low**	**Medium**	**High**
		1	**2**	**3**	**4**
Intensity of Impact	**Very low 1**	1 Negligible	2 Minor	3 Minor	4 Minor
	Low 2	2 Minor	4 Minor	6 Moderate	8 Moderate
	Medium 3	3 Minor	6 Moderate	9 Moderate	12 Major
	High 4	4 Minor	8 Moderate	12 Major	16 Major

Mitigation Measures

i) Construction works will be planned in manner to minimize duration of power outage.
ii) If power outage is unavoidable, it will be communicated to the public and facilities (e.g. hospital) in advance. Outages will be planned in co-ordination with UMEME, and give at least 2 weeks' notice for the occurrence of outages.
iii) Overhead line work to be designed and carried out in a way to avoid interference with existing power lines and maintaining safe separation distances from existing distribution lines.

Adoption of the above mitigation measures will reduce impact intensity to "very low" level resulting in a residual impact of minor significance.

7.4 NEGATIVE IMPACTS - RE-CONDUCTORING OF TRANSMISSION LINES

7.4.1 Improper Waste Management

Re-conductoring of the transmission lines will involve removing the existing conductors and replacing them with new higher capacity ones. Potential waste types include:

≠ E-Waste (old conductors removed and off-cuts of the new conductors installed)
≠ General waste – domestic refuse (litter) generated by construction workers
≠ Packaging material such as plastic, paper, cables, etc.

The re-conductoring will be done along three (03) different routes with a total length of approximately 41 km, traversing sections of forest (Kifu Central Forest Reserve and Namyoya Central Forest Reserve), plantations, towns, residential areas, highways, small roads, busy junctions, etc. Being a line Project, it will be imperative that all waste is managed at source to minimize any environmental and aesthetic impacts.

Impact significance

The sensitivity of the receptor is medium considering that the Project traverses areas that are rural, plantations, forests and urban centres and since it is a line Project, waste collection points might be few and far between. Some of the receptors such as the sections through forest will be more sensitive than the urban centres.

The impact intensity is rated as low since although the waste type will mostly be non-biodegradable cable which if not properly managed could have long-term impacts on the environment the expected waste cables are valuable for reuse and recycling.

Therefore, the impact significance is moderate.

		Sensitivity of Receptor			
		Very low	**Low**	**Medium**	**High**
		1	**2**	**3**	**4**
Intensity of Impact	**Very low 1**	1 Negligible	2 Minor	3 Minor	4 Minor
	Low 2	2 Minor	4 Minor	6 Moderate	8 Moderate

	Medium 3	3 Minor	6 Moderate	9 Moderate	12 Major
	High 4	4 Minor	8 Moderate	12 Major	16 Major

Mitigation measures

i) Maximization of reuse and recycling.
ii) Storage of waste only in designated waste containers and areas. Waste will be sorted to ensure appropriate final disposal.
iii) Storage of hazardous wastes in specialized/labelled containers and facility.
iv) Wastes to be handled and disposed only by NEMA-authorized waste management entities.
v) Strict prohibition of littering and implementation of awareness programs throughout the Project area.
vi) Daily clean-ups at the construction sites.
vii) The construction contractor will be required to submit Construction Waste Management Plan (WMP) to UETCL and other necessary organizations for approval.

Adoption of the above mitigation measures will reduce impact intensity to "very low" level resulting in a residual impact of minor significance.

7.4.2 Occupational and Community Health and Safety

The lines to be re-conductored traverse a number of towns, residential areas, highways, small roads, and busy junctions that are in some instances very highly populated such as Katanga Slum and Kifumbira towards the Kampala North substation. The residents of these communities will be exposed to hazards associated with the re-conductoring process such as parts and tools falling from heights (132 kV conductors usually have a clearance of m above the ground and up to 8.6 m over a highway).

Risks to the workers will include working with heavy machinery, lifting heavy loads, operating machinery with moving parts such as the winch and tensioner, working at heights (132 kV conductors usually have a clearance of about 6 m above the ground, and up to 8.6 m over a highway) and exposure to high voltage electricity.

Minor injuries would be reversible but effects such as permanent disability or electrocution of workers resulting in fatalities are irreversible. The workers affected would most likely be household heads; this impact would not only affect workers but their immediate and extended families as well.

Impact significance

The sensitivity of the human receptor, especially in the event of fatal accidents is high, although would be low for minor injuries.

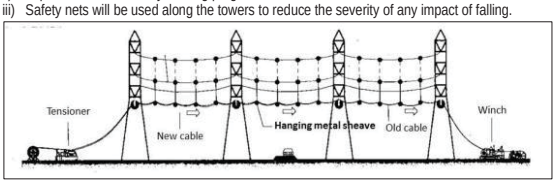
The potential hazards present during the installation and testing of such equipment and parts as the transformer and switchgear, include working at heights, exposure to high voltage electricity. However, the impact intensity is rated low since the system is not power loaded during any re-conductoring works.

Therefore the impact significance is moderate.

		Sensitivity of Receptor			
		Very low	Low	Medium	High
		1	2	3	4
Intensity of Impact	Very low 1	1 Negligible	2 Minor	3 Minor	4 Minor
	Low 2	2 Minor	4 Minor	6 Moderate	8 Moderate
	Medium 3	3 Minor	6 Moderate	9 Moderate	12 Major
	High 4	4 Minor	8 Moderate	12 Major	16 Major

Mitigation measures

i) Compliance to JICA's "The Guidance for the Management of Safety for Construction Works in Japanese ODA Projects" and the provisions of Uganda's OSH Act 2006.
ii) Implementation of safety training programs for all workers.
iii) Safety nets will be used along the towers to reduce the severity of any impact of falling.



iv) Contractors will provide all workers with requisite Personal Protective Equipment (PPE) appropriate to the job at hand. Foremen of the specific crew and management will be responsible for not permitting a worker on-site unless they are wearing the appropriate PPE for the activity. If a worker refuses to use the provided PPE, they are to be suspended from their worksite.
v) Lock out - tag out procedures to be clearly displayed on site and followed.
vi) Contractor to deploy an HSE Officer approved by UETCL.
vii) The construction contractor will be required to submit an Occupational Health and Safety Plan (OHSP) to UETCL and other necessary organizations for approval. The Plan will include the 'Fire and Emergency Management Plan' and 'First Aid Kits and Tool Box Talks' for which templates are provided in APPENDIX 10 and APPENDIX 11 respectively.
viii) Contractor shall provide on-site toilet and washing water for workers.
ix) Contractor shall provide appropriate safety signage at appropriate locations in the project area including ancillary work sites, e.g. No smoking signs in office, communal places, well as high risk areas prone to fire hazards e.g. near fuel tanks.

Adoption of the above mitigation measures will reduce impact intensity to "very low" level resulting in a residual impact of minor significance.

7.4.3 Traffic Accidents and Disruption

The transmission line route to be re-conductored traverses over major highways such as Jinja Road and Masaka Road, and other smaller but busy roads such as Bukoto-Ntinda Road, Northern Bypass,

Kira Road, and Mawanda Road, among others. Junctions to busy commercial and residential areas are also crossed by the transmission lines to be re-conductored.

Impact Significance

Sensitivity of the receptor is rated high since the transmission line route crosses over major roads in the GKMA.

The intensity of traffic disruption along the Project route is rated low because not every tower along the route has to be accessed since the winch and tensioner can be located at least 3 km or 10 towers apart. This significantly reduces the intensity of the traffic disruption impact since the trucks do not have to move directly beneath or along the existing transmission line and hence can use different access roads where available.

A receptor sensitivity rating of high and an impact intensity rating of low result in a significance rating of moderate.

		Sensitivity of Receptor			
		Very low	Low	Medium	High
		1	2	3	4
Intensity of Impact	Very low 1	1 Negligible	2 Minor	3 Minor	4 Minor
	Low 2	2 Minor	4 Minor	6 Moderate	8 Moderate
	Medium 3	3 Minor	6 Moderate	9 Moderate	12 Major
	High 4	4 Minor	8 Moderate	12 Major	16 Major

Mitigation Measures

i) Strict compliance to speed limits on major roads and by use of speed humps on non-major access roads.
ii) Contractor to undertake daily Tool Box Talks for Workers
iii) Avoid, as far as practical using roads with high risk of accidents.
iv) Vehicle motion alarm to be installed on all construction vehicles.
v) Placement of contractor flagmen and appropriate safety/warning signs in high risk locations (e.g. 'Heavy Trucks Turning', 'Road Diverted', 'Half Road Closed', etc.).
vi) Contractor to maintain a Health and Accident register
vii) The construction contractor will be required to submit a Traffic Management Plan to UETCL and other necessary organizations for approval.
viii) Contractor to Deploy a qualified Site Nurse and Doctor-On-Call
ix) Contractor to set-up a Site Clinic for treatment of minor ailments. However, other cases shall be referred for specialized management
x) Contractor to provide a well-stocked First Aid Kit

Adoption of the above mitigation measures will reduce impact intensity to "very low" level resulting in a residual impact of minor significance.

7.4.4 Temporary Disruption of Electricity Supply

Replacement of the conductors from Mukono branch point to Kampala North Substation and Kampala North Substation to Mutundwe Substation and Lugogo Substations will necessitate the switching off of power to ensure the workers' safety. This will result in the disruption of electricity supply to many areas within the GKMA during the re-conductoring process.

Impact Significance

The sensitivity of receptor to this impact is high because it will be necessary to have the transmission lines to be re-conducted to be taken offline temporarily for workers' safety. The power outage will disrupt many consumers since the transmission lines to be re-conductured serve a wide area (Areas served by Kampala North Substation, New Mukono substation, Mutundwe Substation and Lugogo Substation).

The intensity of impact is rated low because the electricity supply distribution is only expected to be interrupted during the re-conductoring period.

The impact significance will therefore be moderate.

		Sensitivity of Receptor			
		Very low	Low	Medium	High
		1	2	3	4
Intensity of Impact	Very low 1	1 Negligible	2 Minor	3 Minor	4 Minor
	Low 2	2 Minor	4 Minor	6 Moderate	8 Moderate
	Medium 3	3 Minor	6 Moderate	9 Moderate	12 Major
	High 4	4 Minor	8 Moderate	12 Major	16 Major

Mitigation Measures

i) The construction schedule shall be planned to minimize duration of power outage.
ii) During all phases of the project, power outage shall be communicated to the general public, especially health facilities such that planning can be done to avoid fatal consequences. Outages will be planned in co-ordination with UMEME, and give at least 2 weeks' notice for the occurrence of outages.
iii) Overhead line work shall be designed and carried out in a way to avoid interference with existing power lines and maintaining safe separation distances from existing distribution lines.

Adoption of the above mitigation measures will reduce impact intensity to "very low" level resulting in a residual impact of minor significance.

OPERATION PHASE

7.5 POSITIVE IMPACTS

7.5.1 Reliable and secure electricity power supply in the GKMA

The Project will improve reliability of power supply to the GKMA through the various interventions including construction of Buloba and New Mukono substations, upgrade of Kawaala, Mutundwe and Bujagali substations, and re-conductoring of 132 kV transmission lines from Mukono branch point – Kampala North substation, Kampala North Substation – Mutundwe Substation, and Kampala North to Lugogo Substation. This is a permanent and direct impact.

All the various components of this Project are intended to improve the power supply in the GKMA with the objective of boosting the transmission grid capacity to securely deliver power supply to the metropolitan area in the short and long term, and hence improve the reliability and quality of power supply to the area.

Enhancement measure

This benefit can be sustained through proper management, ensuring all-time site security and regular maintenance of the substations and transmission lines. Additionally, electrical waste will be properly managed to avoid secondary offsite environmental contamination.

7.5.2 Economic development (development of other sectors)

The new and upgraded substations will have an overall positive social impact on the resident and business community not only in Kampala, but further in the Greater Metropolitan area that includes parts of Wakiso, Mukono and Mpigi Districts. This is due to the increased reliability in electricity power supply. This will raise efficiency in sectors such as health, education, retail business, farming and manufacturing improving the overall economy of the Kampala Metropolitan Area. In particular, the New Mukono substation will serve the gazetted Mukono Industrial Area. This impact will be a permanent direct positive impact.

Enhancement measure

This benefit can be sustained through proper management of the substation infrastructure and transmission lines, ensuring all-time site security and regular maintenance of the substations.

7.5.3 Employment

The operation and maintenance of the project (substations and transmission lines) will require a smaller number of specialised engineers and technicians who will be UETCL staff. A typical substation requires less than ten (10) personnel for day-to-day management. There will be ongoing expenditure associated with operation of the substations and transmission lines including management, security and upkeep of the control buildings and grounds. This will be a permanent and direct socio-economic impact of the project.

Enhancement measure

This benefit can be sustained through training of the employees in the operation of the substations and technological development in their fields. Training in occupational health and safety for the substation operators will also be an important part of the skills training, as well as important for the electricity transmission system since early detection of hazards, faults and defects could be essential in smooth operation of the substation.

7.5.4 Improved access roads

To ensure access to the substations in Buloba and Mukono, the existing access roads will be improved. For the Buloba component, 750 m of the access road will be widened to 8 m, while 1.2 km of the access road will be widened to 8m in Mukono, including a section of the road that crosses the River Kasala. These roads are currently being used by the local communities, who will enjoy the use of the improved, graded and widened roads.

Enhancement Measure
Regular maintenance of the access roads will be important to ensure access to the substations and also for the local communities in the respective areas.

7.6 NEGATIVE IMPACTS - SUBSTATIONS

7.6.1 Improper Waste Management

Waste will be generated as a result of the operation and maintenance activities of the substation. The types of waste generated will include:

- ≠ Oil from transformers - transformers used at the substation pose a risk of oil leakages and spills if not well managed.
- ≠ E-waste - E-Waste (including transformers, capacitors battery banks, transformer oil) will be generated during this phase and would have long term impacts on the environment, if not properly managed.
- ≠ Domestic waste – waste from food packaging, plastic bottles, paper packaging from the regular operation and maintenance activities and those of the personnel.

Impact significance

The sensitivity of the receptor to this impact is low, considering the setting of existing substations in Uganda, where the location of transformers and storage area for transformer oil are bunded, e-waste store for collection and disposal by registered providers.

The intensity of the impact will be medium because while domestic waste from the substations will be easy to manage and dispose of, e-Waste will pose a medium or long-term challenge because Uganda currently only has an e-Waste policy but no regulations, standards or recycling/disposal facility. Transformer oil waste also needs to be very carefully managed on-site because the effects of spills can have long term impacts on natural resources such as soil and water. The impact significance is therefore moderate.

		Sensitivity of Receptor			
		Very low	Low	Medium	High
		1	2	3	4
Intensity of Impact	Very low 1	1 Negligible	2 Minor	3 Minor	4 Minor
	Low 2	2 Minor	4 Minor	6 Moderate	8 Moderate
	Medium 3	3 Minor	6 Moderate	9 Moderate	12 Major
	High 4	4 Minor	8 Moderate	12 Major	16 Major

Mitigation Measures

i) Wastes to be handled and disposed only by NEMA-authorized waste management entities.
ii) Waste disposal containers will be provided onsite for each waste category.
iii) Oil pit to be installed at substations to contain accidental spills during transmission oil exchange.
iv) Transmission oil will be free of PCBs.
v) Waste oil to be recycled at UETCL facility for reuse. UETCL has a mobile oil recycling unit that is used at existing substations and residues disposed of at oil companies.

Adoption of the above mitigation measures will reduce impact intensity to "low" level resulting in a residual impact of minor significance.

7.6.2 EMF Impacts

Whenever electricity flows, both electric and magnetic fields exist close to the lines that carry electricity, and close to appliances. During operation and maintenance of the substation and its associated facilities, it is expected that there will be minimal emissions since it is an intermediate substation transforming electricity between 220 / 132 kV and 132 kV /33 kV and thus producing electro-magnetic fields (EMFs) at a lower level, reflecting the lower voltages and smaller sizes.

Research suggests that magnetic fields are a threat to human health as they can cause cancer or could assist in the development of a cancerous condition, miscarriages, Alzheimer's disease or depression. However, no persuasive evidence has been produced over the years.

In 1996, the World Health Organization (WHO) established the International Electromagnetic Fields Project to investigate potential health risks associated with technologies emitting EMF. A WHO Task Group concluded a review of the health implications of Extremely Low Frequency (ELF) fields (WHO, 2007). A number of other adverse health effects have been studied for possible association with ELF magnetic field exposure. These include other childhood cancers, cancers in adults, depression, suicide, cardiovascular disorders, reproductive dysfunction, developmental disorders, immunological modifications, neuro-behavioural effects and neurodegenerative disease. The WHO Task Group concluded that scientific evidence supporting an association between ELF magnetic field exposure and all of these health effects is much weaker than for childhood leukaemia. In some instances (i.e. for

cardiovascular disease or breast cancer) the evidence suggests that these fields do not cause them (APPENDIX 5).

On the ground, the exposure levels from base stations are normally below 1 % of the safety limits (ICNIRP's safety limit is 10 W/m²) as shown in baseline measurements for EMF presented in Section 5.6.

Impact significance
The sensitivity of receptor to the impact, if it were to occur would be high considering the long-term effects of any cancer illness. Intensity is very low based on the inconclusive evidence and the WHO 2007 study (APPENDIX 4) that did not find a link between EFM and cancer. Therefore, the impact significance is minor.

		Sensitivity of Receptor			
		Very low	Low	Medium	High
		1	2	3	4
Intensity of Impact	Very low 1	1 Negligible	2 Minor	3 Minor	4 Minor
	Low 2	2 Minor	4 Minor	6 Moderate	8 Moderate
	Medium 3	3 Minor	6 Moderate	9 Moderate	12 Major
	High 4	4 Minor	8 Moderate	12 Major	16 Major

Mitigation Measures:

i) Research shows that the strength of EMFs decreases rapidly with increasing distance from source. The design and layout of the substation is such that the distance between the substation and the nearest neighbouring structure is not less than 6 metres, which is the minimum recommended distance to ensure safety (Nutter, 2009).

ii) The metal fence around the substation will ensure that almost no electric fields go beyond the substation fence line.

iii) The magnetic fields decrease rapidly with an increase in distance from the source (Min of Health, NZ, 2008). The transformers will be constructed about 6 metres from the fence to ensure that magnetic fields produced inside the substation has dropped to background levels at fence line.

iv) UETCL will continually keep up with the research regarding the connection of EMF the associated risks to human health, and as such keep up with the technological advances so as keep the risks to levels that are as low as reasonably practicable.

Adoption of the above mitigation measures will ensure residual impact of minor significance.

7.6.3 Contribution to climate change

Gas Insulated Switchgear (GIS) will be installed in a number of substations as discussed in Section 2.1. This GIS type switchgear uses sulfur hexafluoride gas (SF_6) for insulation, which gas has a contribution of less than one part in ten thousand of the total contribution to greenhouse gas emission (Table 7-3), a contributor to climate change.

Table 7-3: Estimated contribution of various gases to the greenhouse effect.

Gas	Concentration (pppbv)	Contribution
CO_2	353 x 10^3	60
CH_4	1.7 x 10^3	15
N_2O	310	5
O_3	10 - 50	8
CFC-11	0.28	4
CFC-12	0.48	8
SF_6	0.002	10^{-2}

Source: Schnieder Electric, 2003 http://www2.schneider-electric.com/documents/technical-publications/en/shared/electrical-engineering/breaking-techniques-switchgear/general-knowledge/ect188.pdf

Impact significance
The receptor sensitivity of the impact is rated high because of the long term and far reaching effects of climate change.

The impact intensity is rated very low since the contribution of SF_6 to the atmosphere is less than one part in ten thousand of the total contribution of the other agents to GHG emissions, and the risk of SF_6 leakage from the GIS is also very low, almost negligible.

Therefore, the impact significance is minor.

		Sensitivity of Receptor			
		Very low	Low	Medium	High
		1	2	3	4
Intensity of Impact	Very low 1	1 Negligible	2 Minor	3 Minor	4 Minor
	Low 2	2 Minor	4 Minor	6 Moderate	8 Moderate
	Medium 3	3 Minor	6 Moderate	9 Moderate	12 Major
	High 4	4 Minor	8 Moderate	12 Major	16 Major

Mitigation measures

i) The SF_6 gas will be reclaimed during maintenance and end of life treatment.
ii) The project will use GIS with gas leakage ratio per year less than 0.1% thereby minimizing impacts to insignificant levels.
iii) UETCL will purchase GIS from a supplier that has proven internal procedures to ensure SF_6 release at each stage (production, site maintenance, and end of life). International standards

such as IEC 376 for personnel and environment safety, for electrical installations will be some of the conditions to be fulfilled by successful suppliers of GIS.

7.6.4 Invasion of rodents and snakes in cables

Unwanted animal intrusions can damage equipment and disrupt power inside a substation. Invasion of cable trenches by snakes and other rodents are common at substations. Utilities may experience the consequences of animal contact immediately, or not until months or even years later. For example, transformers could prematurely reach the end of their life due to the high fault current experienced during an in-the-fence fault event, or animal contact can impact power quality by creating capacitor trip outs or voltage sags. Unfortunately, when equipment fails, utilities may not make the connection between the outage and a previous animal contact within the substation.

Figure 7-12: Example of damage caused by a snake at a substation
Source: http://tdworld.com/substations/protect-your-substations-against-animal-intruders

Impact Significance
Receptor sensitivity is rated medium, for the substations being constructed from green field (Buloba and Mukono) since these are in areas that are predominantly farmland, with sections of fallow and wetland. For the substations that are to be upgraded, the receptor sensitivity is low.

Impact intensity is rated high because of the damage that rodents and snakes can cause to the substation cables and the consequent damage to the substation infrastructure. The damage caused by snakes and rodents could be long term, especially if these are not detected early.

Therefore, the impact significance is moderate.

		Sensitivity of Receptor			
		Very low	Low	Medium	High
		1	2	3	4
Intensity of Impact	Very low 1	1 Negligible	2 Minor	3 Minor	4 Minor
	Low 2	2 Minor	4 Minor	6 Moderate	8 Moderate
	Medium 3	3 Minor	6 Moderate	9 Moderate	12 Major
	High 4	4 Minor	8 Moderate	12 Major	16 Major

Mitigation measures

i) The substations will be fenced to keep away animals.
ii) The various equipment at substations will be insulated according to generally accepted industry standards, e.g. allowing 24 in as minimum design space between bus bars. Utilities can obtain this insulating space by covering the reachable energized elements with insulation or providing greater space.
iii) In order to avoid invasion of cable trenches by snakes and other rodents, the operator will use snake and rodent repellents routinely to keep away snakes and rodents. An example of snake repellent is the solar powered snake eliminator (Figure 7-13). This unique repellent has been developed to scare away all kinds of snakes; it emits a pulsing ultrasonic vibration deep into the ground, which the snake picks up through sensors throughout its body. The snake perceives a danger zone causing them to evacuate the area; most snakes will retreat almost immediately. All that is visible of the unit is the sturdy round top, a small solar panel and part of an aluminium probe, which is placed into the ground to transmit the warning pulses through the soil.

Figure 7-13: A solar powered snake repellent

iv) The substation staff will be trained on the animal deterrent methods in use at the respective substations, so as to maintain the integrity of the systems or methods.

7.7 NEGATIVE IMPACTS - TRANSMISSION LINES

7.7.1 Improper waste management

Maintenance activities during transmission line operation will require replacement of conductors. The used conductors and off-cuts from the new conductors will have to be properly handled and managed since they are non-bio-degradable.

Impact Significance
The sensitivity of receptor to this impact occurring is high because e-Waste will pose a medium or long-term challenge because Uganda currently only has an e-Waste policy but no regulations, standards or recycling/ disposal facility.

Intensity of the impact will be low because the expected quantities are relatively low with low frequency of occurrence.

The impact significance will therefore be moderate.

		Sensitivity of Receptor			
		Very low	Low	Medium	High
		1	2	3	4
Intensity of Impact	Very low 1	1 Negligible	2 Minor	3 Minor	4 Minor
	Low 2	2 Minor	4 Minor	6 Moderate	8 Moderate
	Medium 3	3 Minor	6 Moderate	9 Moderate	12 Major
	High 4	4 Minor	8 Moderate	12 Major	16 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 necessarily require frequent replacement, providing proper facilities for handling and storage of construction materials to minimize waste by damage, providing waste collection bins that allow for sorting of waste.
ii) E-Waste will be safely kept in storage by UETCL until an acceptable treatment, recycling or disposal facility is developed in the country.

Adoption of the above mitigation measures will reduce impact intensity to "very low" level resulting in a residual impact of minor significance.

7.7.2 EMF Impacts

Whenever electricity flows, both electric and magnetic fields exist close to the lines that carry electricity, and close to appliances. During operation and maintenance of the substation and its associated facilities, it is expected that there will be minimal emissions since it is an intermediate substation transforming electricity between 220 / 132 kV and thus producing electro-magnetic fields (EMFs) at a lower level, reflecting the lower voltages and smaller sizes.

Research suggests that magnetic fields are a threat to human health as they can cause cancer or could assist in the development of a cancerous condition, miscarriages, Alzheimer's disease or depression. However, no persuasive evidence has been produced over the years.

In 1996, the World Health Organization (WHO) established the International Electromagnetic Fields Project to investigate potential health risks associated with technologies emitting EMF. A WHO Task Group concluded a review of the health implications of Extremely Low Frequency (ELF) fields (WHO, 2007). A number of other adverse health effects have been studied for possible association with ELF magnetic field exposure. These include other childhood cancers, cancers in adults, depression, suicide, cardiovascular disorders, reproductive dysfunction, developmental disorders, immunological modifications, neuro-behavioural effects and neurodegenerative disease. The WHO Task Group concluded that scientific evidence supporting an association between ELF magnetic field exposure and all of these health effects is much weaker than for childhood leukaemia. In some instances (i.e. for cardiovascular disease or breast cancer) the evidence suggests that these fields do not cause them (APPENDIX 5).

Impact Significance
The sensitivity of receptor to the impact, if it were to occur would be high considering the long-term effects of any cancer illness. Intensity is very low based on the inconclusive evidence and the WHO 2007 study (APPENDIX 4) that did not find a link between EFM and cancer. Therefore, the impact significance is minor.

		Sensitivity of Receptor			
		Very low	Low	Medium	High
		1	2	3	4
Intensity of Impact	Very low 1	1 Negligible	2 Minor	3 Minor	4 Minor
	Low 2	2 Minor	4 Minor	6 Moderate	8 Moderate
	Medium 3	3 Minor	6 Moderate	9 Moderate	12 Major
	High 4	4 Minor	8 Moderate	12 Major	16 Major

Mitigation Measures

i) UETCL will continually keep up with the research regarding the connection of EMF the associated risks to human health, and as such keep up with the technological advances so as keep the risks to levels that are as low as reasonably practicable.
ii) UETCL will enforce the transmission line corridor to ensure potential exposure to EMF is minimised.

7.7.3 Corona Effect

A corona discharge is an electrical discharge brought on by the ionization of a fluid surrounding a conductor that is electrically charged, under certain conditions. Spontaneous corona discharges occur naturally in high-voltage systems unless care is taken to limit the electric field strength. The corona will occur when the strength (potential gradient) of the electric field around a conductor is high enough to

form a conductive region, but not high enough to cause electrical breakdown or arcing to nearby objects. It is often seen as a bluish (or other colour) glow in the air adjacent to pointed metal conductors carrying high voltages, and emits light by the same property as a gas discharge lamp. Several factors, including conductor voltage, shape and diameter, and surface irregularities such as scratches, dust, or water drops can affect a conductor's electrical surface gradient and its corona performance.

The ionized gas of a corona is chemically active. In air, this generates gases such as ozone (O_3) and nitrogen oxide (NO), and in turn nitric oxide (NO_2), and thus nitric acid if water vapour is present. Ozone is intentionally created this way in an ozone generator, otherwise, these highly corrosive substances are objectionable or hazardous, and are undesirable where they waste power in electrical systems. Controlled corona discharges are used in a variety of filtration, printing, and other processes.

The effects of corona and induced current effects associated with the operation of high voltage transmission lines include audible noise, radio, television and computer monitor interference, gaseous effluents, shock potential, and fuel ignition. Such effects are common to all energized transmission lines.

Impact Significance

The sensitivity of receptor will be very low because the corona effect is low for transmission lines rated 230 kV and lower. The intensity of impact of the corona effect on the environment is rated low because the effects are short term and only manifest during particular weather conditions (rainy). The impact significance is assessed as minor.

		Sensitivity of Receptor			
		Very low	Low	Medium	High
		1	2	3	4
Intensity of Impact	Very low 1	1 Negligible	2 Minor	3 Minor	4 Minor
	Low 2	2 Minor	4 Minor	6 Moderate	8 Moderate
	Medium 3	3 Minor	6 Moderate	9 Moderate	12 Major
	High 4	4 Minor	8 Moderate	12 Major	16 Major

Mitigation measures:

i) The designer will maintain a ratio of wire size (wire radius) to turn-to-turn spacing (D/r) of less than 5.85, so that corona will not develop.
ii) Workmanship is often the most difficult corona source to identify. Care must be taken to ensure consistent and uniform windings, along with the absence of foreign materials (dust, lint, soldering flux, hand lotion, etc.). Also, solder connections will be smooth and without "solder points."
iii) Potting materials will be low-enough viscosity to insure good penetration within the coils.
iv) Use of the appropriate conductor sizes and material will be ensured during the life of the transmission lines.

v) Regular maintenance of the transmission lines to ensure that any damaged conductors can be detected early and replaced, as damaged conductors are more prone to the corona effect.

Adoption of the above mitigation measures will reduce impact intensity to "very low" level resulting in a residual impact of negligible significance.

7.7.4 Water Pollution

Clearing vegetation under the transmission lines to provide access for maintenance increasing the potential for soil erosion that leads to contamination of downstream receiving water bodies. River Kasala in near the Mukono component would be especially prone to eroded soils.

Impact Significance

The sensitivity of receptor will be medium since the water may be used for domestic purposes. The intensity of impact is rated low because of the distance to the river, lack of actively exposing and loosening the soil surface during operation and small slope topography.

The impact significance is assessed as moderate.

		Sensitivity of Receptor			
		Very low	Low	Medium	High
		1	2	3	4
Intensity of Impact	Very low 1	1 Negligible	2 Minor	3 Minor	4 Minor
	Low 2	2 Minor	4 Minor	6 Moderate	8 Moderate
	Medium 3	3 Minor	6 Moderate	9 Moderate	12 Major
	High 4	4 Minor	8 Moderate	12 Major	16 Major

Mitigation measures:

i) Avoid removing short trees and grasses along the transmission line corridor as far as it does not hinder maintenance works.

Adoption of the above mitigation measure will reduce impact intensity to "very low" level resulting in a residual impact of minor significance.

7.7.5 Bird Collision with transmission lines and perching on towers

Presence of the transmission lines provides a navigation hazard for birds, increasing the potential for electrocution and entanglement. Large birds that may not easily manoeuvre would be especially at risk. Also perching on towers, especially by large birds is a potential risk of electrocution for the birds. Long streams of excrement released by large birds, either perched or in flight near a transmission tower can cause a flashover (an unintended electric discharge over or around an insulator) which can in turn cause damage to consumers' property and equipment.

Impact Significance

The sensitivity of receptor will be medium since birds of conservation concern were identified in the project area. The intensity of impact is rated low because of the large spacing and height of the lines. The impact significance is assessed as moderate.

		Sensitivity of Receptor			
		Very low	Low	Medium	High
		1	2	3	4
Intensity of Impact	Very low 1	1 Negligible	2 Minor	3 Minor	4 Minor
	Low 2	2 Minor	4 Minor	6 Moderate	8 Moderate
	Medium 3	3 Minor	6 Moderate	9 Moderate	12 Major
	High 4	4 Minor	8 Moderate	12 Major	16 Major

Mitigation measures:

i) Installation of avian flight diverters (during construction) along the new transmission lines (Buloba and Mukono).
ii) Installation of bird guards on transmission lines to reduce the faults caused by bird streamers. The purpose of the bird guard is not to harm the birds, but rather to prevent them from perching on specific target points on a power line.

Adoption of the above mitigation measure will reduce impact intensity to "very low" level resulting in a residual impact of minor significance.

7.8 CUMMULATIVE 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. The components of the proposed Project will be located in the districts of Kampala, Wakiso, Mukono, Buikwe and Mpigi. Within each of these districts, there are ongoing and planned infrastructure projects that shall potentially overlap on a temporal and spatial scale with the planned project. Currently projects including upgrading of road junctions, second phase of the Northern Bypass, construction Entebbe Express way and Bombo road are on-going. The Mukono Industrial Park substation and associated transmission line is next to the Projects component named New Mukono substation and associated transmission line will be constructed in Mukono District. A World Bank funded Kawanda–Masaka 220 kV Transmission Line (currently under construction) will be interconnected with the Buloba component. In addition, the land requirement for the corridors to accommodate the planned standard gauge railway and oil pipe line at Mukono will compound the land take impact.

Thus cumulative impacts will be contributed by those activities within the host districts which overlap both spatially and temporary with this Project. Such project's activities include acquiring land for infrastructure development, clearing of vegetation, provision of employment opportunities and associated logistical requirements.

7.8.1 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.

7.8.2 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.

7.8.3 Assessed Cumulative Impacts

The assessed cumulative impacts associated with past, proposed and foreseeable future activities proposed 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

- Employment and contribution to economic growth

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

Mitigation measures

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

vi) Kampala, Wakiso, Mukono, Buikwe and Mpigi Districts' Local authorities must provide for strict enforcement of approval requirements before projects are implemented.

vii) All projects that require abstraction of water must obtain permits for DWRM and ensure compliance to approval conditions to ensure availability and quality.

viii) 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 environment will be followed. In particular UETCL will synchronise development of the proposed Project with the other planned and ongoing projects.

8 ENVIRONMENTAL AND SOCIAL MANAGEMENT AND MONITORING PLAN (ESMP)

8.1 ENVIRONMENTAL AND SOCIAL MANAGEMENT PLAN (ESMP)

Based on the environmental impact assessment, an Environmental and Social Management Plan (ESMP) was prepared to ensure that project impacts are avoided or minimized. The ESMP summarizes the planned mitigation measures against the anticipated environmental impacts, the responsibility for its implementation and supervision, and estimated cost. Table 7-3 shows the ESMP.

Implementation of the construction mitigation measures will be the responsibility of the Construction Contractor under the supervision of the Supervising Consultant. Based on this ESMP, the Construction Contractor will be required to prepare and submit a detailed Construction Environmental Management Plan (CEMP), Waste Management Plan (WMP) and Occupational Health and Safety Plan (OHSP) to UETCL and other relevant organizations for approval. To ensure that the CEMP is effectively implemented, a qualified and experienced environmental officer will need to be assigned in the Construction Contractor and Supervising Consultant respective teams. If unexpected adverse impacts occur, they will be reported immediately to NEMA to seek advice.

Table 7-4 Outline of Environmental and Social Management Plan

Item	Potential impacts	Mitigation measures	Implementation responsibility	Supervision responsibility	Estimated cost
Preconstruction phase					
Involuntary resettlement	Loss of land, crops, structures, etc. due to land acquisition for the new substations and transmission lines (Buloba, Mukono and Kawaala).	• For the 2 x 220 kV transmission lines in Mukono and Buloba sites, the width of the transmission line corridors will be minimized through corridor sharing. • All PAPs will be provided fair and adequate compensation and assistance (e.g. allowances and livelihood restoration programs) until their livelihood and incomes are restored to at least pre-project levels, in accordance to the Project's ARAP. The ARAP will be based on Ugandan laws and in compliance to JICA Guidelines on Environmental and Social Consideration. • Additional assistance will be provided to vulnerable social groups if any. • Internal and external monitoring will be implemented and grievance mechanism established.	UETCL	Office of the Chief Government Valuer	USD 2,111,244 or UGX 7,389,354,180 (Estimated in ARAP)
Conservation area	Partial loss of forest and biodiversity within Nandagi Forest Reserve due to land acquisition for the Mukono transmission lines.	• The loss of forest and associated biodiversity will be compensated (offset) based on the "Forest Biomass and Biodiversity Assessment" undertaken by National Forest Authority (NFA) in conjunction with UETCL. • Any threatened flora species (e.g. *Jacaranda mimosifolia*) that require cutting will be compensated by for example replanting its seed or seedling in a suitable alternative location. • NFA and UETCL shall undertake forest restoration and other activities that shall enhance the management of the remaining Central Forest Reserves. • Nandagi Indigenous Tree Nursery shall be supported to produce more seedlings for Forest restoration.	UETCL/NFA	NEMA, Ministry of Water and Environment	Part of ARAP cost above (Estimated in ARAP)
	Partial loss of NFA leased private tree planting farms within Nandagi Forest Reserve due to land acquisition for the Mukono transmission lines.	• Compensation to private farmers for the planted trees based on the ARAP valuation survey. • NFA shall undertake awareness activities and guide Licensee tree farmers to continue with Tree Planting projects. • Provision of livelihood restoration assistance to the affected private farmers if necessary.	UETCL	NFA	Part of ARAP cost above (Estimated in ARAP)

Item	Potential impacts	Mitigation measures	Implementation responsibility	Supervision responsibility	Estimated cost
Construction phase					
Air pollution	Fugitive dust emission from heavy construction works (e.g. grading works)	• Keeping exposed soil surfaces in damp condition by water spraying and material stockpiles covered when not in use.	Construction contractor	Supervising consultant, NEMA, UETCL	USD 15,000
	Dust and exhaust gas emissions from construction vehicles and machines	• Use of well-maintained vehicles and machines. Vehicles and machines emitting excessive pollutants (e.g. black soot) to be removed until repaired. • Use of closed/covered trucks when transporting dusty materials. • Switching off engines of construction vehicles and machines when not in use.	Construction contractor	Supervising consultant, NEMA, UETCL	USD 35,000 for maintenance programme
Water pollution	Discharge of concrete wash water.	• Discharge of untreated concrete wash water to surface water and groundwater to be strictly prohibited. • Concrete wash water (e.g. from concrete mixer and pump trucks) to be discharged only at designated facilities (e.g. facilities with wash water treatment system). • Recycling of wash water as far as practical.	Construction contractor	Supervising consultant, NEMA, UETCL	USD 10,000 for wash water treatment at to designated facility
	Soil erosion and runoff from construction site (Buloba and Mukono)	• Avoid removing short vegetation and grass along the transmission line corridor as far as it does not hinder construction works. • Implementation of temporary erosion control measures (e.g. silt fence, erosion mats) especially where construction sites are near surface water. • Revegetation of exposed slopes immediately after construction is completed. • Construction of retaining walls for exposed slope protection if necessary. • Construction of temporary runoff drainage channel. • Stockpiles and temporarily removed topsoil to be stored in a location and manner to prevent soil runoff into surface waters.	Construction contractor	Supervising consultant, NEMA, UETCL	USD 6,000 for re-vegetation and slope protection
	Accidental spillage of hazardous liquids and discharge of human waste	• Spillage of hazardous liquids (e.g. oil) to be prevented by implementing spill prevention measures. • Installation of portable toilets for construction workers.	Construction contractor	Supervising consultant, NEMA, UETCL	USD 6,000
Soil pollution	Accidental spillage and leakage of hazardous liquids	• Regular inspection of vehicles and machines for oil and fuel leaks. Leaking vehicles and machines to be removed until repaired. • Spill response kit (e.g. absorbents) to be readily available at the	Construction contractor	Supervising consultant, NEMA, UETCL	USD 15,000 for spill response equipment and

Item	Potential impacts	Mitigation measures	Implementation responsibility	Supervision responsibility	Estimated cost
		construction site. • Hazardous substances to be stored only in specialized/labelled containers and designated storage facility. • Storage facility to be located as far as possible from sensitive areas (e.g. groundwater wells, surface water) and well secured from the public. • Storage and handling facilities of hazardous liquid to be bunded with an impermeable base. • Posting of warning signs at the storage facility. • Hazardous materials only to be handled by trained staff.			bunding of risk-prone equipment
Noise	Noise from heavy construction works	• Vehicles and machinery to be equipped with exhaust mufflers and well maintained. • Noisy equipment to be located as far as possible and aligned to be directed away from sensitive receptors. • In principal, noisy construction works to be limited to normal working hours and no operation on Sundays and public holidays. • Additional noise suppression measures (e.g. covering of noisy units) to be implemented if noise levels at nearest sensitive receptor consistently exceeds national noise standard or in case of consistent complaints. • Construction workers to be provided with appropriate PPE such as ear plugs and ear muffs for protection against excessive noise. • Construction machines and vehicles to be turned off when not in use.	Construction contractor	Supervising consultant	USD 10,000 for appropriate PPE and equipment mufflers
Waste	Generation of construction wastes (e.g. cleared vegetation, concrete debris, removed transmission cables, waste oil)	• Maximization of reuse and recycling. • Storage of wastes only in designated waste containers and areas. • Storage of hazardous wastes in specialized/labelled containers and facility. • Wastes to be handled and disposed only by NEMA-authorized waste management entities. • Strict prohibition of littering and implementation of awareness programs for the construction workers. • Daily clean-ups at the construction sites. • The construction contractor will be required to submit Construction Waste Management Plan (WMP) to UETCL and other necessary organizations for approval.	Construction contractor	Supervising consultant	USD 10,000 for waste handling contractor(s)
Hydrology	Disruption of tributary and water channel flow due to construction of access	• Culverts will be installed where the access road crosses the tributary and channel	Construction contractor	Supervising consultant	Included in construction base cost

Item	Potential impacts	Mitigation measures	Implementation responsibility	Supervision responsibility	Estimated cost
	road (Mukono)				
Social infrastructures	Temporary restriction in the use of access road (New Mukono)	• The access road will be constructed in manner to minimize disturbance to local users (e.g. secure of one-lane width). • Placement of traffic control flagmen, especially at rush hour. • Local community to be informed beforehand if any restrictions occur. • Placement of appropriate safety/warning signs in strategic locations (e.g. 'Heavy Trucks Turning', 'Road Diverted', 'Half Road Closed', etc.) shall be done during the construction period.	Construction contractor	Supervising consultant	USD 4,200 for warning signage
	Temporary disruption of electricity supply	• Construction works will be planned in manner to minimize duration of power outage. • If power outage is unavoidable, it will be communicated to the public and facilities (e.g. hospital) in advance. • Overhead line work to be designed and carried out in a way to avoid interference with existing power lines and maintaining safe separation distances from existing distribution lines.	Construction contractor, UETCL	Supervising consultant; UETCL	Included in construction base cost
Landscape	Change in landscape due to construction of new substations and transmission line (Buloba and Mukono).	• Site restoration (e.g. revegetation) to be implemented immediately after construction is completed. • Creation of green belt, if necessary.	Construction contractor	Supervising consultant	USD 5,700 for site restoration
Infectious diseases	Risk of spreading infectious diseases due to influx of construction workers	• Holding of awareness programs for the construction workers. • Preparation of Code of Conduct to be strictly followed by the workers. • Contractor to undertake HIV/AIDS Management campaigning including Training, distribution of quality Contraceptives and Voluntary Counselling and Testing among workers and adjacent communities and schools.	Construction contractor	Supervising consultant	USD 8,000
Conflicts	There are potential conflicts among workers and between workers and adjacent communities	• Contractor to set-up a Conflict Redress Plan to be approved by UETCL • Contractor to set-up and operationalize a Conflict Redress Committee for approved by UETCL	Construction contractor	Supervising consultant, UETCL	USD 2,000

Item	Potential impacts	Mitigation measures	Implementation responsibility	Supervision responsibility	Estimated cost
Occupational safety	Occupational accidents (e.g. working at height)	• Compliance to JICA's "The Guidance for the Management of Safety for Construction Works in Japanese ODA Projects' and Uganda's OSH Act. • Implementation of safety training programs for all workers. • Provision of appropriate Personal Protective Equipment (PPE). • Holding of regular tool box meeting to discuss safety. • Lockout - tag out procedures to be clearly displayed on site and followed. • Contractor to deploy an HSE Officer approved by UETCL. • Contractor to provide appropriate safety signage at high risk locations (e.g. near fuel tanks) including ancillary work sites. • The construction contractor will be required to submit an Occupational Health and Safety Plan (OHSP) to UETCL and other necessary organizations for approval.	Construction contractor	Supervising consultant	USD 25,000 for appropriate PPE
Accidents	Traffic accidents and disruption due to construction-related traffic	• Strict compliance to speed limits. • Contractor to undertake daily Tool Box Talks for Workers • Avoid, as far as practical using roads with high risk of accidents. • Vehicle motion alarm to be installed on all construction vehicles. • Placement of traffic officers and appropriate safety/warning signs in high risk locations (e.g. 'Heavy Trucks Turning', 'Road Diverted', 'Half Road Closed', etc.). • Contractor to maintain a Health and Accident register • The construction contractor will be required to submit a Traffic Management Plan to UETCL and other necessary organizations for approval. • Contractor to Deploy a qualified Site Nurse and Doctor-On-Call • Contractor to set-up a Site Clinic for treatment of minor ailments. However, other cases shall be referred for specialized management • Contractor to provide a well-stocked First Aid Kit	Construction contractor	Supervising consultant	USD 19,000 for site clinic, site nurse and on-call doctor
Ecosystem	Proliferation of invasive species (Buloba and Mukono)	• Revegetation of exposed surfaces (e.g. cut and fill slopes) to be done by native plant species only, and immediately after works are completed to minimize chance of colonization by invasive species. • Removal of invasive species if observed along the revegetation sites.	Construction contractor	NFA	USD 4,500 for revegetation pf exposed surfaces
	Disturbance to flora and fauna (Buloba and Mukono)	• Implementation of environmental awareness programs for the construction workers, with special focus on threatened species. • Strictly prohibit hunting and poaching of wild life and cutting of trees. • Prevention and minimization of pollution (e.g. noise, water) through strict implementation of planned pollution control measures.	Construction contractor	Supervising consultant	USD 4,000 for environmental awareness training

Item	Potential impacts	Mitigation measures	Implementation responsibility	Supervision responsibility	Estimated cost
Physical Cultural Resources	Loss of archaeological, burial sites, sacred trees, shrines and other physical cultural resources	• Development of a Physical Cultural Resources Management Plan If such physical cultural resource are found: • Consultations to determine relocation costs • Relocation and replacement	UETCL, Contractor	DMM, MGLSD	USD 20,000
Operation phase					
Water pollution	Pollution of surface water due to soil runoff from transmission line corridor and substations (Buloba and Mukono)	• Avoid removing short trees and grasses along the transmission line corridor as far as it does not hinder maintenance works.	UETCL	NEMA	-
Waste	Generation of operation waste (e.g. transformer oil)	• Wastes to be handled and disposed only by NEMA-authorized waste management entities. • Waste disposal containers will be provided onsite for each waste category. • Oil pit to be installed at substations to contain accidental spills during transmission oil exchange. • Transmission oil will be free of PCBs. • Waste oil to be recycled at UETCL facility for reuse. Residues to be disposed at oil companies.	UETCL	NEMA	USD 20,000 for waste handling contractor
Ecosystem	Bird collision with transmission line	• Installation of avian flight diverters (during construction) along the new transmission lines (Buloba and Mukono).	Construction contractor	NEMA/UWA	USD 23,000
TOTAL					**USD 2,353,644**

8.2 ENVIRONMENTAL AND SOCIAL MONITORING PLAN

An Environmental and Social Monitoring Plan (ESMoP) was prepared to check the effectiveness of the measures proposed in the ESMP. If the measures are inadequate, they will be revised until impacts are reduced to satisfactory levels. The ESMoP describes the monitoring methodology, responsibility for its implementation and estimated cost. Table 7-5 shows the ESMoP.

Table 7-5: Environmental and Social Monitoring Plan (ESMoP)

Category	Aim	Method	Frequency	Implementation responsibility	Estimated cost
Preconstruction phase					
Involuntary resettlement	To check the progress and effectiveness of ARAP implementation (Buloba, Mukono and Kawaala)	**[Internal monitoring]** · Assessment of whether compensation and other entitlements are being delivered in line with the ARAP. · Assessment of whether agreed measures to restore or enhance standards of living are being implemented. · Assessment of whether agreed measures to restore or enhance livelihood and sources of income are being implemented. · Identifying any conflicts or problems, issues, or cases of hardship resulting from the resettlement process.	· 1/month during ARAP implementation · Every 3 months during post resettlement for at least 2 years	UETCL	USD 275,000
		[External monitoring] · Assessment of compliance with ARAP actions · Assessment of pre- and post-resettlement socio-economic situation of the affected households · Reviewing records of grievances and following up whether or not appropriate corrective actions have been undertaken and outcomes are satisfactory.	· 2/year during ARAP implementation · 1/year during post resettlement for at least 2 years	Independent organization	USD 145,000
Conservation area	To check the progress and effectiveness of off-set programs at Nandagi Forest Reserve (Mukono)	Joint monitoring between UETCL and NFA. Detailed monitoring method to be determined between UETCL and NFA based on the Land, Biomass and Biodiversity Assessment.	· 4/year for the first year · 1/year for at least 3 years post off-set establishment	UETCL/NFA	To be estimated through the Land, Biomass and Biodiversity Assessment
Construction phase					
Air pollution	To check whether excessive dust and exhaust gas are not emitted from the construction sites (Buloba, Mukono, Kawaala)	Visual inspection of: · Fugitive dust emissions from construction sites · Exhaust gas emissions from construction vehicles and equipment	· Daily	Construction supervisor	Part of supervision base cost
		Field measurement of air quality (PM_{10}, $PM_{2.5}$) at sensitive receptors near the substation sites. Results to be compared with WHO air quality guideline.	· 1/week during heavy construction works (over a six months period)	Construction supervisor (subcontract to local consultant)	USD 24,000
Water pollution	To check whether construction activities are	Field measurement of surface water quality (e.g. pH, EC, DO, SS, turbidity, TN, TP, oil & grease) at Buloba and New Mukono.	· 1/month (over a 12 months period)	Construction supervisor	USD 36,000

Category	Aim	Method	Frequency	Implementation responsibility	Estimated cost
	not causing water pollution (Buloba and Mukono)	Results to be compared with baseline data.		(subcontract to local consultant)	
Soil pollution	To check of any leaks of hazardous liquids	Visual inspection of: · Oil leaks from construction machines and vehicle. · Leaks from storage and handling areas of hazardous liquids.	· 1/week	Construction supervisor	Part of supervision base cost
Noise	To check whether excessive noise are not emitted from the construction sites (Buloba, Mukono, Kawaala)	Field measurement of noise level (LAeq) at sensitive receptors near the substation sites. Results to be compared with National Environment (Noise Standards And Control) Regulations, 2003.	· Daily during heavy construction works · Daily/hourly on receipt of any complaints	Construction supervisor	Part of supervision base cost. Cost of portable sound meter: USD 1,300
Waste	To check whether wastes are stored and handled in accordance to the contractor's Waste Management Plan (All sites)	Visual inspection of waste storage sites and construction sites.	· Daily	Construction supervisor	Part of supervision base cost
Occupational safety	To check whether safety procedures are implemented in accordance to OHSP (All sites)	Visual inspection of work safety procedures and equipment.	· Daily	Construction supervisor	Part of supervision base cost
Ecosystem	To check if construction activities are not causing any unnecessary disturbance to surrounding habitats and species (Buloba and Mukono)	Field surveys of sensitive habitats and flora/fauna around the project sites.	· 1/month (over a 12 months period)	Construction supervisor (subcontract to local consultant)	USD 24,000
Operation phase					
Water pollution	To check the growth status of revegetated areas and whether soil runoff is not polluting surface water (Buloba and Mukono)	Observation of growth status of revegetated areas and water quality measurements of adjacent surface water (SS, turbidity).	· 3/year until regrowth is confirmed	UETCL (subcontract to local consultant)	USD 9,000
Waste	To check operation wastes	Inspection of oil leakages and waste management practices at the	· 4/year	UETCL	Included in UETCL's

Category	Aim	Method	Frequency	Implementation responsibility	Estimated cost
	are stored and handled in accordance to the Waste Management Plan (All sites)	substations.			operation and maintenance budget
Ecosystem	To check of any bird collision incidence along the transmission line corridor (Buloba and Mukono)	Field reconnaissance and community interview along the transmission line corridor.	· 3/year for at least 2 years	UETCL	Included in UETCL's operation and maintenance budget

9 GRIEVANCE MECHANISM

During the construction phase, signage will be displayed at temporary yards and major construction sites outlining the complaints procedure and contact details for making complaints. Upon receiving of a complaint, the following procedure will in general be followed:

- Inform complainant within 24 hours upon acknowledgement of complaint.
- Investigate the complaint to determine its validity and the source of the problem.
- Identify and undertake any action required and communicate response action to complainant.
- Report the complaint in monitoring report including actions, resolution status and any outstanding actions required.

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APPENDIX 1 NEMA APPROVED TERMS OF REFERENCE FOR ESIA

APPENDIX 2 SPECIES LIST OF FLORA AND FAUNA IN PROJECT AREAS

PROPOSED BULOBA COMPONENT

VEGETATION

Table B1 Buloba - Plant Checklist and their abundance

Family	Species	Way Point	B1	B6	B7	B16
		Life form	Cover			
Acanthaceae	*Acanthus polystachius*	Shrub		35	70	8
Acanthaceae	*Asystasia gangetica*	Herb	10	3	10	15
Anacardiaceae	*Mangifera indica*	Tree			20	
Apocynaceae	*Carissa spinarum*	Shrub	2			
Apocynaceae	*Funtumia africana*	Tree				5
Araceae	*Raphia farinifera*	Tree		10		35
Araliaceae	*Polyscias fulva*	Tree	5	5		
Arecaeae	*Phoenix reclinata*	Tree	15	50	10	30
Asteraceae	*Aspilia africana*	Herb		15	25	8
Asteraceae	*Helichrysum forskahlii*	Herb	2			
Asteraceae	*Microglossa pyrifolia*	Shrub				8
Asteraceae	*Vernonia amygdalina*	Shrub	12			
Bignoniaceae	*Spathodea campanulata*	Tree				5
Burseraceae	*Canarium schweinfurthii*	Tree			10	
Clusiaceae	*Harungana madagascariensis*	Tree				20
Convolvulaceae	*Ipomoea cairica*	Climber		10		
Convolvulaceae	*Lepistemon owariensis*	Climber	8	20		
Cucurbitaceae	*Momordica foetida*	Climber		2		
Cyperaceae	*Cyperus denudatus*	Herb	30	10		
Cyperaceae	*Cyperus distans*	Herb		60		
Cyperaceae	*Cyperus papyrus*	Herb	10	15		
Cyperaceae	*Cyperus sp. 1*	Herb	25	40		
Cyperaceae	*Fuirena umbellata*	Herb	6			
Cyperaceae	*Lipocarpha chinensis*	Herb	15			
Cyperaceae	*Pycreus nitidus*	Herb	70	90		10
Euphorbiaceae	*Alchornea cordifolia*	Tree	45	20		5
Euphorbiaceae	*Euphorbia tirucalli*	Tree				3
Euphorbiaceae	*Macaranga schweinfurthii*	Tree	10			
Euphorbiaceae	*Margaritaria discoidea*	Tree				5
Euphorbiaceae	*Shirakiopsis elliptica*	Tree			15	
Fabaceae	*Desmodium salicifolium*	Herb	10			
Fabaceae	*Sesbania sesban*	Shrub	3			
Fabaceae (Mimosoideae)	*Albizia grandibracteata*				10	

Family	Species	Way Point	B1	B6	B7	B16
Fabaceae (Papilionoideae)	*Desmodium adscendens*	Herb		8	5	
Fabaceae (Papilionoideae)	*Desmodium canum*	Climber		3	8	5
Fabaceae (Papilionoideae)	*Erythrina abyssinica*	Tree		5	10	5
Fabaceae (Papilionoideae)	*Indigofera arrecta*	Herb		2	8	
Fabaceae (Papilionoideae)	*Kotschya africana*	Shrub	45			20
Fabaceae (Papilionoideae)	*Pseudathria hookeri*	Herb		2		
Lamiaceae	*Hoslundia opposita*	Shrub	8			
Lamiaceae	*Hyptis baumii*	Herb	15			
Lamiaceae	*Platostoma rotundifolium*	Herb				10
Loganiaceae	*Anthocleista schweinfurthii*	Tree	7			
Malvaceae	*Hibiscus fuscus*	Herb			2	
Malvaceae	*Hibiscus sp.*	Herb		8		
Malvaceae	*Melochia mollis*	Herb				3
Malvaceae	*Triumfetta annua*	Herb				3
Malvaceae	*Triumfetta macrophylla*	Shrub	20	5		
Malvaceae	*Urena lobata*	Herb	10	10		
Melastomataceae	*Dissotis rotundifolia*	Herb	8			
Melastomataceae	*Tristemma mauritianum*	Herb				7
Menispermaceae	*Cissampelos mucronata*	Climber	10	4	5	2
Menispermaceae	*Stephania abyssinica*	Climber	5			
Moraceae	*Artocarpus heterocarpus*	Tree			15	5
Moraceae	*Ficus sp.*	Tree				5
Moraceae	*Milicia excelsa*	Tree			5	
Myrtaceae	*Eucalyptus sp.*	Tree				60
Myrtaceae	*Psidium guajava*	Shrub			5	
Onagraceae	*Ludwigia abyssinica*	Herb	20	5	2	2
Orchidaceae	*Eulophia horsfallii*	Herb	2			
Phyllanthaceae	*Bridelia micrantha*	Tree	10	10	10	8
Poaceae	*Eragrostis mildbraedii*	Grass				10
Poaceae	*Imperata cylindrica*	Grass			45	
Poaceae	*Leersia hexandra*	Grass	60	40	10	45
Poaceae	*Loudetia phragmitoides*	Grass	30			25
Poaceae	*Miscanthus violaceum*	Grass	85			75
Poaceae	*Oplismenus hirtellus*	Grass				3
Poaceae	*Panicum chionachne*	Grass	10			

Family	Species	Way Point	B1	B6	B7	B16
Poaceae	*Panicum maximum*	Grass			40	
Poaceae	*Setaria sphacelata*	Grass		10		
Poaceae	*Unident 1*	Tree	10			
Polypodiaceae	*Microsorum punctatum*	Herb				2
Primulaceae	*Maesa lanceolata*	Tree	15			
Rhamnaceae	*Maesopsis eminii*	Tree			30	
Rubiaceae	*Tricalysia sp.*	Shrub	10			
Rubiaceae	*Uncaria sp.*	Shrub	3			
Sapindaceae	*Blighia unijugata*	Tree			3	
Sapindaceae	*Pseudospondias microcarpa*	Tree			15	
Solanaceae	*Solanum mauritianum*	Shrub		15		
Thelypteridaceae	*Dryopteris sp.*	Herb	25	15	10	8
Typhaceae	*Typha domingensis*	Herb	55	20		40
Ulmaceae	*Trema orientalis*	Tree		2		
Urticaceae	*Urera trinervia*	Herb	3			
Verbenaceae	*Lantana camara*	Shrub	5			
Verbenaceae	*Lantana trifolia*	Shrub	2			
Verbenaceae	*Stachytarpheta urticifolia*	Herb				8
Zingiberaceae	*Aframomum angustifolia*	Herb	40	25	5	

FAUNA – INVERTEBRATES

Table B2 Buloba - Butterflies encountered in the study area, common names, ecotypes and conservation status according to IUCN

Species	Common name	Ecotype	IUCN Conservation status
Nymphalidae			
Abisara neavei neavei		O	NA
Acraea ancedana	Pierre's acraea	S	NA
Acraea ancerata		O	LC
Acraea aurivilli	Aurivillius' Acraea	f	NA
Acraea crinalis		f	NA
Acraea eponina	Orange Acraea	W	NA
Acraea jodutta		F	NA
Acraea natalitica	Natal Acraea	W	NA
Acraea pudorina		U	NA
Acraea quirinalis		f	NA
Bicyclus buea		f	NA
Bicyclus funebris		F	NA
Bicyclus jefferyi	Jeffery's Bush Brown	f	LC
Bicyclus sandace		F	NA
Bicyclus uniformis		U	NA
Bicyclus vulgaris		W	NA
Byblia ilithyia	Joker butterfly	O	NA
Danaus chrysippus	African Queen	M	NA
Amauris niavius	Friar	W	NA
Junonia oenone		W	LC
Junonia sophia	Little Commodore	W	NA
Junonia chorimene	Brown Pansy	O	LC
Junonia terea	Soldier Commodore	W	NA
Neocoenyra gregorii		O	NA
Neptis metella		f	NA
Pseudacraea eurytis		M	NA
Pseudacraea lucretia	False Diadem	f	LC
Ypthima albida	Silver Ringlet	S	NA
Ypthima asterope	Common Three Ring	O	LC
Ypthima antenatta		S	NA
Hesperiidae			
Mylothris chloris	Common dotted border	O	LC
Mylothris rubricosta	Swampy Dotted border	S	NA
Pontia helice	Meadow white	O	NA
Tagiades flesus	Clauded skipper	f	NA

Species	Common name	Ecotype	IUCN Conservation status
Eagris nottoana nottoana	American pink	O	NA
Paeridae			
Belenois creona	African caper white	W	NA
Dixeia orbona	Creamy small white	W	NA
Eurema brigitta	Broad-bordered grass yellow	O	LC
Eurema hapale		O	NA
Lycaenidae			
Gorgyra eretina		U	NA
Pseudonacaduba sichela	African line blue	O	LC

Key:
VU- vulnerable, NT- Near threatened, LC-CD- Least Concern conservation dependant, NI- Not included on either Ugandan or IUCN red lists, DD- Data deficient, UG- Uganda, EN- Endangered
NA - Not yet assessed by IUCN
LC - Least concern

FAUNA - HERPETILES

Table B3 Buloba - Herpetiles recorded from the study, their abundance and conservation status

Way points	Species	English name	Number	Abundance	IUCN Conservation status	Habitat description
B1-B3	*Afrixalus osorio*	Angola banana frog	1	2	LC	Degraded marsh
	Hyperolius cinnamomeoventris	Cinnamon reed frog	2	4	LC	
	Hyperolius kivuensis	Kivu reed frog	4	9	LC	
	Haplobatrachus occipitalis	Common bull frog	5	11	LC	
	Mabuya striata	Striped skink	1	2	LC	
	Hyperolluys viridiflavus	Common reed frog	3	6	LC	
	Amietophrynus maculatus	Flat backed toad	1	2	LC	
	Phylothamnus semivariegatus	Spotted bush snake	1	2	LC	
	Hemisus guineensis	Marbled Snout-Burrower	1	2	LC	
	Amietophrynus regularis	African common toad	1	2	LC	
	Amnirana galamensis	Galam-white Lipped Frog	2	4	LC	
	Phylothamnus angolensis	Angola green snake	1	2	LC	
	Xenopus victorianus	Lake victoria Clawed Frog	3	6	LC	
	Ptychadena mascareniensis	Mscarean grass frog	7	15	LC	
	Phrynobatrachus natalensis	Natal puddel frog	9	19	LC	
	Ptychadena anchietae	Anchieta's ridged frog	2	4	LC	
	Mabuya maculirabris	Speckeled skink	2	4	LC	
	Kassina senegalensis	Senegal Kassina	1	2	LC	
B4-B6			47			Degraded marsh
	Hyperolius viridiflavus	Common reed frog	7	23	LC	
	Ptychadena mascareniensis	Mscarean grass frog	8	26	LC	
	Amietophrynus maculatus	Flat backed toad	1	3	LC	

Way points	Species	English name	Number	Abundance	IUCN Conservation status	Habitat description
	Hyperolius cinnamomeoventris	Cinnamon reed frog	5	16	LC	
	Haplobatrachus occipitalis	Common bull frog	3	10	LC	
	Phylothamnus angolensis	Angola green snake	1	3	LC	
	Amientia angolensis	Angola river frog	2	6	LC	
	Leptotyphlops scutifrons	Peter's worm snake	1	3	LC	
	Mabuya maculirabris	Speckeled skink	3	10	LC	
Substation			31			Fallow lands and gradens
	Mabuya maculirabris	Speckeled skink	5	26	LC	
	Amietophrynus maculatus	Flat backed toad	2	11	LC	
	Amietophrynus regularis	African common toad	1	5	LC	
	Hyperolius viridiflavus	Common reed frog	1	5	LC	
	Bitis arietans	Puff adder	1	5	LC	
	Lamprophis fuliginosus	Brown house snake	1	5	LC	
	Psammophis mossambicus	Olive sand snake	1	5	LC	
	Drysdalia coronoides	White lipped snake	1	5	LC	
	Acanthocercus atricolis	Blue headed agama	2	11	LC	
	Mabuya striata	Speckeled skink	4	21	LC	
B16-B23			19			fallow lands and Marshes
	Hyperolius cinnamomeoventris	Cinnamon reed frog	3	7	LC	
	Hyperolius kivuensis	Kivu reed frog	2	5	LC	
	Haplobatrachus occipitalis	Common bull frog	8	19	LC	
	Mabuya striata	Striped skink	3	7	LC	

Way points	Species	English name	Number	Abundance	IUCN Conservation status	Habitat description
	Hyperolius viridiflavus	Common reed frog	5	12	LC	
	Amietophrynus maculatus	Flat backed toad	2	5	LC	
	Lamprophis fuliginosus	Brown house snake	1	2	LC	
	Phylothamnus angolensis	Angola green snake	1	2	LC	
	Kassina senegalensis	Senegal Kassina	2	5	LC	
	Xenopus victorianus	Lake victoria Clawed Frog	3	7	LC	
	Ptychadena mascareniensis	Mscarean grass frog	5	12	LC	
	Phrynobatrachus natalensis	Natal puddel frog	4	9	LC	
	Ptychadena ancheate	Anchieta's ridged frog	1	2	LC	
	Mabuya maculirabris	Speckeled skink	2	5	LC	
	Drysdalia coronoides	White lipped snake	1	2	LC	
B18-B24			43			Fallow lands, marshes and eucalyptus plantation
	Hyperolius viridiflavus	Common reed frog	3	11	LC	
	Mabuya maculirabris	Speckeled skink	1	4	LC	
	Ptychadena mascareniensis	Mscarean grass frog	4	14	LC	
	Amietophrynus maculatus	Flat backed toad	1	4	LC	
	Hyperolius cinnamomeoventris	Cinnamon reed frog	5	18	LC	
	Naja melanoleuca	Forest water cobra	1	4	LC	
	Haplobatrachus occipitalis	Common bull frog	6	21	LC	
	Phylothamnus angolensis	Angola green snake	1	4	LC	
	Bitis arietans	Puff adder	1	4	LC	
	Amientia angolensis	Angola river frog	1	4	LC	

Way points	Species	English name	Number	Abundance	IUCN Conservation status	Habitat description
	Leptotyphlops scutifrons	Peter's worm snake	1	4	LC	
	Xenopus victorianus	Lake victoria Clawed Frog	3	11	LC	
B20-B22			28			Gardens and fallow lands
	Amietophrynus regularis	African common toad	2	9	LC	
	Mabuya maculirabris	Speckeled skink	3	13	LC	
	Amietophrynus maculatus	Flat backed toad	1	4	LC	
	Drysdalia coronoides	White lipped snake	1	4	LC	
	Hyperolius viridiflavus	Common reed frog	6	26	LC	
	Bitis arietans	Puff adder	1	4	LC	
	Lamprophis fuliginosus	Brown house snake	1	4	LC	
	Psammophis mossambicus	Olive sand snake	1	4	LC	
	Hemidactylus mabouia	Tropical house gecko	2	9	LC	
	Acanthocercus atricolis	Blue headed agama	3	13	LC	
	Mabuya striata	Striped skink	2	9	LC	
			23			

FAUNA – BIRDS

Table B4 Buloba - Bird species recorded from the proposed project area

Atlas Number	Species	Habitat preference	Count 1	Count 2	Count 3	Mean Score	Other bird descriptors
27	Black headed Heron *Ardea melanocephala*	W	0	6	0	2.0	RB
30	Common Squaco Heron *Ardeola ralloides*	WW	0	0	3	1.0	WV?, AfM/NB?, RB
32	Cattle Egret *Bublucus ibis*		1	4	0	1.7	RB
34	Great Egret *Casmerodius albus*	WW	0	4	0	1.3	RN?, AfM/NB? R-VU
42	Hamerkop *Scopus umbretta*	W	0	0	4	1.3	RB
43	African Open-billed Stork *Anastomus lamelligerus*	W	0	6	0	2.0	RB, AfM/NB
51	Hadada Ibis *Bostrychia hagedash*	W	2	4	0	2.0	RB
60	White-faced Whistling Duck *Dendrocygna viduata*	WW	2	0	0	0.7	RB
129	Lizard Burzard *Kaupifalco monogrammicus*	f	0	0	1	0.3	RB
130	Long crested Eagle *Lophaetus occipitalis*	f	0	0	1	0.3	RB
142	Black-shouldered Kite *Elamus caeruleus*		0	2	0	0.7	RB
190	Helmetted Guineafowl *Numidia meleagris*		0	5	4	3.0	RB
346	Ring-necked Dove *Streptopelia capicola*		0	0	6	2.0	RB
350	Red -eyed Dove *Streptopelia semitorquata*	f	6	4	0	3.3	
355	Blue-Spotted wood Dove *Turtur afer*	f	0	5	6	3.7	RB
372	Great blue Turaco *Corythaeola cristata*	F	0	0	4	1.3	RB
376	Eastern Grey Plantain-eater *Crinifer zonurus*		5	5	4	4.7	RB
388	Diederick Cuckoo *Chrysococcyx caprius*		0	0	4	1.3	RB, Afm/(B?), PM
389	African Emerald Cuckoo *Chrysococcyx cupreus*	F	0	0	5	1.7	RB?
394	Levaillant's Cuckoo *Oxylophus levaillantii*	f	0	0	3	1.0	AfM/B
399	Red-chested Cuckoo *Cuculus solitarius*	F	6	3	3	4.0	RB, Afm/NB?

Atlas Number	Species	Habitat preference	Count 1	Count 2	Count 3	Mean Score	Other bird descriptors
406	White-browed Couckal *Centropus supercilliosus*		0	0	4	1.3	RB
443	Little Swift *Apus affinis*		0	4	0	1.3	RB
459	Speckled Mousebird *Colius striatus*		6	3	0	3.0	RB
466	Malachite Kingfisher *Alcedo cristata*	WW	0	0	4	1.3	RB
472	Striped Kingfisher *Halcyon chelicuti*		6	3	0	3.0	RB
475	Woodland Kingfisher *Halcyon senegalensis*		6	0	5	3.7	PM, RB
478	African Pygmy Kingfisher *Ispidina lecontei*	fW	4	0	0	1.3	RB, AfM/NB
500	Broad billed roller *Eurystomus glaucurus*	fW	6	0	0	2.0	RB, AfM/NB
502	Hoopoe *Upupa epos*		0	5	0	1.7	AFIM/NB, WV,FB
534	Double-toothed Barbet *Lybiusbidentatus*	f	0	2	2	1.3	RB
548	Yellow-rumped Tinker bird *Pogoniulus bilineatus*	F	0	0	2	0.7	RB
639	White-headed Saw-wing *Psalidoprocne albiceps*	f	0	2	0	0.7	R-RR
681	Arrow-marked Barbbler *Turdoides jardineii*		0	0	3	1.0	RB
732	Common Bulbul *Pycnonotus barbatus*	f	6	6	6	6.0	RB
801	African Thrush *Turdus pelios*	f	0	6	6	4.0	RB
837	Grey backed Cameroptera *Camaroptera brachyura*	f	0	2	4	2.0	RB
854	Rattling Cisiticola *Cisiticola chiniana*		0	4	6	3.3	
863	Winding Cisiticola *Cisiticola galactotes*	W	6	6	0	4.0	RB
866	Croaking Cisiticola *Cisiticola natalensis*		6	0	0	2.0	RB
869	Stout Cisiticola *Cisticola robustus*		0	4	0	1.3	RB
889	Green Hylia *Hylia prasina*	F	6	0	0	2.0	RB
934	Northern Black Flycatcher *Melaenornis edoliodes*		0	2	6	2.7	RB
960	Brown-throated Wattle-eye *Platysteira cyanea*	f	0	0	6	2.0	RB
988	Yellow-throated Longclaw *Macronyx croceus*		0	5	3	2.7	RB
1004	Tropical Boubou *Laniarius aethiopicus*	f	5	0	0	1.7	RB

Atlas Number	Species	Habitat preference	Count 1	Count 2	Count 3	Mean Score	Other bird descriptors
1025	Black crowned Tchagra *Tchagra senegala*		0	5	0	1.7	RB
1029	Common Fiscal *Lanius collaris*		0	4	0	1.3	RB
1056	Lesser Blue-eared Starling *Lamprotornis chalybaeus*		6	0	0	2.0	RB
1122	Scarlet chested Sunbird *Chalcomitra senegalensis*	f	6	0	6	4.0	RB
1133	Yellow White-eye *Zosterops senegalensis*	f	0	3	0	1.0	RB
1140	Fan tailed Widowbird *Euplectes axillaris*	W	6	6	4	5.3	RB
1165	Black-headed Weaver *Ploceus cucullatus*		0	0	6	2.0	RB
1206	Grey-headed Sparrow *Passer griseus*		1	0	0	0.3	RB
1216	Pin-tailed Whydah *Vidua macroura*		0	6	0	2.0	RB
1226	Common Waxbill *Estrilda astrild*	W	0	5	0	1.7	RB
1239	African Firefinch *Lagonosticta rubricata*		0	0	1	0.3	RB
1265	Black-and-white Mannikin *Lonchura bicolor*	f	6	0	5	3.7	RB
1266	Bronze Mannikin *Lonchura cucullata*		6	0	5	3.7	RB
1283	African Citril *Serinus citrinelloides*	f	0	2	4	2.0	RB

Table B5 The more common species of birds recorded in the project area

Atlas Number	Species	Habitat preference	Mean Score
190	Helmetted Guineafowl *Numidia meleagris*		3.0
350	Red -eyed Dove *Streptopelia semitorquata*	f	3.3
355	Blue-Spotted wood Dove *Turtur afer*	f	3.7
376	Eastern Grey Plantain-eater *Crinifer zonurus*		4.7
399	Red-chested Cuckoo *Cuculus solitarius*	F	4.0
459	Speckled Mousebird *Colius striatus*		3.0
472	Striped Kingfisher *Halcyon chelicuti*		3.0
475	Woodland Kingfisher *Halcyon senegalensis*		3.7
732	Common Bulbul *Pycnonotus barbatus*	f	6.0
801	African Thrush *Turdus pelios*	f	4.0
854	Rattling Cisiticola *Cisiticola chiniana*		3.3
863	Winding Cisiticola *Cisiticola galactotes*	W	4.0
1122	Scarlet chested Sunbird *Chalcomitra senegalensis*	f	4.0
1140	Fan tailed Widowbird *Euplectes axillaris*	W	5.3
1265	Black-and-white Mannikin *Lonchura bicolor*	f	3.7
1266	Bronze Mannikin *Lonchura cucullata*		3.7

PROPOSED MUKONO COMPONENT

VEGETATION

Table M1 Mukono - Plant Checklist and their abundance

MUKONO		Way Point	M2	M8	M9	M10	1413	M1	1415	1414	M19	M20	M21	M22	M27	M54	M52	M51	M48	M49	M45	1419	M40	M41	M37	M35	38	M36	M34	M32	1421	IUCN conservation status
Family	Species	Life form	Percentage Cover (%)																													
Fabaceae (Papilionoideae)	*Abrus* sp.	Climber																												2		N/A
Euphorbiaceae	*Acalypha bipartita*	Shrub	10															3														NA
Euphorbiaceae	*Acalypha neptunica*	Shrub																												3		NA
Euphorbiaceae	*Acalypha ornata*	Herb													35	3	15	15	65										15		15	NA
Acanthaceae	*Acanthus polystachius*	Shrub	5							10				15			8															NA
Passifloraceae	*Adenia cissampeloides*	Climber								6																						NA
Passifloraceae	*Adenia rumicifolia*	Climber													1																	NA
Zingiberaceae	*Aframomum angustifolium*	Herb											15			5																NA
Asteraceae	*Ageratum conyzoides*	Herb																					30									NA
Fabaceae (Mimosoideae)	*Albizia grandibracteata*	Tree	10				5			5				7		10			10													NA
Euphorbiaceae	*Alchornea cordifolia*	Tree										3		25		65	30		15	75		2	5									NA
Apocynaceae	*Alstonia boonei*	Tree												8																		NA
Annonaceae	Unident 2	Tree																								5						N/A
Loganiaceae	*Anthocleista schweinfurthii*	Tree												5																		NA
Moraceae	*Antiaris toxicaria*	Tree																											2	2		NA
Moraceae	*Artocarpus heterophyllus*	Tree	8	7										7																		NA
Asteraceae	*Aspilia africana*	Herb																														NA
Aspleniaceae	*Asplenium* sp.	Herb																45														N/A
Acanthaceae	*Asystasia gangetica*	Herb	2														3															NA
Asteraceae	*Bidens pilosa*	Herb						40																								NA
Sapindaceae	*Blighia unijugata*	Tree								15				3														3				NA
Phyllanthaceae	*Bridelia micrantha*	Tree								5						3	9	8		20												NA
Acanthaceae	*Brillantaisia* sp.	Herb																			45						45	20				N/A
Malvaceae	Broussonetia papyrifera	Tree	10									2							25							10		40	35	20	8	NA
Achariaceae	*Caloncoba crepiniana*	Tree								6																						NA
Fabaceae (Caesalpinioideae)	*Caesalpinia volkensii*	Shrub														5																NA
Burseraceae	*Canarium schweinfurthii*	Tree	10			5				5																						NA
Apocynaceae	*Carissa spinarum*	Shrub																														NA
Ulmaceae	*Celtis adolfi-friedericii*	Tree																								6						NA
Ulmaceae	*Celtis africana*	Tree																												2		NA
	Centella asiatica	Herb						10			10																					LC
Ulmaceae	*Chaetacme aristata*	Tree																												3		NA
Menispermaceae	*Cissampelos mucronata*	Climber																														NA
	?Cleistopholis		N/A							6																						N/A
Rutaceae	*Clausena anisata*	Tree															3											2				NA
Rubiaceae	*Coffea* sp.	Tree	5	15																												N/A

MUKONO		Way Point	M2	M8	M9	M10	1413	M1	1415	1414	M19	M20	M21	M22	M27	M54	M52	M51	M48	M49	M45	1419	M40	M41	M37	M35	38	M36	M34	M32	1421	IUCN conservation status
Family	Species	Life form	Percentage Cover (%)																													
Commelinaceae	*Commelina* sp.	Herb															10															N/A
Asteraceae	*Conyza floribunda*	Herb		10																												NA
Boraginaceae	*Cordia africana*	Tree								10	20																					NA
Costaceae	*Costus* sp.	Herb												3		25																N/A
Asteraceae	*Crassocephalum vitellinum*	Herb											10									9										NA
Poaceae	*Cynodon dactylon*	Grass						35																								NA
Cyperaceae	*Cyperus cyperoides*	Herb					2					8																				N/A
Cyperaceae	*Cyperus denudatus*	Herb																														NA
Cyperaceae	*Cyperus difformis*	Herb							8				8									10										LC
Cyperaceae	*Cyperus distans*	Herb							8																							LC
Cyperaceae	*Cyperus dives*	Herb							2				8		10																	NA
Cyperaceae	*Cyperus dubius*	Herb																				30			3							LC
Cyperaceae	*Cyperus papyrus*	Herb														40																LC
Cyperaceae	*Cyperus sp. 1*	Herb																														N/A
Vitaceae	*Cyphostemma adenocaule*	Climber										7																				NA
Fabaceae (Papilionoideae)	*Demodium adscendens*	Herb					40				50							30								70		35				NA
Fabaceae (Papilionoideae)	*Desmodium canum*	Climber											1																			NA
Fabaceae (Papilionoideae)	*Desmodium salicifolium*	Herb											3																			LC
Fabaceae (Papilionoideae)	*Desmodium tortuosum*	Herb			10																											NA
Fabaceae (Papilionoideae)	*Desmodium uncinatum*	Herb																								20					10	NA
Poaceae	*Digitaria abyssinica*	Grass						30																								NA
Poaceae	*Digitaria longiflora*	Grass						5																								NA
Melastomataceae	*Dissotis rotundifolia*	Herb																3		3		2	6									NA
Dracaenaceae	*Dracaena fragrans*	Shrub		2																											1	NA
Dracaenaceae	*Dracaena steudneri*	Tree		5																												NA
Thelypteridaceae	*Dryopteris* sp.	Herb																														N/A
Acanthaceae	*Dyschoriste radicans*	Herb					10												4													NA
Poaceae	*Eragrostis mildbraedii*	Grass																														NA
Poaceae	*Eragrostis exasperata*	Grass													5																	NA
Fabaceae (Papilionoideae)	*Erythrina abyssinica*	Tree	4							5																						NA
Asteraceae	*Ethulia conyzoides*	Herb							5																							LC
Myrtaceae	*Eucalyptus* sp.	Tree					90				90					9							95	75	60							N/A
Orchidaceae	*Eulophia horsfallii*	Herb																														NA
Euphorbiaceae	*Euphorbia heterophylla*	Herb						15																	90							NA
Euphorbiaceae	*Euphorbia tirucalli*	Tree																														LC
Moraceae	*Ficus asperifolia*	Shrub	2																3							2				7		NA
Moraceae	*Ficus elastica*	Tree	10	5																												NA
Moraceae	*Ficus exasperata*	Tree																													3	NA
Moraceae	*Ficus natalensis*	Tree	15													3																NA
Moraceae	*Ficus vallis-choudae*	Tree	8																										2		5	NA
Moraceae	*Ficus* sp.	Tree	4							5									8									20				N/A

MUKONO		Way Point	M2	M8	M9	M10	1413	M1	1415	1414	M19	M20	M21	M22	M27	M54	M52	M51	M48	M49	M45	1419	M40	M41	M37	M35	38	M36	M34	M32	1421	IUCN conservation status
Family	Species	Life form	Percentage Cover (%)																													
Moraceae	*Ficus* sp.	Tree								15																10						N/A
Phyllanthaceae	*Flueggea virosa*	Shrub					2												3													NA
Cyperaceae	*Fuirena umbellata*	Herb							15				4									5										LC
Apocynaceae	*Funtumia africana*	Tree												5																		NA
Amaryllidaceae	*Gloriosa superba*	Herb									1																					LC
Malvaceae	*Glyphaea brevis*	Shrub															5									2						NA
Proteaceae	*Grevillea robusta*	Tree	5																													NA
Clusiaceae	*Harungana madagascariensis*	Tree									5			3			3	5	8													NA
Asteraceae	*Helichrysum forskahlii*	Herb																														NA
Malvaceae	*Hibiscus calyphyllus*	Shrub	15														5		3		15						15			15		NA
Malvaceae	*Hibiscus fuscus*	Herb																														NA
Malvaceae	*Hibiscus* sp.	Herb											5			5																N/A
Malvaceae	*Hibiscus surattensis*	Herb									10		5				2					1										NA
Lamiaceae	*Hoslundia opposita*	Shrub																														NA
Lamiaceae	*Hyptis baumii*	Herb																														NA
Poaceae	*Imperata cylindrica*	Grass			20			15																								NA
Fabaceae (Papilionoideae)	*Indigofera arrecta*	Herb																														NA
Convolvulaceae	*Ipomoea batatus*	Herb				8	6																		15							NA
Convolvulaceae	*Ipomoea cairica*	Climber														4																NA
Fabaceae (Mimosoideae)	*Jacaranda mimosifolia*	Tree												8																		VU B1+2ac
Acanthaceae	*Justicia flava*	Herb															7															NA
Acanthaceae	*Justicia* sp.	Herb															2															N/A
Bignoniaceae	*Kigelia africana*	Tree												5																		NA
Fabaceae (Papilionoideae)	*Kotschya africana*	Shrub																														NA
Cyperaceae	*Kyllinga elatior*	Herb																					25									NA
Verbenaceae	*Lantana camara*	Shrub					2																								2	NA
Verbenaceae	*Lantana trifolia*	Shrub					2			1																						NA
Leeaceae	*Leea guinensee*	Herb														3																NA
Poaceae	*Leersia hexandra*	Grass							10	15			70		90	25	30					50										NA
Lamiaceae	*Leonotis nepetifolia*	Herb																							2							NA
Convolvulaceae	*Lepistemon owariensis*	Climber										2	2		8	4	15						20	8	15							NA
Malvaceae	*Leptonychia* sp.	Tree																												2		N/A
Cyperaceae	*Lipocarpha chinensis*	Herb																														LC
Loranthaceae	*Loranthus* sp.	Shrub	2																													N/A
Poaceae	*Loudetia phragmitoides*	Grass																														NA
Onagraceae	*Ludwigia abyssinica*	Herb							2														9									NA
Euphorbiaceae	*Macaranga schweinfurthii*	Tree							3				35	25																		NA
Primulaceae	*Maesa lanceolata*	Tree								4	3						8	3	5	10				3								NA
Rhamnaceae	*Maesopsis eminii*	Tree	25			5	8			30				30					2													NA
Anacardiaceae	*Mangifera indica*	Tree		15		5																										DD
Euphorbiaceae	*Manihot esculenta*	Shrub		10	35			45																								NA

MUKONO		Way Point	M2	M8	M9	M10	1413	M1	1415	1414	M19	M20	M21	M22	M27	M54	M52	M51	M48	M49	M45	1419	M40	M41	M37	M35	38	M36	M34	M32	1421	IUCN conservation status
Family	Species	Life form	Percentage Cover (%)																													
Marantaceae	*Marantochloa purpurea*	*Herb*	20							10						20	10															NA
Euphorbiaceae	*Margaritaria discoidea*	*Tree*								3																						NA
Bignoniaceae	*Markhamia lutea*	*Tree*	25							15				5																		NA
Malvaceae	*Melochia mollis*	*Herb*																														NA
Convolvulaceae	*Merremia pterygocaulis*	*Climber*																		4												NA
Asteraceae	*Microglossa pyrifolia*	*Shrub*																														NA
Polypodiaceae	*Microsorum punctatum*	*Herb*														2																NA
Moraceae	*Milicia excelsa*	*Tree*										15		8																		NT
Fabaceae (Mimosoideae)	*Mimosa pigra*	*Shrub*														8																NA
Fabaceae (Mimosoideae)	*Mimosa pudica*	*Herb*			3			6																								LC
Poaceae	*Miscanthus violaceum*	*Grass*																														NA
Cucurbitaceae	*Momordica foetida*	*Climber*																														NA
Annonaceae	*Monodora myristica*	*Tree*																										3			5	NA
Moraceae	Unident 3	Tree												5																		N/A
Cucurbitaceae	*Mukia maderaspatana*	Climber							1				2												2							NA
Musaceae	*Musa* sp.	Herb				6																										N/A
Cecropiaceae	*Myrianthus holstii*	Tree												5							7					5	7		3			NA
Poaceae	*Olyra latifolia*	Grass																											3		4	NA
Poaceae	*Oplismenus hirtellus*	Grass																										6		4	3	NA
Oxalidaceae	*Oxalis latifolia*	Herb										15																				NA
Commelinaceae	*Pallisota schweinfurthii*	Herb																											2			NA
Poaceae	*Panicum brevifolium*	Grass																8														NA
Poaceae	*Panicum chionachne*	Grass													4	8	10		4					90								NA
Poaceae	*Panicum maximum*	Grass			50			40								10		15					15		5							NA
Poaceae	*Paspalum scrobiculatum*	Grass	20								10			40																		LC
Sapindaceae	*Paullinia pinnata*	Climber																														NA
Poaceae	*Pennisetum purpureum*	Grass														5																NA
Lauraceae	*Persea americana*	Tree		10																												NA
Polygonaceae	*Persicaria setosula*	Herb											3		8																	NA
Arecaeae	*Phoenix reclinata*	Tree							3	5			40	20		10	35		5	50	15			7			15			2		NA
Polypodiaceae	*Phymatosorus scolopendria*	Herb														8																NA
Solanaceae	*Physalis peruviana*	Herb										1																				NA
Pinaceae	*Pinus* sp.	Tree										100						90			70				55	95	70					N/A
Piperaceae	*Piper umbellata*	Herb																								2		25	10		20	NA
Fabaceae (Mimosoideae)	*Piptadeniastrum africanum*	Tree																			5						5					NA
Lamiaceae	*Platostoma rotundifolium*	Herb																														NA
Araliaceae	*Polyscias fulva*	Tree												5																		NA
Commelinaceae	*Polysphaeria* sp.	Herb													5																	N/A
Fabaceae (Papilionoideae)	*Pseudathria hookeri*	Herb																														NA
Poaceae	*Pseudechinolaena polystachya*	Grass														10																NA

MUKONO		Way Point Life form	M2	M8	M9	M10	M13	M1	M15	M14	M19	M20	M21	M22	M27	M54	M52	M51	M48	M49	M45	M19	M40	M41	M37	M35	38	M36	M34	M32	M21	IUCN conservation status
Family	Species		Percentage Cover (%)																													
Meliaceae	*Pseudocedrella* sp.	Tree																			45					35	45	70	55	45	40	N/A
Sapindaceae	*Pseudospondias microcarpa*	Tree	2							35	8			25		45	10			10		5		3			5					N/A
Myrtaceae	*Psidium guajava*	Shrub						10			6	15		10																		N/A
Cyperaceae	*Pycnora nitidus*	Herb								15			25											15								N/A
Arecaae	*Raphia farinifera*	Tree																														N/A
Zingiberaceae	*Renealmia congolana*	Herb																			25					25		25	25	15		N/A
Euphorbiaceae	*Ricinus communis*	Shrub			2																											N/A
Rubiaceae	*Rothmannia urcelliformis*	Tree																									2					N/A
Rosaceae	*Rubus* sp.	Shrub																	3													N/A
Polygonaceae	*Rumex abyssinica*	Herb												3																		N/A
Rubiaceae	*Rytigynia* sp.	Shrub																			2					2						N/A
Abeyzmaceae	*Sacamone africana*	Climber																	5													N/A
Fabaceae (Caesalpinioideae)	*Senna hirsuta*	Shrub			1			15	5					8															5		5	N/A
Fabaceae	*Senna spectabilis*	Tree	15					2																					2			LC
Fabaceae	*Sesbania sesban*	Shrub								2			2			3	10															N/A
Poaceae	*Setaria pusilla*	Grass							5																							N/A
Poaceae	*Setaria sphacelata*	Grass			2																											N/A
Poaceae	*Setaria* sp.	Grass																														N/A
Euphorbiaceae	*Shirakiopsis elliptica*	Tree	30													6					8											N/A
Malvaceae	*Sida rhombifolia*	Herb			6			20															1	10							6	N/A
Poaceae	*Sinapundinaria alpina*	Grass															5															N/A
Smilacaceae	*Smilax* sp.	Climber																												2	2	N/A
Solanaceae	*Solanum mauritianum*	Shrub																											2			N/A
Poaceae	*Sorghum arundinaceum*	Grass			5			15						70										10								N/A
Bignoniaceae	*Spathodea campanulata*	Tree	30			2	8			20				6		3		10					5									N/A
Verbenaceae	*Stachytarpheta orthostila*	Herb						10																								N/A
Menispermaceae	*Stephania abyssinica*	Climber															3															N/A
Asteraceae	*Synedrella nodiflora*	Herb																						8								N/A
Myrtaceae	*Syzygium* sp.	Tree								5																						N/A
Abeyzmaceae	*Tabernaemontana* sp.	Tree								8			6																5	15		N/A
Lamiaceae	*Tectona grandis*	Tree		5																												N/A
Combretaceae	*Terminalia superba*	Tree												65	3		20	5			40					30	40	70		40	20	N/A
Apocynaceae	*Thevetia peruviana*	Shrub	3																													N/A
Ulmaceae	*Trema orientalis*	Tree								5	3																					N/A
Rubiaceae	*Tricalysia* sp.	Shrub																														N/A
Meliaceae	*Trichilia dregeana*	Tree	10											3							8					8						N/A
Moraceae	*Trilepsium madagascariensis*	Tree																											4	5	5	N/A
Melastomataceae	*Tristemma mauritianum*	Herb											6									15	15									N/A
Malvaceae	*Triumfetta annua*	Herb	15																		45											N/A
Malvaceae	*Triumfetta macrophylla*	Shrub																														N/A

MUKONO		Way Point Life form	M2	M8	M9	M10	M13	M1	M15	M14	M19	M20	M21	M22	M27	M54	M52	M51	M48	M49	M45	M19	M40	M41	M37	M35	38	M36	M34	M32	M21	IUCN conservation status
Family	Species		Percentage Cover (%)																													
Typhaceae	*Typha domingensis*	Herb								8																						N/A
Rubiaceae	*Uncaria* sp.	Shrub																														N/A
Pinaceae	Unident.1	Tree																														N/A
Malvaceae	*Urena lobata*	Herb	10			15			25			10		8	10									2								N/A
Urticaceae	*Urera hiniensis*	Herb									6			3		3												2				N/A
Rubiaceae	*Vangueria apiculata*	Tree													4																	N/A
Rubiaceae	*Vepris nitidula*	Tree												2																	10	N/A
Asteraceae	*Vernonia amygdalina*	Shrub														3												5				N/A
Asteraceae	*Vernonia auriculifera*	Shrub						5																								N/A
Acanthaceae	*Whitfieldia elongata*	Shrub	2																													N/A

FAUNA – INVERTEBRATES

Table M2 Mukono - Butterflies encountered in the study area, common names, ecotypes and conservation status according to IUCN

Species	Common name	Ecotype	IUCN Conservation status	Location
PAPILIONIDAE				
Papilioninae				
Papilio dardanus	Mocker Swallowtail	W	VU (sub sp)	C
Papilio demodocus	Citrus Swallowtail	M	NT	B
Papilio ophidicephalus	Emperor Swallowtail	F	LC CD	F
PIERIDAE				
Coliadinae				
Catopsilia florella	African Emigrant	M	NI	F
Eurema hecabe	Common Grass Yellow	M	LC	C
Eurema desjardinsi	Angled Grass Yellow	U	LC	B
Eurema senegalensis	Forest Grass Yellow	F	NI	C
Pierinae				
Nepheronia argia	Large Vagrant	F	LC	F
Nepheronia thalassina	Cambridge Vagrant	f	LC	B
Dixeia charina	African Small White	O	NI	F
Dixeia spilleri	Spiller's Yellow	F	NI	B
Leptosia nupta	Immaculate Wood White	F	LC CD	C
Mylothris continua		F	LC	C
Mylothris schumanni		F	LC	C
LYCAENIDAE				
Lipteninae				
Pentila pauli	Spotted Pentila	f	LC	F
Pentila tachyroides	Mylothrid Pentila	F	LC	F
Theclinae				
Deudorix antalus	Brown Playboy	W	LC	F
Polyommatinae				
Cacyreus lingeus	Common Bush Blue	W	LC	C
Lampides boeticus	Pea Blue	M	NI	F
NYMPHALIDAE				
Danainae				
Amauris hecate	Dusky Danaid	F	NI	B
Amauris niavius	Friar	W	NI	B
Danaus chrysippus	African Queen	M	NI	B
Tirumala formosa	Beautiful Tiger	f	NI	F
Satyrinae				
Bicyclus buea		f	NI	B
Bicyclus golo		F	NI	B
Bicyclus mollitia		F	NI	B
Bicyclus safitza	Common Bush Brown	W	NI	B

Species	Common name	Ecotype	IUCN Conservation status	Location
Bicyclus sandace		F	NI	B
Bicyclus vulgaris		W	NI	B
Melanitis leda	Common Evening Brown	W	NI	F
Neocoenyra gregorii		O	NI	B
Ypthima albida	Silver Ringlet	f	NI	C
Ypthima asterope	Common Three Ring	O	LC	B
Ypthima baldus	Common Fivering	U	NI	B
Ypthimomorpha itonia	Swamp ringlet	S	NI	F
Charaxinae				
Charaxes etheocles	Demon Charaxes	F	LC	C
Charaxes numenes		f	NI	F
Charaxes varanes	Pearl Charaxes	W	NI	F
Euxanthe crossleyi	Crossley's Forest Queen	F	NI	B
Nymphalinae				
Ariadne albifascia		U	DD in UG	C
Ariadne enotrea	African Castor	F	NI	B
Aterica galena	Forest Glade Nymph	F	NI	F
Bebearia chriemhilda		F	NI	F
Bebearia cocalia	Spectre	f	NI	F
Bebearia dealbata		F	VU	F
Byblia anvatara	African Castor	F	NI	F
Cyrestris camillus	African Map Butterfly	F	NI	C
Euphaedra medon	Common Forester	F	NI	F
Euphaedra rex	King Forester	F	VU in UG	F
Euphaedra preussi		F	NI	F
Eurephene ribensis		F	NI	B
Eurytela dryope	Golden Piper	W	NI	C
Hypolimnas misippus	Diadem	M	NI	B
Junonia chorimene	Golden Pansy	O	LC	B
Junonia oenone	Dark Blue Pansy	W	LC	B
Junonia sophia	Little Commodore	W	NI	B
Junonia styga	Brown Pansy	f	NI	B
Junonia terea	Soldier Commodore	W	NI	B
Neptidopsis ophione	Scalloped Sailer	f	NI	F
Neptis melicerta	Streaked Sailer	F	LC	B
Neptis saclava	Small Spotted Sailer	W	NI	B
Neptis serena	River Sailor	O	NI	B
Neptis trigonophora		F	VU in UG	F
Phalanta eurytis	African Leopard Fritillary	M	NI	F
Precis archesia	Garden Inspector	O	NI	F
Pseudoneptis bougandensis	Blue Sailer	F	NI	F
Acraeinae				
Acraea acerata	Falls Acraea	O	NI	B
Acraea ancedana	Pierre's acraea	S	NI	B

Species	Common name	Ecotype	IUCN Conservation status	Location
Acraea alicia		W	NI	C
Acraea elgonense		U	NI	F
Acraea eponina	Orange Acraea	W	NI	B
Acraea lycoa		F	NI	B
Acraea uvui	Tiny Acraea	f	NI	C
Libytheinae				
Abisara neavei	Neave's Jude	F	NI	B
HESPERIIDAE				
Coeliadinae				
Coeliades forestan	Striped Policeman	W	NI	F
Hesperiinae				
Acleros mackenii	Macken's Skipper	F	NI	F
Borbo fatuellus	Long Horned Swift	W	NI	C
Caenides dacena		F	EN in UG	B
Ceratrichia mabirensis		F	NI	B
Metisella midas	Golden Sylph	S	NI	B
Parnara naso	Water Watchman	W	NI	C
Pardaleodes incerta		F	NI	C

Key to conservation status:
***VU**- vulnerable, **NT**- Near threatened, **LC-CD**- Least Concern conservation dependant, **NI**- Not included on either Ugandan or IUCN red lists, **DD**- Data deficient, **UG**- Uganda, **EN**- Endangered*
Key to location
***C**- Recorded outside the forest reserve, **F**- Recorded inside the forest reserve, **B**- Recorded from both locations*

Key:
***F**-Forest, **W**- Wide spread, **S**- Swamp, **O**- Open habitats and **U**- Unknown habitat*

FAUNA – BIRDS
Table M4 Mukono - Bird species recorded from the proposed project area

Atlas number	Species	Conservation status	habitat	Number of points at which species was recorded
18	Greater Cormorant		WW	1
27	Black headed heron		W	3
32	Cattle Egret			1
42	Hammerkop		W	2
43	African open-billed Stork		W	2
51	Hadada ibis		W	2
96	Harrier Hawk		f	1
102	Shikra		f	1
129	Lizzard Buzzard		f	5
130	Long Crested eagle		f	2
138	Black Kite			2
142	Black shouldered kite			2
147	Grey Kestrel			2
190	Helmeted Guineafowl			1
194	Grey Crowned Crane	G-EN, R-NT	WW	1
346	Ring-necked Dove		f	3
355	Blue-spotted Wood Dove		f	13
358	African Green Pigeon		F	2
367	Brown Parrot			1
371	Grey Parrot	G-VU, R_NT	FF	1
372	Great Blue Turraco		F	2
376	Eastern Grey Plantain-Eater			4
384	Common Wattle eye			4
388	Diedrick's Cuckoo			3
391	Klaa's Cuckoo		f	3
397	African Cuckoo			1
399	Red-chested cuckoo		F	1
406	White Browed Coucal			1
443	Little swift			1
459	Speckled Mousebird			5
472	Stripped Kingfisher			2
475	Woodland kingfisher			4
478	African Pygmy Kingfisher		fW	2
491	Little bee eater			2
513	Black & White casqued Hornbill		F	2
515	Crowned hornbill		f	1
534	Double toothed barbet		f	2
539	Spot flanked barbet	R-RR		1
585	Cardinal Woodpecker			1

Atlas number	Species	Conservation status	habitat	Number of points at which species was recorded
612	Rufous-napped Lark			1
637	Wire tailed swallow		W	2
639	White-headed saw-wing	R-RR	f	2
701	Yellow-whiskered Greenbul		F	3
705	Little Greenbul		F	2
716	Western Nicator		F	1
732	Common Bulbul		f	13
751	White browed Robinchat		f	3
771	Sooty chat			1
783	Whinchat			1
789	Forest Robin		FF	1
801	African Thrush		f	3
837	Grey-backed Camaroptera		f	12
857	Red faced cisticola		W	1
860	Winding Cisticola		W	6
864	Whistling Cisticola			4
869	Stout Cisticola			2
875	Grey-capped Warbler	R-RR	fWW	1
889	Green Hylia		F	3
911	White Chinned Prinia		F	3
934	Northern Black Flycatcher			4
937	Swamp flycatcher		WW	1
938	Ashy Flycatcher		F	2
955	Black & white Shrike-flycatcher		f	5
961	Black Throated Wattle eye		F	1
963	African Blue Flycatcher		f	4
968	African Paradise Fly catcher		f	1
988	Yellow throated longclaw			1
1004	Tropical Boubou		f	3
1022	Brown-crowned Tchagra			1
1060	Ruppell's long-tailed Starling			1
1080	Collared Sunbird			2
1096	Copper Sunbird		fW	2
1103	Bronze Sunbird		f	3
1107	Marico Sunbird			1
1112	Olive sunbird		FF	6
1120	Green Headed Sunbird		F	1
1122	Scarlet-chested Sunbird		f	7
1128	Variable Sunbird		f	4
1133	Yellow White-eye		f	3
1140	Fan-tailed widowbird		W	9
1159	Baglafecht Weaver		f	1

Atlas number	Species	Conservation status	habitat	Number of points at which species was recorded
1165	Black-headed Weaver			2
1170	Lesser Masked weaver			8
1173	Yellow backed weaver		WW	3
1175	Vieillot's Black Weaver		f	5
1206	Grey Headed Sparrow			3
1211	Village Indigobird			2
1216	Pin tailed Whydah			2
1230	Black -crowned waxbill		f	6
1239	African fire finch			4
1241	Red billed firefinch			1
1259	Red headed Bluebill		F	1
1261	Red-cheeked Cordon-bleu			1
1265	Black & white mannikin		f	3
1266	Bronze Mannikin			12
1280	Yellow rumped Seedeater			1
1283	African Citril		f	2
1290	Yellow Fronted Canary			5
1292	Streaky seed eater			1

APPENDIX 3 RESULTS OF WATER ANALYSIS FROM NWSC

PROPOSED BULOBA COMPONENT

NATIONAL WATER AND SEWERAGE CORPORATION
CENTRAL LABORATORY - BUGOLOBI
P.O.BOX 7053 KAMPALA
E-mail: waterquality@nwsc.co.ug
CERTIFICATE OF ANALYSIS

CLIENT: AIR WATER EARTH
Address : P.O.Box 22428
Tel: 0772496451
Email: h.kalibbala@awe-engineers.com
Date Sample Received: 13-April-2016

Ref No: LS090/INV/2016/392
Sampled by: Client
Type of container: Plastic
Sample Source: Borehole Water
Date of Report: 19-April-2016

Table of Analytical Results

Parameters	Units	Buloba station one	National Standard for potable water. (Un treated water)
WS Sample Nr	--	K2189/16/C	
pH	--	5.7	6.5-8.5
Total Dissolved Solids (TDS)	mg/L	59	1200
Total Suspended Solids (TSS)	mg/L	60	0
Total Nitrogen (TN)	mg/L	0.9	20.0
Total Phosphorous (TP)	mg/L	0.1	10.0
Chemical Oxygen Demand (COD)	mg/L	14	Not specified
Fat,Oil & Grease (FOG)	mg/L	0.8	Not specified

Remarks:
With the exception of pH and TSS the sample showed complying physicochemical characteristics with the National Standards for untreated potable water.
ANALYSED BY: Robinah Muhairwe

AUTHORISED BY: .....**MANAGER, Central Laboratory Services**

APPROVED BY: .....**SENIOR MANAGER, Water Quality Management Department**
NB: The NWSC certificate of analysis by no means constitutes a permit to any person or company undertaking to conduct business

NATIONAL WATER AND SEWERAGE CORPORATION
CENTRAL LABORATORY - BUGOLOBI
P.O.BOX 7053 KAMPALA
E-mail: waterquality@nwsc.co.ug
CERTIFICATE OF ANALYSIS

CLIENT: AIR WATER EARTH
Address : P.O.Box 22428
Tel: 0772496451
Email: h.kalibbala@awe-engineers.com
Date Sample Received: 13-April-2016

Ref No: LS090/INV/2016/392
Sampled by: Client
Type of container: Plastic
Sample Source: Raw Water
Date of Report: 19-April-2016

Table of Analytical Results

Parameters	Units	Buloba station 2 (Wetland)	National Standard for potable water. (Un treated water)
WS Sample Nr	--	K2191/16/C	
pH	--	6.5	6.5-8.5
Total Dissolved Solids (TDS)	mg/L	89	1200
Total Nitrogen (TN)	mg/L	1.3	20.0
Total Phosphorous (TP)	mg/L	0.2	10.0
Total Suspended Solids (TSS)	mg/L	13	0
Chemical Oxygen Demand (COD)	mg/L	13	Not specified
Fat,Oil & Grease (FOG))	mg/L	0.3	Not specified

Remarks:
With the exception of TSS the sample showed complying physicochemical characteristics with the National Standards for untreated potable water.
ANALYSED BY: Robinah Muhairwe

AUTHORISED BY: .....**MANAGER, Central Laboratory Services**

APPROVED BY: .....**SENIOR MANAGER, Water Quality Management Department**
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NATIONAL WATER AND SEWERAGE CORPORATION
CENTRAL LABORATORY - BUGOLOBI
P.O.BOX 7053 KAMPALA
E-mail: waterquality@nwsc.co.ug
CERTIFICATE OF ANALYSIS

CLIENT: AIR WATER EARTH
Address : P.O.Box 22428
Tel: 0772496451
Email: h.kalibbala@awe-engineers.com
Date Sample Received: 13-April-2016

Ref No: LS090/INV/2016/392
Sampled by: Client
Type of container: Plastic
Sample Source: Unprotected Spring
Date of Report: 19-April-2016

Table of Analytical Results

Parameters	Units	Buloba Station 3	National Standard for potable water. (Un treated water)
WS Sample Nr	--	K2190/16/C	
pH	--	5.5	6.5-8.5
Total Dissolved Solids (TDS)	mg/L	18	1200
Total Nitrogen (TN)	mg/L	1.2	20.0
Total Phosphorous (TP)	mg/L	0.2	10.0
Total Suspended Solids (TSS)	mg/L	10	0
Chemical Oxygen Demand (COD)	mg/L	18	Not specified
Fat,Oil & Grease (FOG)	mg/L	5.3	Not specified

Remarks:
With the exception of pH and TSS the sample showed complying physicochemical characteristics with the National Standards for untreated potable water.
ANALYSED BY: Robinah Muhairwe

AUTHORISED BY: .....**MANAGER, Central Laboratory Services**

APPROVED BY: .....**SENIOR MANAGER, Water Quality Management Department**
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PROPOSED MUKONO COMPONENT

NATIONAL WATER AND SEWERAGE CORPORATION
CENTRAL LABORATORY - BUGOLOBI
P.O.BOX 7053 KAMPALA
E-mail: waterquality@nwsc.co.ug
CERTIFICATE OF ANALYSIS

CLIENT: AIR WATER EARTH
Address : P.O.Box 22428
Tel: 0772496451
Email: h.kalibbala@awe-engineers.com
Date Sample Received: 09-May-2016

Ref No: LS090/INV/2016/498
Sampled by: Client
Type of container: Plastic
Sample Source: Raw Water
Date of Report: 19-May-2016

Table of Analytical Results

Parameters	Units	Station 1	National Standard for potable water. (Un treated water)
WS Sample Nr	--	K2515/16/C	
pH	--	7.7	6.5-8.5
Total Dissolved Solids (TDS)	mg/L	29	1200
Total Phosphorous (TP)	mg/L	2.2	10.0
Total Suspended Solids (TSS)	mg/L	15	0
Chemical Oxygen Demand (COD)	mg/L	39	Not specified
Fat, Oil & Grease (FOG)	mg/L	2	Not specified

Remarks:
With the exception of TSS the sample showed complying physicochemical characteristics with the National Standards for untreated potable water.
ANALYSED BY: Robinah Muhairwe

AUTHORISED BY: .....**MANAGER, Central Laboratory Services**

APPROVED BY: .....**SENIOR MANAGER, Water Quality Management Department**
NB: The NWSC certificate of analysis by no means constitutes a permit to any person or company undertaking to conduct business

NATIONAL WATER AND SEWERAGE CORPORATION
CENTRAL LABORATORY - BUGOLOBI
P.O.BOX 7053 KAMPALA
E-mail: waterquality@nwsc.co.ug

CERTIFICATE OF ANALYSIS

CLIENT: AIR WATER EARTH
Address : P.O.Box 22428
Tel: 0772496451
Email: h.kalibbala@awe-engineers.com
Date Sample Received: 09-May-2016

Ref No: LS090/INV/2016/498
Sampled by: Client
Type of container: Plastic
Sample Source: Raw Water
Date of Report: 19-May-2016

Table of Analytical Results

Parameters	Units	Station 2	National Standard for potable water. (Un treated water)
WS Sample Nr	--	K2516/16/C	
pH	--	7.5	6.5-8.5
Total Dissolved Solids (TDS)	mg/L	26	1200
Total Phosphorous (TP)	mg/L	0.8	10.0
Total Suspended Solids (TSS)	mg/L	17	0
Chemical Oxygen Demand (COD)	mg/L	27	Not specified
Fat, Oil & Grease (FOG)	mg/L	15	Not specified

Remarks:
With the exception of TSS the sample showed complying physicochemical characteristics with the National Standards for untreated potable water.

ANALYSED BY: Robinah Muhairwe

AUTHORISED BY: .....MANAGER, Central Laboratory Services

APPROVED BY: .....SENIOR MANAGER, Water Quality Management Department

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NATIONAL WATER AND SEWERAGE CORPORATION
CENTRAL LABORATORY - BUGOLOBI
P.O.BOX 7053 KAMPALA
E-mail: waterquality@nwsc.co.ug

CERTIFICATE OF ANALYSIS

CLIENT: AIR WATER EARTH
Address : P.O.Box 22428
Tel: 0772496451
Email: h.kalibbala@awe-engineers.com
Date Sample Received: 09-May-2016

Ref No: LS090/INV/2016/498
Sampled by: Client
Type of container: Plastic
Sample Source: Raw Water
Date of Report: 19-May-2016

Table of Analytical Results

Parameters	Units	Station 3	National Standard for potable water. (Un treated water)
WS Sample Nr	--	K2517/16/C	
pH	--	7.6	6.5-8.5
Total Dissolved Solids (TDS)	mg/L	33	1200
Total Phosphorous (TP)	mg/L	0.4	10.0
Total Suspended Solids (TSS)	mg/L	27	0
Chemical Oxygen Demand (COD)	mg/L	23	Not specified
Fat, Oil & Grease (FOG)	mg/L	17	Not specified

Remarks:
With the exception of TSS the sample showed complying physicochemical characteristics with the National Standards for untreated potable water.

ANALYSED BY: Robinah Muhairwe

AUTHORISED BY: .....MANAGER, Central Laboratory Services

APPROVED BY: .....SENIOR MANAGER, Water Quality Management Department

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APPENDIX 4 ELECTROMAGNETIC FIELDS AND PUBLIC HEALTH

ELECTROMAGNETIC FIELDS AND PUBLIC HEALTH
EXPOSURE TO EXTREMELY LOW FREQUENCY FIELDS

Backgrounder
June 2007
(Source: http://www.who.int/peh-emf/publications/facts/fs322/en/)

The use of electricity has become an integral part of everyday life. Whenever electricity flows, both electric and magnetic fields exist close to the lines that carry electricity, and close to appliances. Since the late 1970s, questions have been raised whether exposure to these extremely low frequency (ELF) electric and magnetic fields (EMF) produces adverse health consequences. Since then, much research has been done, successfully resolving important issues and narrowing the focus of future research.

In 1996, the World Health Organization (WHO) established the International Electromagnetic Fields Project to investigate potential health risks associated with technologies emitting EMF. A WHO Task Group recently concluded a review of the health implications of ELF fields (WHO, 2007).

This Fact Sheet is based on the findings of that Task Group and updates recent reviews on the health effects of ELF EMF published in 2002 by the International Agency for Research on Cancer (IARC), established under the auspices of WHO, and by the International Commission on Non-Ionizing Radiation Protection (ICNIRP) in 2003.

ELF field sources and residential exposures
Electric and magnetic fields exist wherever electric current flows - in power lines and cables, residential wiring and electrical appliances. **Electric** fields arise from electric charges, are measured in volts per metre (V/m) and are shielded by common materials, such as wood and metal. **Magnetic** fields arise from the motion of electric charges (i.e. a current), are expressed in tesla (T), or more commonly in millitesla (mT) or microtesla (μT). In some countries another unit called the gauss, (G), is commonly used (10,000 G = 1 T). These fields are not shielded by most common materials, and pass easily through them. Both types of fields are strongest close to the source and diminish with distance.

Most electric power operates at a frequency of 50 or 60 cycles per second, or hertz (Hz). Close to certain appliances, the magnetic field values can be of the order of a few hundred microtesla. Underneath power lines, magnetic fields can be about 20 μT and electric fields can be several thousand volts per metre. However, average residential power-frequency magnetic fields in homes are much lower - about 0.07 μT in Europe and 0.11 μT in North America. Mean values of the electric field in the home are up to several tens of volts per metre.

Task group evaluation
In October 2005, WHO convened a Task Group of scientific experts to assess any risks to health that might exist from exposure to ELF electric and magnetic fields in the frequency range >0 to 100,000 Hz (100 kHz). While IARC examined the evidence regarding cancer in 2002, this Task Group reviewed evidence for a number of health effects, and updated the evidence regarding cancer. The conclusions and recommendations of the Task Group are presented in a WHO Environmental Health Criteria (EHC) monograph (WHO, 2007).
Following a standard health risk assessment process, the Task Group concluded that there are no substantive health issues related to ELF electric fields at levels generally encountered by members of the public. Thus the remainder of this fact sheet addresses predominantly the effects of exposure to ELF magnetic fields.

Short-term effects
There are established biological effects from acute exposure at high levels (well above 100 μT) that are explained by recognized biophysical mechanisms. External ELF magnetic fields induce electric fields and currents in the body which, at very high field strengths, cause nerve and muscle stimulation and changes in nerve cell excitability in the central nervous system.

Potential long-term effects
Much of the scientific research examining long-term risks from ELF magnetic field exposure has focused on childhood leukaemia. In 2002, IARC published a monograph classifying ELF magnetic fields as "possibly carcinogenic to humans". This classification is used to denote an agent for which there is limited evidence of carcinogenicity in humans and less than sufficient evidence for carcinogenicity in experimental animals (other examples include coffee and welding fumes). This classification was based on pooled analyses of epidemiological studies demonstrating a consistent pattern of a two-fold increase in childhood leukaemia associated with average exposure to residential power-frequency magnetic field above 0.3 to 0.4 μT. The Task Group concluded that additional studies since then do not alter the status of this classification.

However, the epidemiological evidence is weakened by methodological problems, such as potential selection bias. In addition, there are no accepted biophysical mechanisms that would suggest that low-level exposures are involved in cancer development. Thus, if there were any effects from exposures to these low-level fields, it would have to be through a biological mechanism that is as yet unknown. Additionally, animal studies have been largely negative. Thus, on balance, the evidence related to childhood leukaemia is not strong enough to be considered causal.

Childhood leukaemia is a comparatively rare disease with a total annual number of new cases estimated to be 49,000 worldwide in 2000. Average magnetic field exposures above 0.3 μT in homes are rare: it is estimated that only between 1% and 4% of children live in such conditions. If the association between magnetic fields and childhood leukaemia is causal, the number of cases worldwide that might be attributable to magnetic field exposure is estimated to range from 100 to 2400 cases per year, based on values for the year 2000, representing 0.2 to 4.95% of the total incidence for that year. Thus, if ELF magnetic fields actually do increase the risk of the disease, when considered in a global context, the impact on public health of ELF EMF exposure would be limited.

A number of other adverse health effects have been studied for possible association with ELF magnetic field exposure. These include other childhood cancers, cancers in adults, depression, suicide, cardiovascular disorders, reproductive dysfunction, developmental disorders, immunological modifications, neurobehavioural effects and neurodegenerative disease. The WHO Task Group concluded that scientific evidence supporting an association between ELF magnetic field exposure and all of these health effects is much weaker than for childhood leukaemia. In some instances (i.e. for cardiovascular disease or breast cancer) the evidence suggests that these fields do not cause them.

International exposure guidelines
Health effects related to short-term, high-level exposure have been established and form the basis of two international exposure limit guidelines (ICNIRP, 1998; IEEE, 2002). At present, these bodies consider the scientific evidence related to possible health effects from long-term, low-level exposure to ELF fields insufficient to justify lowering these quantitative exposure limits.

WHO's guidance
For high-level short-term exposures to EMF, adverse health effects have been scientifically established (ICNIRP, 2003). International exposure guidelines designed to protect workers and the public from these effects should be adopted by policy makers. EMF protection programs should include exposure measurements from sources where exposures might be expected to exceed limit values.

Regarding long-term effects, given the weakness of the evidence for a link between exposure to ELF magnetic fields and childhood leukaemia, the benefits of exposure reduction on health are unclear. In view of this situation, the following recommendations are given:

- Government and industry should monitor science and promote research programmes to further reduce the uncertainty of the scientific evidence on the health effects of ELF field exposure. Through the ELF risk assessment process, gaps in knowledge have been identified and these form the basis of a new research agenda.

- Member States are encouraged to establish effective and open communication programmes with all stakeholders to enable informed decision-making. These may include improving coordination and consultation among industry, local government, and citizens in the planning process for ELF EMF-emitting facilities.

- When constructing new facilities and designing new equipment, including appliances, low-cost ways of reducing exposures may be explored. Appropriate exposure reduction measures will vary from one country to another. However, policies based on the adoption of arbitrary low exposure limits are not warranted.

Further reading

a. WHO - World Health Organization. Extremely low frequency fields. Environmental Health Criteria, Vol. 238. Geneva, World Health Organization, 2007.

b. IARC Working Group on the Evaluation of Carcinogenic Risks to Humans. Non-ionizing radiation, Part 1: Static and extremely low-frequency (ELF) electric and magnetic fields. Lyon, IARC, 2002 (Monographs on the Evaluation of Carcinogenic Risks to Humans, 80).

c. ICNIRP - International Commission on Non-Ionizing Radiation Protection. Exposure to static and low frequency electromagnetic fields, biological effects and health consequences (0-100 kHz). Bernhardt JH et al., eds. Oberschleissheim, International Commission on Non-ionizing Radiation Protection, 2003 (ICNIRP 13/2003).

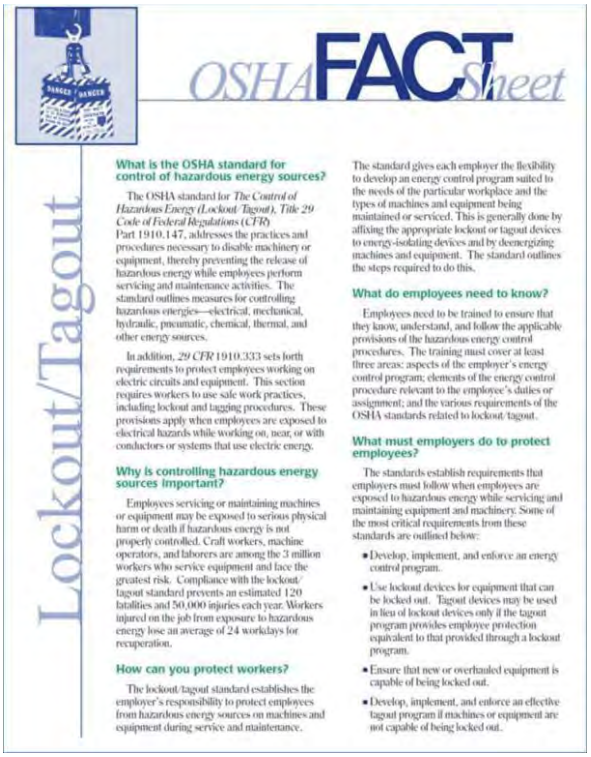
d. ICNIRP – International Commission on Non-Ionizing Radiation Protection (1998). Guidelines for limiting exposure to time varying electric, magnetic and electromagnetic fields (up to 300 GHz). Health Physics 74(4), 494-522.

e. IEEE Standards Coordinating Committee 28. IEEE standard for safety levels with respect to human exposure to electromagnetic fields, 0-3 kHz. New York, NY, IEEE - The Institute of Electrical and Electronics Engineers, 2002 (IEEE Std C95.6-2002).

For more information contact:

WHO Media centre
Telephone: +41 22 791 2222
E-mail: mediainquiries@who.int

APPENDIX 5 LOCKOUT- TAGOUT FACTSHEET



OSHA FACTSheet

Lockout/Tagout

What is the OSHA standard for control of hazardous energy sources?

The OSHA standard for *The Control of Hazardous Energy (Lockout/Tagout), Title 29 Code of Federal Regulations (CFR)* Part 1910.147, addresses the practices and procedures necessary to disable machinery or equipment, thereby preventing the release of hazardous energy while employees perform servicing and maintenance activities. The standard outlines measures for controlling hazardous energies—electrical, mechanical, hydraulic, pneumatic, chemical, thermal, and other energy sources.

In addition, *29 CFR* 1910.333 sets forth requirements to protect employees working on electric circuits and equipment. This section requires workers to use safe work practices, including lockout and tagging procedures. These provisions apply when employees are exposed to electrical hazards while working on, near, or with conductors or systems that use electric energy.

Why is controlling hazardous energy sources important?

Employees servicing or maintaining machines or equipment may be exposed to serious physical harm or death if hazardous energy is not properly controlled. Craft workers, machine operators, and laborers are among the 3 million workers who service equipment and face the greatest risk. Compliance with the lockout/tagout standard prevents an estimated 120 fatalities and 50,000 injuries each year. Workers injured on the job from exposure to hazardous energy lose an average of 24 workdays for recuperation.

How can you protect workers?

The lockout/tagout standard establishes the employer's responsibility to protect employees from hazardous energy sources on machines and equipment during service and maintenance.

The standard gives each employer the flexibility to develop an energy control program suited to the needs of the particular workplace and the types of machines and equipment being maintained or serviced. This is generally done by affixing the appropriate lockout or tagout devices to energy-isolating devices and by deenergizing machines and equipment. The standard outlines the steps required to do this.

What do employees need to know?

Employees need to be trained to ensure that they know, understand, and follow the applicable provisions of the hazardous energy control procedures. The training must cover at least three areas: aspects of the employer's energy control program; elements of the energy control procedure relevant to the employee's duties or assignment; and the various requirements of the OSHA standards related to lockout/tagout.

What must employers do to protect employees?

The standards establish requirements that employers must follow when employees are exposed to hazardous energy while servicing and maintaining equipment and machinery. Some of the most critical requirements from these standards are outlined below:

- Develop, implement, and enforce an energy control program.
- Use lockout devices for equipment that can be locked out. Tagout devices may be used in lieu of lockout devices only if the tagout program provides employee protection equivalent to that provided through a lockout program.
- Ensure that new or overhauled equipment is capable of being locked out.
- Develop, implement, and enforce an effective tagout program if machines or equipment are not capable of being locked out.

APPENDIX 6 PERMISSIBLE NOISE LEVELS

MAXIMUM PERMISSIBLE NOISE LEVELS

PART I

Regulation 6(1)

Maximum Permissible Noise Levels for General Environment

Column 1	Column 2	
Facility	**Noise Limits B (A) (Leq)**	
	DAY	**NIGHT**
A. Any building used as hospital, convalescence home, home for the aged, sanatorium and institutes of higher learning, conference rooms, public library, environmental or recreational sites.	45	35
B. Residential buildings	50	35
C. Mixed residential (with some commercial and entertainment)	55	45
D. Residential + industry or small-scale production + commerce	60	50
E. Industrial	70	60

Time Frame: use duration

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

Night : 10.00p.m - 6.00a.m

The time frame takes into consideration human activity.

PART IV

Regulation 6 (4)

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.

APPENDIX 7 DRAFT NATIONAL AIR QUALITY STANDARDS

POLLUTANT	AVERAGING TIME FOR AMBIENT AIR	EXAMPLES TO WHICH STANDARDS ARE APPLICABLE	STANDARD FOR AMBIENT AIR	STANDARD FOR EMISSIONS SOURCE (POINT SOURCES)
Acid mist	24 hr	Acid manufacture, battery manufacture and acid changing, chemical stores and labs	100 µgNm^{-3}	
Ammonia	24 hr	Refrigeration, chemicals stores and labs, fish processing Combustion processes, boilers or any process involving sulphur burning	200 µgNm^{-3}	50 mg/Nm^3
Asbestos	24 hr	Construction industry, garages/car repairs, asbestos manufacture	0.01 fibres ml^{-1}	
Baggase	24 hr	Sugar processing plants	200 µNgm^{-3}	
Carbon dioxide	8 hr	Breweries, soft drink industries, burning processes	9.0 ppm	
Carbon monoxide	8 hr	Combustion processes, boilers	9.0 ppm	
Cement	24 hr	Cement industries, construction	200 µgNm^{-3}	50 mg/Nm^3
Ceramics	24 hr	Tile and brick industries, ceramic industries, construction	200 µgNm^{-3}	
Chlorine	24 hr	Water treatment, fish processing, chemical stores and labs	200µg Nm^{-3}	< 3mg/Nm^3
Cobalt	1 month	Cobalt processing, copper mining	1.0 µgNm^{-3}	
Coffee dust	24 hr	Coffee processing and trading	200 µg Nm^{-3}	
Cotton fibres	24 hr	Cotton farming, ginning and export, textile manufacture	200 µgNm^{-3}	
Copper dust	1 month	Copper mining and processing, metal works and fabrication	1.0 µgNm^{-3}	0.5 mg/Nm^3
Electrode manufacture emissions	24 hr	Electrode manufacture, garages/car repairs, welding, metal fabrication	150 µgNm^{-3}	20 mg/Nm^3
Grain dust	24 hr	Grain milling, bakeries, feed mills, breweries, agriculture	200µgNm^{-3}	
Hydrocarbons	24 hr	Chemical stores and labs, fuel depots and stations	5 mgm^{-3}	
Hydrogen Sulphide	24hr	Waste water treatment, tanneries	15 µgNm^{-3}	15 mg/Nm^3
Lead	1 month	Battery manufacture and repair metal fabrication	1.0 µgNm^{-3}	0.5 mg/Nm^3
Lime	24 hr	Lime and cement industries, agriculture, construction	200 µgNm^{-3}	
Nitrogen oxides (NO_x)	24 hr 1 year Arithmetic mean	Combustion processes, welding	0.10 ppm	300 mg/Nm^3
Ozone	1 hr		0.10 ppm	
Pesticides	24 hr	Pest control and plant protection	See App....	
Phosphates	24 hr	Fertiliser manufacture, soap and detergents industry	200 µgNm^{-3}	50 mg/Nm^3
Silica	24 hr	Construction industry, detergent and manufacture, quarries	200 µgNm^{-3}	
Smoke	Not to exceed 5 min. in any one hour	Industry, trade or nay combustion process	Ringlemann scale No.2 or 40% observed at 6m or more	
Soot	24 hr	Combustion, charcoal and brick making, boilers	500 µgN m^{-3}	

POLLUTANT	AVERAGING TIME FOR AMBIENT AIR	EXAMPLES TO WHICH STANDARDS ARE APPLICABLE	STANDARD FOR AMBIENT AIR	STANDARD FOR EMISSIONS SOURCE (POINT SOURCES)
Sulphur dioxide	24 hr	Combustion processes, boilers or any process involving sulphur burning	0.15 ppm	400 mg/Nm^3
Sulphur trioxide	24 hr	Sulphur burning, sulphuric acid manufacture	200µgNm^{-3}	
Synthetic fibres	24 hr	Synthetic textiles manufacture	0.01fibres ml^{-1}	
Tea dust	24 hr	Tea processing and manufacture	200 µgNm^{-3}	
Tobacco dust	24 hr	Cigarette manufacture including tobacco curing, tobacco farming	200µgN m^{-3}	
Total suspended particles/ particulate emissions	24 hr	Industries (e.g cement, lime), quarries, grain milling, coffee processors, pharmaceuticals and any other trade	300 µgN m^{-3}	<50mg/Nm^3
Wood dust	24 hr	Saw mills, timber works and furniture making, construction	1 mgNm^{-3}	20mg/Nm^3
VOCs	24 hr	Breweries, fuel depots and stations	6 mgNm^{-3}	20mg/Nm^3

APPENDIX 8 NATIONAL (UNTREATED) POTABLE WATER STANDARDS

US EAS 12

UGANDA STANDARD

First Edition
2014-10-15

Potable water — Specification

Reference number
US EAS 12: 2014

© UNBS 2014

Potable water — Specification

1 Scope

This Final Draft East African Standard specifies requirements and methods of sampling and test for potable water (treated potable water and natural potable water).

2 Normative references

The following referenced documents are indispensable for the application of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

ASTM D 5907, *Standard test methods for filterable matter (total dissolved solids) and non-filterable matter (total suspended solids) in water*

EAS 39, *Hygiene in the food and drink manufacturing industry — Code of practice*

ISO 10359, *Water quality -- Determination of fluoride*

ISO 10523, *Water quality -- Determination of pH*

ISO 11423, *Water quality -- Determination of benzene and some derivatives*

ISO 11732, *Water quality -- Determination of ammonium nitrogen -- Method by flow analysis (CFA and FIA) and spectrometric detection*

ISO 11885, *Water quality -- Determination of selected elements by inductively coupled plasma optical emission spectrometry (ICP-OES)*

ISO 11923, *Water quality -- Determination of suspended solids by filtration through glass-fibre filters*

ISO 11969, *Water quality -- Determination of arsenic -- Atomic absorption spectrometric method (hydride technique)*

ISO 12020, *Water quality -- Determination of aluminium —Atomic absorption spectrometric methods*

ISO 12846, *Water quality -- Determination of mercury -- Method using atomic absorption spectrometry (AAS) with and without enrichment*

ISO 13877, *Soil quality -- Determination of polynuclear aromatic hydrocarbons -- Method using high - performance liquid chromatography*

ISO 14402, *Water quality -- Determination of phenol index by flow analysis (FIA and CFA)*

ISO 14911, *Water quality -- Determination of dissolved Li+, Na+, NH4+, K+, Mn2+, Ca2+, Mg2+, Sr2+ and Ba2+ using ion chromatography -- Method for water and waste water*

ISO 15061, *Water quality -- Determination of dissolved bromate -- Method by liquid chromatography of ions*

ISO 15089, *Water quality -- Guidelines for selective immunoassays for the determination of plant treatment and pesticide agents*

ISO 15681, *Water quality -- Determination of orthophosphate and total phosphorus contents by flow analysis (FIA and CFA)*

ISO 16265, *Water quality -- Determination of the methylene blue active substances (MBAS) index -- Method using continuous flow analysis (CFA)*

ISO 16266, *Water quality -- Detection and enumeration of Pseudomonas aeruginosa —Method by membrane filtration*

ISO 21567, *Microbiology of food and animal feeding stuffs —Horizontal method for the detection of Shigella spp.*

ISO 22743, *Water quality -- Determination of sulfates -- Method by continuous flow analysis (CFA)*

ISO 4832, *Microbiology of food and animal feeding stuffs —Horizontal method for the enumeration of coliforms —Colony-count technique*

ISO 5961, *Water quality -- Determination of cadmium by atomic absorption spectrometry*

ISO 6059, *Water quality -- Determination of the sum of calcium and magnesium -- EDTA titrimetric method*

ISO 6222, *Water quality -- Enumeration of culturable microorganisms —Colony count by inoculation in nutrient agar culture media*

ISO 6332, *Water quality -- Determination of the chemical oxygen demand*

ISO 6333, *Water quality -- Determination of manganese -- Formaldoxime spectrometric method*

ISO 6461, *Water quality -- Detection ad enumeration of the spores of sulphite-reducing anaerobes (clostridia) —Method by membrane filtration*

ISO 6703, *Water quality -- Determination of cyanide*

ISO 6777, *Water quality -- Determination of nitrite -- Molecular absorption spectrometric method*

ISO 6785, *Milk and milk products -- Detection of Salmonella spp.*

ISO 6888, *Microbiology of food and animal feeding stuffs —Horizontal method for the enumeration of coagulass-positive staphylococci (Staphylococcus aureus and other species)*

ISO 7027 *Water quality -- Determination of turbidity*

ISO 7393, *Water quality -- Determination of free chlorine and total chlorine*

ISO 7887, *Water quality -- Determination of colour*

ISO 7888, *Water quality -- Determination of electrical conductivity*

ISO 7890, *Water quality -- Determination of nitrate -- Part 3: Spectrometric method using sulfosalicylic acid*

ISO 7899, *Water quality -- Detection and enumeration of intestinal anterccocci*

ISO 7980, *Water quality -- Determination of calcium and magnesium -- Atomic absorption spectrometric method*

ISO 8165, *Water quality -- Determination of selected monovalent phenols*

ISO 8245, *Water quality -- Guidelines for the determination of total organic carbon (TOC) and dissolved organic carbon (DOC)*

ISO 8288, *Water quality -- Determination of cobalt, nickel, copper, zinc, cadmium and lead -- Flame atomic absorption spectrometric methods*

ISO 9174, *Water quality -- Determination of chromium -- Atomic absorption spectrometric methods*

ISO 9297, *Water quality -- Determination of chloride —Silver nirate titration with chromate indicator (Mohr's method)*

ISO 9308, *Water quality — Detection and enumeration of Escherichia colli and coliform bacteria*

ISO 9390, *Water quality -- Determination of borate -- Spectrometric method using azomethine-H*

ISO 9696, *Water quality -- Measurement of gross alpha activity in non-saline water -- Thick source method*

ISO 9697, *Water quality -- Measurement of gross beta activity in non-saline water -- Thick source method*

ISO 9964, *Water quality -- Determination of sodium and potassium*

ISO 9965, *Water quality -- Determination of selenium -- Atomic absorption spectrometric method (hydride technique)*

3 Terms and definitions

For the purposes of this standard, the following terms and definitions shall apply.

3.1
potable water
water that is safe and suitable for human consumption

3.2
drinking water
potable water intended for human consumption

3.3
treated water
water that has undergone through processes such as flocculation, coagulation, sedimentation, filtration and disinfection

3.4
natural potable water
water that is from natural sources that is fit for human consumption without undergoing any form of treatment which will alter its original chemical composition and bacteriological purity

3.5
conventional treatment
process involving deliberate coagulation, flocculation sedimentation, filtration, and disinfection to improve the safety and quality of the finished drinking water to consumers

3.6
water quality
the chemical, physical and biological characteristics of water in respect to suitability for human consumption

3.7
safe water
water that is free from physical, chemical and/or biological substances in concentrations which could cause illness or injury to consumers

3.8
surveillance
an independent continuous, specific measurement, observation and reporting for the purpose of water quality management and operational activities

3.9
disinfection
reduction by means of chemical agents and/or physical methods, of the number of micro-organism to a level that does not compromise public health

3.10
potable water distribution system
public or private water systems providing consumers with tap water suitable for direct consumption

3.11
approved water supply
source of water that has been inspected and approved by the competent authority for human consumption

4 Requirements for potable water

4.1 General requirements

4.1.1 Potable water shall be free from organisms and chemical substances that are hazardous and injurious to human health and shall comply with requirements in Table 1, 2, 3, 4, 5, and 6.

4.1.2 The location, construction, operation and supervision of water supply source, its reservoirs and its distribution system shall be such that they exclude any possible pollution of the water in compliance with relevant national regulations.

4.1.3 Potable water shall be handled under hygienic conditions as stipulated in EAS 39.

4.2 Specific quality requirements

4.2.1 Physical characteristics

Potable water shall conform to the physical characteristics in Table 1.

Table 1— Physical requirements for potable water

Sl. No.	Characteristic	Treated potable water	Natural potable water	Method of test
i)	Colour (TCU[a] max)	15	50	ISO 7887
ii)	Turbidity (NTU max)	5	25	ISO 7027
iii)	pH	6.5 – 8.5	5.5-9.5	ISO 10523
iv)	Taste	Not objectionable	Not objectionable	-
v)	Odour	Odourless	Odourless	-
vi)	Conductivity (µS/cm)max	1500	2500	ISO 7888
vii)	Suspended matter	Not detectable	Not detectable	ISO 11923

[a] True colour units (TCU) mean 15 hazen units after filtration.

4.2.2 Chemical characteristics

Potable water shall conform to the chemical characteristics affecting quality indicated in Table 2.

Table 2 — Quality requirements for potable water

Sl. No.	Substance or characteristic	Treated potable water (mg/L max.)	Natural potable water (mg/L max.)	Method of test
i)	Total dissolved solids	700	1500	ASTM D 5907
ii)	Total hardness, as $CaCO_3$,	300	600	ISO 6059
iii)	Aluminium, as Al^{+++},	0.2	0.2	ISO 12020
iv)	Chloride, as Cl^-	250	250	ISO 9297
v)	Total Iron as Fe	0.3	0.3	ISO 6332
vi)	Sodium, as Na^+	200	200	ISO 9964-1
vii)	Sulphate SO_4	400	400	ISO 22743

viii)	Zinc, as Zn^{++}	5	5	ISO 8288
ix)	Magnesium, as Mg^{++}	100	100	ISO 7980
x)	Calcium, as Ca^{++}	150	150	ISO 7980

4.2.3 Chemical characteristics affecting the safety of potable water

4.2.3.1 Inorganic contaminants

Potable water shall conform to the limits of inorganic contaminants affecting safety indicated in Table 3.

APPENDIX 9 RECORDS OF STAKEHOLDER CONSULTATIONS

A. Uganda Wildlife Authority

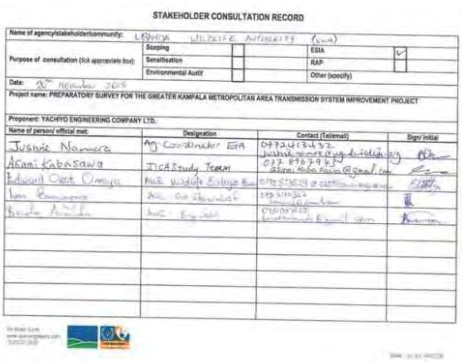
Week	**47**	Meeting date	**20 November 2015**
		Recorded by	**BA**
Meeting/subject	**Meeting with Uganda Wildlife Authority (UWA) - Consultation on GKMA Transmission Line Improvement Project**	Total pages	**2**
Stakeholder	**Uganda Wildlife Authority**		

Present	Apology	Copy	Name	Organisation	Designation
☒	☐	☐	Justine Namara	UWA	Ag. Coordinator EIA
☒	☐	☐	Asami Kabasawa	JICA Study Team	Project Manager
☒	☐	☐	Edward Okot Omoya	AWE	Wildlife Ecologist - Fauna
☒	☐	☐	Ivan Bamweyana	AWE	Sociologist
☒	☐	☐	Brenda Amanda (BA)	AWE	Engineer

Item	Update
1.	**Introduction**
	The Ag. EIA Coordinator welcomed the team to the UWA offices. This was followed by self-introductions, before a presentation of the Project details was made by AWE. The presentation included: ≠ Project Background ≠ Project Location ≠ The ESIA process ≠ Project components and activities ≠ Potential Environmental and Social Impacts
2.	**Question and Answer Session**
	Jinja Wildlife Sanctuary
2.1.	**Comment:** The extents of wildlife sanctuaries are not marked physically on ground. The importance of these sanctuaries is to conserve species of national importance such as migratory birds. UWA does not own land in sanctuaries. Therefore, there are only minor restrictions on land use. The duty of UWA is to manage the wildlife within the sanctuaries
2.2.	**Comment:** The sanctuary's wildlife mostly consists of migratory birds. The Project's baseline studies will need to find out the seasons of interest so that work is planned around the seasons.

Week	**47**	Meeting date	**20 November 2015**
		Recorded by	**BA**
Meeting/subject	**Meeting with Uganda Wildlife Authority (UWA) - Consultation on GKMA Transmission Line Improvement Project**	Total pages	**2**
Stakeholder	**Uganda Wildlife Authority**		

2.3.	**Comment:** The boundaries of the Jinja Wildlife Sanctuary are defined in the Second Schedule of the Uganda Wildlife Act as 'the municipality of Jinja and part of the Napolean Gulf and the River Nile which lies within the following area – commencing at Kirinya; thence along the lakeshore and the right bank of the river as far as the Bujagali Falls; thence along the left bank of the river and the lakeshore as far as Bugungu pier; thence in a straight line to the point of commencement. This implies that the Project should use the Jinja Municipality boundaries of 1964 to confirm whether or not the Project lies within the sanctuary boundaries.
2.4.	**Recommendation:** The Project should not involve much disturbance since the towers and access roads are already in existence.
2.5.	**Comment:** Since the line is already in existence and UETCL maintains a line corridor for maintenance works, it is not expected that the works to be conducted for the Project will result in major disturbance within the Jinja Wildlife Sanctuary.


STAKEHOLDER CONSULTATION RECORD

Name of agency/stakeholder/community: UGANDA WILDLIFE AUTHORITY (UWA)			
Purpose of consultation (tick appropriate box)	Scoping ☐	ESIA ☑	
	Sensitisation ☐	RAP ☐	
	Environmental Audit ☐	Other (specify)	
Date: 20th November 2015			
Project name: PREPARATORY SURVEY FOR THE GREATER KAMPALA METROPOLITAN AREA TRANSMISSION SYSTEM IMPROVEMENT PROJECT			
Proponent: YACHIYO ENGINEERING COMPANY LTD.			
Name of person/ official met	Designation	Contact (Tel/email)	Sign/ Initial
Justine Namara	Ag. Coordinator EIA	0772413432	[illegible]
Asami Kabasawa	JICA Study Team	077 8967943	[illegible]
Edward Okot Omoya	AWE Wildlife Ecologist	[illegible]	[illegible]
Ivan Bamweyana	AWE [illegible]	[illegible]	[illegible]
Brenda Amanda	AWE - Engineer	[illegible]	[illegible]

B. Buikwe District Environment Officer

Week	**47**	Meeting date	**18 November 2015**
		Recorded by	**BA**
Meeting/subject	**Meeting with Buikwe District Environment Officer - Consultation on GKMA Transmission Line Improvement Project**	Total pages	**2**

Present	Apology	Copy	Name	Organisation	Designation
☒	☐	☐	Jazira Nakira	Buikwe DLG	District Environment Officer
☒	☐	☐	James Kimmula	Buikwe DLG	Economic Planner/ Statistician
☒	☐	☐	Brenda Amanda (BA)	AWE	Engineer

Item	Update
1.	**Introduction**
	The AWE team was welcomed and self-introductions made. A presentation of the Project details was made by the AWE team. The presentation included: ≠ Project Background ≠ Project Location ≠ The ESIA process ≠ Project components and activities ≠ Potential Environmental and Social Impacts
2.	**Question and Answer Session**
2.1.	**Comment:** Mabira forest reserve Najjembe sc, Buikwe Wakisi sc, Buikwe
2.2.	**Comment:** Cultural sites-not sure about names.
2.3.	**Comment:** Rivers: Njeru and Wakisi flow into River Nile. Nagijje, Mukono and Kayunga flow into Sezibwa River then to Lake Kyoga.
2.4.	**Challenge:** Sometimes people have constructed within the corridor. The planners need to know the reserve.
2.5.	**Comment:** Jinja Wildlife sanctuary: Buikwe District Environment Officer did not know about it. The team did not see it; area was residential (nice house with beautiful grass outside) before the hill. It enters Mabira.

2.6.	**Observation:** There are two lines from the substation. The corridor appears well maintained and respected. Plantations of bananas (matooke), tea, and gardens of maize are within the corridor. River Nakalasa crossed by the transmission line in Namataba village. River Kasala was flooded and Kisamba which is a smaller river is possibly crossed by the transmission line in Wakiso.

STAKEHOLDER CONSULTATION RECORD

Name of agency/stakeholder/community: DISTRICT ENVIRONMENT OFFICER BUIKWE DISTRICT					
Purpose of consultation (tick appropriate box):	Scoping			ESIA	✓
	Sensitisation			RAP	
	Environmental Audit			Other (specify)	
Date: 18th November 2015					
Project name: PREPARATORY SURVEY FOR THE GREATER KAMPALA METROPOLITAN AREA TRANSMISSION SYSTEM IMPROVEMENT PROJECT					
Proponent: YACHIYO ENGINEERING COMPANY LTD.					

Name of person/ official met:	Designation	Contact (Tel/email)	Sign/ initial
Nakiri Jaziira Kalazza	Environment Officer	[illegible]@gmail.com 0772[illegible]	[signature]
Kimanda James	Economic Planner / Statistician	Jkimanda@yahoo.com 0772[illegible]	[signature]

C. Wetlands Management Department (WMD)

MINUTES OF THE MEETING HELD BETWEEN WMD AND AIR WATER EARTH ON STAKEHOLDER CONSULTATIONS FOR ESIA AND ARAP OF GREATER KAMPALA METROPOLITAN AREA TRANSMISSION SYSTEM IMPROVEMENT PROJECT

Held on 1st December, 2015 at the Climate change Boardroom

AGENDA

1. Communication from chair
2. Presentations by AWE
3. Reactions and Way forward

Minutes No.	Discussion and recommendation	Responsible persons
SCM/EIA/01/01/12/15 Communication from Chair	• The meeting is meant to discuss the proposed greater Kampala Metropolitan area Transmission System Improvement Project • As the lead agency in Wetland Management it is paramount that WMD is consulted to advice in the EIA process since part of the power lines will pass over wetlands and associated ecosystems.	SWO/EIA
SCM/EIA/02/01/12/15 Reactions to the presentations	• The wetlands are illegally occupied so the issue of compensation should not arise. The proprietor needs to liaise with the Ministry of Lands to go about the issue of resettlement from the wetland. • Biodiversity of the areas affected should be documented and mitigation measures to its disruption should be well outlined. • A separate EIA should be done for the roads that will be used as access for routine maintenance. • There areas of wetland destroyed need to be restored to as near as possible to the original after construction. • The trees vegetation cleared especially trees should be replaced with the indigenous species to that area. • A field visit needs to be carried out in order to ascertain better appreciate the exact nature of the impacts.	ALL
SCM/EIA/03/01/12/15 Way forward	The consultant needs to come to WMD and receive the comments in writing and sign for them.	

Since visit was done, could recommendations be made more [illegible]?

1

Chair : Owang Joel C
[signature]
SWO/EIA 12/01/16

Secretary EWOR ALOYSIUS
[signature]
WO/AS 12/01/16

2

STAKEHOLDER CONSULTATION RECORD

Name of agency/stakeholder/community: DIRECTORATE OF ENVIRONMENT AFFAIRS (WETLANDS DEPARTMENT)					
Purpose of consultation (tick appropriate box):	Scoping			ESIA	✓
	Sensitisation			RAP	✓
	Environmental Audit			Other (specify)	
Date: 01 DECEMBER 2015					
Project name: PREPARATORY SURVEY FOR THE GREATER KAMPALA METROPOLITAN AREA TRANSMISSION SYSTEM IMPROVEMENT PROJECT					
Proponent: YACHIYO ENGINEERING COMPANY LTD.					

Name of person/ official met:	Designation	Contact (Tel/email)	Sign/ initial
[illegible]	GT	[illegible]97@yahoo.com	[signature]
Aloysius Ewor	Wetlands Officer	[illegible]@gmail.com	[signature]
Kayondo Stephen	Wetlands Officer	[illegible]@yahoo.com	[signature]
Apio Kevin	GT	kevin.apigo@gmail.com	[signature]
Owang Joel C	Senior Wetland Officer	[illegible]@yahoo.com	[signature]
Pamela Tashobya	Consultant/RAP Specialist	[illegible]@yahoo.com	[signature]
Mugenyi Faith	Sociologist	[illegible]@gmail.com	[signature]
[illegible]	Surveyor/GIS Specialist	[illegible]@gmail.com	[signature]
Beda Ananda	Engineer	[illegible]@gmail.com	[signature]

D. Occupational Health and Safety Department (OSH); Ministry of Gender, Labour and Social Development

Week	22	Meeting date	25 May 2016
		Recorded by	SN, BA
Meeting/subject	**Ministry of Gender, Labour and Social Development (OSH); - Consultation on GKMA Transmission Line Improvement Project**	Total pages	3

Present	Apology	Copy	Name	Organisation	Designation
☒	☐	☐	Sam Aniebyoona	MGLSD	Specialised safety inspector Mechanical
☒	☐	☐	Augius Samuel .W	MGLSD	Ag senior specialised safety inspector
☒	☐	☐	Sharifah Nakigozi (SN)	Air Water Earth	HSE consultant
☒	☐	☐	Brenda Amanda (BA)	Air Water Earth	Petroleum Engineer

Item	Update
1.	**Introduction**
	AWE team member was welcomed to MGLSD- OSH Department by the Specialised Safety Inspector (mechanical). The consultant representative explained the purpose of the visit and scope of the project; gave a brief description of the project and encouraged stakeholder to provide input. The presentation included: ≠ Project Background ≠ Project Location ≠ The ESIA process ≠ Project components and activities ≠ Potential Environmental and Social Impacts
2.	**Question and Answer Session**
	Occupation Safety and Health
2.1.	**Workforce**

2.2.	▪ Contractor should provide workers with adequate personal protective equipment after risk assessment has been done (PPE); ▪ The workers should for at most 40 hours per week- extra hours payable as overtime (OT); ▪ Labour recruitment should be fair and free of discrimination; ▪ Workers should be provided with adequate sanitation facilities for females and for males separated and well labelled; ▪ The contractor should have first aid box and trained first aider at the site; ▪ The contractor should have a safety officer at the site; ▪ The workers should receive trainings (induction for new staff and refresher training for old staff on occupational hazards and risks). ▪ Pre-medical examination should be carried out to check if workers are fit for the Jobs assigned. ▪ The supervisor should be a local person who can communicate with the workers. ▪ Training program for workers need to be developed and shared with ministry of gender Labour and social Development, OHS department. The Department can be involved in providing some required safety training.
2.3.	**Workplace**
	▪ The contractor should develop a comprehensive traffic management plan; ▪ The contractor should have strategically placed traffic signs off-site; ▪ The contractor should have adequate signage on-site- warning/ restricting access; ▪ The contractor should have an emergence preparedness plan; ▪ The contractor should have fire facilities- extinguishers, assemble point etc.; ▪ The contractor should have safety policy; ▪ The contractor should have first aid facilities; ▪ The contractor should keep record of incidences of accidents; ▪ The contractor should have an HIV/AIDS policy ▪ A comprehensive Risk Assessment management plan should be developed for all activities. ▪ The public needs to be aware & involved in the project especially local employment this will improve the ownership & protection of the project by the local people. ▪ After 6 months any workplace should have a safety committee
2.4.	**Waste handling**
2.5.	▪ The contractor should have licensed waste handlers ▪ Waste should be segregated on site before disposal
2.6.	**Registration**
2.7.	i) The contractor will be required to register the site as a workplace before commencement of work; ii) Submit the following; ≠ Architectural plans should be submitted commissioner for approval before construction of buildings or alteration of existing buildings of workplace begins according to section 42 of OHS Act 2006; ≠ Traffic management plan; ≠ Risk assessment analysis; ≠ Emergence preparedness plan; ≠ Policy on sexual harassment; ≠ Safety policy iii) Notify the ministry within one month (30 days) before commencement of work;


STAKEHOLDER CONSULTATION RECORD

Name of agency/stakeholder/community: OCCUPATIONAL HEALTH & SAFETY DEPARTMENT, MGLSD			
Purpose of consultation (tick appropriate box):	Scoping ☐	ESIA ☑	
	Sensitisation ☐	RAP ☐	
	Environmental Audit ☐	Other (specify)	
Date: 25th May 2015			
Project name: PREPARATORY SURVEY FOR THE GREATER KAMPALA METROPOLITAN AREA TRANSMISSION SYSTEM IMPROVEMENT PROJECT			
Proponent: YACHIYO ENGINEERING COMPANY LTD.			
Name	~~Village/Parish~~ DESIGNATION	Contact (Telephone)	Sign/ initial
Augius Samuel . W	Ag. Senior Specialised Safety Insp.	0712-812723	[signature]
Sam Aniebyoona	Project Officer Specialised Safety Inspector	0773524963	[signature]
Sharifah Nakigozi	Air Water Earth HSE consultant	0703674191 [illegible]	[signature]
Brenda Amanda	Engineer - AWE	0751907692	[signature]

RECORDS OF STAKEHOLDER CONSULTATIONS WITH PROJECT AFFECTED COMMUNITIES

MUKONO PROJECT AREA

1. **Meeting with National Forestry Authority (NFA) Private foresters**

Week	11	Meeting date	10 May 2016
		Recorded by	IKK
Meeting/subject	**Meeting with National Forestry Authority (NFA) Private foresters- Consultation on GKMA Transmission Line Improvement Project**	Total pages	2

Present	Apology	Copy	Name	Organisation	Designation
☒	☐	☐	List attached	NFA Foresters	
☒	☐	☐	Mercy Nampurira	NFA	Nandagi Forest Supervisor
☒	☐	☐	Ian Kakuru Kahigi (IKK)	Air Water Earth Ltd	Valuation Surveyor
☒	☐	☐	Edward Okot Omoya (EOO)	Air Water Earth Ltd	Ecologist

Item	Update
1.	**Introduction**
	The NFA Nandagi Forest Supervisor welcomed the team and the foresters that managed to make it for the sensitization meeting. Introductions of the Consultant team present for the meeting were made. A presentation of the 'ESIA and RAP for The Preparatory Survey for the Greater Kampala Metropolitan Area Transmission System Improvement Project' was made to the PAPs present who comprised registered NFA foresters, their managers and a few unregistered share croppers. The presentation included: ≠ Project Background ≠ Project Location ≠ Project and activities components ≠ The ESIA process ≠ Potential Environmental and Social Impacts (construction and operation phase) ≠ Mitigation Measures for identified impacts (construction and operation phase) ≠ Resettlement Action Plan (land survey and valuation survey procedures, compensation process, grievance mechanism, and disturbance allowance)
2.	**Question and Answer Session**
2.1.	**Question:** What is the project duration and when is it expected to commence? **Response:** The project duration is not certain at the moment, since this is still at the preparatory stage, although surveying and valuation is expected to commence as soon as possible.

2.2.	**Comment:** The NFA forest supervisor should be included on the grievance committee as she knows the affected people personally and would be better able to assist in addressing their issues.
2.3.	**Question:** Will the project be able to provide certain additional services that are lacking in the community e.g health centre, drug store? **Response:** The consultant is not privy to that information but will ensure to convey to the project proponent.
2.4.	**Question:** Will share croppers who are planting their crops in the forest be compensated for their loss of livelihood? **Response:** According to the NFA forest supervisor, no croppers are permitted within the forest reserve and therefore any croppers therein are operating illegally. On this basis, no croppers will be compensated.

STAKEHOLDER CONSULTATION RECORD

Name of agency/stakeholder/community: NANDAGI FOREST FARMERS

Purpose of consultation (tick appropriate box)				
	Scoping	☐	ESIA	✓
	Sensitisation	✓	RAP	✓
	Environmental Audit	✓	Other (specify)	

Date: 10/05/2016

Project name: PREPARATORY SURVEY FOR THE GREATER KAMPALA METROPOLITAN AREA TRANSMISSION SYSTEM IMPROVEMENT PROJECT

Proponent: YACHIYO ENGINEERING COMPANY LTD.

Name	Village/Parish	Contact (Telephone)	Sign/ initial
Nvagyire Judith	Nandagi	0778391794	Y-J
OCEN Joel / Tonny	Nandagi	0777215539	[illegible]
Kalule Peter	Nandagi	07	[illegible]
Ssenjonga [illegible]	Nandagi	0755129976	[illegible]
Kiwanuka David	Nandagi	0759650651	[illegible]
Ssejjinda Yisa Ssalongo	Nandagi	0754702636	[illegible]
Nakibuule Prossecovia	Namawojjolo		
Tenywa Garton			
Noel Kajubi	Namawojjolo		
Pado Moyiks	Nandagi		
Augustine	Nandagi		

STAKEHOLDER CONSULTATION RECORD

Name of agency/stakeholder/community: NANDAGI FOREST FARMERS

Purpose of consultation (tick appropriate box)				
	Scoping	☐	ESIA	✓
	Sensitisation	✓	RAP	✓
	Environmental Audit	✓	Other (specify)	

Date: 10/05/2016

Project name: PREPARATORY SURVEY FOR THE GREATER KAMPALA METROPOLITAN AREA TRANSMISSION SYSTEM IMPROVEMENT PROJECT

Proponent: YACHIYO ENGINEERING COMPANY LTD.

Name	Village/Parish	Contact (Telephone)	Sign/ initial
Namusisi Molly	Nandagi	0775599065	[illegible]
Asiimwe Mutabazi Wilson	Nandagi	0772414702	[illegible]
Tumuhaise Brian	Nandagi	+252619340253 0700600294	[illegible]
Mpiso Daniel	Wanjeyo	0779112655	[illegible]
Kiyaga Fred	Namawojjolo West	0773819055 [illegible]	[illegible]
Rwamwiri Dickson	Nandagi	0778331004	[illegible]
Namulondo Florence	Namawojjolo West	0773924111	[illegible]
Nalubega Annet	Nandagi	0750518522	[illegible]
Nalubwama Sarah	Nandagi	0787414495	[illegible]
Kyarikunda Elizabeth	Nandagi		Elizabeth
Talyewa Juma	Nandagi	0786759652	[illegible]

STAKEHOLDER CONSULTATION RECORD

Name of agency/stakeholder/community: NANDAGI FOREST FARMERS

Purpose of consultation (tick appropriate box)				
	Scoping	☐	ESIA	✓
	Sensitisation	✓	RAP	✓
	Environmental Audit	✓	Other (specify)	

Date: 10/05/2016

Project name: PREPARATORY SURVEY FOR THE GREATER KAMPALA METROPOLITAN AREA TRANSMISSION SYSTEM IMPROVEMENT PROJECT

Proponent: YACHIYO ENGINEERING COMPANY LTD.

Name	Village/Parish	Contact (Telephone)	Sign/ initial
Musoozi Stephen	Nabuti / Nsuube Nyenga	0773152672	[illegible]
Tasi Samuel	Namawojjolo-West	0772[illegible]	[illegible]
Yuliyana	Namawojjolo West	0773617941	[illegible]
Massolo Margaret	Namawojjolo West	0778020054	Massolo
Asiiba Kyakuwa	Namawojjolo West		[illegible]
Namuwonge Margret	Namawojjolo East	0775341629	Namuwonge
Mawa Eriabu	Namawojjolo West		
Mukonyezi Asaph	Namawojjolo West		[illegible]
Ariyo Bukulu	Wakiso	0772357499	[illegible]
Nakato Rusatuse	Namawojjolo West		
NaKamya Joyce	Bwefulumya		N.J

STAKEHOLDER CONSULTATION RECORD

Name of agency/stakeholder/community: NANDAGI FOREST FARMERS

Purpose of consultation (tick appropriate box)				
	Scoping	☐	ESIA	✓
	Sensitisation	✓	RAP	✓
	Environmental Audit	✓	Other (specify)	

Date: 10/05/2016

Project name: PREPARATORY SURVEY FOR THE GREATER KAMPALA METROPOLITAN AREA TRANSMISSION SYSTEM IMPROVEMENT PROJECT

Proponent: YACHIYO ENGINEERING COMPANY LTD.

Name	Village/Parish	Contact (Telephone)	Sign/ initial
Balibawo Juliet	Namawojjolo		[illegible]

2. **Meeting with Community in Mukono Project Area - Nama II, Buyuki and Luwunga villages**

Week	**11**	Meeting date	**30 April 2016**
		Recorded by	**IKK**
Meeting/subject	**Meeting with Communities in Mukono - Nama II, Buyuki and Luwunga villages - Consultation on GKMA Transmission Line Improvement Project**	Total pages	**2**
Project Proponent	**Yachiyo Engineering Company Limited**		

Present	Apology	Copy	Name	Organisation	Designation
☒	☐	☐	List attached	Nama II, Buyuki and Luwunga	Project Affected Persons
☒	☐	☐	List attached	Nama II, Buyuki and Luwunga	Chairpersons
☒	☐	☐	Ian Kakuru Kahigi (IKK)	Air Water Earth Ltd	Valuation Surveyor
☒	☐	☐	Isa Kabenge	Air Water Earth Ltd	Engineer

Item	Update
1.	**Introduction**
	The LC1 Chairman of Luwunga zone welcomed the team. Introductions of the consultant team and chairpersons present for the meeting were made. A presentation of the **'ESIA and RAP for The Preparatory Survey for the Greater Kampala Metropolitan Area Transmission System Improvement Project'** was made to the chairpersons and a few PAPs present, including but not limited to: The presentation included: ≠ Project Background ≠ Project Location ≠ Project and activities components ≠ The ESIA process ≠ Potential Environmental and Social Impacts (construction and operation phase) ≠ Mitigation Measures for identified impacts (construction and operation phase) ≠ Resettlement Action Plan (land survey and valuation survey procedures, compensation process, grievance mechanism, and disturbance allowance)
2.	**Question and Answer Session**
2.1.	**Comment:** Projects take place but compensation delays for a long time and this affects the PAPs because their plans are put on hold and they incur losses in the process.

2.2.	**Comment:** L.C1s are a vital part of any project implementation and yet they are usually not compensated for their time and effort yet they are fully involved in the project from start to finish. This should be given consideration so that they may be enlisted on project implementation teams in some capacity. **Response:** The LCs will be facilitated for their involvement, especially when they have to walk with the Surveyors and Valuers.
2.3.	**Concern:** If assessment has been done but compensation is eventually not done and the project is aborted. How would the PAPs be compensated after sacrificing their properties and not undertaking any developments as a result? **Response:** The principle in Uganda is to compensate for affected properties. Therefore, no injury or damage is realised if the project is aborted and hence no compensation payment can be advanced.
2.4.	**Question:** Who constitutes the grievance committee? **Response:** The grievance committee constitutes a member of the Local Council, a member of the project proponent organisation and an identified NGO from the project area.
2.5.	**Concern:** In some instances, PAPs' structures get old and collapse before compensation is done. How will these be handled if re-assessment is done subsequently? **Response:** In the event that a PAP's structure collapses before compensation, the PAP will get the compensation due him as his property information will have already been captured.
2.6.	**Question:** Will PAPs be permitted to use the land after the project has been implemented? **Response:** The project proponent intends to fully compensate and acquire the project area and therefore no work or developments by PAPs will be allowed subsequent to project implementation.
2.7.	**Concern:** How will kibanja holders and title owners be compensated? **Response:** Kibanja owners and title holders will be equitably compensated in their individual holding capacities on pro rata basis.
2.8.	**Concern:** Wives may not receive any money and the husbands claim it all and squander it. How will their interests be put into consideration? **Response:** Wives especially those who are legally or traditionally married will be put into consideration by having their information captured during the payment exercise and as much as possible, husbands will be encouraged to present joint accounts for payment. This will be done with the help of the L.C1 to identify such risk prone relationships.

STAKEHOLDER CONSULTATION RECORD

Name of agency/stakeholder/community:	Nama II, Bugulu & Luwunga			
Purpose of consultation (tick appropriate box)	Scoping		ESIA	✓
	Sensitisation	✓	RAP	✓
	Environmental Audit		Other (specify)	
Date: 30/04/2016				
Project name: PREPARATORY SURVEY FOR THE GREATER KAMPALA METROPOLITAN AREA TRANSMISSION SYSTEM IMPROVEMENT PROJECT				
Proponent: YACHIYO ENGINEERING COMPANY LTD.				

Name	Village/Parish	Contact (Telephone)	Sign/ initial
Mulimira JAMES	NAMA II	0750338699	[illegible]
Ssengendo Henry	Nama II	0773444274	[illegible]
Kalugo Stephens	NAMA II	0779901376	[illegible]
Maluboweraned Nambaseeto	Nama II	0784369042	[illegible]
Walakira Edward	Nama II	0773007349	[illegible]
Babumba Habert	Nama II	0774552980	[illegible]
Ssemanda Edward	Nama II	0787348303	[illegible]
Jenifa Taka	NAMA II	0772624681	Jenifa
Nuwonge Winfred	Luwunga	0774043383	[illegible]
KABUGO SEMEI	NAMA II	0798219267	[illegible]
Senkaaguuka Willy	Nama II	0798219267	—

STAKEHOLDER CONSULTATION RECORD

Name of agency/stakeholder/community:	Nama II, Bugulu & Luwunga			
Purpose of consultation (tick appropriate box)	Scoping		ESIA	✓
	Sensitisation	✓	RAP	✓
	Environmental Audit		Other (specify)	
Date: 30/04/16				
Project name: PREPARATORY SURVEY FOR THE GREATER KAMPALA METROPOLITAN AREA TRANSMISSION SYSTEM IMPROVEMENT PROJECT				
Proponent: YACHIYO ENGINEERING COMPANY LTD.				

Name	Village/Parish	Contact (Telephone)	Sign/ initial
Kyobe Samuel	Nama II	0750502032	[illegible]
KABUGO SEMEI	NAMA II	0705256274	[illegible]
Ndyabawe	Bugulu	0755603274	[illegible]
Lubwama Ken	Nama II	0753033846	[illegible]
NASIRUMBI RUTH	Nama II	0782519683	N.R.
Nabbanja Am	Nama II	0782019941	NAm
RATIPHER DAMBA	NAMA II	0773 80 63 44	[illegible]
KATWAMBA WILLIAM	NAMA II	0782647136	[illegible]
Sowko ABudala	Nama II	0775770713	AT
Muwanga Isaac	Nama II	0775643050	
DAVIDI Lwanga	NAMA II		[illegible]

STAKEHOLDER CONSULTATION RECORD

Name of agency/stakeholder/community:	Nama II, Bugulu & Luwunga			
Purpose of consultation (tick appropriate box)	Scoping		ESIA	✓
	Sensitisation	✓	RAP	✓
	Environmental Audit		Other (specify)	
Date: 30/04/16				
Project name: PREPARATORY SURVEY FOR THE GREATER KAMPALA METROPOLITAN AREA TRANSMISSION SYSTEM IMPROVEMENT PROJECT				
Proponent: YACHIYO ENGINEERING COMPANY LTD.				

Name	Village/Parish	Contact (Telephone)	Sign/ initial
BASHEKA RENON	NAMA II	0782249354	[illegible]
NKugwa Yowen	Nama II	0775515065	Nkugwa
Dunze Yoba	Nama II	0751012916	[illegible]
Gayobba Daniel	NAMA II		Segobba
Wegulo Magezi	Nama II	0757578553	

3. **Meeting with Community in Mukono Project Area - Wanjeyo, Kivuvu and Bwefulumya villages**

Week	11	Meeting date	**30 April 2016**
		Recorded by	**IKK**
Meeting/subject	**Meeting with Communities in Mukono - Wanjeyo, Kivuvu and Bwefulumya villages - Consultation on GKMA Transmission Line Improvement Project**	Total pages	**2**
Project Proponent	**Yachiyo Engineering Company Limited**		

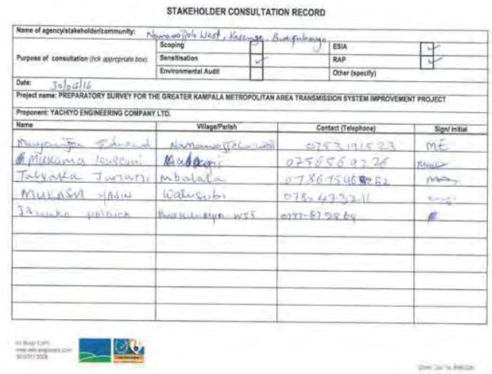
Present	Apology	Copy	Name	Organisation	Designation
☒	☐	☐	List attached	Wanjeyo, Kivuvu and Bwefulumya	Project Affected Persons
☒	☐	☐	List attached	Wanjeyo, Kivuvu and Bwefulumya	Chairpersons
☒	☐	☐	Ian Kakuru Kahigi (IKK)	Air Water Earth Ltd	Valuation Surveyor
☒	☐	☐	Isa Kabenge	Air Water Earth Ltd	Engineer

Item	Update
1.	**Introduction**
	The LC1 Chairman of Bwefulumya zone welcomed the team. Introductions of the consultant team and chairpersons present for the meeting were made. A presentation of the **'ESIA and RAP for THE Preparatory Survey for the Greater Kampala Metropolitan Area Transmission System Improvement Project'** was made to the chairpersons and a few PAPs present, including but not limited to: The presentation included: ≠ Project Background ≠ Project Location ≠ Project and activities components ≠ The ESIA process ≠ Potential Environmental and Social Impacts (construction and operation phase) ≠ Mitigation Measures for identified impacts (construction and operation phase) ≠ Resettlement Action Plan (land survey and valuation survey procedures, compensation process, grievance mechanism, and disturbance allowance)
2.	**Question and Answer Session**

2.1.	**Question:** Where exactly is the project going to pass within this particular area? **Response:** The project route is outlined in the google earth image on the presentation slides. The transmission lines will commence from the intersection with the chinese lines in Nama, Luwunga downhill up to Bwefulumya where they meet the substation. The substation will predominantly affect commercial foresters in Nandagi Forest reserve
2.2.	**Comment:** It has been said that community members will be given opportunities for employment during project works. That will be a good initiative.
2.3.	**Question:** Are the power lines going to be connected from existing lines to the new sub-station? **Response:** Yes, there will be a 132 kV line connecting from the substation to the existing transmission lines along the highway.
2.4.	**Question:** Will power supply from the new lines and sub-stations be able to connect for community domestic use? **Response:** Yes, from the 132 kV connection to existing transmission lines but not directly to the high voltage lines or the substation.
2.5.	**Concern:** Can the local leaders write to project so that any projects being implemented within this community give job opportunities especially labourers to community members first? **Response:** As a principle, project contractors are encouraged to utilise community members of the project community for some lay jobs to help raise the economic status of the project community. This is done in conjunction with the local leaders. However, the local leaders are at liberty to write to the project contractors to request for such job opportunities for their community.
2.6.	**Question:** If the corridor to be acquired borders with someone's house, would that person's house be affected and can they be compensated for that house? **Response:** In such an event, the person would not be compensated unless if he suffered injurious affection as a result of project works.
2.7.	**Question:** Since a sub-station is to be constructed within the community, can UMEME and UETCL make some effort to increase the density of power supply and connections in this area? **Response:** It is not within the mandate of the consultant to advise UMEME or UETCL on how to distribute power resources but the consultant shall present the concerns of the community for their discretionary review.

STAKEHOLDER CONSULTATION RECORD

Name of agency/stakeholder/community:	Namawojjolo West, Kasenge, Bwefulumya		
Purpose of consultation (tick appropriate box): Scoping [ ] Sensitisation [✓] Environmental Audit [ ]	ESIA [✓] RAP [✓] Other (specify)		
Date: 30/04/16			
Project name: PREPARATORY SURVEY FOR THE GREATER KAMPALA METROPOLITAN AREA TRANSMISSION SYSTEM IMPROVEMENT PROJECT			
Proponent: YACHIYO ENGINEERING COMPANY LTD.			
Name	**Village/Parish**	**Contact (Telephone)**	**Sign/ initial**
[illegible]	Namawojjolo	[illegible]	[illegible]
[illegible]		075-8 900 499	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]
Muwanga [illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]
Nalubega Annet	Namawojjolo	[illegible]	[illegible]
[illegible]	Nakapinyi / Kasenge	[illegible]	[illegible]
KIYAGA FRED	Namawojjolo West	0773819355	[illegible]
Kayeebye Mohamed	Bwefulumya west	0712379995	[illegible]
HALEMA SULA	Bwefulumya	078851894464	[illegible]
Nakibuka [illegible]	Bwefulumya		Nakibuka



STAKEHOLDER CONSULTATION RECORD

Name of agency/stakeholder/community:	Namawojjolo West, Kasenge, Bwefulumya		
Purpose of consultation (tick appropriate box): Scoping [ ] Sensitisation [✓] Environmental Audit [ ]	ESIA [✓] RAP [✓] Other (specify)		
Date: 30/04/16			
Project name: PREPARATORY SURVEY FOR THE GREATER KAMPALA METROPOLITAN AREA TRANSMISSION SYSTEM IMPROVEMENT PROJECT			
Proponent: YACHIYO ENGINEERING COMPANY LTD.			
Name	**Village/Parish**	**Contact (Telephone)**	**Sign/ initial**
[illegible] Edward	Namawojjolo [illegible]	0753191523	[illegible]
Mukama [illegible]	[illegible]	0756569276	[illegible]
Tabyaka Juranti	Mbalala	[illegible]	[illegible]
MUKASA YASIN	Walusubi	[illegible]	[illegible]
[illegible]	Bwefulumya WST	[illegible]	[illegible]

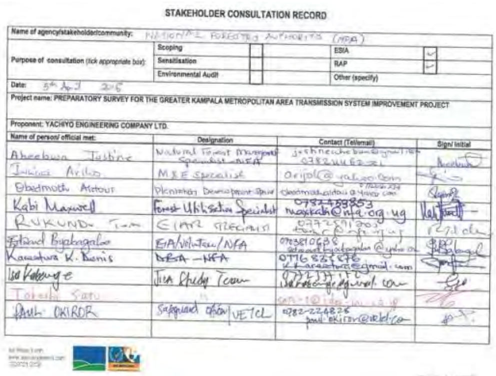
4. **Meeting with National Forestry Authority (NFA)**

eek	13	Meeting date	5 April 2016
		Recorded by	BA
Meeting/subject	**Meeting National Forestry Authority - Consultation on GKMA Transmission Line Improvement Project**	Total pages	2

Present	Apology	Copy	Name	Organisation	Designation
☒	☐	☐	List attached	NFA	
☒	☐	☐	Paul Okiror	UETCL	Safeguard Officer
☒	☐	☐	Takeshi Sato	JICA Study Team	ESIA Specialist
☒	☐	☐	Dr. Isa Kabenge	Air Water Earth	Engineer
☒	☐	☐	Brenda Amanda (BA)	Air Water Earth	Engineer

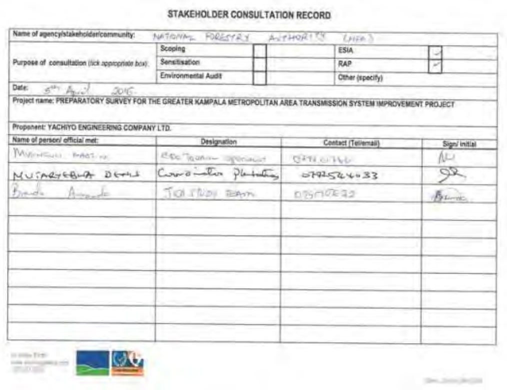
Item	Update
1.	**Introduction**
	The JICA study team was welcomed and self-introductions made. A presentation of the Project details was made by the JICA study team. The presentation included: ≠ Project Background ≠ Project Location ≠ Project and activities components ≠ The ESIA process ≠ Potential Environmental and Social Impacts (construction and operation phase) ≠ Mitigation Measures for identified impacts (construction and operation phase) ≠ Resettlement Action Plan (land survey and valuation survey procedures, compensation process, grievance mechanism, and disturbance allowance)
2.	**Question and Answer Session**
2.1.	**Comment:** First project-Electrification of Mukono industrial parks project. More two substations connecting Iganga to Mayuge.
2.2.	**Comment:** The Mukono industrial parks project affects Nandagi project. Options/ alternatives considerations include social, environmental and economic alternatives analysis.
2.3.	**Comment:** Negotiations are still on-going with NFA so the transmission line corridor and substation sites are not yet confirmed.
2.4.	**Comment:** The Chinese require 30m corridor, while JICA transmission line requires 75m corridor. That is a total of 105m. The substation is 3 acres, 6 ha as approximate transmission line length inside the substation. Access road is 1.2km (8m wide).
2.5.	**Comment:** NFA needs to see the option selection reports showing the alternatives and why the forest reserve area was selected.

Item	Update
2.6.	**Question:** What distance was left for the river protection? River Kasala which joins Sezibwa downstream.
2.7.	**Question:** Standard gauge railway and other proposed roads. Has UETCL found out about any other projects that are planned for the near future within the project area? Standard gauge railway to be 2m from the ground. This project needs to be harmonised with other government projects e.g. Railway, Jinja Expressway.
2.8.	**Comment:** NFA needs to know that UETCL has confirmed that there are no projects planned or existing that can share a wayleave with the UETCL projects.
2.9.	**Concern:** UETCL needs to own the projects, as opposed to pseudo names like Chinese substation or Japanese substation.
2.10.	**Comment:** Bujagali substation will be intended to increase switch from 132kV (existing) to 220kV, although without need for more land requirement.
2.11.	**Comment:** Another meeting will be held in which the documents submitted by UETCL will be arranged. A field visit of the area will then be held.
2.12.	**Concern:** The width of the corridor is wide and yet it is a protected area.



STAKEHOLDER CONSULTATION RECORD

Name of agency/stakeholder/community:	NATIONAL FORESTRY AUTHORITY (NFA)		
Purpose of consultation (tick appropriate box): Scoping [ ] Sensitisation [ ] Environmental Audit [ ]	ESIA [✓] RAP [✓] Other (specify)		
Date: 5th April 2016			
Project name: PREPARATORY SURVEY FOR THE GREATER KAMPALA METROPOLITAN AREA TRANSMISSION SYSTEM IMPROVEMENT PROJECT			
Proponent: YACHIYO ENGINEERING COMPANY LTD.			
Name of person/ official met:	**Designation**	**Contact (Tel/email)**	**Sign/ initial**
Abeebwa Justine	Natural Forest Management Specialist - NFA	[illegible]	[illegible]
Julius Arilo	M&E Specialist	[illegible]@yahoo.com	[illegible]
Obadmoth Atdoui	Plantation Development Specialist	[illegible]@yahoo.com	[illegible]
Kabi Maxwell	Forest Utilisation Specialist	[illegible]@nfa.org.ug	[illegible]
RUKUNDO Tom	EIA/R SPECIALIST	[illegible]	[illegible]
Edward Byabagalo	EIA/Volunteer/NFA	[illegible]	[illegible]
Karastura K. Denis	DBSA - NFA	[illegible]	[illegible]
Isa Kabenge	Jica Study Team	[illegible]	[illegible]
Takeshi Sato	"	[illegible]	[illegible]
Paul OKIROR	Safeguard officer UETCL	0782-224826 paul.okiror@uetcl.com	[illegible]



STAKEHOLDER CONSULTATION RECORD

Name of agency/stakeholder/community:	NATIONAL FORESTRY AUTHORITY (NFA)		
Purpose of consultation (tick appropriate box):	Scoping ☐ / Sensitisation ☐ / Environmental Audit ☐	ESIA ✓ / RAP ✓ / Other (specify)	
Date: 5th April 2016			
Project name: PREPARATORY SURVEY FOR THE GREATER KAMPALA METROPOLITAN AREA TRANSMISSION SYSTEM IMPROVEMENT PROJECT			
Proponent: YACHIYO ENGINEERING COMPANY LTD.			
Name of person/ official met:	Designation	Contact (Tel/email)	Sign/ initial
[illegible]	[illegible]	[illegible]	[illegible]
MUTARYEBWA DENIS	Coordinator Plantations	0772524033	[illegible]
Brenda Amanda	JICA STUDY TEAM	[illegible]	[illegible]

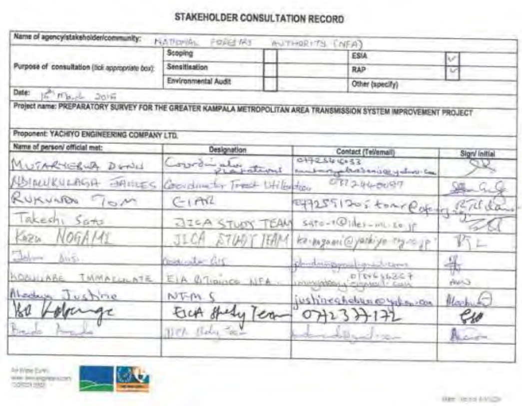
5. **Meeting with National Forestry Authority (NFA)**

Week	11	Meeting date	16 March 2016
		Recorded by	BA
Meeting/subject	Meeting with National Forestry Authority (NFA) - Consultation on GKMA Transmission Line Improvement Project	Total pages	2

Present	Apology	Copy	Name	Organisation	Designation
☒	☐	☐	List attached	NFA	
☒	☐	☐	Denis Mutaryebwa	NFA	Coordinator Plantations
☒	☐	☐	Takeshi Sato	JICA Study Team	ESIA Specialist
☒	☐	☐	Kazu Nogami	JICA Study Team	
☒	☐	☐	Dr. Isa Kabenge	JICA Study Team	Engineer
☒	☐	☐	Brenda Amanda (BA)	JICA Study Team	Engineer

Item	Update
1.	**Introduction**
	The JICA study team was welcomed by Tom Rukundo, the NFA EIA Specialist and self-introductions made. A presentation of the Project details was made by the JICA study team. The presentation included: ≠ Project Background ≠ Project Location ≠ Project and activities components ≠ The ESIA process ≠ Potential Environmental and Social Impacts (construction and operation phase) ≠ Mitigation Measures for identified impacts (construction and operation phase) ≠ Resettlement Action Plan (land survey and valuation survey procedures, compensation process, grievance mechanism, and disturbance allowance)
2.	**Question and Answer Session**
2.1.	**Comment:** Nandagi is located outside the nursery bed, the land was given to tree farmers by NFA, so the land belongs to NFA, but the trees belong to individual farmers. It is also managed by NFA. Since it is government land, an offset fee is paid. NFA will dialogue with UETCL regarding the offset.
2.2.	**Comment:** Biodiversity evaluation should be part of the ESIA study. For the transmission line through Mabira, UETCL got a consultant to do the biodiversity evaluation.
2.3.	**Comment:** Purpose of the forest reserve is mostly as a catchment area where streams pass.
2.4.	**Comment:** Uncoordinated planning is a major problem for the forest reserves example, Standard Gauge Railway and Oil Pipeline. The cumulative impacts can be great, such that the forest reserves are lost.

2.5.	**Comment:** Minimal impact would be going through the sugarcane plantation. Why isn't the line going through the plantation and instead through the forest reserve. The 16 acres obtained for the substation were already acquired by UETCL. This project is only dealing with the transmission line corridor for the new proposed substation, since it was found that this 16 acres was sufficient for two substations.
2.6.	**Comment:** A 'no-objection' letter about the Chinese Project was obtained by UETCL. NFA does not have an official confirmation about this. NFA will follow-up the matter with UETCL.
2.7.	**Comment:** Booklet on management of forest reserves regarding activities acceptable within the reserves is available and can be shared with the Consultant.
2.8.	**Recommendation:** Send kmz file of Project area to NFA John Diisa (Coordinator GIS) and Tom Rukundo so that extent of Project area within forest reserves is known.



STAKEHOLDER CONSULTATION RECORD

Name of agency/stakeholder/community:	NATIONAL FORESTRY AUTHORITY (NFA)		
Purpose of consultation (tick appropriate box):	Scoping ☐ / Sensitisation ☐ / Environmental Audit ☐	ESIA ✓ / RAP ✓ / Other (specify)	
Date: 16th March 2016			
Project name: PREPARATORY SURVEY FOR THE GREATER KAMPALA METROPOLITAN AREA TRANSMISSION SYSTEM IMPROVEMENT PROJECT			
Proponent: YACHIYO ENGINEERING COMPANY LTD.			
Name of person/ official met:	Designation	Contact (Tel/email)	Sign/ initial
MUTARYEBWA DENIS	Coordinator Plantations	0772524033	[illegible]
[illegible]	Coordinator Forest Utilization	[illegible]	[illegible]
RUKUNDO TOM	EIA/R	[illegible]	[illegible]
Takeshi Sato	JICA STUDY TEAM	[illegible]	[illegible]
Kazu NOGAMI	JICA STUDY TEAM	[illegible]	[illegible]
John Diisi	Coordinator GIS	[illegible]	[illegible]
[illegible]	EIA [illegible] NFA	[illegible]	[illegible]
[illegible] Justine	NTFMS	[illegible]	[illegible]
Isa Kabenge	JICA Study Team	0772377172	[illegible]
Brenda Amanda	JICA Study Team	[illegible]	[illegible]

BULOBA PROJECT AREA

6. **Meeting with Community in Buloba Project Area - Kaggaba, Mabuye and Nsujjwe villages**

Week	05	Meeting date	27 January 2016
		Recorded by	BA

Meeting/subject	Meeting with Buloba residents (Kaggaba, Mabuye and Nsujjuwe villages)- Consultation on GKMA Transmission Line Improvement Project	Total pages	2

Present	Apology	Copy	Name	Village	Designation
☒	☐	☐	List attached	Buloba residents	
☒	☐	☐	Ian Kakuru	Air Water Earth Ltd.	Valuer
☒	☐	☐	Brenda Amanda	Air Water Earth Ltd.	Engineer

Item	Update
3.	**Introduction**
	The AWE team was welcomed and self-introductions made. A presentation of the Project details was made by the AWE team. The presentation included: ≠ Project Background ≠ Project Location ≠ Project and activities components ≠ The ESIA process ≠ Potential Environmental and Social Impacts (construction and operation phase) ≠ Mitigation Measures for identified impacts (construction and operation phase) ≠ Resettlement Action Plan (land survey and valuation survey procedures, compensation process, grievance mechanism, and disturbance allowance)
4.	**Question and Answer Session**
	Project Design
4.1.	**Question:** Is the 15 acres mentioned only for the substation, or for the entire Project area? **Response**: The 15 acres mentioned is for the substation area.
4.2.	**Question:** How will the *kibanja* holders and title holders be catered for? **Response:** The compensation for such an area is split such that the kibanja holder receives 70% of the compensation sum while the title holder receives 30% of the compensation sum.
4.3.	**Comment:** Sometimes the Valuers don't give the right amount e.g. someone who deserves more money gets less, and vice versa. **Response:** The valuation process will be conducted in line with the laws of Uganda and the JICA Guidelines for Social and Environmental Considerations. In accordance with the Ugandan laws, the Valuation report will be submitted to the Chief Government Valuer for approval of the compensation values to be used for the Project.
4.4.	**Question:** How will the Grievance Committee be selected and where could it be found? **Response:** The Grievance Committee will be composed of the area local chairpersons such as LC I and LC II. Aside from the local chairpersons, the Committee will also include an elder on the village, an opinion leader, as well as a representative from UETCL. The Committee's office shall be at the LC Chairperson's office, or another location that the PAPs agree upon as being the most convenient. UETCL also has officers that are dedicated to handling the RAP issues that arise from their various Projects.
4.5.	**Question**: If a young fruit tree has been valued, will the future prospects be catered for e.g. the jack fruit trees or oranges that would have been reaped from the fruit tree? **Response:** No, valuations are done on as as-is basis. Projections are not done during the valuation exercise.

4.6.	**Suggestion:** Both the kibanja holder and title holder should be present during the Valuation exercise. **Response:** All PAPs will be notified when the fieldwork for surveying and valuation is taking place.
4.7.	**Comment:** Sometimes the cut-off date is announced but the Project takes long to start, yet the people have been asked to hold off on developments. **Response:** If a Project takes more than 2 years after the cut-off date, a re-evaluation is done to take into consideration any changes.
4.8.	**Complaint:** Towards the end of last year (2015), a team doing geo-technical surveys was in the area. The team ate fruits from community members' trees and also parked their vehicles in peoples' compounds without asking for permission. **Response**: It is regrettable that community members' property was not respected. All the Consultants involved will be informed to ensure that all field staff respect community members' property and make requests to use or purchase any individual or community resources.
4.9.	**Question:** The Graveyard for the Grail Sisters is within the Project area. Will these graves be relocated? **Response:** The Project route will try as much as possible not to affect any physical and cultural resources. However, the affected areas will be more accurately identified after the surveyors have started with field work and marked out the substation and corridor extents.
4.10.	**Question:** Some landowners do not live in the area and have to travel from far. Will facilitation be provided for this? **Response:** No, facilitation is not provided for the community members to attend meetings.

STAKEHOLDER CONSULTATION RECORD

Name of agency/stakeholder/community: KAGABA, MABUYE & NSUJJWE VILLAGES, MPIGI DISTRICT				
Purpose of consultation (tick appropriate box):	Scoping ☐	Sensitisation ☑	Environmental Audit ☐	ESIA ☑ RAP ☑ Other (specify)
Date: 27th January 2016				
Project name: PREPARATORY SURVEY FOR THE GREATER KAMPALA METROPOLITAN AREA TRANSMISSION SYSTEM IMPROVEMENT PROJECT				
Proponent: YACHIYO ENGINEERING COMPANY LTD.				

Name of person/ official met:	Designation (Village)	Contact (Tel/email)	Sign/ initial
Hajji Mugagga [illegible]	Kagaba	(Skena Properties Ltd) 0707715037/0782710288	[illegible]
MUGAMBE M.	"	0752973966	[illegible]
[illegible]	[illegible]	0775 426930	[illegible]
Ndiwalala Nasiiri	Kaggaba	0701 709526	[illegible]
NAJJIKA ROSE	Lubaga / Kaggaba	0752472523	[illegible]
Prisca Nakitto	Lubaga / Kaggaba	0775687250	P. Nakitto
Kasujja Abman	Kaggaba-Nabusujjo	[illegible] Land Lord	[illegible]
Frances Nassuuna	Lubaga/Kaggaba	0787096404	[illegible]
Nassanga Theopista	Kaggaba	0772563808	[illegible]
Lugemwa Sarah	Kagaba	0787554545	Sarah
SSALI MOHAMMED MOSES	CHAIR LC KAGGABA	0702/0772-497579	[illegible]

STAKEHOLDER CONSULTATION RECORD

Name of agency/stakeholder/community: KAGGABA, MABUYE & NSUJJWE VILLAGES, MPIGI DISTRICT				
Purpose of consultation (tick appropriate box):	Scoping ☐	Sensitisation ☑	Environmental Audit ☐	ESIA ☑ RAP ☑ Other (specify)
Date: 27th January 2015				
Project name: PREPARATORY SURVEY FOR THE GREATER KAMPALA METROPOLITAN AREA TRANSMISSION SYSTEM IMPROVEMENT PROJECT				
Proponent: YACHIYO ENGINEERING COMPANY LTD.				

Name of person/ official met:	Designation (Village)	Contact (Tel/email)	Sign/ initial
[illegible]	Kaggaba	0782301540	[illegible]
[illegible]	KAGGABA	[illegible]	[illegible]
Nakalanda Rashidah	Kaggaba	0701381286	[illegible]
SSEBULEGE-EMM.	MABUYE	0702831185	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]

7. **Meeting with Community in Buloba Project Area - Kaggaba, Mabuye and Nsujjwe villages**

Week	13	Meeting date	**30 March 2016**
		Recorded by	**BA**
Meeting/subject	**Meeting with Buloba residents (Kaggaba, Mabuye and Nsujjwe villages)- Consultation on GKMA Transmission Line Improvement Project**	Total pages	**2**

Present	Apology	Copy	Name	Village	Designation
☒	☐	☐	List attached	Buloba residents	
☒	☐	☐	Ian Kakuru	Air Water Earth Ltd.	Valuer
☒	☐	☐	Isa Kabenge	Air Water Earth Ltd.	Engineer
☒	☐	☐	Brenda Amanda	Air Water Earth Ltd.	Engineer
☒	☐	☐	Sato Takeshi	JICA Study Team	ESIA Specialist

Item	Update
1.	**Introduction**
	The AWE team was welcomed and self-introductions made. A presentation of the Project details was made by the AWE team. The presentation included: ≠ Project Background ≠ Project Location ≠ Project and activities components ≠ The ESIA process ≠ Potential Environmental and Social Impacts (construction and operation phase) ≠ Mitigation Measures for identified impacts (construction and operation phase) ≠ Resettlement Action Plan (land survey and valuation survey procedures, compensation process, grievance mechanism, and disturbance allowance)
2.	**Question and Answer Session**
2.1.	**Concern:** It would be best to invite only those who are directly affected by the project so as not to waste too much time. Some people invited for the meeting will not lose land to the project.
2.2.	**Question:** Can't the surveyors and valuers come soon so that the affected people are identified? The most important thing is for the project area to be clearly marked. Response: The Surveyors and Valuers will start field work after they are informed that community sensitization meetings such as this one have been held.
2.3.	**Question:** Would the project come to a standstill if there were land wrangles within the project area? **Response:** The Project's Grievance Mechanism makes it possible to have dialogue with the ownership of the land that has wrangles. If the matters cannot be easily resolved, and no feasible alternative can be made to the Project design, there is the possibility of a hold-up in the Project progress.

2.4.	**Question:** Is it possible for the project route to change if it interacts with many other projects e.g. the Express highway? **Response:** Yes, the Project design can be changed at this point if major obstacles are met or identified.
2.5.	**Comment:** The contacts provided by the Consultants should be those of individuals and not general office numbers. Noted: Individual phone numbers will be provided, in addition to the office phone number.
2.6.	**Question:** When will the project start? **Response:** Towards the end of this year 2016, Government of Uganda and Japanese government are expected to sign an agreement. Project implementation will then probably take about two years.
2.7.	**Comment:** The time lag between the Surveyors and Valuers should not be long as this could result in people continuing to develop their land, sometimes dubiously.
2.8.	**Concern:** People's property should be adequately compensated.

STAKEHOLDER CONSULTATION RECORD

Name of agency/stakeholder/community: KAGGABA MABUYE & NSUJJWE VILLAGES				
Purpose of consultation (tick appropriate box):	Scoping ☐	Sensitisation ☑	Environmental Audit ☐	ESIA ☑ RAP ☐ Other (specify)
Date: 30th March 2016				
Project name: PREPARATORY SURVEY FOR THE GREATER KAMPALA METROPOLITAN AREA TRANSMISSION SYSTEM IMPROVEMENT PROJECT				
Proponent: YACHIYO ENGINEERING COMPANY LTD.				

Name of person/ official met:	~~Designation~~ Village	Contact (Tel/email)	Sign/ initial
MUGAMBE MINSUSEKA	KAGGABA	0752973966	[illegible]
SSEBULEGE-EMM	MABUYE	0702831185	
Kasujja Abman	Kaggaba-Nabusujjo	[illegible]	[illegible]
Prisca Nakitto	The Grail Kaggaba	0775687250	P. Nakitto
Musoke Peter	Mabuye c/p LC	0705-283779	[illegible]
[illegible]	Kaggaba	[illegible]	[illegible]
Lugemwa Sarah	Kaggaba	0787554545	Sarah
KATIWA EVE	KAGGABA	0789199964	[illegible]
Takeshi Sato	JICA team		[illegible]
[illegible]	Kaggaba	0782301540	[illegible]
MUTYABA YUSUF	KAGGABA NABUSUJJO	0773 426930	[illegible]

STAKEHOLDER CONSULTATION RECORD

Name of agency/stakeholder/community:	National Forestry Authority (NFA)				
Purpose of consultation (tick appropriate box):	Scoping	☐	ESIA	☑	
	Sensitisation	☐	RAP	☑	
	Environmental Audit	☐	Other (specify)		
Date: 5th April 2015					
Project name: PREPARATORY SURVEY FOR THE GREATER KAMPALA METROPOLITAN AREA TRANSMISSION SYSTEM IMPROVEMENT PROJECT					
Proponent: YACHIYO ENGINEERING COMPANY LTD.					

Name of person/ official met:	Designation	Contact (Tel/email)	Sign/ initial
Abeebwa Justine	Natural Forest Management Specialist - NFA	[illegible] 0782446221	[illegible]
Julius Arilo	M&E Specialist	orijol@yahoo.com	[illegible]
Obedmoth Aitour	Plantation Development Spcl	[illegible]@yahoo.com	[illegible]
Kabi Maxwell	Forest Utilisation Specialist	0782459853 maxkabi@nfa.org.ug	[illegible]
Rukundo Tom	EIA/R Specialist	0772591203 [illegible]@nfa.org.ug	[illegible]
Edward Byabagalo	EIA/Volunteer/NFA	0703810638 edwardbyabagalo@yahoo.com	[illegible]
Karaakwa K. Denis	DRSA - NFA	0776835876 k.karaakwa@gmail.com	[illegible]
Isa Kabenge	JICA Study Team	0772339172 [illegible]@gmail.com	[illegible]
Tohru Sato	"	[illegible]	[illegible]
Paul Okiror	Safeguard officer UETCL	0782-224826 paul.okiror@uetcl.com	[illegible]

STAKEHOLDER CONSULTATION RECORD

Name of agency/stakeholder/community:	National Forestry Authority (NFA)				
Purpose of consultation (tick appropriate box):	Scoping	☐	ESIA	☑	
	Sensitisation	☐	RAP	☑	
	Environmental Audit	☐	Other (specify)		
Date: 5th April 2015					
Project name: PREPARATORY SURVEY FOR THE GREATER KAMPALA METROPOLITAN AREA TRANSMISSION SYSTEM IMPROVEMENT PROJECT					
Proponent: YACHIYO ENGINEERING COMPANY LTD.					

Name of person/ official met:	Designation	Contact (Tel/email)	Sign/ initial
Mwanguzi [illegible]	[illegible]	[illegible]	[illegible]
Musakyebuka Denis	Coordinator Plantations	0772564033	[illegible]
Brenda Amanda	JICA Study Team	[illegible]	[illegible]

8. **Meeting with SEMA Properties – Buloba Project area**

Week	46	Meeting date	**12 November 2015**
		Recorded by	**Ivan B**
Meeting/subject	**Preparatory Survey for the Greater Kampala Metropolitan Transmission System Improvement Project - Buloba Site Land Ownership Review**	Total pages	**1**

Present	Apology	Copy	Name	Organisation	Designation
☒	☐	☐	Mukwaya Sula (MS)	Millennium Estate Ltd	Managing Director
☒	☐	☐	Semakula Sulait (SS)	Sema Properties Ltd	Managing Director
☐	☐	☐	Muyingo Musa (MM)	Sema Properties Ltd	Manager
☒	☐	☐	Ivan Bamweyana (IB)	AWE	Surveyor & GIS specialist

Item	Update
1.	**Introduction**
	Mr. Semakula Sulait welcomed the AWE representative to Sema Properties Limited. Self-introductions of all members present for the meeting were made. A presentation of the project was made to the Sema team, including but not limited to: ≠ Project description ≠ Proposed location of Buloba substation and associated infrastructure
2.	**Discussion**
	Current status of land ownership
2.1.	The land in question is still under the management of Sema Properties Ltd. The company had started on the process of transferring ownership to Bulo Parent's School Teachers' Association. However, the process was halted upon learning about the proposed substation project, as part of the Transmission System Improvement Project. *Note: Bulo Parent`s School is under the proprietorship of Sema Managing Director`s brother.*
	Willingness to sell
2.2.	Sema Properties is willing to sell the land in question. Inevitably, a new location will be identified for the Bulo Parent School's Teachers' Association.
	Conditions attached to willingness to sell
2.3.	Sema Property Limited, being a real estate company that sells land, will attach a value to the land in question. The sale process with UETCL will be initiated after a 'price tag' has been attached to the land
	Other land owners
2.4.	Sema Properties does not own the entire land proposed for the substation.
	Additional Information

2.5.	Sema property has been approached by another party (UETCL surveyor) on the same land issue.
2.6.	The local area name is "Nsimbe", not Buloba.

Stakeholder consultation record

Name of agency/stakeholder/community:	Millennium Estates & Sema Properties				
Purpose of consultation (tick appropriate box):	Scoping	☑	ESIA	☐	
	Sensitisation	☐	RAP	☐	
	Environmental Audit	☐	Other (specify)		
Date: 12 November 2015					
Project name: Improvement of Greater Kampala Metropolitan Transmission System					
Proponent:					

Name of person/ official met:	Village	Contact (Tel/email)	Sign/ initial
Mukwaya Sula	Millennium Estate	0704669333/	[illegible]
Hajji Semakula Sulait	Sema Properties	0772425253	[illegible]
Hajji Muyingo Musa	Sema Properties	0782770058	[illegible]
Bamweyana Ivan	AWE	0782180350	[illegible]

KAWAALA PROJECT AREA

9. **Meeting with Community in Kawaala Project Area - Namungoona residents**

Week	**13**	Meeting date	**29 March 2016**
		Recorded by	**BA**
Meeting/subject	**Meeting with Namungoona residents- Consultation on GKMA Transmission Line Improvement Project**	Total pages	**2**

Present	Apology	Copy	Name	Village	Designation
☒	☐	☐	List attached	Namungoona residents	
☒	☐	☐	Isa Kabenge	Air Water Earth Ltd.	Engineer
☒	☐	☐	Brenda Amanda	Air Water Earth Ltd.	Engineer

Item	Update
1.	**Introduction**

	The AWE team was welcomed and self-introductions made. A presentation of the Project details was made by the AWE team. The presentation included: ≠ Project Background ≠ Project Location ≠ Project and activities components ≠ The ESIA process ≠ Potential Environmental and Social Impacts (construction and operation phase) ≠ Mitigation Measures for identified impacts (construction and operation phase) ≠ Resettlement Action Plan (land survey and valuation survey procedures, compensation process, grievance mechanism, and disturbance allowance)
2.	**Question and Answer Session**
2.1.	**Question:** Can one remove some of their property such as roof or doors even after they have been paid? **Response:** Yes, as long as the information has been captured by the Valuer. All additions or subtractions from property after the cut-off date are not considered during compensation.
2.2.	**Question:** The cable, in some cases is passing through land that is undeveloped. Will such land owners be compensated? **Response:** Yes, all land owners will be compensated for their lost property. Developments on the land are also compensated for.
2.3.	**Question:** It is possible that the trench will affect some people even though it is not necessarily going through their land? Can such people volunteer to be compensated for relocation if they are uncomfortable having the cable so close to them? **Response:** No, one cannot volunteer to be affected by the Project. However, any damage to one's property during the course of the Project implementation can be compensated. The reporting of such cases would be done through the Local leaders and the Grievance Committee.
2.4.	**Question:** The land on which the current substation is located belonged to one of the meeting participants who was not compensated. Will the remaining land also be taken without compensation? Response: This Project will be implemented in line with JICA Guidelines and Ugandan laws. Therefore, all people whose land will be acquired will be compensated for both their land, and any property on the land affected.
2.5.	**Question:** Will the project give time for the brick making to be completed before the project can commence? **Response:** Yes, because notice to relocate will be given when the compensation money is paid. This notice period is always given, because it also has an impact on the amount of compensation given since the disturbance allowance is calculated based on the notice period.

2.6.	**Question:** Who gets compensated? The landowner or tenant? **Response:** Both the land owner and kibanja holder receive compensation. An example in this area that is on Kabaka's land is that on Kabaka's land, the Buganda Land Board receives 30% of the calculated compensation amount while the Kibanja holder will receive 70% of the compensation amount. A tenant occupying a house will not receive any part of the compensation sum because ample notice will be given and none can always move to another location.
2.7.	**Comment:** The entire compensation process should involve the LC chairman. Response: Noted. Chairpersons are always involved in the compensation process.

STAKEHOLDER CONSULTATION RECORD

Name of agency/stakeholder/community: NAMUNGOONA LC I				
Purpose of consultation (tick appropriate box):	Scoping		ESIA	✓
	Sensitisation	✓	RAP	✓
	Environmental Audit		Other (specify)	
Date: 29th March 2016				
Project name: PREPARATORY SURVEY FOR THE GREATER KAMPALA METROPOLITAN AREA TRANSMISSION SYSTEM IMPROVEMENT PROJECT				
Proponent: YACHIYO ENGINEERING COMPANY LTD.				

Name of person/ official met:	~~Designation~~ Village	Contact (Tel/email)	Sign/ initial
Asiimwe Godfrey	Chairperson LC1 LCI [illegible]	0772499821	[illegible]
[illegible]	Namungoona LC I	0752333934	[illegible]
[illegible] Aisha	Namungoona LC I	0753190672	[illegible]
[illegible]	"	[illegible]	[illegible]
Ssekajja Daniel	"	[illegible]	[illegible]
Paul T.	"		
Rwambale Patrick	"	0756086691	
[illegible] George	"	[illegible]	[illegible]
[illegible]	"	0756215429	
NKUUBI HAROONA	Security member	0750739746	[illegible]
Sembatya [illegible]	"	0789348082	

STAKEHOLDER CONSULTATION RECORD

Name of agency/stakeholder/community: NAMUNGOONA LC I				
Purpose of consultation (tick appropriate box):	Scoping		ESIA	✓
	Sensitisation	✓	RAP	✓
	Environmental Audit		Other (specify)	
Date: 29th March 2016				
Project name: PREPARATORY SURVEY FOR THE GREATER KAMPALA METROPOLITAN AREA TRANSMISSION SYSTEM IMPROVEMENT PROJECT				
Proponent: YACHIYO ENGINEERING COMPANY LTD.				

Name of person/ official met:	~~Designation~~ Village	Contact (Tel/email)	Sign/ initial
[illegible]	Namungoona LC I	[illegible]	
Katongole [illegible]	"		
[illegible]	—		
Jamilah Mukasa	"	0703242071	
[illegible]	—		

APPENDIX 10 FIRE AND EMERGENCY MANAGEMENT PLAN

Emergency Management Plan

An Emergency shall be declared if an untoward incident (Fire, Major solvent/inflammable material spill or Major injury Accidents) occurs and requires the mobilization of all possible resources to tackle it. Regular drills shall be conducted to familiarize every-body on their roles in the event of such emergency. Participation in these drills is mandatory as per procedure.

Emergency Management and Incident investigation shall cover the following:

1) Emergency procedures including;
    a. Switch on the nearest Fire Alarm
    b. Contain the emergency appropriately.
    c. All officers, supervisors and other members of core group to rush to the site of emergency.
    d. Affected area supervisors/ shift-in-charge to guide core group members in mitigating the emergency.
    e. If required on the instructions of shift-in-charge shut down operations in an orderly manner.
    f. notifying emergency service organizations at the earliest opportunity
    g. medical treatment assistance
    h. Effective communication between the people authorised by the business to co-ordinate the emergency response and all persons at site.
2) Testing of the emergency procedures including the frequency of testing;
3) Information, training and instruction to relevant workers in relation to implementing the emergency procedures.

The principal contractor will maintain the emergency plan for the workplace so that it remains effective.

Emergency Evacuations

In the event of an emergency evacuation, all workers are to cease carrying out their work and vacate the workplace immediately, following the process outlined in the emergency plan for that workplace.

If there are any other persons present within the workplace who may not be familiar with evacuation procedures, workers are to assist these persons in evacuating.

All persons are required to assemble in the nominated assembly points at the workplace until they receive further instructions from the business or emergency services personnel.

In the event of a fire all persons should follow the "Fire Emergency Procedure" outlined in this section of the system.

After hours emergencies

If any workers are working at the workplace outside ordinary work hours, it is their responsibility to notify the emergency services and evacuate the site in the event of an emergency.

Evacuating injured / people with

Workers should give immediate assistance to injured/ disabled people and assist them out of the site after all other workers have commenced their evacuation.

Fire Management plan

Section 60 of OHS act 2006 states that it's the responsibility of the occupier/contractor to ensure adequate preparedness and response to any fire incidents in his / her premises

In order to reduce hazards and the spread of fire, the following minimum requirements shall be reviewed and incorporated in fire management plan.

Fire Safety Minimum Requirements

The fire management plan shall be prepared by the owner and shall be reviewed after any significant changes to the project. The minimum requirements for a fire management plan shall include:

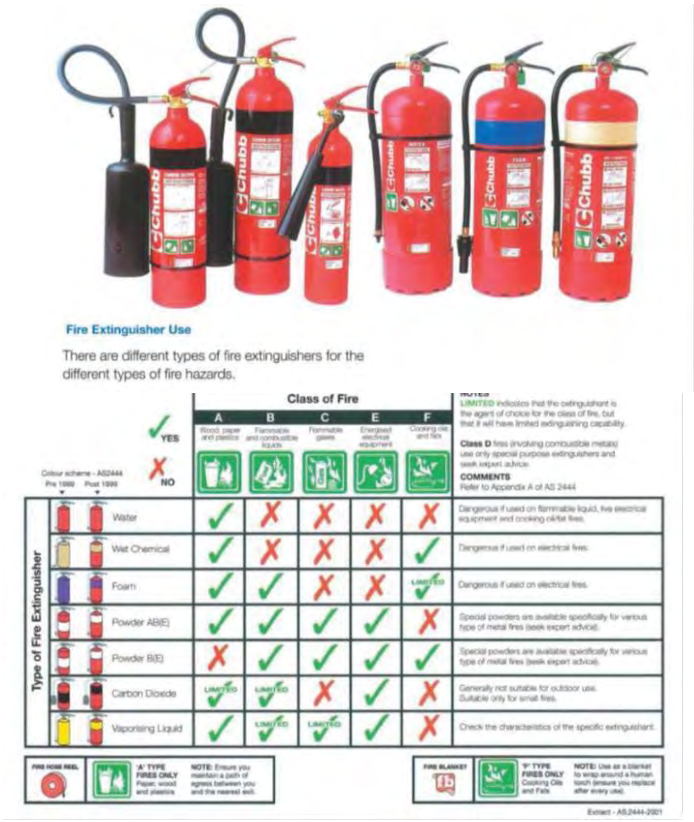
1. Designation and organization of site personnel to carry out fire safety duties.
2. The emergency procedures to be followed in the event of a fire, including:
    a. Sounding the alarm,
    b. Notifying the Fire Department,
    c. Instructing site personnel on the procedures to be followed when the alarm sounds, firefighting procedures
    d. Attack the fire, if safe to do so, using the appropriate firefighting equipment.
    e. Once away from the site, assemble at a pre-designated location.
    f. Inform Site Supervisor/ OH&S Advisor
3. Measures for controlling fire hazards in and around the building.
4. A maintenance procedure for firefighting facilities.
5. Documents, including diagrams, showing the type, location and operation of the building fire emergency systems.
6. List of all emergency response numbers and list of names, addresses, and telephone numbers of persons to be contacted during and after normal operating hours in the event of an emergency.

It is also important to remember:

1. To avoid panic and leave the site in an orderly fashion.
2. If your or another person's clothes catch fire you should (or get the person to):
    - **STOP** where you are, do not run.
    - **DROP** to the floor.
    - **ROLL** to smother the flames.
3. If confronted by heavy volumes of smoke, crawl to safety (the clear air is near the floor).
4. Follow the instructions of the emergency service personnel.

TYPES OF FIRE FIGHTING EQUIPMENT

Its roll of a contractor to ensure that only the correct firefighting equipment be used for the appropriate type of fire, as outlined in the diagram and table below



USING FIRE EXTRINGUISHERS

Only people who have been trained should use a fire extinguisher, unless there is no Alternative. When using a fire extinguisher the following points should be remembered:

- ✓ Do not panic, keep calm and think.
- ✓ Warn everyone in the area of impending danger.
- ✓ Stay between the doorway and the fire.
- ✓ Use the right type of extinguisher (refer to label on extinguisher).
- ✓ Have others back you up with other extinguishers.
- ✓ Be certain you know how to use the extinguisher.
- ✓ If in doubt – read the instructions.
- ✓ Ensure that the business is notified that the extinguisher has been used.

APPENDIX 11 FIRST AID KITS AND TOOL BOX TALKS

FIRST AID KITS

First Aid facilities, equipped to a level commensurate with the risk shall be provided and will be fully maintained at all times. Supplementary facilities or eye wash stations shall be located at locations considered to be accessible.

All injuries treatments shall be entered into the project first aid register and reported to the project representative and Project HSE Officer.

Injuries requiring medical attention or further consultation may be referred to the site emergency centre.

All workers should immediately notify the Project HSE Officer of all injuries or incidents where a person is or could have been seriously injured.

All injuries or incidents of any kind should be recorded on the First Aid/ Incident Register.

First Aid Representatives

All qualified first aid personal shall be identified with an approved sticker depicting a white cross on a green background on their safety helmets.

Names of attendants shall be displayed on safety notice boards.

All employees shall be made aware of the first aid post location and the identification of first aid personal in specific work crews during Induction and Orientation session.

TOOL BOX TALKS

Safety meetings shall be held on a weekly basis. The purpose of these meetings will be to enable the supervisor to discuss and where necessary provide explanations for safety related subjects in a concise manner so as to ensure the understanding and interaction of participants.

The manager shall liaise with supervisory personnel to formulate subject matter and specific safety topics consistent with currant activities. Details of all safety meetings including attendees, topics or any concerns raised from topic discussions and proposed actions shall be recorded using the standard toolbox report form.

Copies shall be posted on all safety notice boards and sent to the Project Manager.

SAFETY TOOLBOX MEETING STRUCTURE

Coordinator	Project Manager /HSE Coordinator
Chairperson	Supervisor
Attendees	Entire work crew
Agenda	❖ Previous minutes, report back ❖ Incident/ accident reports, trends ❖ Safety topic ❖ Topic discussion
Frequency	Weekly
Minutes	To be recorded on the tool box meeting report form and distributed to management, safety committee and notice boards

HIV/ AIDS MANAGEMENT PLAN

Management of HIV/AIDS at site/ workplace

HIV/AIDS workplace management requires the advocacy and implementation of
(1) Company policies,
(2) Educational programmes, and
(3) Reasonable care and support provisions to help HIV-positive workers continue employment.
A prevention programme that aims to manage HIV/AIDS in the workplace ideally consists of these three components.

HIV/AIDS policy
Formalization of procedures related to HIV/AIDS in the

Education
Awareness raising and prevention of HIV infection and discrimination.

Care & support
Provision of access to appropriate health care and

HIV/AIDS policy development (format of the Policy, however, a contractor should develop their own this is just a guide)

A policy structures all efforts related to workplace prevention of HIV/AIDS and mitigation of its effects. The policy not only formalizes the company's commitment to manage HIV/AIDS, but also shares the responsibilities for upholding the policy with company employees.

Important policy issues to consider include:

- ✓ How will the policy build on and integrate with other existing workplace programmes?
- ✓ How will employees' right to confidentiality of medical information be secured?
- ✓ What educational efforts to increase staff knowledge on HIV/AIDS will be undertaken?
- ✓ What non-discrimination and support measures (e.g. access to medical treatment) will be put in place?

Staff training

Training of employees is the backbone of any workplace prevention programme. This aims to build staff knowledge and capacity to analyze personal risk behavior and prevent HIV transmission. An increased understanding of HIV/AIDS will further help staff to feel comfortable working together with HIV-positive co-workers. Including HIV/AIDS education in its orientation training for new staff and providing training to all staff on an annual basis would also be a good measure.

Workplace care and support measures

Provision of reasonable care and support services is essential to enable HIV-positive employees to continue working as long as possible and fulfill their expected job responsibilities. Accommodating the needs of both management and HIV-positive staff is a process of problem solving balanced by guidelines as described in the HIV/AIDS policy

.

There exists a wide variety of possible care and support provisions. Proven effective practices include:

- ✓ According time off for health-related appointments.
- ✓ Provide resources for worker requirements at camps and regulating outside visits
- ✓ Provision of counseling services.
- ✓ Assurance of continued employment.
- ✓ Financial and insurance assistance.
- ✓ Short and long-term leave.
- ✓ Access to medical treatment, including affordable anti-retroviral drugs (ARV) for employees and spouses/live-in partners.
- ✓ Reassignment to a less physically demanding position or change from full-time to part-time employment (e.g. job sharing).
- ✓ Making condoms available (partnership with the government and/or NGOs).

Workers Training on HSE management

Every employee needs to know how to work safely and without risks to health. You must provide clear instructions and information, and adequate training to your employees. Providing simple information or instructions is likely to be sufficient. These would be:

- ✓ hazards and risks they may face, if any
- ✓ measures in place to deal with those hazards and risks, if necessary
- ✓ how to follow any emergency procedures

Some employees may have particular training needs, for example:

- ✓ new recruits need basic induction training in how to work safely, including arrangements for first aid, fire and evacuation
- ✓ people changing jobs or taking on extra responsibilities need to know about any new health and safety implications
- ✓ Young employees are particularly vulnerable to accidents and you need to pay particular attention to their needs, so their training should be a priority. It is also important that new, inexperienced or young employees are adequately supervised
- ✓ Employee representatives or safety representatives will require training that reflects their responsibilities.

- ✓ Some people's skills may need updating by refresher training.

Risk assessment should identify any further training needs associated with specific risks. If you have identified danger areas in your workplace, you must ensure that your employees receive adequate instruction and training on precautions they must take before entering them. Legal requirements for specific job training, e.g. for operating cranes, trucks. Whenever new equipment, technology or changes to working practices/systems are introduced, employees will need to know about any new health and safety implications.

Employees also have responsibilities under health and safety law to:

- ✓ take care of their own health and safety and that of others
- ✓ co-operate with you to help you comply with health and safety legislation
- ✓ follow any instructions or health and safety training you provide
- ✓ tell you about any work situations that present a serious and imminent risk
- ✓ let you know about any other failings they identify in your health and safety arrangements

APPENDIX 12 WETLANDS RESTORATION PLAN FOR BULOBA AND NEW MUKONO SUBSTATIONS AND TRANSMISSION LINES

The plan identifies goals and includes a grading plan, a planting plan, and a discussion of maintenance requirements and contingency measures. The main objective of the restoration is to increase the sites' functions to a level which maintains the original capacity as habitat for amphibians, waterfowls, aquatic organisms, and native wetland plants, and as a purifier of runoff from adjoining catchment areas within the project sites in Buloba and Mukono.

The target wetland types are seasonally or semi permanently inundated Palustrine emergent slope/ flats wetland with small pools of open water. During construction of the substations and the subsequent transmission lines, every practical measure to avoid and minimize wetland impacts will be employed. As the substations' sites and the pylon foundations will be backfilled, the original contours of the topography will be matched to make sure that wetland hydrology will be maintained. The topsoil from the wetland will have been set aside during excavation and will be placed back in its location during backfilling except for the area that will be permanently constructed on. This will have the effect of positioning many of the roots and seeds of the original wetland back in place. In addition, the wetland areas will be replanted with a native seed mix. In the forested wetlands, the construction phase will necessitate clearance of trees which should be replanted with native trees. These processes will restore considerable portions of the affected wetlands to an original state.

The project requires access roads to install the transmission and substation structures. To the extent practicable, UETCL will be using the existing access roads to limit the total amount of wetland impacts from the Project.

GRADING PLAN

The primary goals for grading the restoration site are:

- ≠ Excavate select areas to create depressional features that will have hydrologic conditions favourable to the wetland sedge community;
- ≠ Re-contour the ditches in the Project affected areas to reduce slopes to no greater than 25 percent; and create a more meandering pattern, in order to improve the bio-filtration function of the drainage feature; and
- ≠ Remove fill that has been placed in the restoration areas.

It is important to ensure that material used for berms around the depressional areas is not from the historic fill but is native soil that has been removed during excavation activities. Additionally, all soil manipulation and grading activity will be supervised by a qualified biologist.

The following pollution control measures will be practiced throughout the grading operation:

- ≠ Erosion control measures will be used during the grading operations, including installation of silt fencing to protect the adjoining wetland areas.
- ≠ Operation of equipment in the adjoining wetland areas will not be allowed.

Excavated material not for use on the site will be transported offsite. An off-site fill disposal area should therefore be available.

Precautions will be taken to prevent chemical toxicants such as gasoline, lubricants, and other fuels and oils from entering aquatic areas during grading. Designated refuelling areas will be located at least 50 m from any wetlands or waterways.

- ≠ Grading operations will not result in the generation of waste materials that could enter surface waters. Toxic substances will not be introduced above natural background levels in waters of the state in amounts that may be harmful to aquatic life. No pollutants of any kind (petroleum products) will be discharged to waterways.
- ≠ The staging area will be checked regularly for equipment leaks, and any contaminated soils will be dug up and treated offsite.

PLANTING SPECIFICATIONS

Woody Plant Specifications

- ≠ Growing medium shall be well-filled with roots so that roots and medium form a cohesive unit when removed from the container.
- ≠ Top growth shall be commensurate with root growth, free from dead wood or foliar diseases, and be a minimum of 24cm high. Shrub species shall be pruned during production if necessary to stimulate branching and avoid legginess, i.e., bare lower stems and inability to stand upright.
- ≠ Root systems shall be in good condition and actively growing with white tips.
- ≠ Bare root plantings may be used.

On-Site Care of Plants

- ≠ When plants are in transit from the nursery to the job site, they shall continue to receive regular irrigation and protection from wind. All plants shall be watered immediately before planting (the same day) so that moisture in the containers is at or near field capacity. Handling during planting shall be such that overheating or excessive drying is avoided.
- ≠ If temperatures at the nursery and the job site are significantly different, the plants shall be delivered to the job site a minimum of one week prior to planting.

Planting Specifications

- ≠ All planting must be done in the beginning of the rainy season. Dates of the suitable planting periods vary from year-to-year. The first rainy season begins in March to May and the second rainy season runs from mid September to November.
- ≠ If early germination occurred and the grass dies, or an acceptable stand of grass is not achieved, reseed and fertilize the area according to the permanent seeding requirements. In areas where both woody plants and grasses are required, planting of woody plants shall be done prior to seeding of grasses.
- ≠ Graded slopes shall be left rough. Compacted areas of less than 5:1 (20%) slope shall be scarified or lightly tilled on contour. Existing rills, gullies, or other erosion damage shall be repaired and any biotechnical erosion control measures shall be installed prior to seeding. All

physical erosion control improvements, such as earth berms, shall be installed prior to grass seeding.

- No straw shall be used on the site.
- Wood fibre shall be wood cellulose fibre that contains no germination or growth-inhibiting factors. It shall be produced from non-recycled wood such as wood chips of similar material and shall have the property of even dispersion and suspension when agitated in water.
- The tackifier shall be applied with uniform coverage and shall consist of the following materials:
  - Seed husks e.g. Ecology Control
  - Wood fibre
  - Water
- The materials shall be mixed to form a slurry and applied by hydro seeder or similar equipment equipped with a continuous agitation system of sufficient operating capacity to produce a homogenous slurry. The discharge system shall be capable of applying the slurry at a continuous and uniform rate. Mixing, agitation and holding times shall be the same as specific above for hydro seeding.

Unrooted Cuttings or Live Staking

- Cuttings (live stakes) shall be prepared from live native plant species in the Project areas which are either obtained from on-site or from other sites within the area and shall be free from obvious signs of canker diseases. Cuttings shall be dormant; the leaves shall be removed (stripped) from the stems.
- Cuttings shall be cut to size and manner which does not result in frayed ends or bark. During preparation, the orientation of cuttings shall be maintained, i.e., all cuttings shall be arranged basipetal (tops up, bases down). Cuttings shall be tied in bundles of 50 and the cut tops painted with a water base paint, e.g., interior latex paint to seal the cuts and identify the tops. A highly visible colour, red, orange, yellow, etc. shall be used.
- Cuttings shall be prepared no longer than one week before planting. Cuttings shall be maintained in moist conditions at all times. They may be stored out-of-doors in shade and submerged in water, either in natural streams or ponds or in containers. When stored in containers, the water shall be changed daily. During planting, the cuttings shall be kept moist until planted. This may be accomplished by carrying in planting bags or buckets, covered with moist vermiculite, sawdust, or similar material, or in water.

Watering

Supplemental watering shall be applied to all shrub and tree plantings during the dry seasons from June to August, and December to February for a minimum of 2 years following installation of plantings.

MAINTENANCE AND CONTINGENCY MEASURES

Maintenance activities may be performed as needed, including the installation of animal damage protection devices and periodic weeding and/or spot-spraying to prevent the establishment of non-native invasive plant species.

Problems and areas of failure will be identified and reported immediately. Anticipated problems include the possibility of insufficient water during establishment of new plantings, animal damage to young seedlings, less than optimal survival rates for new plantings, and invasion by non-native plant species. If survival rates fall below 80%, replacement plantings, reseeding, or other measures will be taken to ensure that enhancement goals are met. Before doing so, onsite hydrologic conditions that might have contributed to the failure will be identified and remedied if possible via selective regrading.

Supplemental watering of planted trees and shrubs is encouraged during the dry seasons from June to August, and December to February, for at least 2 years after plantings, or until the new plantings become established. If dry conditions continue to be a problem, then the planting mix, topography, and hydrologic conditions need to be evaluated and new prescriptions may need to be prepared, including modification of the grading and planting plans.

Animal damage, including from rodents such as squirrels, may be a problem on young plantings. Animal damage will be noted and corrective actions will be implemented immediately.

Young shrubs and trees may need to be protected until they grow thick enough to be out of damage potential.

Bare areas will be reseeded or replanted with the appropriate grass/herb mix. Necessary planting and seeding will be completed at the appropriate time of year for the species. If survival continues to be a problem, the reasons will need to be determined and corrective actions taken, including new plant species and mixes, and/or regrading. Invasive plants will be controlled through mechanical or chemical means.

MONITORING PLAN

The purpose of monitoring is to provide data that can suggest midcourse corrections that should be implemented to better realize the project's objectives. The entire site should be monitored annually for a period of at least five years after restoration. At the end of each year, data collected as described below should be used to identify any changes in the wetland boundaries noted in the ESIA final report.

The methods used for monitoring include the establishment of fixed photo points and vegetation assessment plots along transects. A minimum of ten photo points is recommended for this project. The photo points will be marked on the ground with steel pipe or rebar. The GPS points at which the photos were taken, and the date, will also be recorded. The location of the photo points will be transferred into the GIS and a map of the final as-built Restoration Site Plan, with directional and distance measurements noted so that they can be reinstalled if they are accidentally removed or vandalized during the monitoring period.

Monitoring Goals, Objectives, and Performance Standards

Goal: Restore and enhance a considerable area of the existing wetland and upland habitat to primarily emergent wetland habitat in the slope/flats hydrogeomorphic class, dominated with native species typical of emergent wetlands of the Buloba and New Mukono substations and the respective transmission lines.

Objective 1: Enhance the existing wetland by establishing native plant species typical of native emergent wetland areas of Buloba and New Mukono substations and the transmission lines.

Performance Standard: Emergent cover in the restored portion of the site shall be 50% by Year 1 and 85% by Year 3, as measured by vegetation sampling transects and photo points.

Performance Standard: No more than 15% percent cover of non-native plant species shall be present within 3 years of construction as measured by sampling transects and photo points. When measuring cover, up to 50% of any stratum can be composed of desirable native volunteer plant species.

Objective 2: The restored wetland area will exhibit hydrologic characteristics typical of wetlands of the neighbouring wetlands.

Performance Standard: Within 3 years of construction, the restored wetland area will meet the criteria for wetland hydrology.

Vegetation Monitoring

Vegetation will be evaluated in square-meter plots located along transects that span the site. In each plot, assessments will include percent cover by plant stratum and species, species composition (note whether native or exotic, planted or colonizer), and the average height and survival of each dominant species. Data collected should be recorded on appropriate data forms and evaluated. Monitoring should occur in October, when plant diversity is anticipated to be highest.

Plants will be identified in each plot and classified according to their moisture conditions. This information will be used to determine which plots meet a wetland vegetation criterion of 80% dominance of wetland plant species (species classified as Facultative or wetter) that are native species. Suggested references for plant identification by skilled botanists are Hitchcock and Cronquist (1978) and Hitchcock *et al.* (1994).

Hydrology Monitoring

Wetland hydrologic characteristics will be recorded in at least one vegetation plot on each transect. The hydrologic monitoring visit will be conducted during the rainy seasons (March to May and September to November), when hydrologic conditions during the growing season can be evaluated.

Soil Monitoring and Sediments

Monitoring is needed to track the development of hydric soils over time. Soil profiles will be described in at least four wetland plots along each transect, preferably the one expected to be the wettest and the one expected to be the driest. Soil pits will be dug to a depth of 45.72 cm. Soil colours will be identified from with Munsell colours, notations, and colour names. The primary indicator of hydric soil conditions will be the time and duration of saturation or ponding. The plot will also be evaluated for the presence or absence of other hydric soil indicators listed in the COE Manual, including the presence of common and distinct redoximorphic features (or mottles) in the top 25.4cm of the soil pit (tested when moist), and a chroma of 1 without distinct mottles or a chroma of 2 with distinct mottles.

Because the restored site will continue to receive sediment-laden runoff from developed areas, the remnant channel and excavated areas within the site should be monitored annually for sediment accumulations. If accumulations of greater than about 1 cm/yr are noted after the first year at any

location (allowing for some shifting that may occur following onsite grading), the accumulated sediments should be removed and placed offsite, provided any colonizing native plants are not unduly disturbed.

Buffers

The upland buffers will be evaluated for percent cover by plant stratum and species, species composition (note whether native or exotic, planted or colonizer), average height, and percent survival of each species. Data collected will be recorded on appropriate data forms.

Reporting

A report summarizing the results of the field monitoring visit will be completed each year. In addition to assessing the enhancement projects for vegetation, soil, and hydrology, the report will also discuss problem areas and failure, including inappropriate design, slopes steeper than 20%, installation flaws, and inappropriate plantings. A discussion of methods to correct identified problems and failures will also be included. Photos from the fixed photo points and completed data forms for the sample plots will be included with the report.

Impacts would be further minimized by utilizing protective measures such as wooden matting or the use of low profile vehicles designed for distributing weight so as not to cause unnecessary soil compaction in wetland areas.

Construction-related mitigation

- Use of low profile vehicles designed for distributing weight so as not to cause unnecessary soil compaction;
- Marsh mats to span wetland areas and limit wetland soil compaction;
- Silt fencing of wetland areas to prevent accidental disturbances and siltation;
- Sequencing of construction activity to enable the construction work that requires site access through the wetlands to be completed within a short period of time, as practicable.
- Restoration plan for temporary disturbances which includes a long term monitoring plan;

Post-construction related mitigation may include the following:

- Creation of new wetlands along the ROW and at off-site locations.
- Along the ROW combine wetlands restoration with the restoration of riparian habitat crossing the ROW. This would involve the creation of scrub/shrub wetlands parallel to streams.
- Creation of wetlands at 2:1 for permanent impacts;
- Purchase of wetland credits from a wetlands mitigation bank at similar ratios, from NEMA.
- Other required elements to be discussed with the NEMA at the time of permit submission

APPENDIX 13 CHANCE FINDS PROCEDURE

Sites that are buried may be discovered during excavation for the substation foundations or foundations for the transmission line towers within the respective Project areas. To mitigate damage to previously unidentified archaeological resources, it is proposed that the construction foremen will inform construction crew to be aware of the possibility of discovering fossils or archaeological remains.

Such discoveries of archaeological nature are termed as 'archaeological chance finds'. These could be concentrations of pottery, fossils in rock, animals and human bones, arrow heads, worked stone etc. In standing with the JICA Guidelines, the World Bank Safeguard Policy OP 4.11 on Physical Cultural Resources should be adopted in project design to carter for such discoveries. The initial procedure when such sites are found aim to avoid any further damage. The procedure that must be followed in the event of a chance find includes:

1. The person or group (identifier) who identified or exposed the burial ground must cease all activity in the immediate vicinity of the site. Stop operations in the area where fossiliferrous or archaeological remains are discovered during ground disturbance activities,
2. The identifier must immediately inform his/her Site Supervisor of the discovery.
3. The Site Supervisor must ensure that the site or area is delineated and control access to the site,
4. Secure the site to prevent any damage or loss of removable objects. In cases of removable antiquities or sensitive remains, a night guard shall be present until the responsible authorities and the Directorate of Museums and Monuments take over,
5. The Site Supervisor will notify the responsible local authorities and Commissioner of Museums and Monuments at the Directorate of Museums and Monuments under the Ministry of Tourism, Wildlife and Antiquities (within 24 hours or less) of a fossiliferous /archaeological site,
6. Request for a representative to make a site inspection. The Directorate of Museums and Monuments would be in charge of protecting and preserving the site before deciding on subsequent appropriate procedures. This would require a preliminary evaluation of the findings to be performed by the archeologists of the Directorate of Museums and Monuments (within three days). The significance and importance of the findings should be assessed according to the various criteria relevant to cultural heritage including the aesthetic, historic, scientific or research, social and economic values. The record details of the find will be documented,
7. Decisions on how to handle the finding shall be taken by the Directorate of Museums and Monuments. This could include changes in the drainage alignment (such as when the finding is an irremovable remain of cultural or archeological importance), conservation, preservation, restoration and salvage,
8. Implementation for the authority decision concerning the management of the finding shall be communicated in writing by the Directorate of Museums and Monuments, and
9. 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.

These procedures must be referred to as standard provisions in construction contracts, when applicable to ensure protection of cultural heritage. During project implementation, the Site Supervisor shall monitor the above regulations relating to the treatment of any chance find encountered are observed.

Relevant findings will be recorded in JICA Supervision Reports, and Implementation Completion Reports (ICRs) will assess the overall effectiveness of the project's cultural property mitigation, management, and activities, as appropriate.

In the event that a delay is incurred in direct relation to archeological findings not stipulated in the contract (and affecting the overall schedule of works), the contractor may apply for an extension of time. However, the contractor will not be entitled for any kind of compensation or claim other than what is directly related to the execution of the archeological findings works and protections.

資料－７　簡易住民移転計画に関する
再委託業者からの報告書

PREPARATORY SURVEY FOR
THE GREATER KAMPALA METROPOLITAN AREA
TRANSMISSION SYSTEM IMPROVEMENT PROJECT

ABBREVIATED RESETTLEMENT ACTION PLAN (ARAP)

FINAL REPORT

Prepared for:
UGANDA ELECTRICITY TRANSMISSION COMPANY LIMITED
Plot 10 Hannington Road
P. O. Box 7625, Kampala, Uganda.
Tel: +256-414-233-433
Fax: +256-414-341-789
W: www.uetcl.com

By:
AIR WATER EARTH (AWE) LTD
Civil, Environmental Engineers & Project Management Consultants
M1. 27 Binayomba Road, Bugolobi
P. O. Box 22428, Kampala, UGANDA.
T: 041-4268466, Mob: 078-2580480
E: mail@awe-engineers.com
W: www.awe-engineers.com

In Association with:

YACHIYO ENGINEERING COMPANY LIMITED (YEC)

CS Tower, 5-20-8, Asakusabashi, Taito-ku,
Tokyo, 111-8648, Japan
+81-03-5822-2900

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AWE is member of International Federation of Consulting Engineers (FIDIC-GAMA)

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Preparation, review and authorization

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Lead Consultants
Isa KABENGE, PhD.
BScEng (MAK), MEng (SA), PhD (USA)
Registered EIA Practitioner (Cert No. CC/EIA/110/15)
Drainage Engineer/GIS specialist & Team Leader.
Eng. Lammeck KAJUBI; PE.
BScEng (1.1 Hons), MEngSc(Env)(UQ-Australia), MUIPE
Registered Professional Environmental Engineer (PE)- UGANDA
Registered EIA Practitioner (Cert No.CC/EIA/108/15)
Environmental Engineer
Herbert Mpagi KALIBBALA, PhD.
BScEng(Civ)(MAK), MScEng (Env) (MAK), PhD, GMUIPE
Registered EIA Practitioner (Cert No. CC/EIA/109/15)
Civil/Infrastructure Engineer.
Pamela K. TASHOBYA
BA (MAK), MSc (Dev Mgt.)
Registered EIA Practitioner (Cert No.CC/EIA/111/15)
Socio-development Specialist
Faith MUGERWA
BA (MAK), MA (Soc)
Registered EIA Practitioner (Cert No. CC/EIA/113/15)
Sociologist

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ACRONYMS & ABBREVIATIONS

AP	Angle Point
AWE	Air Water Earth (AWE) Limited, *(here in the consultant)*
Cap.	Chapter
cct	Circuit
DPP	District Development Plan
EA	Environmental Assessment
EAC	East African Community
EIS	Environmental Impact Statement
ESIA	Environmental and Social Impact Assessment
e-Waste	Electronic Waste
GKMA	Greater Kampala Metropolitan Area
GIS	Gas-Insulated Switchgear
HC	Health Centre (e.g. HC IV, HC III, HC II)
HIV/AIDS	Human Immunodeficiency Virus/ Acquired Immunodeficiency Syndrome
JICA	Japan International Cooperation Agency
LC	Local Council
NEMA	National Environment Management Authority
NFA	National Forestry Authority
NGO	Non-Governmental Organization
O&M	Operation and Maintenance
ODA	Official Development Assistance of Japan
PAP	Project Affected Persons
PCDP	Public Consultation and Disclosure Plan
PPE	Personal Protective Equipment
RAP	Resettlement Action Plan
REA	Rural Electrification Agency
RoW	Right of Way
SS	Substation
SF6	Sulfur Hexafluoride Gas
STDs	Sexually Transmitted Diseases
TC	Town Council
TL	Transmission Line
ToR	Terms of Reference
UBOS	Uganda Bureau of Statistics
UEGCL	Uganda Electricity Generation Company Limited
UETCL	Uganda Electricity Transmission Company Limited
UPE	Universal Primary Education
UWA	Uganda Wildlife Authority
VAT	Value Added Tax
YEC	Yachiyo Engineering Company Limited

DEFINITIONS:

Compensation: Payment in cash or in kind at replacement value for an asset or a resource affected by the project at the time the assets need to be replaced.

Cut-off date: Date of completion of the census and assets inventory of persons affected by the project. Persons occupying the project area after the cut-off date are not eligible for compensation and/or resettlement assistance. Similarly, fixed assets (such as built structures, crops, fruit trees, and woodlots) established after the date of completion of the assets inventory, or an alternative mutually agreed on date, will not be compensated. For this project, the cut-off date was 1st June 2013.

Economic Displacement: Loss of income or means of livelihood resulting from land acquisition or obstructed access to resources (land, water or forest) caused by the construction or operation of the project.

Land Acquisition: It is the process of acquiring land under the legally mandated procedures of eminent domain.

Project-Affected Area: The area subject to a change in use as a result of construction and operation of the project.

Project-Affected Person (PAP): Any person who, as a result of project implementation, loses right to own, use, or otherwise benefit from a built structure, land (residential, agricultural, pasture or undeveloped/unused land), annual or perennial crops and trees, or any other fixed or moveable asset, either in full or in part, permanently or temporarily. Affected people might be displaced either physically ("Physically Displaced People") or economically ("Economically Displaced People").

Physical Displacement: Loss of shelter and assets resulting from land acquisition associated with the project, requiring affected persons to move to other locations.

Project-Affected Households (PAH): A PAH is a household that includes one or several project-affected persons and usually comprises of a head of household, their spouses, children and other dependents (e.g. parents, grandchildren).

Resettlement Assistance: Support provided to people who are going to be physically displaced by the project. Assistance may include transportation and other services that are provided to affected people during relocation. Assistance may also include cash allowances to compensate affected people for inconveniences associated with resettlement and settle up expenses during transition to a new locale and lost workdays.

Replacement cost: Compensation for lost assets, i.e., market value of the assets in addition to transaction costs (taxes, registration fees and cost associated with registration or transfer of new land). The replacement value of an item must reflect cost at the time it is due for replacement. For land and structures, "replacement value" is defined as follows:

i) Agricultural land: the market value of land of equal productive use or potential located in the vicinity of the affected land, plus the cost of preparation to levels similar to or better than those of the affected land including fees of any registration and transfer taxes;
ii) Land in urban areas: the market value of land of equal size and use, with similar or improved public infrastructure facilities and services, preferably located in the vicinity of the affected land, plus the cost of any registration and transfer taxes;
iii) Household and public structures: the cost of purchasing or building a new structure, with an area and quality similar to or better than those of the affected structure, or of repairing a partially affected structure, including labour, contractors' fees and any registration and transfer taxes.

Resettlement Strategy (Rehabilitation Strategy): Approaches used to assist people in their efforts to improve (or at least to restore) their incomes, livelihoods, and standards of living in real terms after resettlement. The resettlement strategy typically consists of payment of compensation at replacement cost, transition support arrangements, relocation to new sites (if applicable), and provision of alternative income-generating assets (if applicable).

Resettlement Action Plan: A resettlement action plan (RAP) is a planning document describing what will be done to address direct social and economic impacts associated with involuntary resettlement.

Resettlement Entitlements: Resettlement entitlements with respect to a particular eligibility category are the sum total of compensation and other forms of assistance provided to displaced persons in the respective eligibility category.

Stakeholders: A broad term that covers parties affected by or interested in a project or a specific issue: i.e. all parties who have a stake in a particular initiative. Primary stakeholders are those most directly affected and in resettlement situations such as people who lose property or income because of the project.

Vulnerable people: People who may by virtue of gender, ethnicity, age, physical or mental disability, economic disadvantage or social status are more adversely affected by resettlement than others; and who may have limited ability to claim or take advantage of resettlement assistance and related development benefits.

RoW: The 5m wide center area of a transmission line route where no activities other than transmission lines are allowed. The lands within the areas are acquired by UETCL.

Way Leave: The areas on both sides of the ROW within the transmission line corridor

Corridor: The areas in the vicinity of the transmission line, where activities are either restricted or prohibited due to the routing of the transmission line.

WEIGHTS AND MEASURES

km Kilometre
kV Kilovolt (10^3 volt)

EXECUTIVE SUMMARY

1 INTRODUCTION

The Republic of Uganda has been experiencing high economic growth and approximately 7% annual economic growth has been recorded over the past years. In line with this growth trend, the power demand has also been increasing rapidly at 9.7% on average per year from 2007 to 2012. The Government of Uganda and the electricity companies have been developing the power sources mainly by utilizing abundant water resources in Uganda.

However, these entities are facing difficulties in upgrading the power system to satisfy the recent power demand since it requires a huge amount of costs. Against this background, the Government of Uganda has requested Japan's ODA loan project called 'The Greater Kampala Metropolitan Area Transmission System Improvement Project' (hereinafter abbreviated as "Project") to the Government of Japan, which aims at the development of transmission and substation system in Kampala Metropolitan Area, to realize the sustainable social and economic development. The Project aims to increase the capacity of power supply through the upgrade of transmission and substation system in Kampala Metropolitan Area.

2 DESCRIPTION OF THE PROJECT

2.1 Project location

The Project will involve construction of new substations and associated transmission lines (Buloba and New Mukono), upgrade of substations (Kawanda, Kawaala, Bujagali and Mutundwe), and re-conducting of 132 kV transmission lines.

2.2 Brief description of the Transmission line

The transmission tower will be of the steel lattice type commonly used in Uganda and worldwide. The height of the tower will vary depending on the site topography and surrounding structures, but a clearance height of at least 7 – 8 m will be secured from the ground level. The four corners of the transmission tower base will be secured over a concrete foundation.

2.3 Brief description of the Substations

A substation is a part of an electrical generation, transmission, and distribution system. Substations transform voltage from high to low, or the reverse, or perform any of several other important functions. A substation generally consist of switchgear (combination of electrical disconnect switches, fuses or circuit breakers used to control, protect and isolate electrical equipment), transformer and control building. Generally two types of switchgear will be employed: open-air isolator switchgear or gas-insulated switchgear (GIS).

3 OBJECTIVES AND SCOPE OF THE ARAP

This Abbreviated Resettlement Action Plan (ARAP) was prepared to enable immediate compensation of local people currently undertaking livelihood activities on the affected land which will be used by the proposed project.

According to World Bank safeguard requirements, an ARAP is prepared when the number of affected persons is less than 200. The main objective of ARAP was to identify the project-affected-persons (PAPs) and establish the quantity and value of affected livelihood activities on the proposed project site.

Preparation of this ARAP has been based on socio-economic surveys and census and data provided by independent surveying/valuation firm. For purposes of this study, scope of Resettlement Impact is provided in Chapter 4.

4 SCOPE OF RESETTLEMENT IMPACTS

Greater Kampala Metropolitan Area traverses districts of Kampala, Mukono and Mpigi Districts in Uganda. During the census survey analysis, it was observed that the population comprised of mainly Baganda, with a percentage of (85.5%) other tribes included Banyankole and other migrant tribes like the Bafumbira, Bakiga and others.

During the field surveys on economic activities, majority of the respondents were teacher (27.4%) and farmers were (22.6%) who were mainly in Nama II in Mukono District. In Kawaala project area the majority of the PAPs are brick makers. Prevalently in GKMA project area the project affected persons were mainly land owners and from the field interviews the land tenure was predominantly Mailo. The most affected households were headed by males compared to female-headed households. Prevalently charcoal is the principal source of energy for cooking in the project districts and electricity is used mainly for lighting. However, there were some villages that had used kerosene and solar.

Analysis of education shows that majority of the household heads have completed University Education primary 46.7% and only 5% never attained any level of education. This means that majority of the population can provide skilled labour in the construction phase if employment will be available to the local communities. There were also PAPs who had attained primary education (26.7%) and therefore they can also provide their unskilled labour if the jobs are available.

5 ORGANIZATIONAL RESPONSIBILITIES

The main agencies which will be involved managing this ARAP are:

- Uganda Electricity Transmission Company Limited, UETCL
- Ministry of Energy & Mineral Development, MEMD
- Ministry of Gender, Labour and Social Development, MGLSD
- Local district administrations (Mukono, Mpigi and Kampala)
- Ministry of Lands, Housing and Urban Development, MLHUD (approving compensation rates)
- Electricity Regulatory Authority, ERA
- Ministry of Tourism Trade and Industry (MTTI)

All these institutions will help with the execution of the ARAP in their respective capacities as described in Chapter 4.

6 COMPENSATION AND INCOME RESTORATION

The objective of the ARAP is to avoid or minimize, to the extent possible, the hardships and impoverishment that the project may be caused and to mitigate any adverse impacts at the household and community levels. These objectives are detailed and made more specific in terms of the principles and guidelines to be followed for adoption of entitlement framework and planning and implementation of rehabilitation activities.

a) Eligibility for compensation

A Project Affected Person (PAP) is one who, as a consequence of the project, sustains losses as a result of impact on a) land, b) structure, c) immovable asset and/or d) livelihood/incomes. The PAPs have been identified through census survey that forms the basis for this ARAP.

In addition the same or additional groups of people will lose land or structures being used as common property.

At a later phase, another category would include people who, during the construction of transmission line and associated substation suffer damage to their property caused by construction teams. This could include, for instance damage to cultivated fields, fruit trees and, possibly, infrastructure such as fences. For this category of affected people the same compensation principles outlined in this ARAP will apply.

The following categories are eligible for compensation:

- Landlords owning land to be affected by the Transmission line project.
- People whose structures are to be affected by the Transmission line corridor.
- People who rent land for cultivation (sharecroppers) and their crops or trees are to be removed or damaged due to land acquisition activities;

b) Potential impacts

Along the proposed line route and associated sub-stations, structures will be compensated and permanently removed. Some PAPs would be able to reconstruct their structures a small distance away from the project area, because they have sufficient unaffected land, while others without sufficient land left will have to completely relocate. Examples of structures to be affected are shown in Photo 2 of the main report. Other affected property includes crops and trees see Photo 3. The total numbers of people affected are shown in Table ES1:

Table ES1: Number of PAPs per project component

PROJECT COMPONENT	NUMBER OF PAPs	TENURE
Kawaala	7	Kibanja, Buganda Land Board
Buloba	58	Private Mailo,
Mukono	31	Kibanja , Private Mailo
Total	**96**	

c) Livelihood restoration

Resettlement assistance and livelihood development, sustenance and restoration programmes are included in resettlement planning when affected households stand to lose a significant portion of their livelihood resources (e.g. subsistence agricultural plots, access to important natural resources, etc.) as a result of land acquisition or resettlement. Such programmes are intended to offset the effects of those losses that cannot adequately be compensated for through monetary payments or replacement of assets – e.g. the disruption of social support networks, reduced access to markets, decreased soil productivity, the time required to reinstate agricultural plots to their former productivity, etc. – so as to ensure that resettled/ compensated households are not worse off after the project than they were before. Livelihood restoration is particularly important where a project affects the livelihoods of vulnerable households (i.e. households who, because of their social or economic status, may be more adversely affected than others by a temporary or permanent loss of part of their asset base). A description of the livelihood restoration plan is detailed in Chapter 6.

7 GRIEVANCE REDRESS MECHANISM

Based on experience on former resettlements carried out, most grievances will be related to property valuation. These are likely to arise when households consider compensation values for their assets insufficient, especially when PAPs doubt if valuation values do indeed provide replacement value or if PAPs misunderstood the compensation process and believe they are entitled to additional compensation. Given this, UETCL will constitute a dedicated committee and procedure to manage and close out grievances. While some grievances would be resolved by the committee, others might not, such as when claimants contest compensation rates developed by District Land Boards. In spite of the grievance procedure, if, the aggrieved person is not satisfied with resolutions of the Grievance Committee at local level/village, he/she will have the choice of resorting to courts of law.

8 MONITORING AND EVALUATION

Monitoring and evaluation will be done by UETCL as well as an independent monitor like an NGO to ensure a complete and objective process. The monitor should not be in conflict of interest and can therefore not be hired from the organization that supports the RAP's implementation. Hence, independent monitoring role should be advertised along with terms of reference or job description and minimum requirements. The purpose of monitoring is to provide feedback on RAP implementation and to identify problems and successes as early as possible to allow timely adjustment of implementation arrangements. It also allows for verification of RAP implementation progress.

During resettlement, monitoring shall focus on resettlement issues such as:

- Number of families that have been compensated;
- Number of people, who have acquired legal documents to new property,
- Efficiency and effectiveness of grievance redress mechanism.
- Post resettlement monitoring should focus on rehabilitation issues, for example:

- Success level of restoration of livelihoods
- Success level of restoration of assets
- Efficiency and effectiveness of grievance redress mechanism.

A review of regular progress reports produced by UETCL will be carried out by all stakeholders both at national and local levels. After completion of resettlement, monitoring shall focus on rehabilitation issues and status on each of the measures should be assessed, for example:

- Target date for completion (e.g. within two months of resettlement);
- Progress to date (e.g. 60%);
- Progress in the last month (e.g. 20 households relocated);
- Target for this month (e.g. 40 houses relocated);
- Reasons for delay, if any; and
- Action to be taken, including specific responsibilities of other members of implementation team. Socio-economic assessment to ensure minimal impacts – that the PAPs are not worse off than before the RAP process.

8 COSTS AND BUDGET

In order, for restore the livelihood of the PAPs after the project implementation, they will need community support initiatives associated with entrepreneurship development programmes e.g petty trade, agro-forestry business (tree-seedlings) functional adult literacy, farming and business skills. In order to prepare them for life ahead with which to sustain a tenancy in the community after resettlement, PAPs should receive these living skills and initiatives during the 6-months' notice provided to them to vacate the compensated assets. Resettlement compensation budget is shown in Table ES2 whereas the Budget for community initiatives is shown in Table ES3.

Table ES2: Resettlement compensation budget (UGX)

Nature of resettlement	Assessed Value	Disturbance Allowance (30%)	Total Value
KAWAALA SECTION			
Land Value	23,690,000	7,107,000	30,797,000
Buildings	1,332,000	399,600	1,731,600
TOTAL - KAWAALA	**25,022,000**	**7,506,600**	**32,528,600**
BULOBA SECTION			
Land Value	972,239,000	291,671,700	1,263,910,700
Buildings	27,630,500	8,289,150	35,919,650
Crops and trees	77,707,500	23,312,250	101,019,750
TOTAL - BULOBA	**1,077,577,000**	**323,273,100**	**1,400,850,100**
MUKONO SECTION			
PAPs Out Side of the Nandagi Forest Reserve			
Land Value	471,814,000	141,544,200	613,358,200

Buildings	12,503,600	3,751,080	16,254,680
Crops and trees	35,382,000	10,614,600	45,996,600
Sub-Total	**519,699,600**	**155,909,880**	**675,609,480**
NFA Land and Trees covered by the Nandagi Forest Reserve			
Land Value	1,030,959,000	309,287,700	1,340,246,700
Trees	1,551,420,000	465,426,000	2,016,846,000
Sub-Total	**2,582,379,000**	**774,713,700**	**3,357,092,700**
Licencees trees planted on NFA Land within the Nandagi Forest Reserve			
Trees	1,479,441,000	443,832,300	1,923,273,300
Sub-Total	**1,479,441,000**	**443,832,300**	**1,923,273,300**
TOTAL - MUKONO	**4,581,519,600**	**1,374,455,880**	**5,955,975,480**
GRAND TOTAL	**5,684,118,600**	**1,705,235,580**	**7,389,354,180**

Table ES3: Budget for Livelihood Restoration

Item	Cost Estimated (UGX)	Agency responsible	Financial source
Skills training and employment programmes	6,000,000	UETCL	GOU
Farming skills training (e.g. soil fertility management, animal husbandry etc.)	11,541,842	UETCL	GOU
Functional Adult Literacy (FAL) skills training	3,000,000	UETCL	GOU
Entrepreneurship development programmes e.g petty trade, agro-forestry business (tree-seedlings)	5,000,000	UETCL	GOU
Community support infrastructure and farming inputs – 5%	302,455,374	UETCL	GOU
TOTAL – LIVELIHOOD RESTORATION	**327,997,216**	UETCL	GOU

1 INTRODUCTION

1.1 BACKGROUND

The Republic of Uganda has been experiencing high economic growth and approximately 7% annual economic growth has been recorded over the past years. In line with this growth trend, the power demand has also been increasing rapidly at 9.7% on average per year from 2007 to 2012. The Government of Uganda and the electricity companies have been developing the power sources mainly by utilizing abundant water resources in Uganda.

However, these entities are facing difficulties in upgrading the power system to satisfy the recent power demand since it requires a huge amount of costs. Against this background, the Government of Uganda has requested Japan's ODA loan project called 'The Greater Kampala Metropolitan Area Transmission System Improvement Project' (hereinafter abbreviated as "Project") to the Government of Japan, which aims at the development of transmission and substation system in Kampala Metropolitan Area, to realize the sustainable social and economic development. The Project aims to increase the capacity of power supply through the upgrade of transmission and substation system in Kampala Metropolitan Area.

The Project's components at Kawaala, Mukono and Buloba, required acquisition of land. Thus Air Water Earth (AWE) Ltd. was contracted to undertake the ARAP on behalf of Uganda Electricity Transmission Company (UETCL) Ltd., the executing agency of this Project.

1.2 OUTLINE OF PROJECT COMPONENTS

The Project includes a number of components as listed in Table 1. The components include construction of new substations, upgrade and improvement of existing substations, and expansion of existing transmission lines.

Table 1: List of Project Components that require land acquisition

	Main component	Outline	Contents	Land Area/Corridor width to be Acquired
Substation	**1. Buloba Substation**	Approx. area: 200 m x 260 m	New Construction	200 m x 260 m
	(1) 220 / 132 kV Transformer	125 MVA×2units		
	(2) 132 / 33 kV Transformer	40 MVA×2units		
	(3) 220 kV Switchgear	1 lot		
	(4) 132 kV Switchgear	1 lot		
	(5) 33 kV Switchgear	1 lot		
	(6) Control building	1 lot		
	(7) Access road	Approx. 8 m x 750 m		8 m
	2. Mukono Substation		Widening existing small road	
	(1) Access road	Approx. 8 m x 750 m		8 m
Transmission Line	**3. 220 kV Transmission Line**			
	(1) Buloba branch point – Buloba Substation	Approx. 0.9 km×4cct	New Construction	75 m
	(2) New Mukono branch point – New Mukono Substation	Approx. 4.2 km×4cct	New Construction	75 m
	4. 132 kV Transmission Line			
	(1) Buloba branch point-Buloba Substation	Approx.0.8 km×2cct	New Construction	30 m
	(2) New Mukono Substation - New Mukono branch point (Southern trunk line)	Approx.0.4 km×2cct	New Construction	30 m
	(3) Kawaala branch point—Kawaala Substation	Approx.0.1 km×2cct	Cabling	5 m

1.3 PROJECT LOCATION

The Project will involve construction of new substations and associated transmission lines (Buloba and New Mukono), upgrade of substations (Kawanda, Kawaala, Bujagali and Mutundwe), and re-conducting of 132 kV transmission lines. Table 2 presents the location of the project components by Village, Parish, Sub-county, County and District.

Table 2: Location of Project Components

Component	Location				GIS Co-ordinates (of substation location)
	District	County/ SubCounty	Parish	Village	
Construction of substations					
Buloba substation	Mpigi	Mawokota County / Kiringente SubCounty	Sekiwunga	Nakirebe, Kaggaba, Mabuye	432122 E, 28384 N
New Mukono substation	Mukono	Mukono County / Nama SubCounty	Mpoma	Nama II, Buyuki, Luwunga	480587 E, 42750 N
			Kasenge	Kivuvu	
			Namawojjolo	Wanjeyo, Namawojjolo West, Bwefulumya	
Upgrade of substations					
Kawanda substation	Wakiso	Nansana Municipality / Nabweru Subcounty			448657 E, 45333 N
Kawaala substation	Kampala	Lubaga Division	Lubya	Namungoona II	448764 E, 37072 N
Bujagali substation	Buikwe				515039 E, 55312 N
Mutundwe substation	Kampala	Lubaga Division			448185 E, 32427 N

Re-conductoring of 132 kV transmission lines		
Mukono branch point (Northern trunk line) - Kampala North Substation	Mukono District – Wakiso District –Kampala District	
Kampala North Substation — Mutundwe Substation	Kampala District	
Kampala North Substation — Lugogo Substation	Kampala District	

1.4 PROJECT PROPONENT AND COST

Name and address: Uganda Electricity Transmission Limited Company (UETCL)
Plot 10 Hannington Road
P.O. Box 7625, Kampala, Uganda
Tel: +256 414 233 433

Contact Person: Mr. Eriasi Kiyemba,
Managing Director/CEO
UETCL
EMAIL: transco@uetcl.com

Estimated Project Cost: $115 Million

1.5 BRIEF DESCRIPTION OF SUBSTATION

A substation is a part of an electrical generation, transmission, and distribution system. Substations transform voltage from high to low, or the reverse, or perform any of several other important functions. A substation generally consist of switchgear (combination of electrical disconnect switches, fuses or circuit breakers used to control, protect and isolate electrical equipment), transformer and control building.

Generally two types of switchgear will be employed: open-air isolator switchgear or gas-insulated switchgear (GIS). An open-air isolator type requires relatively large area but construction cost is low. GIS type uses sulphur hexafluoride gas (SF6) for insulation. It requires less space for installation but is more costly.

1.6 BRIEF DESCRIPTION OF TRANSMISSION LINE

The transmission tower will be of the steel lattice type commonly used in Uganda and worldwide. The height of the tower will vary depending on the site topography and surrounding structures, but a clearance height of at least 7 – 8 m will be secured from the ground level. The four corners of the transmission tower base will be secured over a concrete foundation.

1.7 PROJECT JUSTIFICATION

The Government of Uganda, through UETCL, is planning to improve the power sector of Uganda by putting in place robust electricity infrastructure to make the power supply more reliable, secure and sufficient to meet the electricity requirements of the people of Uganda.

Through this Project implementation, UETCL intends to improve the power supply in Greater Kampala Metropolitan Area with the objective of boosting the transmission grid capacity to securely deliver power supply to the metropolitan area in the short and long term, and to improve the reliability, availability and quality of power supply to the area. Figure 1 shows the Transmission Line Network in GKMA.

Source: JICA Study Team

Figure 1: Transmission Line Network in GKMA (Existing and Planned)

1.8 OBJECTIVES OF THE ARAP

This Abbreviated Resettlement Action Plan (ARAP) was prepared to enable immediate compensation of local people currently undertaking livelihood activities on the affected land which will be used by the proposed project.

According to World Bank safeguard requirements, an ARAP is prepared when the number of affected persons is less than 200. The main objective of ARAP was to identify the project-affected-persons (PAPs) and establish the quantity and value of affected livelihood activities on the proposed project site.

The functional objective of this ARAP is to guide UETCL in compensation of PAPs who currently use the parcel of land to be taken by the project.

Objectives of this ARAP were to:

i) Prepare a social profile of PAPs;
ii) Ensure that affected people receive equitable compensation for affected assets/ livelihood activities;
iii) Raise awareness about the project and its impacts among PAPs;
iv) Establish actual compensation costs necessary for compensation;
v) Prepare compensation strategies including an entitlement matrix and implementation arrangements; and
vi) Prepare strategies, such as a grievance management plan to mitigate adverse impacts.

2 POLICIES, LEGISLATION AND INSTITUTIONAL STRUCTURE

2.1 INTRODUCTION

There are a number of national regulations and international standards that set the requirements for conducting the ARAP for the proposed Project. The main Ugandan laws applicable to the ARAP studies are:

i) ***Land Act Cap 227 (1998):*** This avers that land belongs to the people and due compensation must be made before private assets are affected by development projects/ infrastructure.

ii) ***Land Acquisition Act (1965):*** This is an old piece of legislation developed to make provision for compulsory acquisition of land for public purposes but it also requires in several sections (2-12) that compensation be made to property owners affected by the Project.

In absence of RAP guidelines, these studies are conducted basing on financiers' resettlement requirements such as JICA, World Bank, IFC, AFD and AfDB social safeguard policies which are commonly used for RAP studies of development projects in Uganda.

2.2 NATIONAL POLICY FRAMEWORK

2.2.1 The Energy Policy, 2002

The goal of this policy is 'to meet the energy needs of Uganda's population for social and economic development in an environmentally sustainable manner'. The policy recognises Uganda's vast energy potential and the direct correlation between the country's energy supply and economic and social development through sectors such as industry, health, transport, education, water resources, agriculture, forestry, decentralisation and land use. The Policy also recognises that the development projects in the energy sector have significant impacts on the environment and, therefore, sets out to integrate the economic and social development with environmental protection and conservation for sustainable development.

Objective five (5) of the Policy aims at managing energy-related environmental impacts and it states that the Government will ensure that environmental considerations are given priority by energy suppliers and users to protect the environment and put in place a monitoring mechanism to evaluate compliance with established environmental protection guidelines. To meet the above objective, Government is required to:

- ≠ Promote the use of alternative sources of energy and technologies which are environmentally friendly;
- ≠ Sensitise energy suppliers and users about the environmental issues associated with energy;
- ≠ Work towards the establishment and acceptance of broad targets for the reduction of energy-related emissions that are harmful to the environment and energy users;
- ≠ Note issues of extension of power to and across the countryside; and
- ≠ Promote efficient utilisation of energy resources.

<u>Relevance to this Project:</u> The proposed development of this Project is in line with the objectives of the Policy to meet the increasing energy needs of the GKMA.

2.2.2 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.

<u>Relevance to this Project</u>: This Project will require land acquisition for upgrade of the Kawaala Substation and the construction of the new Buloba substation and associated transmission lines and new transmission lines associated with the new Mukono substation. It is estimated that less than 200 land owners will be affected by the Project implementation, and as such, an Abbreviated Resettlement Action Plan (ARAP) will be conducted in line with the objectives of this Policy.

2.2.3 National Gender Policy, 1997

The overall goal of this policy is to mainstream gender concerns 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. Thus, in the context of the power sector, this policy aims to address imbalances which arise from existing gender inequalities and promotes participation of both women and men in all stages of the energy project cycle, equal access to, and control over significant economic resources and benefits.

<u>Relevance to this Project</u>: This Project will require labour during construction, and O&M 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.

<u>Relevance to this Project</u>: The implementation of the proposed Project is in line with aspirations of Vision 2040 to improve access and reliability of electricity supply to the Ugandan population. This Project will serve the GKMA in particular.

2.2.4 HIV/AIDS Policy, 1992

In Uganda 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 responsible for labour) 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 managed 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 infection 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 construction, there may be an influx of people into the project area possibly resulting into sexual fraternisation and a risk of HIV/AIDS spread. These requirements are expected to be fulfilled by the construction contractors or their subcontractors.

Relevance to this Project: This policy is relevant to the project if implementation of proposed transmission line and the substations results in in-migration into project communities by people seeking construction jobs and possibly sexual fraternisation associated with HIV/AIDS risk.

2.2.5 Uganda Resettlement/Land Acquisition Policy Framework, 2002

With regard to compensation and resettlement issues, the main pieces of legislation are the Constitution of Republic of Uganda/and the Land Act 1998 both of which require that:

- Compensation should be aimed at minimizing social disruption and assist those who have lost assets as a result of the project to maintain their livelihoods. In accordance with Ugandan laws and standards, a disturbance allowance is to be provided to assist the project affected individual or family to cover costs of moving and relocating to a new holding. This disturbance allowance however might not be sufficient to cover income losses.
- Community infrastructure must be replaced and ideally be improved in situations where it was deficient.

Relevance: This policy is relevant as it serves as a guideline to UETCL on the principles' of fair compensation as stipulated by the law. Additionally, it also helps to safeguard UETCL against unfair demands from the PAP during implementation.

2.3 NATIONAL LEGISLATIVE FRAMEWORK

2.3.1 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.

On land tenure regimes and transfer of land, the Constitution prescribes tenure regimes in accordance with rights and interests held in land. Article 237 of the Constitution, 1995, vests land in the citizens of Uganda and identifies four land tenure systems, namely: customary, freehold, mailo and leasehold.

Understanding these systems (detailed in section 4 of the Land Act, 1998) is vital for compensation of households to be affected by the project. These tenure systems are outlined below:

Customary tenure: In this tenure, land is owned in perpetuity and tenure is governed by rules generally accepted as binding and authoritative by the class of persons to which it applies (that is, "customary regime is not governed by written law"). Customary occupants are occupant of former public land, and occupy the land by virtue of their customary rights; they have proprietary interest in the land and are entitled to certificates of customary ownership. Certificates for customary ownership are issued by the District Land Board, through application to the Parish Land Committee.

Freehold tenure: This tenure derives its legality from the Constitution. It involves the holding of land in perpetuity or for a period less than fixed by a condition and enables the holder to exercise, subject to the law, full powers of ownership.

Leasehold tenure: Lease tenure is created either by contract or by operation of the law. It is a form of tenure under which the landlord or lessor grants the tenant or lessee exclusive possession of the land, usually for a defined period and in return for a rental fee. The tenant has security of tenure and a proprietary interest in the land.

The Constitution and the Land Act also protect "rights of spouses and children" with regard to land transactions. The head of household must acquire the consent of spouse and children prior to any sale of land on which the family ordinarily resides.

Mailo land tenure: The Mailo land tenure system is a feudal ownership introduced in Buganda by the British in 1900 under the Buganda Agreement. "*Mailo*" is a Luganda word for "mile" as the original grants under the agreement were measured in square miles. Prior to the 1975 Land Reform Decree, Mailo land was owned in perpetuity by individuals and by the Kabaka (hereditary King). Persons, who lived on this land, as well as new entrants, were legally protected to live on and use the land, but they were obliged to pay "*busuulu*" (a form of tax).

The Mailo land tenure system:

- Derives its legality from the Constitution and its incidents from the written law;
- Involves the holding of land in perpetuity;
- Permits separation of ownership of land from ownership of developments thereon made by a lawful or bona fide occupant;
- Enables the holder to exercise all powers of ownership, subject to the rights of those persons occupying the land at the time of the creation of the *mailo* title and their successors.

Relevance to this Project: The construction and operation of the proposed project will have an impact on some aspects of the environment and these will be dealt with in a manner that upholds the Constitutional provision for a clean and healthy environment. Any land take for purposes of this

proposed project development will be in line with the constitutional provision for equitable compensation to affected land owners.

2.3.2 The Electricity Act, Cap 145

The Electricity Act, 1999 aims at bringing about an enabling environment for the transformation of the electricity sector. The main objective of the Act is to regulate the generation, transmission, distribution, sale, export, import and distribution of electricity in Uganda. The Act established the Electricity Regulation Authority, which has the mandate to regulate generation, transmission and distribution of electricity in the country, and as such, provides requisite licences.

Section 68 of the Act provides guidelines placement of electricity supply lines on land, stating that a developer shall as much as possible minimise damage to the environment and shall ensure prompt payment of fair and adequate compensation to all interested persons for any damage or loss sustained by construction of electricity supply infrastructure. Section 69 of the Act requires a developer where a licensee authorised by the Authority intends to enter land under the management or control of the Uganda Land Commission or a District Land Board, the licensee shall give thirty days' notice to the Uganda Land Commission or a District Land Board, stating the nature and extent of the acts intended to be undertaken.

Relevance to this Project: The client will obtain any required licences in line with the provisions of this Act. Any land take for the Project will also be done in line with the provisions of this Act.

2.3.3 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 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: This Project will require land acquisition for upgrade of the Kawaala substation, construction of the new Buloba substation and associated transmission lines and new transmission lines associated with the new Mukono substation. It is estimated that less than 200 land owners will be affected by the Project implementation, and as such, an Abbreviated Resettlement Action Plan (ARAP) will be conducted in line with the provisions of this Act.

2.3.4 National Forestry and Tree Planting Act, 2003

The National Forestry and Tree Planting Act is an Act to provide for the conservation, sustainable management and development of forests for the benefit of the people of Uganda; to provide for the declaration of forest reserves for purposes of protection and production of forests and forest produce; to provide for the sustainable use of forest resources and the enhancement of the productive capacity of forests; to provide for the promotion of tree planting; to consolidate the law relating to the forest sector

and trade in forest produce; to establish a National Forestry Authority; to repeal the Forests Act, Cap. 147 and the Timber (Export) Act Cap. 151.

Some of the purposes of this Act are to:

a) Create an integrated forest sector that will facilitate the achievement of sustainable increases in economic, social and environmental benefits from forests and trees by all the people of Uganda;
b) Guide and cause the people of Uganda to plant trees;
c) Ensure that forests and trees are conserved and managed in a manner that meets the needs of the present generation without compromising the rights of future generations by safeguarding forest biological diversity and the environmental benefits that accrue from forests and trees;
d) Encourage public participation in the management and conservation of forests and trees;
e) Ensure that environmental benefits, costs and values are reflected in strategies and activities relating to forestry.

Section 38 of the Act requires that 'A person intending to undertake a project or activity, which may, or is likely to have a significant impact on a forest, shall undertake an environmental impact assessment'.

Relevance to this Project: The Mukono component of this Project requires approximately 15 ha of forest clearance inside Nandagi Forest Reserve. The licensed private farmers inside Nandagi Forest Reserve need to be compensated.

2.4 JICA SAFEGUARD POLICIES

The key principle of JICA policies on involuntary resettlement is summarized below.

i) Involuntary resettlement and loss of means of livelihood are to be avoided when feasible by exploring all viable alternatives.
ii) When population displacement is unavoidable, effective measures to minimize the impact and to compensate for losses should be taken.
iii) People who must be resettled involuntarily and people whose means of livelihood will be hindered or lost must be sufficiently compensated and supported, so that they can improve or at least restore their standard of living, income opportunities and production levels to pre-project levels.
iv) Compensation must be based on the full replacement cost[1] as much as possible.
v) Compensation and other kinds of assistance must be provided prior to displacement.
vi) For projects that entail large-scale involuntary resettlement, resettlement action plans must be prepared and made available to the public. It is desirable that the resettlement action plan include elements laid out in the World Bank Safeguard Policy, OP 4.12, Annex A.
vii) In preparing a resettlement action plan, consultations must be held with the affected people and their communities based on sufficient information made available to them in advance. When consultations are held, explanations must be given in a form, manner, and language that are understandable to the affected people.

viii) Appropriate participation of affected people must be promoted in planning, implementation, and monitoring of resettlement action plans.

ix) Appropriate and accessible grievance mechanisms must be established for the affected people and their communities.

Above principles are complemented by World Bank OP 4.12, since it is stated in JICA Guidelines that "JICA confirms that projects do not deviate significantly from the World Bank's Safeguard Policies". Additional key principle based on World Bank OP 4.12 is as follows.

a) Affected people are to be identified and recorded as early as possible in order to establish their eligibility through an initial baseline survey (including population census that serves as an eligibility cut-off date, asset inventory, and socioeconomic survey), preferably at the project identification stage, to prevent a subsequent influx of encroachers or others who wish to take advance of such benefits.

b) Eligibility of benefits include, the PAPs who have formal legal rights to land (including customary and traditional land rights recognized under law), the PAPs who don't have formal legal rights to land at the time of census but have a claim to such land or assets and the PAPs who have no recognizable legal right to the land they are occupying.

c) Preference should be given to land-based resettlement strategies for displaced persons whose livelihoods are land-based

d) Provide support for the transition period (between displacement and livelihood restoration.

e) Particular attention must be paid to the needs of the vulnerable groups among those displaced, especially those below the poverty line, landless, elderly, women and children, ethnic minorities if any etc.

f) For projects that entail land acquisition or involuntary resettlement of fewer than 200 people, abbreviated resettlement plan is to be prepared.

g) In addition to the above core principles on the JICA policy, it also laid emphasis on a detailed resettlement policy inclusive of all the above points; project specific resettlement plan; institutional framework for implementation; monitoring and evaluation mechanism; time schedule for implementation; and, detailed Financial Plan etc.

In a number of situations, as shown in Table 4 below JICA guideline requirements are favorable to affected persons than Ugandan law. The project is committed to undertaking appropriate compensation approaches to meet both Ugandan law and JICA requirements.

Table 3: Gaps between JICA guidelines and Ugandan laws

No.	JICA Guidelines	Laws of Uganda	Gaps between JICA Guidelines and Laws of Uganda	Safeguard Measures Adopted in GKMA
1.	Involuntary resettlement and loss of means of livelihood are to be avoided when feasible by exploring all viable alternatives. (JICA GL)	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 when taking land "for public use or in the interest of defence, public safety, public order, public morality or public health." Both Uganda's Constitution 1995 and the Land Act 1998 give the government and local authorities power to compulsorily acquire land under *Eminent Domain*	Gap – Uganda has no specific guidelines on involuntary resettlement but even the two principle laws on land: the *Constitution* and *Land Act* do not mention specific provisions for avoidance or minimizing involuntary resettlement	All viable alternatives including the design options will be explored to avoid involuntary resettlement and loss of means of livelihood
2.	When population displacement is unavoidable, effective measures to minimize impact and to compensate for losses should be taken. (JICA GL)	Ugandan Constitution requires that prompt, fair and adequate compensation be paid prior to displacement.	Gap – Measures to minimize impact are not provided for and it is unclear how to interpret "prompt, fair and adequate" compensation	Effective measures to minimize impact and to compensate for losses will be provided during preparation of the RAP
3.	People who must be resettled involuntarily and people whose means of livelihood will be hindered or lost must be sufficiently compensated and supported, so that they can improve or at least restore their standard of living, income opportunities and production levels to pre-project levels. (JICA GL)	There are no explicit provisions under resettlement or relocation laws for livelihood assistance.	Gap – No provision for livelihood assistance during resettlement process	The project will provide transition allowance. The program should have a strategy for enabling the PAPs restore their incomes to at least pre-project levels
4.	Compensation must be based on the full replacement cost as much as possible. (JICA GL)	Permanent buildings valued based on replacement cost and on top of this a *Disturbance Allowance* of 15% or 30%) is provided if more than six or less than six months' notice to vacate compensated assets, respectively, is issued to project affected persons.	No gap - The project developer will ensure fair and prompt compensation for the PAPs.	Project will provide compensation based on full replacement value. This will include the payment of government valuation rates, a disturbance allowance and a top-up allowance (based on current inflation rate) to compensate for the rise in price of construction

No.	JICA Guidelines	Laws of Uganda	Gaps between JICA Guidelines and Laws of Uganda	Safeguard Measures Adopted in GKMA
		Non-permanent buildings will receive a cash compensation based on District Compensation Rates plus disturbance allowance of 15% or 30% (depending on notice period). Tenants of structures: Repayment of unused rent, and six-months' notice to vacate structure.		materials.
5.	Compensation and other kind of assistance must be provided prior to displacement. (JICA GL)	No person from whom land is to be acquired shall be required to vacate until they receive full compensation (the exception could be with absentee landlords/ property owners).	Gap - The meaning of "other kinds of assistance" are not explicit in Uganda's law	Compensation and necessary assistance on a case-by-case basis will be provided prior to displacement.
6.	For projects that entail large-scale involuntary resettlement, resettlement action plans must be prepared and made available to the public. (JICA GL)	Land acquisition act Sections 3 and 5 only provide for a declaration that land is needed for public purpose and a notice to persons having an interest to be published, respectively	Gap - There is no equivalence on preparation of resettlement plans and making them available to the public	Preparation of resettlement plans will be undertaken in a consultative manner and final RAP documents made available to the public
7.	In preparing a resettlement action plan, consultations must be held with the affected people and their communities based on sufficient information made available to them in advance. (JICA GL)	There are no explicit provisions for consultations and disclosure but there are guidelines issued by separate ministries (for example RAP Guide for roads).	Potential gap exists in regard to stakeholder involvement and information disclosure	Consultations will be held with the affected people and their communities based on sufficient information made available to them in advance
8.	When consultations are held, explanations must be given in a form, manner and language understandable to affected people. (JICA GL)	There are no explicit provisions for consultations and disclosure but there are guidelines issued by separate ministries (for example RAP guide for roads).	Gap - There are no explicit provisions for consultations and disclosure.	Information provided to PAPs during consultations will be a form, manner and language that they understand
9.	Appropriate participation of affected people must be promoted in planning, implementation, and monitoring of resettlement action plans. (JICA GL)	The Land Acquisition Act, makes provision for an enquiry whereby project affected persons (PAPs) can make formal written claim and the assessment officer is obliged to conduct a hearing before making his award.	While PAP participation is inherent in the ESIA/RAP process, it contains a number of differences with the requirements of JICA guidelines.	PAP participation will be provided for and promoted throughout the ESIA/RAP preparation process
10.	Appropriate and accessible grievance	The Land Act, 1998 had provided for land	Potential gap exists in terms of	Establish appropriate and

No.	JICA Guidelines	Laws of Uganda	Gaps between JICA Guidelines and Laws of Uganda	Safeguard Measures Adopted in GKMA
	mechanisms must be established for the affected people and their communities. (JICA GL)	tribunals to resolve all land related issues. However, since their suspension in 2007, the High Court handles all land-related cases as provided for in the Land Acquisition Act. The Land Act also states that traditional authority mediators must retain their jurisdiction to deal with and settle land disputes.	accessibility and affordability by PAPs if the High Court must handle land-related grievances	accessible grievance mechanisms. Grievance committees to be instituted but the procedure will not replace 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.
11.	Affected people are to be identified and recorded as early as possible in order to establish their eligibility through an initial baseline survey (including population census that serves as an eligibility cut-off date, asset inventory, and socioeconomic survey), preferably at the project identification stage, to prevent a subsequent influx of encroachers of others who wish to take advance of such benefits. (WB OP4.12 Para.6)	Land acquisition Act in Section 5 only provides for a notice to persons having an interest in private property to be published	Although PAPs are required to be identified and served notices, there is no explicit provision for baseline census and socioeconomic surveys as part of a RAP process	The project will conform to WB OP 4.12 and best practices during the preparation of the RAP.
12.	Eligibility of benefits includes, the PAPs who have formal legal rights to land (including customary and traditional land rights recognized under law), the PAPs who don't have formal legal rights to land at the time of census but have a claim to	Ugandan law does not make specific provision for squatters or illegal settlers and compensation is given to only legal occupants. The Land Act treats lawful occupants and bona fide occupants as statutory tenants of the registered owner.	Those without formal legal rights or claims to such lands are not entitled to be resettled or compensated	Dialogue with policy makers will be initiated to explore the possibility of giving compensation to those without formal legal rights or claims to such lands in order to conform to WB OP 4.12.

No.	JICA Guidelines	Laws of Uganda	Gaps between JICA Guidelines and Laws of Uganda	Safeguard Measures Adopted in GKMA
	such land or assets and the PAPs who have no recognizable legal right to the land they are occupying. (WB OP4.12 Para.15)	Under Section 29 of the Land Act, "lawful occupant" means a person who entered the land with consent of the registered owner, and includes a purchaser; or a person who had occupied land as a customary tenant but whose tenancy was not disclosed or compensated for by the registered owner at the time of acquiring the leasehold certificate of title. "Bona fide occupant" means a person who before the coming into force of the Constitution had occupied and utilised or developed any land unchallenged by the registered owner or agent of the registered owner for twelve years or more; or had been settled on land by the Government or an agent of the Government, which may include a local authority. For the avoidance of doubt, a person on land on the basis of a licence from the registered owner shall not be taken to be a lawful or bona fide occupant under this section. Any person who has purchased or otherwise acquired the interest of the person qualified to be a bona fide occupant under this section shall be taken to be a bona fide occupant for the purposes of this Act.		
13.	Preference should be given to land-based resettlement strategies for displaced persons whose livelihoods are land-based.	The law is not explicit about land-based resettlement strategies	Gap - The law is no explicit about land-based resettlement strategies in the Ugandan law	Land-based resettlement strategies for displaced persons whose livelihoods are land-based

No.	JICA Guidelines	Laws of Uganda	Gaps between JICA Guidelines and Laws of Uganda	Safeguard Measures Adopted in GKMA
	(WB OP4.12 Para.11)			will be strongly considered
14.	Provide support for the transition period (between displacement and livelihood restoration). (WB OP4.12 Para.6)	There are no equivalent provisions on relocation assistance, transitional support, or the provision of civic infrastructure	Gap - There are no provisions for transitional support in Uganda	The project will provide transition allowance
15.	Particular attention must be paid to the needs of the vulnerable groups among those displaced, especially those below the poverty line, landless, elderly, women and children, ethnic minorities etc. (WB OP4.12 Para.8)	There is no distinction made on the basis of gender, age, or ethnic origin in Ugandan law during compensation.	Gap - There is no distinction made on the basis of gender, age or ethnic origin in Uganda law during compensation	The project will conform to the requirements of WB OP 4.12 and best practices during the preparation of the RAP in regards to the needs of the vulnerable groups.
16.	For projects that entail land acquisition or involuntary resettlement of fewer than 200 people, abbreviated resettlement plan is to be prepared. (WB OP4.12 Para.25)	There is no explicit provision for abbreviated RAP In the Ugandan law.	Gap - There is no explicit provision for Abbreviated RAP in the Ugandan law.	The project will conform to WB OP 4.12 in cases of land acquisition or involuntary resettlement of fewer than 200 PAPs.

In a number of situations, as shown in Table 3 above JICA guideline requirements are favorable to affected persons than Ugandan law. The project is committed to undertaking appropriate compensation approaches to meet both Ugandan law and JICA requirements.

3 ORGANIZATIONAL RESPONSIBILITIES

The main agencies which will be involved managing this ARAP are:

- Uganda Electricity Transmission Company Limited, UETCL
- Ministry of Energy & Mineral Development, MEMD
- Ministry of Gender, Labour and Social Development, MGLSD
- Local district administrations (Mukono, Mpigi and Kampala)
- Ministry of Lands, Housing and Urban Development, MLHUD (approving compensation rates)
- Electricity Regulatory Authority, ERA
- Ministry of Tourism Trade and Industry (MTTI)

These are discussed in sections below.

3.1 Uganda Electricity Transmission Company Limited, UETCL

Functions of UETCL are directly under policy oversight of MEMD. In respect to this ARAP, UETCL will be responsible for resources mobilization, distribution and implementation of compensation and resettlement. Specifically, the Project Implementation Department in UETCL will be involved with implementation of this ARAP. UETCL has the responsibility to directly oversee resettlement/compensation activities, identifying and co-coordinating all players in the resettlement programme, managing grievances and monitoring ARAP implementation.

Relation to the project: UETCL is the project developer.

3.2 Ministry of Energy & Mineral Development

Ministry of Energy & Mineral Development (MEMD) sets policies for the energy sector in Uganda. The mandate of the MEMD is to establish, promote the development, strategically manage and safeguard rational and sustainable exploitation and utilization of energy and mineral resources for social and economic development. This mandate is fulfilled through its roles below:

- Providing policy guidance in development of the energy resources;
- Creating enabling environment to attract investment in development, provision and utilization of energy;
- Acquiring, processing and interpreting technical data in order to establish the energy resource potential of Uganda; and
- Inspecting, regulating, monitoring and evaluating activities of private companies in energy so that the resources are developed, exploited and used on a rational and sustainable basis.

In order to contribute effectively to poverty reduction, the ministry's medium term key priorities are:

- to increase electricity generation capacity and development of the transmission network; and
- to increase access to modern energy services through rural electrification and renewable energy development;

Above priorities are met through strategies below:

- Increasing energy mix in power generation, promote and co-invest in the development of new power generation and transmission projects; and
- Promote and/or implement rural electrification through grid extension, development of decentralized power supply systems and use of renewable energy resources.

Relation to the project: Based on the functions of MEMD, compensation and resettlement associated with proposed GKMA will be overseen at the policy level, by this Ministry. The proposed GKMA is therefore in line with strategies of MEMD.

3.3 Ministry of Gender, Labour & Social Development, MGLSD

This Ministry guides all actors in the social development sector and creates an enabling environment for social transformation, leading to improved standards of living for all, increased equality and social cohesion. These roles make MGLSD a key secondary stakeholder in proposed GKMA project with roles of empowering project communities to harness their potential through cultural growth, skills development and labour productivity for sustainable and gender responsive development. MGLSD has a department of occupational health and safety which is mandated to inspect workplace to ensure safety and gender equity. The Ministry has the following projects which should tie into and compliment objectives of proposed GKMA

- Community Rehabilitation Programme for the Disabled (CBR);
- Functional Adult Literacy Programme (FAL);
- Support to AIDS Orphans and Other Vulnerable Children (PCY);
- Elimination of Child Labour.

Relation to the project: Above programmes are relevant in so far as some PAPs may be disabled (hence require CBR programmes) or need FAL and PCY. In addition, MGLSD will ensure that no Child Labour is involved in any resettlement activities.

3.4 Local Governments traversed by the Transmission line

The proposed GKMA components that require land acquisition will traverse districts of Mukono, Mpigi and Kampala. As provided by the Local Government Act, local governments are mandated to set compensation rates for crops and non-permanent structures through their District Land Boards. Local governments will also be important in managing and monitoring social impact abatement framework through site visits or resolving complaints from affected communities. Hence they have a central responsibility in this project in regard to monitoring resettlement impacts and ensuring social benefits of the project are equitably accessible to every community. Local officers will also ensure that proper resettlement, compensation and grievance management are undertaken. The lower administrative structures (Local councils LC 1 to LC5) are important in community mobilization and ensuring law and order in villages through local defence units, which should be useful for ensuring security during project implementation, including compensation.

Relation to the project: During compensation, LC1s and LC3s in project-affected areas will be helpful for identification or verification of rightful property owners.

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

The Chief Government Valuer (CGV) in the Valuation Division in the Ministry of Lands, Housing and Urban Development (MLHUD) is responsible for approving the property valuation report developed as part of this RAP.

Relation to the project: Additionally, property or cadastral survey report is submitted to the Commissioner for Surveys & Mapping in MLHUD for review and approval. MLHUD will therefore play a direct role in compensation and resettlement activities of proposed GKMA.

3.6 Electricity Regulatory Authority, ERA

Electricity Regulatory Authority (ERA) is a body corporate established by the Electricity Act, 1999 to license and regulate the generation, transmission, distribution, sale, export and import of electricity in Uganda. The role of ERA is to ensure compliance with conditions in license issued for power transmission. These conditions also include undertaking proper resettlement planning during development of power transmission lines.

Relation to the project: ERA mediates in disputes between aggrieved parties and power companies. In the case of RAPs, ERA is the last resort to mediate between complainants and the utility company before a dispute is taken to courts of law. It is a responsibility of ERA to ensure that this tribunal is fully constituted and facilitated to perform its duties.

4 LAND ACQUISITION AND POTENTIAL IMPACTS

A census was conducted to cover all potentially affected persons by the proposed Project to establish their number, types and size quantity of affected assets. The methods of the census survey are described below.

4.1 Criteria of Identifying PAPs

The PAPs were identified by the cadastral surveying team as any person (or entity/ organisation) whose property (land, building, crops) or income was affected in part or whole by the project and would therefore be compensated.

4.2 Census of PAPs

The PAPs census was undertaken from 4th to 7th May and 7th June 2016 and aimed to enumerate affected persons and register them according to locations. Administration of the census questionnaire (Photo 1) was utilized to all PAPs in their respective villages of Kawaala, Buloba and Mukono. Data collected in the census questionnaires was coded, entered in EPiData and exported to SPSS microcomputer software for analysis. All census data that was collected for all PAPs was analysed to provide social profile of affected persons. The census was undertaken in tandem with property survey and valuation exercise. Results of the census were compiled into in an MS Access database, linked with the property valuation data. All PAPs losing property were interviewed using Census questionnaire (Appendix 2). A photograph of every PAP was taken (as evidence of rightful property ownership).

Photo 1: Census questionnaire administration in Nama II village, Mukono District

4.3 DESCRIPTION OF THE TYPES OF IMPACTS

4.3.1 Land acquisition

Area required for permanent land acquisition will be 11.985 ha, 34.603 ha and 0.0335ha in Buloba, Mukono and Kawaala, respectively, making it a total of 46.621 ha for the entire project footprint.

Table 4: shows the number of PAPs (landowners) within the land acquisition area by tenure type.

Table 4: Number of land owners by tenure type

No.	Item	Buloba	Mukono	Kawaala
1	Land to be acquired (ha)	11.985	34.603	0.0335
2	No. of project affected persons (landowners)	58	31	7
a	Mailo	42	20	1
b	Leaseholder	2	0	0
c	Kibanja	14	11	6

4.3.2 Structures within the project affected areas

Table 5 shows the number and types of structures within the land acquisition area. One residential structure is located each in Buloba and Mukono (see Photo 2). Other structures include incomplete building, pit latrine and water tank. All these structures will be demolished and compensated at full replacement value.

Table 5: Number and types of structures within the land acquisition area

Item	Buloba	Mukono	Kawaala
No. of project affected structures	6	4	1
Residential	1	1	0
Common property	0	0	0
Others	5	3	1

Resettlement will not be required as the PAPs would be able to reconstruct their structures a small distance away within their land boundary.

Photo 2: Example of structures that will be affected by the transmission line

4.3.3 Livelihood impacts from Loss of Land

Within the project affected area, there are 7 and 20 PAPs in Buloba and Mukono, respectively that are growing crops. Most are subsistence farmers and also sell their crops in case of surplus yield and loss of their farmland may result in less food supply for their household and income. Main crops that will be affected by the project are cassava, maize and beans. Photo 3 shows some of the crops that will be lost to the project. In addition, there will be six PAPs that will lose their trees to the project in Nandagi Forest

Reserve, Nama II village, Mukono District. Examples of such trees are eucalyptus and pines as shown in Photo 4.

Photo 3: Some of the crops that will be affected by the project

Photo 4: Some of the trees that will be affected in Nadagi Forest reserve

Table 6 below shows total number of PAPs who will be losing crops and trees within the project area.

Table 6: Number of PAPs losing crops and trees

No.	Item	Buloba	Mukono	Kawaala
1	No. of landowners growing crops	7	20	0
2	No. of affected NFA licensed private farmers	-	6	-

4.3.4 Vulnerable Groups

While vulnerable groups differ from project to project, it is important that they are identified and profiled for each project and in this case three (3) vulnerable people (Sick, infirm and orphaned) were identified along the entire project area as shown in
Table **7** . This will help to have solutions to be formulated and mitigation measures put in place to ensure that they are able to live a good life even after the project disruption.
Assistance may take the following forms, depending upon vulnerable people's requests and needs

- Assistance in the compensation payment procedure (going to the bank with the person to cash the check).
- Assistance in the post payment period to secure the compensation money;
- Assistance in moving: providing vehicle, driver and facilitation at the moving stage,
- Providing ambulance services for disabled persons during moving;
- Assistance in building: providing materials, workforce, or building houses;
- Health care if required at critical periods: moving, transition period.

Table 7: Type of vulnerability in project area

No.	Name of PAP	Sex	Location	Nature of Vulnerability
1	Tebagulwa Esther	Female	Namungoona II, Kawaala	Throat Cancer
2	Hakim Serwadda	Male	Nama II, Mukono	Hypertension and Diabetic
3	Mulimira Peter	Male	Nama II, Mukono	Orphaned

4.3.5 Disruption to Social Networks

The predominant tribe in the project areas is Baganda. However, the sudden influx of possibly up to 100 relatively wealthy construction workers, among whom may be some, with different cultures may disrupt social networks and contributing to increase in crime, prostitution and social tension between the locals and the outsiders.

4.3.6 Local Job Opportunities

Construction of the transmission line and associated sub-station will provide employment for low-skilled workforce hired from local communities. Exact workforce size will be determined by the contractor but is expected to be in the range 80-100 workers at the peak period. This will be a positive but reversible impact ceasing at end of the construction period. Nonetheless, job opportunities present considerable direct and secondary benefits in local economies. For example income spent by project employees would stimulate retail businesses of foodstuff and household commodities. There will also be employment opportunities during line operation and maintenance but this will mostly benefit specialized people (Transmission line engineers) and the number employed will likely be small.

4.3.7 Summary of impacts

During the valuation and cadastral survey, it was observed that PAPs whose structures will be lost to the project have sufficient unaffected land where they can reconstruct another house in case of relocation. Some PAPs grow crops on the affected land. While most PAPs will have sufficient

unaffected land to replant the affected crops, those without will need additional assistance such for finding alternative land or livelihood restoration (e.g. provision of employment, alternative income source).

Table **8** below shows summary of the impacts in the project affected area.

Table 8: Summary of impacts for the project affected area

No.	Item	Buloba	Mukono	Kawaala
1	Land to be acquired (ha)	11.985	34.603	0.0335
2	No. of project affected persons (landowners)	58	31	7
	Mailo	42	20	1
	Leaseholder	2	0	0
	Kibanja	14	11	6
3	No. of project affected structures	6	4	1
4	Residential	1	1	0
5	Common property	0	0	0
6	Others	5	3	1
7	No. of landowners growing crops	7	20	0
8	No. of household to be resettled	0	0	0
9	No. of affected NFA licensed private farmers	-	6	-

5 SOCIO-ECONOMIC BASELINE CONDITIONS

The following section provides a summary of results used to characterize socio-economic baseline conditions in the project areas including the persons likely to be affected by the project prior to the project investment. Data used to establish socio-economic baseline conditions were derived from field surveys conducted in the project area during the preparation of the ARAP. The project activities will displace people from portions of their farmland, structures which will be acquired to provide the required easement for electricity transmission line. The survey team employed the following methods: ·

- ≠ Quantitative household census survey
- ≠ Key-Informant Interviews such as District officials, Sub-county chiefs and Local Councils leaders.

5.1 Average number of people living in the household

The project in Buloba, Kawaala and Mukono project areas will directly affect a total of 96 households (Landowners). Of these, 62 respondents were interviewed, the average affected household in the project areas of Buloba, Mukono and Kawaala comprised of 9 and above persons living within a single household which is higher than the national average 5.02. Results from the project areas of Buloba, Buloba, Mukono and Kawaala show 9 and above persons (31.7%) living within a single household, 3-4 persons (23.3%) and 5-6 people (20%)as shown in Table **9**. This shows a high level of dependency on the family households head in the project area.

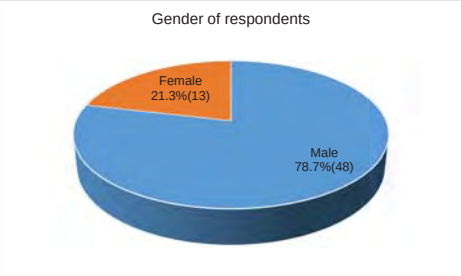
Table 9: Average number of people living in a household

Project area		Number of people living in household					Total
		1-2 people	3-4 people	5-6 people	7-8 people	9 and above people	
Buloba	Count	1	9	7	7	9	33
	%	1.7	15	11.7	11.7	15	55
Mukono	Count	2	5	3	4	9	23
	%	3.3	8.3	5	6.7	15	38.3
Kawaala	Count	1		2		1	4
	%	1.7		3.3		1.7	6.7
Total	Count	4	14	12	11	19	60
	%	6.7	23.3	20	18.3	31.7	100

Source: Field data

5.2 Gender of respondents

From the 62 respondents in the project area, more men were interviewed than women at a rate of 78.7% of men and 21.3% women as shown in Figure **2**. This means therefore that most decisions rest with men within the project area. Further analysis of gender distribution in project area show that there were more women in Buloba 11.5% than in Mukono 6.6% and Kawaala combined 3.3%.



Source: Field data

Figure 2: Gender of the respondents within the project area

Table 10: Gender of the respondents by component

Project area		Gender of respondents by project area		Total
		Male	Female	
Buloba	Count	26	7	33
	%	42.6	11.5	54.1
Kawaala	Count	4	2	6
	%	6.6	3.3	9.8
Mukono	Count	18	4	22
	%	29.5	6.6	36.1
Total	Count	48	13	61
	%	78.7	21.3	100.0

Source: Field data

5.3 Age of respondents

The largest percentage of household heads lies within the age bracket of 26-35, 36-45 and 46-55 years as shown in Table 11. This means that approximately 87.7% of the total population of the PAPs are 26 years and above. This is the less dependency on household resources as most PAPs are in the productive year of their. However due consideration also need to be made for the PAPs in advance age of 56 and above years (8.8%).

Table 11: Age group of respondents

Project area		Age-range					Total
		15-25	26-35	36-45	46-55	56+	
Buloba	Count	1	13	14	5		33
	%	1.8	22.8	24.6	8.8		57.9
Kawaala	Count		3		1	1	5
	%		5.3		1.8	1.8	8.8

Project area		Age-range					Total
		15-25	26-35	36-45	46-55	56+	
Mukono	Count	1	1	7	6	4	19
	%	1.8	1.8	12.3	10.5	7	33.3
Total	Count	2	17	21	12	5	57
	%	3.5	**29.8**	**36.8**	**21.1**	8.8	100

Source: Field data

5.4 Religion and Ethnicity

Majority of the PAPs are Christians as indicated in Table 12 below who stand at 59.7%. They belong to the various denominations found in the project area such as Catholics (24.2%), Protestants (29.0%) and Pentecostal (6.5%). Only 40.3% are Muslims who are the single largest religious sect in the project area with (32.3%) in Buloba, (4.8%) in Kawaala and (3.2%) in Mukono Project areas. Ethnic composition of PAPs in the project area was heterogeneous (**Table 13**) indicates that most people are. However, Baganda were the most predominant tribe (85.5%).

Table 12: Religious affiliation in the project affected area

Project area		Religion				Total
		Catholic	Protestant	Pentecostal	Muslim	
Buloba	Count	3	7	3	20	33
	%	4.8	11.3	4.8	32.3	53.2
Kawaala	Count	2	1	-	3	6
	%	3.2	1.6	-	4.8	9.7
Mukono	Count	10	10	1	2	23
	%	16.1	16.1	1.6	3.2	37.1
Total	Count	15	18	4	25	62
	%	24.2	29	6.5	40.3	100

Source: Field data

Table 13: Tribal affiliation in the project area

Project area		Tribe/Clan									Total
		Mufumbira	Muganda	Mukiga	Mukonjo	Munyala	Munyankole	Munyole	Munyoro	Musoga	
Buloba	Count		30				1	1	1		33
	%		48.4				1.6	1.6	1.6		53.2
Kawaala	Count		3		1	1				1	6
	%		4.8		1.6	1.6				1.6	9.7
Mukono	Count	1	20	1			1				23
	%	1.6	32.3	1.6			1.6				37.1
	Count	1	53	1	1	1	2	1	1	1	62
	%	1.6	85.5	1.6	1.6	1.6	3.2	1.6	1.6	1.6	100.0

5.5 Economic activity

A survey on the economic activities in the project area revealed that the majority of respondents were teachers (27.4%), farmers (22.6%) who were mainly in Mukono project area owing largely to its rural settings, retail traders (14.5%) and transport in form of private car hires and boda-boda riders (3.2%). Other respondents in the project area engaged in private informal employment which entailed building and brick making (5.1%). Especially in Kawaala project area. A few PAPs in the project area were also found to be in private formal employment (1.6%) as shown in Table 14.

Table 14: Occupation of the project affected households

Project Area		Occupation in project area												Total
		Civil servant	Cleric	Farmer	Formal employment	Nurse	Private formal employment	Private Formal employment	Private informal employment	Retail trade	Student	Teacher	Transport	
Buloba	Count	1	1	3	-	1	1		2	5	-	17	2	33
	%	1.6	1.6	4.8	-	1.6	1.6		3.2	8.1	-	27.4	3.2	53.2
Kawaala	Count	-	-	1	-	-	-	1	3	-	1	-	-	6
	%	-	-	1.6	-	-	-	1.6	4.8	-	1.6	-	-	9.7
Mukono	Count	2	-	10	5	-	-	-	2	4	-	-	-	23
	%	3.2	-	16.1	8.1	-	-	-	3.2	6.5	-	-	-	37.1
Total	Count	3	1	14	5	1	1	1	7	9	1	17	2	62
	%	4.8	1.6	22.6	8.1	1.6	1.6	1.6	11.3	14.5	1.6	27.4	3.2	100

Source: Field data

Annual income

When interviewed on annual income, most household heads revealed making an income of over 1,500,000 million shillings a year (88.7%). However, some household earned between 500,001 - 1,000,000 (9.7%) and 1,000,001 - 1,500,000 (1.6%) in the previous year as shown in Table 15.

Table 15: Average income from the main occupations among the PAPs

Previous annual income	Frequency	Valid Percentage
500,001 - 1,000,000	6	9.7
1,000,001 - 1,500,000	1	1.6
Over 1,500,000	55	88.7
Total	62	100.0

Source: Field data

5.6 Water sources in the project affected areas

When interviewed on sources of water in the project area, respondents showed that they get their water mainly from protected springs (43.5%) and stand pipes (35.5%) in the villages of Kaggaba, Nama II and Namugoona II in Buloba Mukono and Kawaala project areas respectively. Boreholes (14.5%) and rain water (4.8%) also serve as sources of water for domestic use as shown in Table 16.

Table 16: Sources of domestic water use within the project area

Project area		Where do you get drinking water from?					Total
		River	Protected spring	Rain water	Borehole	Stand Pipe	
Buloba	Count		15	3	3	12	33
	%		24.2	4.8	4.8	19.4	53.2
Mukono	Count	1	11		6	5	23
	%	1.6	17.7		9.7	8.1	37.1
Kawaala	Count		1			5	6
	%		1.6			8.1	9.7
Total	Count	1	27	3	9	22	62
	%	1.6	43.5	4.8	14.5	35.5	100.

Source: field data

5.7 Source of energy in project area

The main source of energy in the project area is charcoal (69.4%) and firewood (45.2%) which were used predominantly for cooking. Kerosene (14.5%) and Electricity (32.3%) were used for lighting. The least used source of energy for lighting was solar (8.1%) and candles (4.8%)

Table 17: Type of fuel source in the household

Energy sources	N	Percentage
Firewood	28	45.2
Gas	4	6.5
Charcoal	43	69.4
Solar	5	8.1
Kerosene	9	14.5
Biogas	1	1.6
Electricity	20	32.3
Candles	3	4.8
Total	113	182.3

Source: Field data

5.8 Land Use in the project area

Land use is an integral component of any resettlement process as it helps to guide developer on restoration of livelihoods and possible relocation options. On issues related to land use majority of the land was used for agriculture particularly cultivation of crops and livestock grazing in Mukono and

Buloba project areas. In Kawaala project area land was used for brick making see Photo 5. Typically grown crops in the project area included Matooke, cassava, sugarcane maize, beans and potatoes.

Photo 5: Land use within the project areas

5.9 Level of Education in the project affected area

Majority of the household heads have completed University Education primary 46.7% and only 5% never attained any level of education. This means that majority of the population can provide skilled labour in the construction phase if employment will be available to the local communities. There were also PAPs who had attained primary education (26.7%) and therefore they can also provide their unskilled labour if the jobs are available.

Table 18: Level of education within the project affected area

Project area		Literacy Level					Total
		Illiterate	Can read and write	Complete primary education	Complete secondary education	Complete university education	
Buloba	Count		1	9	2	21	33
	%		1.7	15	3.3	35	55
Mukono	Count	3	3	6	4	6	22
	%	5.0	5.0	10	6.7	10.0	36.7
Kawaala	Count	-	2	1	1	1	5
	%	-	3.3	1.7	1.7	1.7	8.3
	Count	3	6	16	7	28	60
	%	5	10	26.7	11.7	46.7	100

Source: field data

5.10 Health and sanitation

In relation to the most common diseases, respondents indicated that malaria was the most prevalent (83.9%) followed by venereal diseases such as Syphilis, HIV/AIDS (3.2%) and respiratory diseases like cough, asthma and flu cough (8.0%) (Table 19). Malaria, skin infections and respiratory infection were mainly common among children.

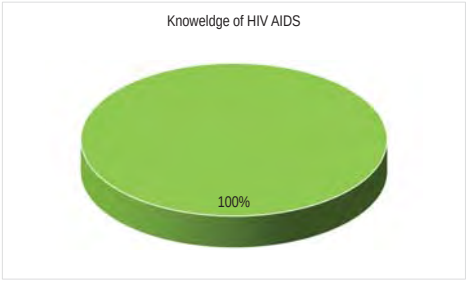
Table 19: Most common diseases in project area

Most common diseases	Frequency	Valid Percentage
Aids	2	3.2
Respiratory infections	5	8.0
Diabates	1	1.6
Malaria	52	83.9
Typhoid	2	3.2
Total	62	100.0

Source: field data

5.11 Knowledge of HIV prevalence and how it's contracted

From the project area all affected PAPs 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 shown in Figure 3.



Source: Field data

Figure 3: Knowledge of HIV/AIDS in the project area

5.12 Welfare indicators

Welfare refers to the wellbeing of persons or groups with consideration to their health, happiness, safety, prosperity and fortunes1. Welfare indicators can be a good measure of poverty levels in a given community. In this report possession of specific Household assets is used among others to measure the economic welfare of the PAPs. The study went further to establish the assets owned by the households in working condition. In table below survey results show that majority of households owned two sets of clothes (96.6%), radio (93.5%) and mobile phones (100%). Few households owned bicycles (30.6 %) and fixed telephone lines (11.3%).

Table 20: Welfare indicators within the project area

Welfare indicators	N	Percentage
Least two sets of clothes	60	96.8
Radio	58	93.5
Mobile telephone	62	100
Fixed telephone	7	11.3
Bicycle	19	30.6
Other transport equipment	29	46.8
Total	235	379

Source: Field data

5.13 Community Perception of the Project

All the households agreed to have the construction of the powerline. They view the construction as an opportunity for job creation, provision of reliable power supply, infrastructure; improve the living standards of the community and better living conditions, and easy access to grid power. However the main concern of the persons affected is that they should be adequately compensated before the project commences.

6 COMPENSATION AND LIVELIHOOD RESTORATION

The objective of the RAP is to avoid or minimize, to the extent possible, the hardships and impoverishment that the project may cause, and to mitigate any adverse impacts thereof at the household and community levels. These objectives are detailed and made more specific in terms of the principles and guidelines to be followed for adoption of entitlement framework and planning and implementation of rehabilitation activities.

6.1 RAP Principles

The following represents a list of basic principles that form the basis for development of this RAP and will be used in the implementation of the compensation process:

- Exploring all possible means to ensure that impact on people by project activities is minimised;
- PAPs are consulted throughout the planning and implementation phase;
- PAPs are informed about their rights and options pertaining to compensation, relocation and about grievance mechanisms available to them;
- Identification of PAPs takes place as per agreed eligibility criteria set out in the RAP;
- Lack of legal rights to land and assets occupied or used does not preclude a PAP from entitlement to compensation and assistance measures;
- Compensation, relocation and rehabilitation measures are as fair as possible to all parties concerned and also minimise long-term liability of the project proponent;
- Not to commence project work on affected sites until PAPs have been fully compensated and/or relocated.

6.2 Compensation for Loss

In order to meet the objectives of the RAP, the following entitlements have been determined.

6.2.1 Eligibility

A Project Affected Person (PAP) is one who, as a consequence of the project, sustains losses as a result of impact on a) land, b) structure, c) immovable asset and/or d) livelihood/incomes. The PAPs have been identified through census survey that forms the basis for this RAP.

6.2.2 Compensation Measures

6.2.2.1 Compensation for Loss of Land

PAPs having titled land (Mailo, Leasehold and Freehold) or Kibanja owners on the affected land are eligible for compensation equal to full replacement cost of the land under the Ugandan laws and additionally, under JICA guidelines, land for land option.

For licensees (NFA licensed private farmers), they are not eligible for any compensation for value of land.

6.2.2.2 Compensation for Loss of Income

(a) Loss of business and Employment

In case of PAPs conducting business activities in affected land (e.g. commercial farming) will suffer loss of income, therefore they will be compensated for loss of business/income through provision of transition allowance. Employees (e.g. employed famers) will also suffer loss of income, therefore they will be given compensation for loss of income through provision of transition allowance.

(b) Loss of crops

PAPs growing perennial crops and trees on the affected land will be compensated based upon the rates determined by the District Land Board in the district compensation rates plus 30% disturbance allowance. Under the Local Government Act, the District Land Board in each local government has the mandate to develop own compensation rates for crops and semi-permanent structures. These rates are normally submitted to the office of the Chief Government Valuer for consideration and approval for each particular year.

PAPs growing seasonal crops are not eligible for any compensation. However, they will be given ample time to harvest any viable crops.

6.2.2.3 Privately Owned Structures (Residential and Commercial)

Owners of structures (including illegal occupiers if any) on the affected land will be compensated at full replacement value without depreciation plus 30% disturbance allowance.

The option of constructing replacement structures by the project proponent (or its contractor) although recommended is often not a preferred option mainly due to lack of capacity and resources.

6.2.2.4 Loss of common property (Community structures)

Common properties on the affected land will be compensated in accordance to approved valuers valuatiuon plus 30% disturbance allowance. Compensation amount will be paid to trustees or community leaders or the project proponent will directly re-construct the replacement structures.

6.2.2.5 Damage Caused During Construction Work

Construction activities may also cause some additional temporary or permanent damage to land and assets that cannot be identified or quantified during RAP preparation. An example might be construction workers trampling crops or vegetables while accessing particular construction sites. Thus, wherever possible, the construction team/contractor will repair the damage to the satisfaction of the affected person. Affected persons with a claim should be required to complete a compensation claim form and submit it to the construction team/contractor. The construction team/contractor will then negotiate the required compensation measures, which may include repairing the damage or payment of compensation in cash or kind. Payment of compensation should be effected in a time bound manner.

6.2.3 Cut-off Date

Cut-off dates determine eligibility of persons and their assets. Therefore, they represent the actual date that the affected assets and infrastructure at a particular site were recorded during the census survey. Assets like land, structures and others, which are created, encroached or acquired by individuals or groups, after the cut off dates, will not be eligible for compensation.

Disclosure of the cut-off date after valuation was communicated to the PAPs by the surveying and valuation team.

6.3 Livelihood Restoration and Other Assistances

6.3.1 Introduction

Resettlement assistance and livelihood development, sustenance and restoration programmes are included in resettlement planning when affected households stand to lose a significant portion of their livelihood resources (e.g. subsistence agricultural plots, access to important natural resources, etc.) as a result of land acquisition or resettlement. Such programmes are intended to offset the effects of those losses that cannot adequately be compensated for through monetary payments or replacement of assets – e.g. the disruption of social support networks, reduced access to markets, decreased soil productivity, the time required to reinstate agricultural plots to their former productivity, etc. – so as to ensure that resettled/ compensated households are not worse off after the project than they were before. Livelihood restoration is particularly important where a project affects the livelihoods of *vulnerable households* (i.e. households who, because of their social or economic status, may be more adversely affected than others by a temporary or permanent loss of part of their asset base).

Where displacement is unavoidable, the developer should plan and execute resettlement as a development initiative that provides displaced persons with opportunities to participate in planning and implementing resettlement activities as well as to restore and improve their livelihoods. JICA recommends that project sponsors undertake the following actions on behalf of all affected people, including members of the host communities in which displaced people will be settled:

Inform affected people of their options and rights concerning resettlement; provide technically and economically feasible options for resettlement based on consultation with affected people and assessment of resettlement alternatives;

- ≠ Whether physical relocation is required or not, provide affected people with prompt and effective compensation at full replacement value for loss of assets due to project activities;
- ≠ Where necessary, provide affected people with development assistance in addition to compensation for lost assets described above such as land preparation, agricultural inputs, and credit facilities and for training and employment opportunities.
- ≠ Where physical relocation is necessary, provide assistance with relocation expenses (moving allowances, transportation, special assistance and health care for vulnerable groups);

- ≠ Provide affected people with transitional financial support (such as short-term employment, subsistence support, or salary maintenance); and

The developer is expected to undertake all land acquisition, provide compensation for lost assets, and initiate resettlement related to a specific project before that project commences. It is recommended that the implementation of resettlement activities be linked to the schedule of disbursements for project financing. In doing so, this will ensure that displacement does not occur before the sponsor has carried out the necessary measures for the resettlement of the affected people. In particular, the acquisition of land and other assets should not take place until compensation is paid and, where applicable, resettlement sites and moving allowances are provided to displaced persons.

The developer must be sensitive to the special needs of women and other vulnerable groups in the planning and implementation of resettlement and livelihood restoration. Men and women have different needs and opportunities for access to land, resources, employment, and markets.

Resettlement is complex and success depends, in part, on getting the details right, including; negotiation with every household; compensation payments made on time; and complaints resolved in a fair and timely manner. This requires resources and adherence to administrative processes. Success in resettlement also comes from an awareness of the "human effects" of the process. It can be very stressful and emotional for people as they come to terms with leaving land and households, and uncertainty over their future. Employees and communities practitioners can also experience stress as they deal with communities under stress and internal pressures to complete the resettlement. Most importantly, resettlement should only be undertaken with the direct involvement of competent professionals who have on ground and project management experience in resettlement.

6.3.2 Relocation assistance

In case of relocation, the PAPs that will be physically relocated will be provided with relocation assistance (e.g. assistance to identify new sites, transaction costs and transport allowance) on top of the compensation that will have been given to them.

Where salvaging of materials is necessary, PAPs will be allowed to salvage any material from the structures they currently own. These materials such as iron sheets, poles and others will be transported by PAPs at their own cost.

6.3.3 Livelihood Restoration Measures

The nature of displacement is such that at times cash compensation and other short-term mitigation measures may not be effective to ensure that affected persons get back to their original status or better in terms of their earnings and productivity.

Therefore designing an income and livelihood restoration plan is essential. The main objective of income and livelihood restoration strategy is the restoration of living standard to pre-displacement level at minimum and includes strategies which would improve future income and living standard. Following are some of the options for livelihood restoration measures:

- ≠ Provision of employment (e.g. Project construction worker)
- ≠ Provision of alternative income generating sources (e.g. poultry, piggery)
- ≠ Provision of training opportunities (e.g. farming skills, animal husbandry)

6.3.4 Assistance for vulnerable people

The RAP Implementation Team in conjunction with PAP committee must design appropriate assistance measures to ensure that the vulnerable people are catered for during resettlement process and should be provided priority for any livelihood restoration measures. Vulnerable people among others may include:

- ≠ Female-headed households (with no additional able-bodied persons);
- ≠ Pregnant and lactating women;
- ≠ Mentally and physically challenged (including amputees);
- ≠ Orphans;
- ≠ Infirm; and sick
- ≠ Elderly.

6.4 Entitlement Matrix

Entitlement matrix is a major integrated part of any resettlement plan. It describes compensation for loss of properties and related assistance for each category of affected PAP. The Entitlement matrix for PAPs is presented in Table 21.

Table 21: Entitlement Matrix

Type if impact	Entitled person	Primary entitlement measures	Other entitlement measures	Responsible organizations
Loss of land	Mailo or Freehold holder (Please see Reference below)	· Cash compensation based on market value (equal to replacement value) and 30% disturbance allowance for both property and land. · Land-for-land compensation if such land is available.	· Relocation assistance (e.g. assistance to identify new site, transaction cost, transport allowance) · Support for transition period (e.g. livelihood restoration program, provision of employment) · Additional assistance for vulnerable people (e.g. provision of resettlement house, priority for livelihood restoration program)	UETCL
	Leaseholder (Leaseholder on Titled Land, Please see Reference below)	· Cash compensation based on market value (equal to replacement value) and 30% disturbance allowance for property. · Cash compensation based on market value (equal to replacement value) and 30% disturbance allowance for the remaining leasehold interest in the land. · Land-for-land compensation if such land is available. · UETCL to acquire lease from the Registered Land owner upon expiry of the lease tenure of the Leaseholder.	· Relocation assistance (e.g. assistance to identify new site, transaction cost, transport allowance) · Support for transition period (e.g. livelihood restoration program, provision of employment) · Additional assistance for vulnerable people (e.g. provision of resettlement house, priority for livelihood restoration program)	UETCL
	Mailo or Freehold titled Land with Bona fide and /or Lawful Occupants (Kibanja Holders)	· Cash compensation based on market value (equal to replacement value) and 30% disturbance allowance for property awarded to the Occupant. · Compensation for Land will be split between the Bonafide/lawful occupant (Kibanja holder) and landowner in the ratio of 40% of above compensation paid to landlords and 60% to the Kibanja owner is the common practice in Uganda · Land-for-land compensation if such land is available.	· Relocation assistance (e.g. assistance to identify new site, transaction cost, transport allowance) · Support for transition period (e.g. livelihood restoration program, provision of employment) · Additional assistance for vulnerable people (e.g. provision of resettlement house, priority for livelihood restoration program)	UETCL
Loss of structure	Owners including Squatters occupiers	· Compensation at full replacement value without depreciation and 30% disturbance allowance.	· Building materials maybe salvaged from old housing to be utilized in new structures. · Relocation assistance (e.g. assistance to identify new site, transaction cost, transport allowance).	UETCL

Type if impact	Entitled person	Primary entitlement measures	Other entitlement measures	Responsible organizations
			· Support for transition period (e.g. livelihood restoration program, provision of employment) · Additional assistance for vulnerable people (e.g. provision of resettlement house, priority for livelihood restoration program)	
Loss of rental accommodation and business premises	Tenants	· Compensation at full replacement value for fixed assets and 30% disturbance allowance.	· Relocation assistance (e.g. assistance to identify new site, transaction cost, transport allowance).	UETCL
Loss of perennial crops	Owners	· Compensation at district rates and 30% disturbance allowance.	· Relocation assistance (e.g. assistance to identify new site, transaction cost, transport allowance).	UETCL
Loss of seasonal crops	Owners	· Ample time will be provided to enable the harvesting of seasonal crops.	· Support for transition period (e.g. livelihood restoration program, provision of employment)	
Loss of business and employment	Business owners	· Compensation for loss of business and employment such as through provision of transition allowance.	· Relocation assistance (e.g. assistance to identify new business and employment, transaction cost, transport allowance). · Support for transition period (e.g. livelihood restoration program, provision of employment)	UETCL
Loss of common property	Owners	· Compensation as per approved valuer and 30% disturbance allowance.	· Relocation assistance (e.g. assistance to identify new site, transaction cost, transport allowance).	UETCL

Reference: Land ownership

Subject to article 237 of the Constitution, all land in Uganda shall vest in the citizens of Uganda and shall be owned in accordance with the following land tenure systems—

i. customary;
ii. freehold;
iii. mailo; and
iv. leasehold.

(1) Customary tenure is a form of tenure applicable to a specific area of land and a specific description or class of persons, governed by rules generally accepted as binding and authoritative by the class of persons to which it applies. All land acquisition in that area is in accordance to their local rules, and ownership and management of the land is according to their own set of Local regulations. Such land can be owned individually, by family, by a traditional institution, by a community and such land is owned in perpetuity.

(2) Freehold tenure is a form of tenure deriving its legality from the Constitution and its incidents from the written law which and involves the holding of registered land in perpetuity or for a period less than perpetuity which may be fixed by a condition and enables the holder to exercise, subject to the law, full powers of ownership of land, including but not necessarily limited to—

i. Using and developing the land for any lawful purpose;
ii. Taking and using any and all produce from the land;
iii. Entering into any transaction in connection with the land, including but not limited to selling, leasing, mortgaging or pledging, subdividing creating rights and interests for other people in the land and creating trusts of the land;
iv. Disposing of the land to any person by will.

A freehold title is usually created and may be created which is subject to conditions, restrictions or limitations which may be positive or negative in their application, applicable to any of the incidents of the tenure.

(3) Mailo tenure is a form of tenure deriving its legality from the Constitution and its incidents from the written law which involves the holding of registered land in perpetuity and permits the separation of ownership of land from the ownership of developments on land made by a lawful or bona fide occupant. This tenure system enables the holder, subject to the customary and statutory rights of those persons lawful or bona fide in occupation of the land at the time that the tenure was created and their successors in title, to exercise all the powers of ownership of the land.

(4) Leasehold tenure is a form of tenure created either by contract or by operation of law, the terms and conditions of which may be regulated by law to the exclusion of any contractual agreement reached between the parties; under which one person, namely the landlord or lessor, grants or is deemed to have granted another person, namely the tenant or lessee, exclusive possession of land usually but not necessarily for a period defined, directly or indirectly, by reference to a specific date of commencement and a specific date of ending.

7 STAKEHOLDER ENGAGEMENT AND DISCLOSURE

7.1 Consultation with PAPs

Public consultation and disclosure of information are vital components for the success of any development project, to ensure two-way communication between the project developer and relevant stakeholders, and assure accountability and transparency in the development process. Not only are they regarded as best practice on ethical and moral grounds, but they are widely documented as resulting in project developments that are more sustainable and cost-effective in the long term, and acceptable to all those who are affected directly and indirectly. In addition, the consultation process provides an opportunity for PAPs to express their views and opinions on the project, and on their present and possible future.

An intense public consultation and disclosure program is therefore required to ensure that Project benefits are maximised and that the Project is implemented sustainably.

Consultations were carried out with PAPs of the project affected areas of Buloba, Kawaala and Mukono during preparation of this ARAP as shown in Table 22. During the sensitization meetings, the project planning schedule was disclosed, cut-off for eligibility was explained and rights of PAPs and grievance procedures were outlined. All meetings were chaired by the village's Local Council (LC1) chairpersons and aimed to create awareness about upcoming ARAP, quell any apprehensions PAPs might have about resettlement thus enabling them to provide true household and personal information during the census survey. In these meetings, project principles of compensation for various types of loss were detailed and various entitlement options discussed.

Table 22: Consultations carried out in the various project affected areas

Component	Date	Location	Target community/village	Number of participants
Mukono	10th May 2016	Nandagi NFA Office	NFA private foresters in Nandagi Forest Reserve	34
	30th April 2016	Buyuki Trading Centre	Community members in villages of Nama II, Buyuki and Luwunga	27
	30th April 2016	Nandagi NFA Office	Community members in villages of Wanjeyo, Kivuvu and Bwefulumya villages	16
Buloba	27th January 2016	Grail Sisters Church, Kaggaba	Community members in villages of Kaggaba, Mabuye, and Nsujjuwe	16
	30th March 2016	Grail Sisters Church, Kaggaba	Community members in villages of Kaggaba, Mabuye, and Nsujjuwe	11
Kawaala	29th March 2016	Project site	Community members of Namungoona	16

A number of consultative meetings were held with relevant stakeholders in lead government agencies, local community leaders and community members in the respective project areas between March and May 2016. Photo 6 shows pictures of some of the meetings held in the various Project areas, while Table 23 provides a summary of the findings from the stakeholder consultations and APPENDIX 1 provides a detailed record of the discussions and attendance for each meeting.

Nama II, Buyuki and Luwunga zones (30/04/2016)


Wanjeyo, Kivuvu and Bwefulumya villages (30/04/2016)


Nandagi Forest Reserve Commercial Foresters (10/05/2016)


Kawaala Substation community (29/03/2016) | Buloba SS Community (30/03/2016)


Photo 6: Meetings held with stakeholders with an interest in the Project

During the sensitization process, issues were raised and summary of key issues is obtained in Table 23. Signed records of consultation are appended as Appendix 1.

Table 23: Key issues raised during stakeholder meetings.

Community	Issue	Response
Mukono	In some instances, PAPs' structures get old and collapse before compensation is done. How will these be handled if re-assessment is done subsequently?	In the event that a PAP's structure collapses before compensation, the PAP will get the compensation due him as his property information will have already been captured.
	Will PAPs be permitted to use the land after the project has been implemented?	The project proponent intends to fully compensate and acquire the project area and therefore no work or developments by PAPs will be allowed subsequent to project implementation.
	How will kibanja holders and title owners be compensated?	Kibanja owners and title holders will be equitably compensated in their individual holding capacities on pro rata basis.
	Who constitutes the grievance committee?	The grievance committee constitutes a member of the Local Council, a member of the project proponent organization and an identified NGO from the project area.
Buloba	How will the kibanja holders and title holders be catered for?	The compensation for such an area is split such that the kibanja holder receives 70% of the compensation sum while the title holder receives 30% of the compensation sum.
	Sometimes the Valuers don't give the right amount e.g. someone who deserves more money gets less, and vice versa.	The valuation process will be conducted in line with the laws of Uganda and the JICA Guidelines for Social and Environmental Considerations. In accordance with the Ugandan laws, the Valuation report will be submitted to the Chief Government Valuer for approval of the compensation values to be used for the Project.
	How will the Grievance Committee be selected and where could it be found?	The Grievance Committee will be composed of the area local chairpersons such as LC I and LC II. Aside from the local chairpersons, the Committee will also include an elder on the village, an opinion leader, as well as a representative from UETCL. The Committee's office shall be at the LC Chairperson's office, or another location that the PAPs agree upon as being the most convenient. UETCL also has officers that are dedicated to handling the RAP issues that arise from their various projects.
	If a young fruit tree has been valued, will the future prospects be catered for e.g. the jack fruit trees or oranges that would have been reaped from the fruit tree?	No, valuations are done on as as-is basis. Projections are not done during the valuation exercise.
	Sometimes the cut-off date is announced but the Project takes long to start, yet the people have been asked to hold off on developments.	If a Project takes more than 2 years after the cut-off date, a re-evaluation is done to take into consideration any changes.
Kawaala	Can one remove some of their property such as roof or doors even after they have been paid?	Yes, as long as the information has been captured by the Valuer. All additions or subtractions from property after the cut-off date are not considered during compensation.
	The cable, in some cases is passing through land that is undeveloped. Will such land owners be compensated?	Yes, all land owners will be compensated for their lost property. Developments on the land are also compensated for.

7.2 Disclosure

A copy of the ARAP shall be displayed at the respective district headquarters of Mukono and Mpigi.

8 GRIEVANCE MANAGEMENT

8.1 Introduction

This section describes avenues for PAPs to lodge a complaint or express a grievance against the project, its staff or contractors during ARAP implementation. It also describes procedures, roles and responsibilities in grievance management process.

Grievance management will aim to provide a two-way channel for the project to receive and respond to grievances from PAPs, stakeholders or other interested parties. Grievances will be managed by a committee based at sub-county level in local government areas of jurisdiction along the power project site.

Sections below outline the proposed grievance management process that utilizes easily accessible local structures through which communities can channel their concerns to the project proponent (UETCL). Use of local leadership structures would ensure that aggrieved persons, especially vulnerable groups easily have their concerns resolved without undue delay or expenses associated with formal legal channels (courts).

8.2 Grievance Mechanism

The grievance mechanism is designed to ensure that PAPs have opportunity to access the project and have their concerns addressed. In addition, it allows the project to be active in identifying solutions to grievances. It should be noted that the grievance procedure will not replace the existing legal process in Uganda, rather based on consensus, it will seek to resolve issues quickly so as to expedite receipt of entitlements and smooth resettlement without resorting to expensive and time-consuming formal legal action. If the grievance procedure fails to provide a solution, complainants can still seek legal redress.

The project will therefore put in place an extra-judicial mechanism for managing grievances and disputes based on explanation and mediation by a third party, preferably an indigenous NGO or committee comprising local leaders and trusted citizens independent of the project. Every aggrieved person shall be able to trigger this mechanism, while still being able to resort to the formal judicial system, if they so wished.

8.3 The Overall Grievance Mechanism

UETCL will form a grievance committee comprising its staff, local leaders and members of a local NGO. The Grievance committee will receive information from three main sources:

- Directly from affected persons.
- From the implementation team executing the resettlement.
- From the Monitoring and Evaluation Officer (UETCL staff)

All grievances will be recorded with a grievance log which will be held by the Grievance Officer who will be a UETCL staff. The log would indicate grievances, date lodged, actions taken to address or reasons the grievance was not acted on (i.e. the grievance was not related to the resettlement

process); information provided to complainant and date the grievance was closed. Grievances can be lodged at any time, either directly or through a grievance committee member. The process for lodging a complaint is outlined below:

- A Grievance Officer will receive the complaint which may be verbal or in writing addressed to chair of the Grievance Committee housed at the sub-county.
- The Grievance Officer will ask claimant questions in their local language write the answers in English and enter the answers in English onto the Grievance Form.
- A local leader (LC1) will witness translation of the grievance into English.
- The LC1 and Complainant will both sign the Grievance Form after they confirm accuracy of the grievance.
- The Grievance Officer lodges the complaint in the Grievance Log.

Grievances shall be resolved and status reported back to complainants within 2 weeks. If more time is required this shall be communicated clearly and in advance to the aggrieved person.

Once the Grievance Committee has determined its approach to the lodged grievance, this will be communicated to the grievance officer, who will communicate this to the complainant. If satisfied, the complainant signs to acknowledge that the issue has been resolved satisfactorily. If the complainant is not satisfied however, the complainant notes the outstanding issues, which may be re-lodged with the Grievance Committee or the complainant may proceed with judicial proceedings.

Sections below provide key people involved in the grievance redress mechanism and associated actions.

a) Grievance Officer

A Grievance Officer (GO), who will be a staff of UETCL, and a member of the implementation team, will lead the grievance mechanism. Every project affected area will have a grievance office designed for it in order enable the project affected people to report their grievances. PAPs will be given a chance to report their grievances in a language that they can communicate best. This is a continuous process even during implementation. Principal responsibilities of the GO will include:

- Recording the grievances, both written and oral, of the affected people, categorizing and prioritizing them and providing solutions within a specified time period.
- Discussing grievances on a regular basis with the Working Group and coming up with decision/actions for issues that can be resolved at that level.
- Informing the Management Committee that will be set up by UETCL of serious cases within an appropriate time frame.
- Reporting to the aggrieved parties about developments regarding their grievances and decisions of the Steering Committee.
- Providing inputs into the Monitoring and Evaluation process.

b) Specific Tasks of the GO

i) Set up a systematic process of recording grievances in a register ("Grievance Book") as well as electronically. The register should be located in the implementation team office and should be accessible to residents.
ii) Both written and verbally communicated grievances should be recorded.
iii) Categorise issues in 3-4 broad categories in order to review and resolve them more efficiently. Suggested categories are grievances regarding:

- Replacement structure or land, and procurement of construction materials;
- Agriculture and crops;
- Livelihoods; and
- Valuation process and payment of compensation.

iv) Prepare a database for recording and keeping track of the grievances and how they were resolved. The database should be a 'living' document, updated weekly. It should also record the status of each grievance. Access to making entries into the database should be restricted to the implementation team, but the general community should be able to use "Grievance Book"/ register to see the status of their complaints.
v) Communicate the grievance procedure to the people, the process for recording their complaints and the timelines for redress. Communication should be done through a community meeting involving the resettled community. Pamphlets outlining the procedures and commitments of the grievance mechanism should be distributed to all households.
vi) Raise grievances at the regular implementation team meeting for discussion. Some resolutions will require coordination/ interaction with the local authorities, which the GO should follow up, while some would require intervention from UETCL.
vii) Provide a regular update on the status of grievances via the database, including reasons for delay, if any. This update needs to be provided on a weekly basis. Also clearly define grievances that will not be entertained by the GO. These could be related to issues other than those linked to the resettlement and rehabilitation process.

The Grievance Process to be followed is depicted in Figure 4

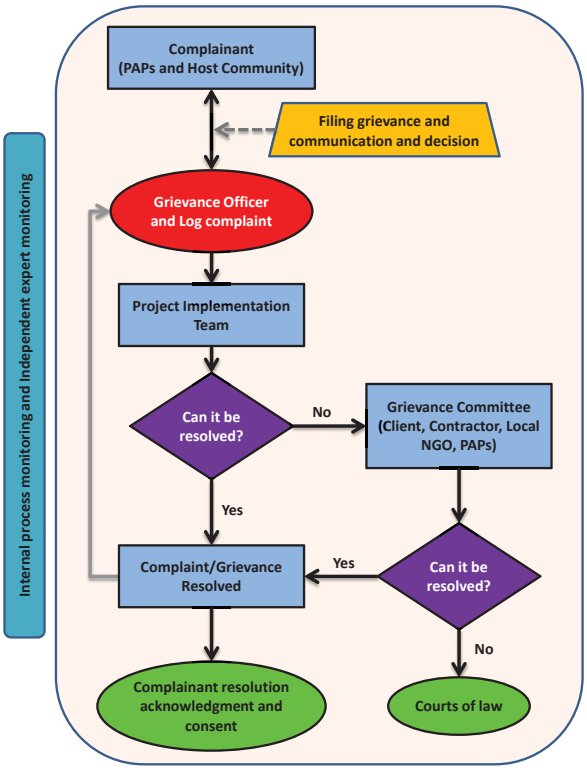


Figure 4: A flow process of grievance mechanism

9 COST AND BUDGET

The total compensation value for the ARAP is approximately UGX 7,389,354,180/= (Uganda Shillings Seven Billion Three Hundred Eighty Nine Million Three Hundred Fifty Four Thousand One Hundred Eighty Only) and is presented in Table 24, while Income restoration budget in Table **25** and overall ARAP budget in Table 26.

Table 24: Resettlement compensation budget (UGX)

Nature of resettlement	Assessed Value	Disturbance Allowance (30%)[1]	Total Value
KAWAALA SECTION			
Land Value	23,690,000	7,107,000	30,797,000
Buildings	1,332,000	399,600	1,731,600
TOTAL - KAWAALA	**25,022,000**	**7,506,600**	**32,528,600**
BULOBA SECTION			
Land Value	972,239,000	291,671,700	1,263,910,700
Buildings	27,630,500	8,289,150	35,919,650
Crops and trees	77,707,500	23,312,250	101,019,750
TOTAL - BULOBA	**1,077,577,000**	**323,273,100**	**1,400,850,100**
MUKONO SECTION			
PAPs Out Side of the Nandagi Forest Reserve			
Land Value	471,814,000	141,544,200	613,358,200
Buildings	12,503,600	3,751,080	16,254,680
Crops and trees	35,382,000	10,614,600	45,996,600
Sub-Total	**519,699,600**	**155,909,880**	**675,609,480**
NFA Land and Trees covered by the Nandagi Forest Reserve			
Land Value	1,030,959,000	309,287,700	1,340,246,700
Trees	1,551,420,000	465,426,000	2,016,846,000
Sub-Total	**2,582,379,000**	**774,713,700**	**3,357,092,700**
Licencees trees planted on NFA Land within the Nandagi Forest Reserve			
Trees	1,479,441,000	443,832,300	1,923,273,300
Sub-Total	**1,479,441,000**	**443,832,300**	**1,923,273,300**
TOTAL - MUKONO	**4,581,519,600**	**1,374,455,880**	**5,955,975,480**
GRAND TOTAL	**5,684,118,600**	**1,705,235,580**	**7,389,354,180**

[1] According to the Land Act Cap 227 Section 77(2); "in addition to compensation value assessed, there shall be a disturbance allowance of 15% or, if less than 6 months' notice to vacate is given, 30% of the total sum assessed." A disturbance allowance of 30% on top of the assessment value was awarded because the project is slated to commence as soon as compensation of the PAPs is done.

In order to restore the livelihood of the PAPs after the project implementation, community support initiatives associated with farming and business skills, health and sanitation, functional adult literacy and HIV/AIDS awareness will be required. UETCL plans to prepare the PAPs for life ahead with which to sustain a tenancy in the community after resettlement, by imparting these living skills and initiatives during the period when they are served with the notice to vacate the compensated assets. Breakdown of the budget for community initiatives is presented in

Table **25**. UETCL developed this budget on the premise that the PAPs' livelihoods will be restored to their original or better condition than they were before.

Table 25: Budget for Livelihood Restoration

Item	Cost Estimated (UGX)	Agency responsible	Financial source
Skills training and employment programmes	6,000,000	UETCL	GOU
Farming skills training (e.g. soil fertility management, animal husbandry etc.)	11,541,842	UETCL	GOU
Functional Adult Literacy (FAL) skills training	3,000,000	UETCL	GOU
Entrepreneurship development programmes e.g petty trade, agro-forestry business (tree-seedlings)	5,000,000	UETCL	GOU
Community support infrastructure and farming inputs – 5%	302,455,374	UETCL	GOU
TOTAL – LIVELIHOOD RESTORATION	**327,997,216**	UETCL	GOU

Table 26: Overall ARAP Budget

Item	Cost Estimated (UGX)	Agency responsible	Financial source
Compensation Costs	6,049,107,480	UETCL	GOU
Provision for Livelihood Restoration – 5%	352,714,001	UETCL	GOU
Special assistance to vulnerable households – 1%	60,491,074	UETCL	GOU
RAP Implementation Consultant – 5%	302,455,374	UETCL	GOU
Monitoring & evaluation – 2.5%	151,227,687	UETCL	GOU
Contingency @ 10% of Total Budget	604,910,748	UETCL	GOU
GRAND TOTAL - ARAP	**7,520,906,364**		

10 IMPLEMENTATION SCHEDULE

The RAP implementation schedule is proposed over a period of 6 months since it has a few numbers of PAPs that will be affected by the project. RAP implementation unit and local committees would be informed shortly after approval of RAP by CGV and funding entity. Compensation payments and in case of any resettlement assistance are expected to start at about the same time and extend over 6 months after which construction would commence.

After the RAP has been approved by the Chief Government Valuer in the first month, the second month will have activities of the RAP disclosure and display for three months to avail ample time for the PAPs to view their compensation prices. Verification of vulnerable PAPs as part of the RAP implementation will also be carried out and compensation will commence thereafter. PAPs with grievances will have their issues addressed and this will be handled concurrently with compensation process. Two months will be put in place to compensate the PAPs and two (2) months set to address complaints for household heads for 96 PAPs for the project area. A schedule of RAP activities in relation to the time table of project implementation is provided in **Figure 5**.

Month Activity	1	2	3	4	5	6	7	8	9	10
RAP Approval										
RAP approval by Chief Government Valuer										
RAP disclosure & display of valuation lists										
Verification of vulnerable PAPs (including vulnerable people) by UETCL										
RAP Implementation										
Procurement of RAP implementation consultant		◆								
Formation and mobilization of RAP unit & committees		◆								
Compensation payment										
Grievance management										
Notice to vacate compensated assets and relocation & resettlement										
Commencement of Construction work										
Monitoring & Evaluation			—	—	—	—	→			

Figure 5: Resettlement Schedule

11 MONITORING AND EVALUATION

11.1 INTRODUCTION

To establish the effectiveness of all the resettlement activities, this Monitoring and Evaluation (M&E) procedures for the ARAP has been designed. With this it is possible to readily identify problems and successes as early as possible. The procedures include internal track keeping efforts as well as independent external monitoring.

11.2 PURPOSE OF MONITORING AND EVALUATION

The purpose of monitoring and evaluation for this ARAP will be to confirm;

- Actions and commitments described in the ARAP are implemented;
- Eligible project affected people receive their full compensation prior to the start of the construction;
- ARAP actions and compensation measures have helped the people who sought cash compensation in restoring their lost incomes and in sustaining/improving pre-project living standards;
- Complaints and grievances lodged by project affected people are followed up and, where necessary, appropriate corrective actions are taken;
- If necessary, changes in ARAP procedure are made to improve delivery of entitlements to project affected people.

Monitoring and evaluation will be done by UETCL that is 2-3 officers will be required at each implementation stage as well as by an independent monitor like an NGO to ensure a complete and objective process. The independent monitor should not be in conflict of interest and can therefore not be hired from the organization that supports the ARAP's implementation. Hence, independent monitoring role should be advertised along with terms of reference or job description and minimum requirements. Sample terms of reference for the independent monitor have been provided in Appendix 3.

11.3 GENERAL OBJECTIVES AND APPROACH

The Monitoring and Evaluation (M&E) mechanism provides a basis to assess overall success and effectiveness of various ARAP processes and measures. This mechanism is based on two components:

a) ***Internal monitoring*** – undertaken by the Monitoring Officer in UETCL and,
b) ***External evaluations*** – undertaken by an external agency e.g. independent NGO, University or other agency.

11.4 INTERNAL MONITORING PROCESS

Internal monitoring is an internal management function allowing UETCL to measure physical progress against milestone input, process, output and outcome indicators established in the ARAP.
Overall objectives and tasks of the internal monitoring process are:

- Tracking progress of ARAP implementation including number of PAPs compensated, relocated and assistance to vulnerable.
- Identification of suitable indicators;
- Measurement of indicators at appropriate intervals;
- Creation of a mechanism to analyse M&E data against a pre-resettlement baseline;
- Set up a system to regularly respond to M&E findings by adapting existing measures or by modifying implementation processes.

Key activities and responsibilities are outlines below:

i) ***Set up a System:*** The M&E officer at each location should develop a common system for monitoring the implementation process which should be based on the resettlement schedule for each location.

ii) **On-going Monitoring:** The M&E Officer for each location will be in-charge of regular monitoring of the implementation process. This will involve:

a) Feedback and inputs from the Implementation and Rehabilitation Officers.
b) Reviewing of the resettlement database.
c) Receiving reports from Grievance Officer and of the grievance database.
d) Receiving information from local representatives.

iii) ***Monthly Reports:*** Consolidated monthly reports with key findings from the on-going monitoring should be submitted to the implementation team and discussed every month and action points determined. This monthly progress review should aim to ensure that important issues are immediately rectified.

iv) ***Baseline review:*** Every 6 months, a limited review of all households should be conducted, which should involve collection of data such as number of people in the household, births, deaths etc. This will ensure that the baseline is up-to date.

The Implementation/ Rehabilitation Officer may undertake this task, with support from 1-2 people from the community.

v) ***Vulnerability assessment:*** It is essential that vulnerability is closely monitored in order to provide timely support to susceptible households. A vulnerability assessment should occur as part of quarterly auditing of all households, and those households that are most vulnerable should be prioritized for monthly auditing and targeted assistance. This may be undertaken by the implementation/ Rehabilitation Officer. Key activities are:

a) Develop a set of criteria to identify vulnerable households.
b) Every three months visit vulnerable households to assess key needs/ issues (e.g. unemployment) with the rehabilitation process.
c) Develop a plan to address these issues in conjunction with the members of the household.

11.5 EXTERNAL MONITORING PROCESS

In addition to the internal monitoring process, external assessment of the resettlement process should be undertaken through an external monitoring agency to be appointed by UETCL. The external evaluation process will be informed by internal monitoring reports prepared by UETCL, and also through independent surveys and consultation conducted by the evaluation agency.

The evaluation system will be based on:

a) Process indicators that measure effectiveness of processes (consultation, grievance) and inputs like people, equipment and materials and identify areas where improvements to existing processes are required. These may include the following:

- Transparency of the implementation process.
- Adequacy of staff and capacity of the implementation agencies.
- Compliance of the resettlement process with Ugandan law.
- Effectiveness of the grievance process.
- Adequacy and effectiveness of public consultation process.
- Effectiveness of the internal monitoring mechanism.

b) Outcome indicators that assess the effectiveness of the resettlement and changes have occurred to the communities' standard of living. Key indicators are given in Table 27.

Table 27: Outcome Indicators

Category	Indicator
Assets	Change in housing size/no of rooms
	Change in housing quality
	Change in house ownership
	Change in number/access/size of outbuildings
	Change in access to distant land plots/ homestead land
Employment	Change in number of people employed
	Change in the number of 'vulnerable' people unemployed
	Change in the stability of income (e.g. from full-time to part time employment)
Income	Change in the average income per person, per household
	Change in source of income
Expenditure	Change in expenditure/ time spent on travel (to work, healthcare, markets, extracurricular activities, cultural sites, kindergarten)
	Change in expenditure on healthcare, kindergarten, household goods, livestock produce)
Infrastructure	Changes in access to entertainment/ community facilities
	Change in access to/ quality of healthcare, education, kindergarten, markets, transportation
	Availability of extracurricular activities at school
Health	Change in frequency/ type of health problems, frequency of accessing healthcare
Education	Change in no of children attending kindergarten/ *boarding school*
Community	Change in type/ frequency of interactions
Networks	Change in support received within the community

c) Key Activities and Responsibilities

It is recommended that external evaluations are undertaken in accordance to the following:

- Twice a year during ARAP implementation;
- Once a year post-ARAP implementation for at least 2 years

During ARAP implementation, evaluation will focus on reviewing the process to date and making modifications to existing rehabilitation measures and other processes (e.g. grievance) where required. This will allow modifications to the process to be benefit the remainder of the resettlement.

In the post ARAP implementation, evaluations will focus on assessing impact and effectiveness of the resettlement and rehabilitation measures. A socio-economic survey will be undertaken for these two evaluations, based on a sample of the total number of PAPs. In addition, the post evaluation survey will also ascertain whether suggestions/findings of the first survey have been addressed.

The results of these surveys will be compared to the baseline information obtained from the household survey conducted before the resettlement process commenced to gauge the effectiveness of the resettlement process over time.

d) Reporting

The external evaluation agency will report to UETCL indicating findings of the evaluation exercise and recommendations on corrective measures in RAP implementation process.

APPENDIX 1 : RECORDS OF STAKEHOLDER CONSULTATIONS

A. Uganda Wildlife Authority

Week	47	Meeting date	20 November 2015
		Recorded by	BA
Meeting/subject	Meeting with Uganda Wildlife Authority (UWA) - Consultation on GKMA Transmission Line Improvement Project	Total pages	2
Stakeholder	Uganda Wildlife Authority		

Present	Apology	Copy	Name	Organisation	Designation
☒	☐	☐	Justine Namara	UWA	Ag. Coordinator EIA
☒	☐	☐	Asami Kabasawa	JICA Study Team	Project Manager
☒	☐	☐	Edward Okot Omoya	AWE	Wildlife Ecologist - Fauna
☒	☐	☐	Ivan Bamweyana	AWE	Sociologist
☒	☐	☐	Brenda Amanda (BA)	AWE	Engineer

Item	Update
1.	**Introduction**
	The Ag. EIA Coordinator welcomed the team to the UWA offices. This was followed by self-introductions, before a presentation of the Project details was made by AWE. The presentation included: ≠ Project Background ≠ Project Location ≠ The ESIA process ≠ Project components and activities ≠ Potential Environmental and Social Impacts
2.	**Question and Answer Session**
	Jinja Wildlife Sanctuary
2.1.	**Comment:** The extents of wildlife sanctuaries are not marked physically on ground. The importance of these sanctuaries is to conserve species of national importance such as migratory birds. UWA does not own land in sanctuaries. Therefore, there are only minor restrictions on land use. The duty of UWA is to manage the wildlife within the sanctuaries

Week	47	Meeting date	20 November 2015
		Recorded by	BA
Meeting/subject	Meeting with Uganda Wildlife Authority (UWA) - Consultation on GKMA Transmission Line Improvement Project	Total pages	2
Stakeholder	Uganda Wildlife Authority		

2.2.	**Comment:** The sanctuary's wildlife mostly consists of migratory birds. The Project's baseline studies will need to find out the seasons of interest so that work is planned around the seasons.
2.3.	**Comment:** The boundaries of the Jinja Wildlife Sanctuary are defined in the Second Schedule of the Uganda Wildlife Act as 'the municipality of Jinja and part of the Napolean Gulf and the River Nile which lies within the following area – commencing at Kirinya; thence along the lakeshore and the right bank of the river as far as the Bujagali Falls; thence along the left bank of the river and the lakeshore as far as Bugungu pier; thence in a straight line to the point of commencement. This implies that the Project should use the Jinja Municipality boundaries of 1964 to confirm whether or not the Project lies within the sanctuary boundaries.
2.4.	**Recommendation:** The Project should not involve much disturbance since the towers and access roads are already in existence.
2.5.	**Comment:** Since the line is already in existence and UETCL maintains a line corridor for maintenance works, it is not expected that the works to be conducted for the Project will result in major disturbance within the Jinja Wildlife Sanctuary.


STAKEHOLDER CONSULTATION RECORD

B. Wetlands Management Department (WMD)

MINUTES OF THE MEETING HELD BETWEEN WMD AND AIR WATER EARTH ON STAKEHOLDER CONSULTATIONS FOR ESIA AND ARAP OF GREATER KAMPALA METROPOLITAN AREA TRANSMISSION SYSTEM IMPROVEMENT PROJECT

Held on 1st December, 2015 at the Climate change Boardroom

AGENDA

1. Communication from chair
2. Presentations by AWE
3. Reactions and Way forward

Minutes No.	Discussion and recommendation	Responsible persons
SCM/EIA/01/01/12/15 Communication from Chair	• The meeting is meant to discuss the proposed greater Kampala Metropolitan area Transmission System Improvement Project. • As the lead agency in Wetland Management it is paramount that WMD is consulted to advice in the EIA process since part of the power lines will pass over wetlands and associated ecosystems.	SWO/EIA
SCM/EIA/02/01/12/15 Reactions to the presentations	• The wetlands are illegally occupied so the issue of compensation should not arise. The proprietor needs to liaise with the Ministry of Lands to go about the issue of resettlement from the wetland. • Biodiversity of the areas affected should be documented and mitigation measures to its disruption should be well outlined. • A separate EIA should be done for the roads that will be used as access for routine maintenance. • There areas of wetland destroyed need to be restored to as near as possible to the original after construction. • The trees vegetation cleared especially trees should be replaced with the indigenous species to that area. • A field visit needs to be carried out in order to ascertain better appreciate the exact nature of the impacts.	ALL
SCM/EIA/03/01/12/15 Way forward	The consultant needs to come to WMD and receive the comments in writing and sign for them.	

1

Chair: Owong Joel C
SWO/EIA 12/01/16

Secretary Ewor Aloysius
WO/AS 12/01/16

2

STAKEHOLDER CONSULTATION RECORD

Name of agency/stakeholder/community: DIRECTORATE OF ENVIRONMENT AFFAIRS (WETLANDS DEPARTMENT)

Purpose of consultation (tick appropriate box)				
	Scoping	☐	ESIA	✓
	Sensitisation	☐	RAP	✓
	Environmental Audit	☐	Other (specify)	

Date: 01 DECEMBER 2015

Project name: PREPARATORY SURVEY FOR THE GREATER KAMPALA METROPOLITAN AREA TRANSMISSION SYSTEM IMPROVEMENT PROJECT

Proponent: YACHIYO ENGINEERING COMPANY LTD.

Name of person/ official met	Designation	Contact (Tel/email)	Sign/ Initial
[illegible]	GT	[illegible]@yahoo.com	[signature]
Alaga Dan	Wetlands Officer	[illegible]@gmail.com	[signature]
[illegible] Stephen	Wetlands Officer	[illegible]@yahoo.com	[signature]
Apie Kevin	GT	kevin.apie@gmail.com	[signature]
Owong Joel C	Senior Wetland [illegible]	[illegible]@yahoo.com	[signature]
Pamela Tashobya	Survey/RAP Specialist	[illegible]@gmail.com	[signature]
Mugerwa Frank	Sociologist	[illegible]	[signature]
[illegible]	[illegible]	[illegible]@gmail.com	[signature]
Brenda Amanda	Engineer	[illegible]@gmail.com	[signature]

C. Occupational Health and Safety Department (OSH); Ministry of Gender, Labour and Social Development

Week	**22**	Meeting date	**25 May 2016**
		Recorded by	**SN, BA**
Meeting/subject	**Ministry of Gender, Labour and Social Development (OSH); - Consultation on GKMA Transmission Line Improvement Project**	Total pages	**3**

Present	Apology	Copy	Name	Organisation	Designation
☒	☐	☐	Sam Aniebyoona	MGLSD	Specialised safety inspector Mechanical
☒	☐	☐	Augius Samuel .W	MGLSD	Ag senior specialised safety inspector
☒	☐	☐	Sharifah Nakigozi (SN)	Air Water Earth	HSE consultant
☒	☐	☐	Brenda Amanda (BA)	Air Water Earth	Petroleum Engineer

Item	Update
1.	**Introduction**
	AWE team member was welcomed to MGLSD- OSH Department by the Specialised Safety Inspector (mechanical). The consultant representative explained the purpose of the visit and scope of the project; gave a brief description of the project and encouraged stakeholder to provide input. The presentation included: ≠ Project Background ≠ Project Location ≠ The ESIA process ≠ Project components and activities ≠ Potential Environmental and Social Impacts
2.	**Question and Answer Session**
	Occupation Safety and Health
2.1.	**Workforce**

2.2.	▪ Contractor should provide workers with adequate personal protective equipment after risk assessment has been done (PPE); ▪ The workers should for at most 40 hours per week- extra hours payable as overtime (OT); ▪ Labour recruitment should be fair and free of discrimination; ▪ Workers should be provided with adequate sanitation facilities for females and for males separated and well labelled; ▪ The contractor should have first aid box and trained first aider at the site; ▪ The contractor should have a safety officer at the site; ▪ The workers should receive trainings (induction for new staff and refresher training for old staff on occupational hazards and risks). ▪ Pre-medical examination should be carried out to check if workers are fit for the Jobs assigned. ▪ The supervisor should be a local person who can communicate with the workers. ▪ Training program for workers need to be developed and shared with ministry of gender Labour and social Development, OHS department. The Department can be involved in providing some required safety training.
2.3.	**Workplace**
	▪ The contractor should develop a comprehensive traffic management plan; ▪ The contractor should have strategically placed traffic signs off-site; ▪ The contractor should have adequate signage on-site- warning/ restricting access; ▪ The contractor should have an emergence preparedness plan; ▪ The contractor should have fire facilities- extinguishers, assemble point etc.; ▪ The contractor should have safety policy; ▪ The contractor should have first aid facilities; ▪ The contractor should keep record of incidences of accidents; ▪ The contractor should have an HIV/AIDS policy ▪ A comprehensive Risk Assessment management plan should be developed for all activities. ▪ The public needs to be aware & involved in the project especially local employment this will improve the ownership & protection of the project by the local people. ▪ After 6 months any workplace should have a safety committee
2.4.	**Waste handling**
2.5.	▪ The contractor should have licensed waste handlers ▪ Waste should be segregated on site before disposal
2.6.	**Registration**

2.7.	i) The contractor will be required to register the site as a workplace before commencement of work; ii) Submit the following; ≠ Architectural plans should be submitted commissioner for approval before construction of buildings or alteration of existing buildings of workplace begins according to section 42 of OHS Act 2006; ≠ Traffic management plan; ≠ Risk assessment analysis; ≠ Emergence preparedness plan; ≠ Policy on sexual harassment; ≠ Safety policy iii) Notify the ministry within one month (30 days) before commencement of work;


STAKEHOLDER CONSULTATION RECORD

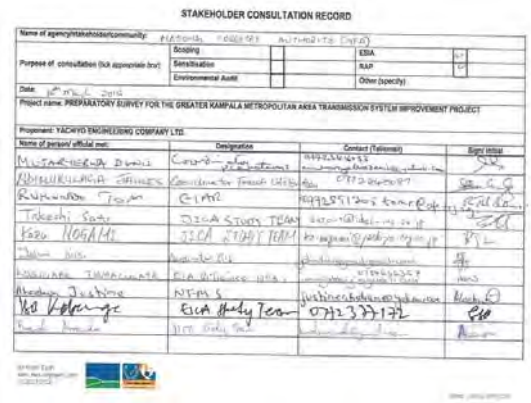
D. Meeting with National Forestry Authority (NFA)

Week	**11**	Meeting date	**16 March 2016**
		Recorded by	**BA**
Meeting/subject	**Meeting with National Forestry Authority (NFA) - Consultation on GKMA Transmission Line Improvement Project**	Total pages	**2**

Present	Apology	Copy	Name	Organisation	Designation
☒	☐	☐	List attached	NFA	
☒	☐	☐	Denis Mutaryebwa	NFA	Coordinator Plantations
☒	☐	☐	Takeshi Sato	JICA Study Team	ESIA Specialist
☒	☐	☐	Kazu Nogami	JICA Study Team	
☒	☐	☐	Dr. Isa Kabenge	JICA Study Team	Engineer
☒	☐	☐	Brenda Amanda (BA)	JICA Study Team	Engineer

Item	Update
1.	**Introduction**
	The JICA study team was welcomed by Tom Rukundo, the NFA EIA Specialist and self-introductions made. A presentation of the Project details was made by the JICA study team. The presentation included: ≠ Project Background ≠ Project Location ≠ Project and activities components ≠ The ESIA process ≠ Potential Environmental and Social Impacts (construction and operation phase) ≠ Mitigation Measures for identified impacts (construction and operation phase) ≠ Resettlement Action Plan (land survey and valuation survey procedures, compensation process, grievance mechanism, and disturbance allowance)
2.	**Question and Answer Session**
2.1.	**Comment:** Nandagi is located outside the nursery bed, the land was given to tree farmers by NFA, so the land belongs to NFA, but the trees belong to individual farmers. It is also managed by NFA. Since it is government land, an offset fee is paid. NFA will dialogue with UETCL regarding the offset.
2.2.	**Comment:** Biodiversity evaluation should be part of the ESIA study. For the transmission line through Mabira, UETCL got a consultant to do the biodiversity evaluation.
2.3.	**Comment:** Purpose of the forest reserve is mostly as a catchment area where streams pass.

2.4.	**Comment:** Uncoordinated planning is a major problem for the forest reserves example, Standard Gauge Railway and Oil Pipeline. The cumulative impacts can be great, such that the forest reserves are lost.
2.5.	**Comment:** Minimal impact would be going through the sugarcane plantation. Why isn't the line going through the plantation and instead through the forest reserve. The 16 acres obtained for the substation were already acquired by UETCL. This project is only dealing with the transmission line corridor for the new proposed substation, since it was found that this 16 acres was sufficient for two substations.
2.6.	**Comment:** A 'no-objection' letter about the Chinese Project was obtained by UETCL. NFA does not have an official confirmation about this. NFA will follow-up the matter with UETCL.
2.7.	**Comment:** Booklet on management of forest reserves regarding activities acceptable within the reserves is available and can be shared with the Consultant.
2.8.	**Recommendation:** Send kmz file of Project area to NFA John Diisa (Coordinator GIS) and Tom Rukundo so that extent of Project area within forest reserves is known.


STAKEHOLDER CONSULTATION RECORD

RECORDS OF STAKEHOLDER CONSULTATIONS WITH PROJECT AFFECTED COMMUNITIES

MUKONO PROJECT AREA

1. Meeting with National Forestry Authority (NFA) Private foresters

Week	11	Meeting date	10 May 2016
		Recorded by	IKK
Meeting/subject	Meeting with National Forestry Authority (NFA) Private foresters- Consultation on GKMA Transmission Line Improvement Project	Total pages	2

Pres	Apol	Copy	Name	Organisation	Designation
☒	☐	☐	List attached	NFA Foresters	
☒	☐	☐	Mercy Nampurira	NFA	Nandagi Forest Supervisor
☒	☐	☐	Ian Kakuru Kahigi (IKK)	Air Water Earth Ltd	Valuation Surveyor
☒	☐	☐	Edward Okot Omoya (EOO)	Air Water Earth Ltd	Ecologist

Item	Update
1.	**Introduction**
	The NFA Nandagi Forest Supervisor welcomed the team and the foresters that managed to make it for the sensitization meeting. Introductions of the Consultant team present for the meeting were made. A presentation of the 'ESIA and RAP for The Preparatory Survey for the Greater Kampala Metropolitan Area Transmission System Improvement Project' was made to the PAPs present who comprised registered NFA foresters, their managers and a few unregistered share croppers. The presentation included: ≠ Project Background ≠ Project Location ≠ Project and activities components ≠ The ESIA process ≠ Potential Environmental and Social Impacts (construction and operation phase) ≠ Mitigation Measures for identified impacts (construction and operation phase) ≠ Resettlement Action Plan (land survey and valuation survey procedures, compensation process, grievance mechanism, and disturbance allowance)

2.	**Question and Answer Session**
2.1.	**Question:** What is the project duration and when is it expected to commence? **Response:** The project duration is not certain at the moment, since this is still at the preparatory stage, although surveying and valuation is expected to commence as soon as possible.
2.2.	**Comment:** The NFA forest supervisor should be included on the grievance committee as she knows the affected people personally and would be better able to assist in addressing their issues.
2.3.	**Question:** Will the project be able to provide certain additional services that are lacking in the community e.g health centre, drug store? **Response:** The consultant is not privy to that information but will ensure to convey to the project proponent.
2.4.	**Question:** Will share croppers who are planting their crops in the forest be compensated for their loss of livelihood? **Response:** According to the NFA forest supervisor, no croppers are permitted within the forest reserve and therefore any croppers therein are operating illegally. On this basis, no croppers will be compensated.

STAKEHOLDER CONSULTATION RECORD

Name of agency/stakeholder/community: NANDAGI FOREST FARMERS

Purpose of consultation (tick appropriate box):				
	Scoping	☐	ESIA	✓
	Sensitisation	✓	RAP	✓
	Environmental Audit	✓	Other (specify)	

Date: 10/05/2016

Project name: PREPARATORY SURVEY FOR THE GREATER KAMPALA METROPOLITAN AREA TRANSMISSION SYSTEM IMPROVEMENT PROJECT

Proponent: YACHIYO ENGINEERING COMPANY LTD.

Name	Village/Parish	Contact (Telephone)	Sign/ initial
Tugagire Judith	Nandagi	0778391994	T.J
OCEN JOEL / TONNY	Nandagi	0777215839	[illegible]
Kalule Peter	Nandagi	07	[illegible]
Ssenyonga Hassan	Nandagi	0755129976	[illegible]
Kiwanuka David	Nandagi	0759650451	[illegible]
Ssejjemba Yisa Ssalongo	Nandagi	0754702636	[illegible]
MIREMBE PROSSCOVIA	Namawojjolo		
TAJJI GASTON			
Noel Kajubi	Namawojjolo		
Pado Mayiko	Nandagi		
Augustine	Nandagi		

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STAKEHOLDER CONSULTATION RECORD

Name of agency/stakeholder/community: NANDANGI FOREST FARMERS

Purpose of consultation (tick appropriate box):				
	Scoping	☐	ESIA	✓
	Sensitisation	✓	RAP	✓
	Environmental Audit	✓	Other (specify)	

Date: 10/05/2016

Project name: PREPARATORY SURVEY FOR THE GREATER KAMPALA METROPOLITAN AREA TRANSMISSION SYSTEM IMPROVEMENT PROJECT

Proponent: YACHIYO ENGINEERING COMPANY LTD.

Name	Village/Parish	Contact (Telephone)	Sign/ initial
NAMPURIRA MERCY	NANDAGI	0775599045	[illegible]
ASABAMUKAMA MULINDWA WILSON	NANDAGI	0772414702	[illegible]
Thamuhaibwe Benon	NANDAGI	+252619340293 0700600294	[illegible]
MPISO DANIER	WANJEYO	0779112633	[illegible]
KIYAGA FRED	NAMAWOJJOLO WEST	0773819355	[illegible]
Rwamahe Dickson	NANDAGI	0778331006	[illegible]
NAMULEMA FLORENCE	NAMAWOJJOLO WEST	0773924111	Flanulena
Nalubega Annet	Nandagi	0750318522	Annet
NDIBALUKIMYA SIRIK ...	Nandagi	078744112 ...	[illegible]
KYARIKUNDA ELIZABETH	Nandagi		Elizabeth
Talyaka Janani	Nandagi	0786759652	[illegible]

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STAKEHOLDER CONSULTATION RECORD

Name of agency/stakeholder/community: NANDAGI FOREST FARMERS

Purpose of consultation (tick appropriate box):				
	Scoping	☐	ESIA	✓
	Sensitisation	✓	RAP	✓
	Environmental Audit	✓	Other (specify)	

Date: 10/05/2016

Project name: PREPARATORY SURVEY FOR THE GREATER KAMPALA METROPOLITAN AREA TRANSMISSION SYSTEM IMPROVEMENT PROJECT

Proponent: YACHIYO ENGINEERING COMPANY LTD.

Name	Village/Parish	Contact (Telephone)	Sign/ initial
Musoozi Stephen	[illegible]	0783152672	[illegible]
[illegible] Samuel	Namawojjolo West	[illegible]	[illegible]
[illegible]	Namawojjolo west	[illegible]	[illegible]
[illegible]	Namawojjolo west	[illegible]	[illegible]
[illegible]	Namawojjolo west		[illegible]
[illegible]	Namawojjolo East	0775341629	[illegible]
[illegible]	Namawojjolo West		
[illegible]	Namawojjolo West		[illegible]
[illegible]	[illegible]	0779357490	[illegible]
[illegible]	Namawojjolo west		
NAKAMYA Joyce	[illegible]		NJ

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STAKEHOLDER CONSULTATION RECORD

Name of agency/stakeholder/community: NANDAGI FOREST FARMERS

Purpose of consultation (tick appropriate box):				
	Scoping	☐	ESIA	✓
	Sensitisation	✓	RAP	✓
	Environmental Audit	✓	Other (specify)	

Date: 10/05/2016

Project name: PREPARATORY SURVEY FOR THE GREATER KAMPALA METROPOLITAN AREA TRANSMISSION SYSTEM IMPROVEMENT PROJECT

Proponent: YACHIYO ENGINEERING COMPANY LTD.

Name	Village/Parish	Contact (Telephone)	Sign/ initial
Bulabaawa Juliet	Namawojjolo		[illegible]

2. Meeting with Community in Mukono Project Area - Nama II, Buyuki and Luwunga villages

Week	11	Meeting date	**30 April 2016**
		Recorded by	**IKK**
Meeting/subject	**Meeting with Communities in Mukono - Nama II, Buyuki and Luwunga villages - Consultation on GKMA Transmission Line Improvement Project**	Total pages	**2**
Project Proponent	**Yachiyo Engineering Company Limited**		

Present	Apologies	Copy	Name	Organisation	Designation
☒	☐	☐	List attached	Nama II, Buyuki and Luwunga	Project Affected Persons
☒	☐	☐	List attached	Nama II, Buyuki and Luwunga	Chairpersons
☒	☐	☐	Ian Kakuru Kahigi (IKK)	Air Water Earth Ltd	Valuation Surveyor
☒	☐	☐	Isa Kabenge	Air Water Earth Ltd	Engineer

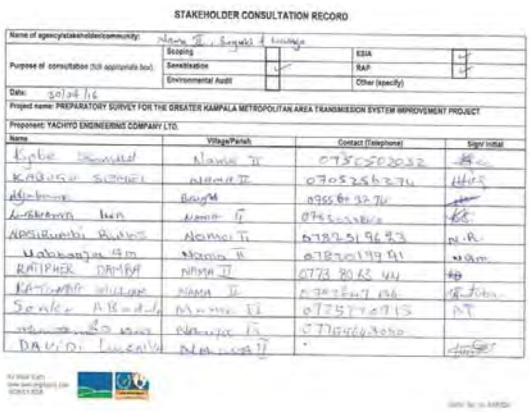
Item	Update
1.	**Introduction**
	The LC1 Chairman of Luwunga zone welcomed the team. Introductions of the consultant team and chairpersons present for the meeting were made. A presentation of the **'ESIA and RAP for The Preparatory Survey for the Greater Kampala Metropolitan Area Transmission System Improvement Project'** was made to the chairpersons and a few PAPs present, including but not limited to: The presentation included: ≠ Project Background ≠ Project Location ≠ Project and activities components ≠ The ESIA process ≠ Potential Environmental and Social Impacts (construction and operation phase) ≠ Mitigation Measures for identified impacts (construction and operation phase) ≠ Resettlement Action Plan (land survey and valuation survey procedures, compensation process, grievance mechanism, and disturbance allowance)
2.	**Question and Answer Session**

2.1.	**Comment:** Projects take place but compensation delays for a long time and this affects the PAPs because their plans are put on hold and they incur losses in the process.
2.2.	**Comment:** L.C1s are a vital part of any project implementation and yet they are usually not compensated for their time and effort yet they are fully involved in the project from start to finish. This should be given consideration so that they may be enlisted on project implementation teams in some capacity. **Response:** The LCs will be facilitated for their involvement, especially when they have to walk with the Surveyors and Valuers.
2.3.	**Concern:** If assessment has been done but compensation is eventually not done and the project is aborted. How would the PAPs be compensated after sacrificing their properties and not undertaking any developments as a result? **Response:** The principle in Uganda is to compensate for affected properties. Therefore, no injury or damage is realised if the project is aborted and hence no compensation payment can be advanced.
2.4.	**Question:** Who constitutes the grievance committee? **Response:** The grievance committee constitutes a member of the Local Council, a member of the project proponent organisation and an identified NGO from the project area.
2.5.	**Concern:** In some instances, PAPs' structures get old and collapse before compensation is done. How will these be handled if re-assessment is done subsequently? **Response:** In the event that a PAP's structure collapses before compensation, the PAP will get the compensation due him as his property information will have already been captured.
2.6.	**Question:** Will PAPs be permitted to use the land after the project has been implemented? **Response:** The project proponent intends to fully compensate and acquire the project area and therefore no work or developments by PAPs will be allowed subsequent to project implementation.
2.7.	**Concern:** How will kibanja holders and title owners be compensated? **Response:** Kibanja owners and title holders will be equitably compensated in their individual holding capacities on pro rata basis.
2.8.	**Concern:** Wives may not receive any money and the husbands claim it all and squander it. How will their interests be put into consideration? **Response:** Wives especially those who are legally or traditionally married will be put into consideration by having their information captured during the payment exercise and as much as possible, husbands will be encouraged to present joint accounts for payment. This will be done with the help of the L.C1 to identify such risk prone relationships.

STAKEHOLDER CONSULTATION RECORD

Name of agency/stakeholder/community:	Nama II, Buyuki & Luwunga		
Purpose of consultation (tick appropriate box)	Scoping ☐ / Sensitisation ✓ / Environmental Audit ☐	ESIA ✓ / RAP ✓ / Other (specify)	
Date: 30/04/2016			
Project name: PREPARATORY SURVEY FOR THE GREATER KAMPALA METROPOLITAN AREA TRANSMISSION SYSTEM IMPROVEMENT PROJECT			
Proponent: YACHIYO ENGINEERING COMPANY LTD.			

Name	Village/Parish	Contact (Telephone)	Sign/ Initial
Mulimira James	NAMA II	0750358699	[illegible]
[illegible]	Nama II	[illegible]	[illegible]
Kabigo Stephen	NAMA II	[illegible]	[illegible]
[illegible]	Nama II	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	Nama II	[illegible]	[illegible]
[illegible] Edward	Nama II	[illegible]	[illegible]
Jenifa Toko	NAMA II	[illegible]	[illegible]
[illegible]	LUWUNGA	[illegible]	[illegible]
KABUGO SEMEI	NAMA II	[illegible]	[illegible]
[illegible] Willy	NAMA II	[illegible]	—



STAKEHOLDER CONSULTATION RECORD

Name of agency/stakeholder/community:	Nama II, Buyuki & Luwunga		
Purpose of consultation (tick appropriate box)	Scoping ☐ / Sensitisation ✓ / Environmental Audit ☐	ESIA ✓ / RAP ✓ / Other (specify)	
Date: 30/04/16			
Project name: PREPARATORY SURVEY FOR THE GREATER KAMPALA METROPOLITAN AREA TRANSMISSION SYSTEM IMPROVEMENT PROJECT			
Proponent: YACHIYO ENGINEERING COMPANY LTD.			

Name	Village/Parish	Contact (Telephone)	Sign/ Initial
[illegible]	Nama II	0750502032	[illegible]
KABUGO [illegible]	NAMA II	0705256274	[illegible]
[illegible]	Buyuki	[illegible]	[illegible]
[illegible]	Nama II	[illegible]	[illegible]
[illegible]	Nama II	[illegible]	N.R.
[illegible]	Nama II	[illegible]	[illegible]
RATIPHER DAMBA	NAMA II	0773 80 63 44	[illegible]
[illegible] William	NAMA II	[illegible]	[illegible]
Senke Abdul	Nama II	0775770715	AT
[illegible]	Nama II	[illegible]	
DAVID [illegible]	Nama II		[illegible]

STAKEHOLDER CONSULTATION RECORD

Name of agency/stakeholder/community:	Nama II, Buyuki & Luwunga		
Purpose of consultation (tick appropriate box)	Scoping ☐ / Sensitisation ✓ / Environmental Audit ☐	ESIA ✓ / RAP ✓ / Other (specify)	
Date: [illegible]			
Project name: PREPARATORY SURVEY FOR THE GREATER KAMPALA METROPOLITAN AREA TRANSMISSION SYSTEM IMPROVEMENT PROJECT			
Proponent: YACHIYO ENGINEERING COMPANY LTD.			

Name	Village/Parish	Contact (Telephone)	Sign/ Initial
[illegible]	NAMA II	[illegible]	[illegible]
[illegible]	Nama II	[illegible]	[illegible]
[illegible]	Nama II	[illegible]	[illegible]
[illegible] David	NAMA II		[illegible]
[illegible]	Nama II	[illegible]	

3. **Meeting with Community in Mukono Project Area - Wanjeyo, Kivuvu and Bwefulumya villages**

Week	**11**	Meeting date	**30 April 2016**
		Recorded by	**IKK**
Meeting/subject	**Meeting with Communities in Mukono - Wanjeyo, Kivuvu and Bwefulumya villages - Consultation on GKMA Transmission Line Improvement Project**	Total pages	**2**
Project Proponent	**Yachiyo Engineering Company Limited**		

Present	Apology	Copy	Name	Organisation	Designation
☒	☐	☐	List attached	Wanjeyo, Kivuvu and Bwefulumya	Project Affected Persons
☒	☐	☐	List attached	Wanjeyo, Kivuvu and Bwefulumya	Chairpersons
☒	☐	☐	Ian Kakuru Kahigi (IKK)	Air Water Earth Ltd	Valuation Surveyor
☒	☐	☐	Isa Kabenge	Air Water Earth Ltd	Engineer

Item	Update
1.	**Introduction**
	The LC1 Chairman of Bwefulumya zone welcomed the team. Introductions of the consultant team and chairpersons present for the meeting were made. A presentation of the **'ESIA and RAP for THE Preparatory Survey for the Greater Kampala Metropolitan Area Transmission System Improvement Project'** was made to the chairpersons and a few PAPs present, including but not limited to: The presentation included: ≠ Project Background ≠ Project Location ≠ Project and activities components ≠ The ESIA process ≠ Potential Environmental and Social Impacts (construction and operation phase) ≠ Mitigation Measures for identified impacts (construction and operation phase) ≠ Resettlement Action Plan (land survey and valuation survey procedures, compensation process, grievance mechanism, and disturbance allowance)

2.	**Question and Answer Session**
2.1.	**Question:** Where exactly is the project going to pass within this particular area? **Response:** The project route is outlined in the google earth image on the presentation slides. The transmission lines will commence from the intersection with the chinese lines in Nama, Luwunga downhill up to Bwefulumya where they meet the substation. The substation will predominantly affect commercial foresters in Nandagi Forest reserve
2.2.	**Comment:** It has been said that community members will be given opportunities for employment during project works. That will be a good initiative.
2.3.	**Question:** Are the power lines going to be connected from existing lines to the new sub-station? **Response:** Yes, there will be a 132 kV line connecting from the substation to the existing transmission lines along the highway.
2.4.	**Question:** Will power supply from the new lines and sub-stations be able to connect for community domestic use? **Response:** Yes, from the 132 kV connection to existing transmission lines but not directly to the high voltage lines or the substation.
2.5.	**Concern:** Can the local leaders write to project so that any projects being implemented within this community give job opportunities especially labourers to community members first? **Response:** As a principle, project contractors are encouraged to utilise community members of the project community for some lay jobs to help raise the economic status of the project community. This is done in conjunction with the local leaders. However, the local leaders are at liberty to write to the project contractors to request for such job opportunities for their community.
2.6.	**Question:** If the corridor to be acquired borders with someone's house, would that person's house be affected and can they be compensated for that house? **Response:** In such an event, the person would not be compensated unless if he suffered injurious affection as a result of project works.
2.7.	**Question:** Since a sub-station is to be constructed within the community, can UMEME and UETCL make some effort to increase the density of power supply and connections in this area? **Response:** It is not within the mandate of the consultant to advise UMEME or UETCL on how to distribute power resources but the consultant shall present the concerns of the community for their discretionary review.


STAKEHOLDER CONSULTATION RECORD

Name of agency/stakeholder/community:	[illegible]			
Purpose of consultation (tick appropriate box)	Scoping		ESIA	✓
	Sensitisation	✓	RAP	✓
	Environmental Audit		Other (specify)	
Date:	[illegible]			
Project name: PREPARATORY SURVEY FOR THE GREATER KAMPALA METROPOLITAN AREA TRANSMISSION SYSTEM IMPROVEMENT PROJECT				
Proponent: YACHIYO ENGINEERING COMPANY LTD.				

Name	Village/Parish	Contact (Telephone)	Sign/ initial
[illegible]	[illegible]	[illegible]	[illegible]


STAKEHOLDER CONSULTATION RECORD

Name of agency/stakeholder/community:	[illegible]			
Purpose of consultation (tick appropriate box)	Scoping		ESIA	✓
	Sensitisation	✓	RAP	✓
	Environmental Audit		Other (specify)	
Date:	[illegible]			
Project name: PREPARATORY SURVEY FOR THE GREATER KAMPALA METROPOLITAN AREA TRANSMISSION SYSTEM IMPROVEMENT PROJECT				
Proponent: YACHIYO ENGINEERING COMPANY LTD.				

Name	Village/Parish	Contact (Telephone)	Sign/ initial
[illegible]	[illegible]	[illegible]	[illegible]

4. **Meeting with National Forestry Authority (NFA)**

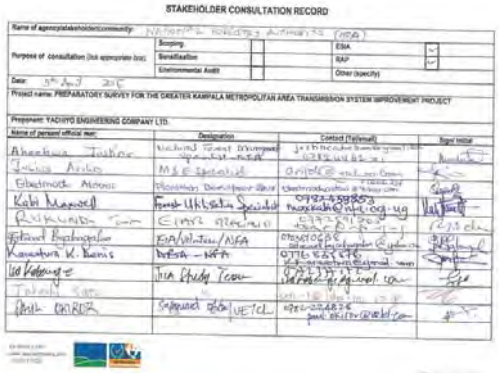
Eek	**13**	Meeting date	**5 April 2016**
		Recorded by	**BA**
Meeting/subject	**Meeting National Forestry Authority - Consultation on GKMA Transmission Line Improvement Project**	Total pages	**2**

Present	Apology	Copy	Name	Organisation	Designation
☒	☐	☐	List attached	NFA	
☒	☐	☐	Paul Okiror	UETCL	Safeguard Officer
☒	☐	☐	Takeshi Sato	JICA Study Team	ESIA Specialist
☒	☐	☐	Dr. Isa Kabenge	Air Water Earth	Engineer
☒	☐	☐	Brenda Amanda (BA)	Air Water Earth	Engineer

Item	Update
1.	**Introduction**
	The JICA study team was welcomed and self-introductions made. A presentation of the Project details was made by the JICA study team. The presentation included: ≠ Project Background ≠ Project Location ≠ Project and activities components ≠ The ESIA process ≠ Potential Environmental and Social Impacts (construction and operation phase) ≠ Mitigation Measures for identified impacts (construction and operation phase) ≠ Resettlement Action Plan (land survey and valuation survey procedures, compensation process, grievance mechanism, and disturbance allowance)
2.	**Question and Answer Session**
2.1.	**Comment:** First project-Electrification of Mukono industrial parks project. More two substations connecting Iganga to Mayuge.
2.2.	**Comment:** The Mukono industrial parks project affects Nandagi project. Options/ alternatives considerations include social, environmental and economic alternatives analysis.

Item	Update
2.3.	**Comment:** Negotiations are still on-going with NFA so the transmission line corridor and substation sites are not yet confirmed.
2.4.	**Comment:** The Chinese require 30m corridor, while JICA transmission line requires 75m corridor. That is a total of 105m. The substation is 3 acres, 6 ha as approximate transmission line length inside the substation. Access road is 1.2km (8m wide).
2.5.	**Comment:** NFA needs to see the option selection reports showing the alternatives and why the forest reserve area was selected.
2.6.	**Question:** What distance was left for the river protection? River Kasaala which joins Sezibwa downstream.
2.7.	**Question:** Standard gauge railway and other proposed roads. Has UETCL found out about any other projects that are planned for the near future within the project area? Standard gauge railway to be 2m from the ground. This project needs to be harmonised with other government projects e.g. Railway, Jinja Expressway.
2.8.	**Comment:** NFA needs to know that UETCL has confirmed that there are no projects planned or existing that can share a wayleave with the UETCL projects.
2.9.	**Concern:** UETCL needs to own the projects, as opposed to pseudo names like Chinese substation or Japanese substation.
2.10.	**Comment:** Bujagali substation will be intended to increase switch from 132kV (existing) to 220kV, although without need for more land requirement.
2.11.	**Comment:** Another meeting will be held in which the documents submitted by UETCL will be arranged. A field visit of the area will then be held.
2.12.	**Concern:** The width of the corridor is wide and yet it is a protected area.

STAKEHOLDER CONSULTATION RECORD



STAKEHOLDER CONSULTATION RECORD

BULOBA PROJECT AREA

5. Meeting with Community in Buloba Project Area - Kaggaba, Mabuye and Nsujjwe villages

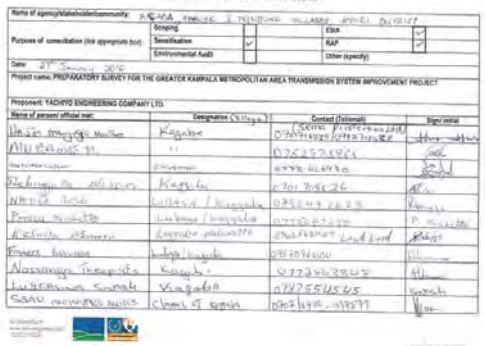
Week	05	Meeting date	27 January 2016
		Recorded by	BA
Meeting/subject	Meeting with Buloba residents (Kaggaba, Mabuye and Nsujjuwe villages)- Consultation on GKMA Transmission Line Improvement Project	Total pages	2

Present	Apology	Copy	Name	Village	Designation
☒	☐	☐	List attached	Buloba residents	
☒	☐	☐	Ian Kakuru	Air Water Earth Ltd.	Valuer
☒	☐	☐	Brenda Amanda	Air Water Earth Ltd.	Engineer

Item	Update
3.	**Introduction**
	The AWE team was welcomed and self-introductions made. A presentation of the Project details was made by the AWE team. The presentation included: ≠ Project Background ≠ Project Location ≠ Project and activities components ≠ The ESIA process ≠ Potential Environmental and Social Impacts (construction and operation phase) ≠ Mitigation Measures for identified impacts (construction and operation phase) ≠ Resettlement Action Plan (land survey and valuation survey procedures, compensation process, grievance mechanism, and disturbance allowance)
4.	**Question and Answer Session**
	Project Design
4.1.	**Question:** Is the 15 acres mentioned only for the substation, or for the entire Project area? **Response**: The 15 acres mentioned is for the substation area.

4.2.	**Question:** How will the *kibanja* holders and title holders be catered for? **Response:** The compensation for such an area is split such that the kibanja holder receives 70% of the compensation sum while the title holder receives 30% of the compensation sum.
4.3.	**Comment:** Sometimes the Valuers don't give the right amount e.g. someone who deserves more money gets less, and vice versa. **Response:** The valuation process will be conducted in line with the laws of Uganda and the JICA Guidelines for Social and Environmental Considerations. In accordance with the Ugandan laws, the Valuation report will be submitted to the Chief Government Valuer for approval of the compensation values to be used for the Project.
4.4.	**Question:** How will the Grievance Committee be selected and where could it be found? **Response:** The Grievance Committee will be composed of the area local chairpersons such as LC I and LC II. Aside from the local chairpersons, the Committee will also include an elder on the village, an opinion leader, as well as a representative from UETCL. The Committee's office shall be at the LC Chairperson's office, or another location that the PAPs agree upon as being the most convenient. UETCL also has officers that are dedicated to handling the RAP issues that arise from their various Projects.
4.5.	**Question**: If a young fruit tree has been valued, will the future prospects be catered for e.g. the jack fruit trees or oranges that would have been reaped from the fruit tree? **Response:** No, valuations are done on as as-is basis. Projections are not done during the valuation exercise.
4.6.	**Suggestion:** Both the kibanja holder and title holder should be present during the Valuation exercise. **Response:** All PAPs will be notified when the fieldwork for surveying and valuation is taking place.
4.7.	**Comment:** Sometimes the cut-off date is announced but the Project takes long to start, yet the people have been asked to hold off on developments. **Response:** If a Project takes more than 2 years after the cut-off date, a re-evaluation is done to take into consideration any changes.
4.8.	**Complaint:** Towards the end of last year (2015), a team doing geo-technical surveys was in the area. The team ate fruits from community members' trees and also parked their vehicles in peoples' compounds without asking for permission. **Response**: It is regrettable that community members' property was not respected. All the Consultants involved will be informed to ensure that all field staff respect community members' property and make requests to use or purchase any individual or community resources.
4.9.	**Question:** The Graveyard for the Grail Sisters is within the Project area. Will these graves be relocated? **Response:** The Project route will try as much as possible not to affect any physical and cultural resources. However, the affected areas will be more accurately identified after the surveyors have started with field work and marked out the substation and corridor extents.
4.10.	**Question:** Some landowners do not live in the area and have to travel from far. Will facilitation be provided for this? **Response:** No, facilitation is not provided for the community members to attend meetings.

STAKEHOLDER CONSULTATION RECORD



STAKEHOLDER CONSULTATION RECORD

6. Meeting with Community in Buloba Project Area - Kaggaba, Mabuye and Nsujjwe villages

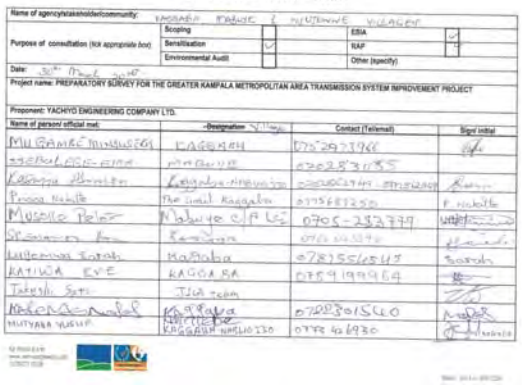
Week	13	Meeting date	30 March 2016
		Recorded by	BA
Meeting/subject	Meeting with Buloba residents (Kaggaba, Mabuye and Nsujjwe villages)- Consultation on GKMA Transmission Line Improvement Project	Total pages	2

Present	Apology	Copy	Name	Village	Designation
☒	☐	☐	List attached	Buloba residents	
☒	☐	☐	Ian Kakuru	Air Water Earth Ltd.	Valuer
☒	☐	☐	Isa Kabenge	Air Water Earth Ltd.	Engineer
☒	☐	☐	Brenda Amanda	Air Water Earth Ltd.	Engineer
☒	☐	☐	Sato Takeshi	JICA Study Team	ESIA Specialist

Item	Update
1.	**Introduction**
	The AWE team was welcomed and self-introductions made. A presentation of the Project details was made by the AWE team. The presentation included: ≠ Project Background ≠ Project Location ≠ Project and activities components ≠ The ESIA process ≠ Potential Environmental and Social Impacts (construction and operation phase) ≠ Mitigation Measures for identified impacts (construction and operation phase) ≠ Resettlement Action Plan (land survey and valuation survey procedures, compensation process, grievance mechanism, and disturbance allowance)
2.	**Question and Answer Session**
2.1.	**Concern:** It would be best to invite only those who are directly affected by the project so as not to waste too much time. Some people invited for the meeting will not lose land to the project.

2.2.	**Question:** Can't the surveyors and valuers come soon so that the affected people are identified? The most important thing is for the project area to be clearly marked. Response: The Surveyors and Valuers will start field work after they are informed that community sensitization meetings such as this one have been held.
2.3.	**Question:** Would the project come to a standstill if there were land wrangles within the project area? **Response:** The Project's Grievance Mechanism makes it possible to have dialogue with the ownership of the land that has wrangles. If the matters cannot be easily resolved, and no feasible alternative can be made to the Project design, there is the possibility of a hold-up in the Project progress.
2.4.	**Question:** Is it possible for the project route to change if it interacts with many other projects e.g. the Express highway? **Response:** Yes, the Project design can be changed at this point if major obstacles are met or identified.
2.5.	**Comment:** The contacts provided by the Consultants should be those of individuals and not general office numbers. Noted: Individual phone numbers will be provided, in addition to the office phone number.
2.6.	**Question:** When will the project start? **Response:** Towards the end of this year 2016, Government of Uganda and Japanese government are expected to sign an agreement. Project implementation will then probably take about two years.
2.7.	**Comment:** The time lag between the Surveyors and Valuers should not be long as this could result in people continuing to develop their land, sometimes dubiously.
2.8.	**Concern:** People's property should be adequately compensated.

STAKEHOLDER CONSULTATION RECORD



STAKEHOLDER CONSULTATION RECORD

STAKEHOLDER CONSULTATION RECORD

7. Meeting with SEMA Properties – Buloba Project area

Week	46	Meeting date	12 November 2015
		Recorded by	Ivan B
Meeting/subject	Preparatory Survey for the Greater Kampala Metropolitan Transmission System Improvement Project - Buloba Site Land Ownership Review	Total pages	1

Present	Apology	Copy	Name	Organisation	Designation
☒	☐	☐	Mukwaya Sula (MS)	Millennium Estate Ltd	Managing Director
☒	☐	☐	Semakula Sulait (SS)	Sema Properties Ltd	Managing Director
☐	☐	☐	Muyingo Musa (MM)	Sema Properties Ltd	Manager
☒	☐	☐	Ivan Bamweyana (IB)	AWE	Surveyor & GIS specialist

Item	Update
1.	**Introduction**
	Mr. Semakula Sulait welcomed the AWE representative to Sema Properties Limited. Self-introductions of all members present for the meeting were made. A presentation of the project was made to the Sema team, including but not limited to: ≠ Project description ≠ Proposed location of Buloba substation and associated infrastructure
2.	**Discussion**
	Current status of land ownership
2.1.	The land in question is still under the management of Sema Properties Ltd. The company had started on the process of transferring ownership to Bulo Parent's School Teachers' Association. However, the process was halted upon learning about the proposed substation project, as part of the Transmission System Improvement Project. *Note: Bulo Parent`s School is under the proprietorship of Sema Managing Director`s brother.*
	Willingness to sell

2.2.	Sema Properties is willing to sell the land in question. Inevitably, a new location will be identified for the Bulo Parent School's Teachers' Association.
	Conditions attached to willingness to sell
2.3.	Sema Property Limited, being a real estate company that sells land, will attach a value to the land in question. The sale process with UETCL will be initiated after a 'price tag' has been attached to the land
	Other land owners
2.4.	Sema Properties does not own the entire land proposed for the substation.
	Additional Information
2.5.	Sema property has been approached by another party (UETCL surveyor) on the same land issue.
2.6.	The local area name is "Nsimbe", not Buloba.

Stakeholder consultation record:

KAWAALA PROJECT AREA

8. Meeting with Community in Kawaala Project Area - Namungoona residents

Week	13	Meeting date	29 March 2016
		Recorded by	BA
Meeting/subject	Meeting with Namungoona residents- Consultation on GKMA Transmission Line Improvement Project	Total pages	2

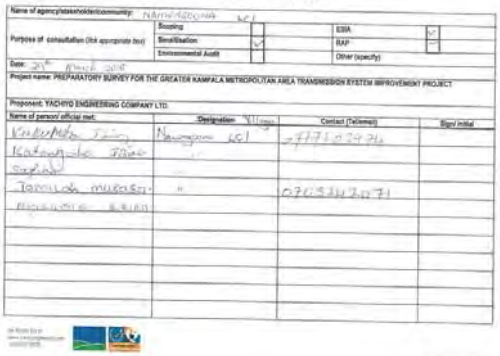
Present	Apology	Copy	Name	Village	Designation
☒	☐	☐	List attached	Namungoona residents	
☒	☐	☐	Isa Kabenge	Air Water Earth Ltd.	Engineer
☒	☐	☐	Brenda Amanda	Air Water Earth Ltd.	Engineer

Item	Update
1.	**Introduction**
	The AWE team was welcomed and self-introductions made. A presentation of the Project details was made by the AWE team. The presentation included: ≠ Project Background ≠ Project Location ≠ Project and activities components ≠ The ESIA process ≠ Potential Environmental and Social Impacts (construction and operation phase) ≠ Mitigation Measures for identified impacts (construction and operation phase) ≠ Resettlement Action Plan (land survey and valuation survey procedures, compensation process, grievance mechanism, and disturbance allowance)
2.	**Question and Answer Session**
2.1.	**Question:** Can one remove some of their property such as roof or doors even after they have been paid? **Response:** Yes, as long as the information has been captured by the Valuer. All additions or subtractions from property after the cut-off date are not considered during compensation.

2.2.	**Question:** The cable, in some cases is passing through land that is undeveloped. Will such land owners be compensated? **Response:** Yes, all land owners will be compensated for their lost property. Developments on the land are also compensated for.
2.3.	**Question:** It is possible that the trench will affect some people even though it is not necessarily going through their land? Can such people volunteer to be compensated for relocation if they are uncomfortable having the cable so close to them? **Response:** No, one cannot volunteer to be affected by the Project. However, any damage to one's property during the course of the Project implementation can be compensated. The reporting of such cases would be done through the Local leaders and the Grievance Committee.
2.4.	**Question:** The land on which the current substation is located belonged to one of the meeting participants who was not compensated. Will the remaining land also be taken without compensation? Response: This Project will be implemented in line with JICA Guidelines and Ugandan laws. Therefore, all people whose land will be acquired will be compensated for both their land, and any property on the land affected.
2.5.	**Question:** Will the project give time for the brick making to be completed before the project can commence? **Response:** Yes, because notice to relocate will be given when the compensation money is paid. This notice period is always given, because it also has an impact on the amount of compensation given since the disturbance allowance is calculated based on the notice period.
2.6.	**Question:** Who gets compensated? The landowner or tenant? **Response:** Both the land owner and kibanja holder receive compensation. An example in this area that is on Kabaka's land is that on Kabaka's land, the Buganda Land Board receives 30% of the calculated compensation amount while the Kibanja holder will receive 70% of the compensation amount. A tenant occupying a house will not receive any part of the compensation sum because ample notice will be given and none can always move to another location.
2.7.	**Comment:** The entire compensation process should involve the LC chairman. Response: Noted. Chairpersons are always involved in the compensation process.

STAKEHOLDER CONSULTATION RECORD

STAKEHOLDER CONSULTATION RECORD



APPENDIX 2 : CENSUS QUESTIONNAIRE TOOL

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UETCL: RAP STUDIES FOR TRANSMISSION LINE ACQUISITION

PROJECT _____ PLOT REF ____/____/____/____

ENUMERATOR: _____

AFFECTED HOUSEHOLD – SOCIO-ECONOMIC FORM

Date of Interview: _____ Village: _____

SECTION 1 FAMILY INFORMATION

LO ____ Tenant ____ Licensee ____ Co-owner ____ Co-Tenant ____ Squatters ____

Affected Person: _____ (Surname, First Name)

Sex: _____ Date/Year of Birth: _____ Age: _____ exact/approximate (circle appropriate response)

Where were you born? _____ (Village/District) When did you come here? _____

Are your parents alive? Yes No If alive, which? _____ (circle appropriate response)

Where do/did your parents live? _____ (Village/District)

Identicard/ Voters card/Other ID _____ Presented? Yes No ID No: _____

Name on ID _____ Address on ID _____

Marital Status (circle appropriate response) Single Married (no of spouses) _____ Seperated Widowed

Tribe/Clan: _____ (indicate both)

Village: _____ (Where affected Property is)

Main Occupation of Affected person: _____

Where do you work? _____ (Village/District not Company)

Religion: Catholic Protestant Muslim Other: _____

Is the affected plot a principal place of residence? (circle appropriate response) Yes No

If YES, what are your relocation preferences (village and distance in km from residence)

1 _____

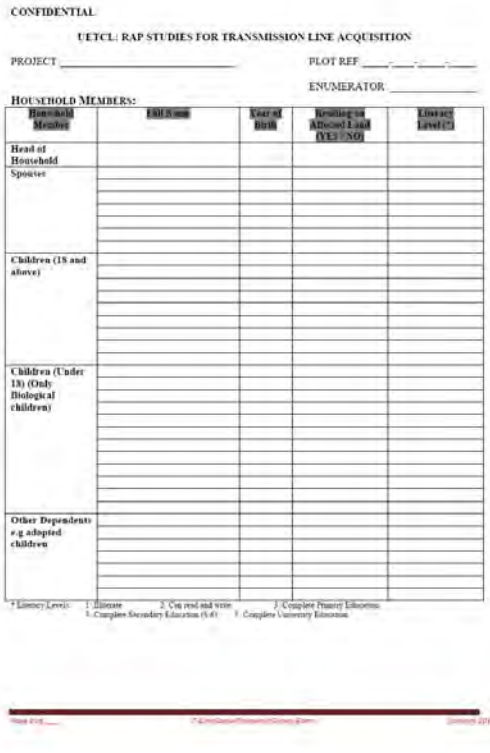
2 _____

Have you buried members of your family on this land? (circle appropriate response) Yes No (Affected Land)

If YES, how many? _____

Do you wish to relocate the graves? (circle appropriate response) Yes No

Page 1 of ____ Time/Date Economic Survey Form January 2015



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UETCL: RAP STUDIES FOR TRANSMISSION LINE ACQUISITION

PROJECT _____ PLOT REF ____/____/____/____

ENUMERATOR _____

HOUSEHOLD MEMBERS:

Household Member	Child's name	Year of Birth	Residing on Affected Land (YES / NO)	Literacy Level (*)
Head of Household				
Spouses				
Children (18 and above)				
Children (Under 18) (Only Biological children)				
Other Dependents e.g adopted children				

(*) Literacy Levels: 1. Illiterate 2. Can read and write 3. Complete Primary Education 4. Complete Secondary Education (S.4) 5. Complete University Education

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UETCL: RAP STUDIES FOR TRANSMISSION LINE ACQUISITION

PROJECT: _____ PLOT REF: ____/____/____/____

ENUMERATOR: _____

SECTION 2: HOUSEHOLD LAND HOLDINGS AND ASSETS

Agricultural Plots(Greater portion of land used for farming)

Location (Village)	Area Acres	Status of Occupation (Owner/Co-Owner/Tenant/Co-Tenant/Licensee)					Agricultural Use (Crops typically grown & animals reared)	Affected (Yes / No)	
		LO	CO	T	CT	L		Y	N
		LO	CO	T	CT	L		Y	N
		LO	CO	T	CT	L		Y	N
		LO	CO	T	CT	L		Y	N
		LO	CO	T	CT	L		Y	N

Residential Plots(Greater portion of land used for residential)

Location (Village)	Area Acres	Status of Occupation (Owner/Co-Owner /Tenant/ Co-tenant/Licensee)					Structures on Plot (see values info)	Affected (Yes / No	
		LO	CO	T	CT	L		Y	N
		LO	CO	T	CT	L		Y	N
		LO	CO	T	CT	L		Y	N
		LO	CO	T	CT	L		Y	N
		LO	CO	T	CT	L		Y	N

Structures

Location (Village)	Construction materials (Permanent / Non Permanent)		Status of Occupation (Owner/Co-Owner /Tenant/ Co-tenant/Licensee)					Condition (see values info) (New, Good, Fair, Poor, Ruin, etc)	Affected (Yes / No	
	P	NP	LO	CO	T	CT	L		Y	N
	P	NP	LO	CO	T	CT	L		Y	N
	P	NP	LO	CO	T	CT	L		Y	N
	P	NP	LO	CO	T	CT	L		Y	N
	P	NP	LO	CO	T	CT	L		Y	N

P-Permanent: Burnt bricks and mortar
NP- Non-Permanent: Mud and wattle
– Semi Permanent:Unburnt bricks and mortar

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UETCL: RAP STUDIES FOR TRANSMISSION LINE ACQUISITION

PROJECT: _____ PLOT REF: ____/____/____/____

ENUMERATOR: _____

SECTION 3: LIVELIHOOD (Get income for past 1 year)

Item Description	Cash Ug. Shillings for the last 12 months	In Kind *e.g Cow/Labour/Grain Barter trade/Gifts*
Income from Household Enterprises *(Please provide details of calculations in notebook)*		
Crop Farming		
Other Agricultural Income *(eg: Livestock, Poultry)*		
Non-Agricultural Income e.g Boda boda, brick making, alcohol brewing etc		
Property Income		
Rent received from rented property (land, housing)		
Benefits		
Family allowances/social security benefits (NSSF, Pensions, Life Insurance)		
Remittances and assistance received from others(Relatives offering regular support)		
Other (inheritance, alimony, scholarships, etc)		
Employment		
Formal employment income (salaried Workers)		
TOTAL		

Do you have a bank account? *(circle appropriate response)* **YES / NO**
If yes, where? *(e.g. bank name, location, distance)*: _____

SECTION 4: HEALTH & VULNERABILITY

Are there disabled or chronically ill people in the household? **YES / NO** If YES, How many? _____

If **YES**: - Type of disability/illness: _____

- Type of care required: _____

Number of births & deaths over the last 12 months in the household:

- Births: _____

- Deaths: _____ Cause: _____

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UETCL: RAP STUDIES FOR TRANSMISSION LINE ACQUISITION

PROJECT: _____ PLOT REF: ____/____/____/____

ENUMERATOR: _____

What are the most common diseases that affect the family?

- _____
- _____
- _____
- _____

What is the nearest health facility known to the family? _____

Is it actually used by the family? **YES NO**

If NO, why? _____

Do you practice family planning? **YES NO**

Have you heard of HIV/AIDS? **YES NO**

How is HIV/AIDS contracted?

_____

How can HIV/AIDS be avoided? _____

SECTION 5: WELFARE INDICATORS

Does everyone in the household have at least two sets of clothes?	Y	N
Does anyone in the household own a radio? Ask for Radio on cellphone only.	Y	N
Does anyone in the household own a mobile telephone? *If yes, write down the number.*	Y	N
Does anyone in the household own a fixed telephone? *If yes, write down the number.*	Y	N
Does the household have a bicycle?	Y	N
Does the household have any other transport equipment other than a bicycle? *If yes, what type of vehicle? (bodaboda, car)*	Y	N
If someone in the household had a serious problem, is there anybody in this settlement that you could ask assistance from?(social ties – who can bail you out)	Y	N

Where do you get drinking water from? _____ Distance from residence _____ metres.

Do you fish in the present situation? **YES NO**

If **YES**, where? _____ How often? _____ (times per duration)

Do you hunt in the present situation? **YES NO**

If **YES**, where? _____ How often? _____

What fuel do you use in the household?
Firewood Gas Charcoal Solar

Paraffin/Kerosene Biogas Electricity Other _____

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UETCL: RAP STUDIES FOR TRANSMISSION LINE ACQUISITION

PROJECT: _____ PLOT REF: ____/____/____/____

ENUMERATOR: _____

SECTION 6: OTHER OBSERVATIONS & COMMENTS

NOTICE:

I understand that this form is not the agreement to buy my land or place an encumbrance upon my land or to compensate me. I understand that I must continue farming as usual until further notice.

I have read the above information and agree that the information on this form is true, full and complete.

Dated this _____ **day of** _____ **2015**

AFFECTED PERSON

Sign : _____

Name : _____

REPRESENTATIVE – LC 1 (In witness)

Sign : _____

Name : _____

Title : _____

PARISH LAND COMMITTEE MEMBER (In witness)

Sign : _____

Name : _____

Title : _____

REPRESENTATIVE – UETCL

Sign : _____

Name : _____

Title : _____

APPENDIX 3 : TERMS OF REFERENCE FOR AN EXTERNAL MONITORING AGENCY

A. Project Background

The Republic of Uganda has been experiencing high economic growth and approximately 7% annual economic growth has been recorded over the past years. In line with this growth trend, the power demand has also been increasing rapidly at 9.7% on average per year from 2007 to 2012. The Project aims to increase the capacity of power supply through the upgrade of transmission and substation system in Kampala Metropolitan Area.

To implement the Project, land acquisition will be required at Buloba, New Mukono and Kawaala components. People affected by the land acquisition will be compensated and rehabilitaed by UETCL in accordance to the Resettlement Action Plan (RAP). UETCL seeks to engage an independent External Monitoring Agency (EMA) to undertake monitoring and evaluation of the RAP implementation process.

B. Key Objective of External Monitoring

Monitoring is an integral part of the resettlement process. The External Monitoring Agency (EMA) will review implementation process as per set policies and criterias in the RAPs report, assess the achievement of resettlement objectives, the changes in living standards and livelihoods, restoration of the economic and social base of the project affected people, the effectiveness, impact and sustainability of entitlements, the need for further mitigation measures if any, and to learn strategic lessons for future policy formulation and planning.

C. Scope of Work

The scope of work of the External Monitoring Agency (EMA) will include the following activities:-

1. To develop specific monitoring indicators for undertaking monitoring of the Resettlement Action Plan (RAP).
2. To review and verify the progress in land acquisition/resettlement implementation of the Project.
3. Identify the strengths and weaknesses of the land acquisition/resettlement objectives and approaches as well as implementation strategies.
4. Evaluate and assess the adequacy of compensation given to the APs and the livelihood opportunities and incomes as well as the quality of life of APs of project-induced changes.
5. Identification of the categories of impacts and evaluation of the quality and timeliness of delivering entitlements (compensation and rehabilitation measures) for each category and how the entitlements were used and their impacts and adequacy to meet the specified objectives of the Plans. The quality and timeliness of delivering entitlements, and the sufficiency of entitlements as per approved entitlement matrix.
6. Provide a summary of whether involuntary resettlement was implemented (a) in accordancewith the RAPs, and (b) in accordance with the stated policy.

7. To review the quality and suitability of the relocation sites from the perspective of the both affected and host communities.
8. Verify expenditure & adequacy of budget for resettlement activities.
9. To analyze the pre-and post-project socio-economic conditions of the affected people. The methodology for assessment should be very explicit, noting any qualifications.
10. Review results of internal monitoring and verify claims through sampling check at the field level to assess whether land acquisition/resettlement objectives have been generally met.Involve the affected people and community groups in assessing the impacts of land acquisitionfor monitoring and evaluation purposes.
11. To monitor and assess the adequacy and effectiveness of the consultative process with affected people, particularly those vulnerable, including the adequacy and effectiveness ofgrievance procedures and legal redress available to the affected parties, and disseminationof information about these.
12. Identify, quantify, and qualify the types of conflicts and grievances reported and resolved andthe consultation and participation procedures.
13. Describe any outstanding actions that are required to bring the resettlement activities in line with the policy. Describe further mitigation measures needed to meet the needs of any affected person or families judged and/or perceiving themselves to be worse off as aresult of the Project. Provide a timetable and define budget requirements for these supplementary mitigation measures.
14. Describe any lessons learned that might be useful in developing the new national resettlement policy and legal/institutional framework for involuntary resettlement.
15. Verifying internal reports by field-checking delivery of compensation to PAPs, including the levels and timing of the compensation; readjustment of land; preparation and adequacy of resettlement sites; construction of houses; provision of employment, the adequacy of the employment, and income levels; training; special assistance for vulnerable groups; repair, relocation, or replacement of infrastructure; relocation of enterprises, compensation, and adequacy of the compensation; and transition allowances;
16. Interviewing a random sample of PAPs in open-ended discussions, to assess their knowledge and concerns about the resettlement process, their entitlements, and the rehabilitation measures;
17. Observing the functioning of the resettlement operation at all levels, to assess its effectiveness and compliance with the RAP;
18. Checking the type of grievance issues and the functioning of grievance redress mechanisms by reviewing the processing of appeals at all levels and interviewing aggrieved PAPs:
19. Advising TANROADS regarding possible improvements in the implementation of the RAP.

D. Methodology and Approach

The general approach to be used is to monitor activities and evaluate impacts ensuring participation of all stakeholders especially women and vulnerable groups. Monitoring tools should include both quantitative and qualitative methods. The external monitor should reach out to cover:

- ≠ PAPs who had property, assets, incomes and activities severely affected by Project works and had to relocate either to resettlement sites or who chose to self-relocate, or whosesource of income was severely affected.
- ≠ PAPss who had property, assets, incomes and activities marginally affected by Project works and did not have to relocate;
- ≠ PAPs by off-site project activities by contractors and sub-contractors, including employment, use of land for contractor's camps, pollution, public health etc.;

Supplemented by Focused Group Discussions (FGD) which would allow the monitors to consult arange of stakeholders (local government, resettlement field staff, NGOs, community leaders, and,most importantly, APs), community public meetings: Open public meetings at resettlement sites toelicit information about performance of various resettlement activities.

E. Other Stakeholders and their Responsibility

1. Responsibilityof the executing Agencies (EAs)

The EAs through their Project Implementation Unit (PIU) will ensure timely supply of background references, data and other necessary information to the EMA and provide access to project sites and relevant places to let the EMA implement external monitoring activity.

2. Responsibility of the Implementing organization(s)

Organizations that will assist EAs in implementing land acquisition and resettlement activities will provide information required by the EMA at site and at their Project Offices. It will on behalf of EAs ensure free access to project sites and related areas and the database on land acquisition and resettlement activities.

F. Team Composition of the External Monitoring Agency

The EMA should focus on, data collection, processing and analysis to pin point problem areas and weaknesses, and to light on deserving measures to achieve the objectives on schedule are the special interest of the subject. Thus, there is a need for a dedicated monitoring team with adequate gender representation. Further, it is essential that the central team or field level coordinators responsible for monitoring, are skilled and trained in data base management, interview technique, and social and economic/finance. Keeping in mind these criteria, the team should ideally include:

Position/expertise	Qualification and experience
1. Team Leader/ Implementation Specialist	Master in social science with 10-year working experience in social impact assessment including census and socioeconomic surveys, stakeholders' consultation, and analyzing social impacts to identify mitigation measures in compliance with social safeguard policies of the international development financing institutions and national legislations. Experience of preparing resettlement framework and action plans and implementation of plans for externally financed projects is essential.
2. Social Impact Specialist	Master in social science with 5-year working experience in social impact assessment including census and socioeconomic surveys, stakeholders'

	consultation, and analyzing social impacts to identify mitigation measures in compliance with social safeguard policies of the international development financing institutions and national legislations. Experience of preparing resettlement framework and action plans and implementation of plans for externally financed projects is essential.
3. Data Analyst	Graduate with working experience and knowledge of software such as SPSS (Statistical Package for the Social Sciences)

G.Time Frame and Reporting

The EMA will be employed over a period of 3 years with intermittent inputs from the professionalteam to continue 2 years after completion of the RAP implementation.

Quarterly and annual monitoring reports should be submitted to UETCL with copies to JICA. An evaluation report at the end of the project should be submitted to UETCL and concerned parties with critical analysis of the achievement of the program and performance of EAs and implementingorganizations.

The external monitors will provide monitoring and evaluation report covering the following aspects:

- ≠ Whether the resettlement activities have been completed as planned and budgeted;
- ≠ The extent to which the specific objectives and the expected outcomes/results havebeen achieved and the factors affecting their achievement or non achievement;
- ≠ The extent to which the overall objective of the Resettlement Plan, pre project orimproved social and economic status, livelihood status, have been achieved and thereasons for achievement / non achievement;
- ≠ Major areas of improvement and key risk factors;
- ≠ Major lessons learnt; and
- ≠ Recommendations.

Formats for collection and presentation of monitoring data will be designed in consultation with EAs.

H. Qualification of the External Monitoring Agency

The EMA will have at least 10 years of experience in resettlement policy analysis and implementation of resettlement plans. Further, work experience and familiarity with all aspects of resettlement operations would be desirable. NGOs, Consulting Firms or University Departments (consultant organization) having requisite capacity and experience on the same can qualify for services

Interested agencies should submit a proposal to UETCL with a brief statement of the approach,methodology, and relevant information concerning previous experience on monitoring ofresettlement implementation and preparation of reports.

The profile of its agency, along with full signed CVs of the team to be engaged, must be submitted along with the technical proposal.

I. Budget and Logistics

The budget should include all expenses such as staff salary, office accommodation, training, computer/software, transport, field expenses and other logistics necessary for field activities, data collection, processing and analysis for monitoring and evaluation work. Additional expense claims whatsoever outside the proposed and negotiated budget will not be entertained. VAT, Income Tax and other charges admissible will be deducted at source as per Government laws.

資料－８　地形測量に関する
再委託業者からの報告書

Intended for

Uganda Electricity Transmission Company Limited (UETCL)

Document type

Topographic Surveying

Date

February, 2016

GREATER KAMPALA TRANSMISSION NETWORK PROJECT IN THE REPUBLIC OF UGANDA

BULOOBA SUBSTATION TOPOGRAPHIC SURVEYING

YACHIYO ENGINEERING CO.,LTD.
Consulting Engineers & Architects

BULOOBA SUBSTATION TOPOGRAPHIC SURVEYING

Revision **00**

Date **17.02.2016**

Made by **JH**

Checked by **BE**

Approved by **DA**

Yachiyo Engineering Co. Ltd,
5-20-8 Asakusabashi, Taito-ku
Tokyo 111-8648, Japan

NEWPLAN Limited
Crusader House
Plot 3 Portal Avenue
P.O. Box 7544, Kampala
Uganda
T +256 414 340 243/4/5

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LIST OF TABLES

LIST OF APPENDIX

1 INTRODUCTION

1.1 About Report

This report mainly deals with the topographic surveying based on surveying work which was conducted in December 2015 and January 2016. This report identify and map the contours of the ground and existing features on the surface of the earth or slightly above or below the earth's surface (i.e. trees, buildings, streets, walkways, manholes, boundary lines and the lines of easements on or crossing the property , etc...).

1.2 Background

Yachiyo Engineering Company Ltd (YEC) were commissioned by Japan international cooperation agency (JICA) to carry out a preparatory survey for the improvement of the greater Kampala metropolitan area transmission system in the republic of Uganda. Yachiyo Engineering Company Limited (YEC) intended to put up a new substation known as Bulooba substation in Maya. This will involve construction of a substation and associated infrastructure. In order to construct the mentioned substation, Topographic Surveying was required in order for a designer to accurately show zoning and other agency required setbacks.

Following decision of conducting Topographic Surveying at Bulooba substation in Maya, Newplan limited have been contracted by Yachiyo Engineering Company Ltd (YEC) to carry out a Topographic surveying and Geotechnical investigation in Maya, Wakiso district.

1.3 The consultant

Following a competitive bidding procedure Newplan Limited were appointed by Yachiyo Engineering Company Ltd (YEC) to carry out Topographic surveying and Geotechnical investigation. The Contract for the Topographic surveying and Geotechnical investigation was signed on 14th December 2015 and the assignment commenced on 16th December, 2015.

This report, together with the Geotechnical report, represent the conclusion of the Bulooba substation Topographic surveying and Geotechnical investigation contract.

1.4 Project Description

Bulooba substation is located in Wakiso district, Central Uganda that encircles Kampala, Uganda's capital city. It is located approximately 20km (12mi) by road from the capital centre, Kampala. The approximate centroid of the project area coordinates is 36 N 432067 UTM 28687. It is neighbouring a residential area generally consisting of one storey high buildings in the North, West and South with an access road east of the site. The elevation of the project area varies between 1163 to 1196amsl.

Bulooba substation is a non-existing substation without developments on the site. The project area incorporated within the site boundary is approximately 112558m².

The project area is classified under tropical climate with temperatures ranging from 15 to 29 ^{0}C. The project area receives rain in in two different season, March to May and in August to December. The mean annual rainfall is between 1125mm and 1350mm.

1.5 Scope

The scope of the assignment included preparation of a detailed topographic map of the areas where the substation will be located and surroundings including buildings, drainage channel and all access roads. Measurement (using suitable methods) of the control points were to provide a reliable base for the surveys. Scope of works for above will be as follows:

1. Obtaining relevant survey data/maps for the area mentioned.
2. The field work – This will involve laying out survey control stations and picking of the details on site with TOTAL STATION survey equipment.
   a) Boundary confirmation
   b) Picking of x,y,z position of all existing manmade and natural ground features. This includes but not limited to accurate positions of buildings, roads, etc..
   c) Picking ground positions and levels of sewer lines, drains, spot heights
3. Map production – This will involve plotting of details picked on site to produce the survey plan / map. The plan / map will show all details and contour lines for the site. This will be done using AutoCAD Civil 3D.

2 METHODOLOGY

2.1 Personnel and Equipment

The survey team was led by Eria Kamegero as the Senior Surveyor, assisted by Julius Habalurema plus field assistants. Equipment consisted of CHC X900 dual frequency differential GPS units and a Leica TCR 705 Total station.

2.2 Datum

The survey was based on the National Grid based on the Clarke 1880 modified spheroid, the Transverse Mercator projection and the UTM Arc 1960 datum as shown in **Error! Reference source not found.**2.1.

Table 2. 1: Assumptions made for the topographic survey

Parameter	**Description**
Projection Type	Transverse Mercator
Zone	Universal Transverse Mercator Zone 36 (UTM Zone 36)
Zone Parameters	
Central Meridian	33^{0} East
Scale factor at Central Meridian	0.9996
Longitude of Grid Origin	0^{0} E
Latitude of Grid Origin	0^{0} N
False Easting	500,000m
False Northing	0.000m
Datum Name	Arc 1960 New
Reference Ellipsoid	Clarke 1880 Modified with the following parameters: a = 6378249.145m 1/f = 293.465

2.3 Permanent Markers

The ground markers were made of iron pins approximately 1m long, driven into the ground and surrounded by concrete about 40 cm diameter and at least 30 cm deep. The points were selected in positions related to those described in the T.O.R, and meant for measurement of specific areas of the project.

2.4 Field Measurements

These were based on the control points set up at strategic positions around the site that were established using the GPS Real time kinematic fixing method using national geodetic points as base stations for the established points. The rest of the topographic points were acquired by traversing using a Leica TCR 705 total station and the traverse was tied onto the earlier established points.

The rest of the project points were then based on BSS01, BSS02, BSS03, BSS04 and BSS05 (see **Error! Reference source not found.**.2). These points were coordinated using static positioning method where they occupied for 45minutes in order to fix them accurately.
Before is an extract of the Rinex file for the Static positioning that was done on all the controls.

Land Survey Overview

3/18/2016 3:37:40 PM
www.spectraprecision.com

Project Name : Buloba
Spatial Reference System : SPEC 2016 NORTH
Time Zone : (UTC+03:00) Nairobi
Linear Units : Meters

Coordinate System Summary

Coordinate system
- **Name :** SPEC 2016 NORTH
- **Type :** Projected
- **Unit name :** Meters
  - **Meters per unit :** 1
- **Vertical datum :** Ellipsoid
- **Vertical unit :** Meters
  - **Meters per unit :** 1

Datum
- **Name :** Arc1960
- **Ellipsoid Name :** Clerke 1880 mod
- **Semi-major Axis :** 6378249.145 m
- **Inverse Flattening :** 293.465000000
- **DX to WGS84 :** -160.0000 m
- **DY to WGS84 :** -6.0000 m
- **DY to WGS84 :** -302.0000 m
- **RX to WGS84 :** -0.000000 "
- **RY to WGS84 :** -0.000000 "
- **RZ to WGS84 :** -0.000000 "
- **ppm to WGS84 :** 0.000000000000

Projection
- **Projection Class :** Transverse_Mercator
- **latitude_of_origin** 0° 00' 00.00000"N
- **central_meridian** 33° 00' 00.00000"E
- **scale_factor** 0.999600000000
- **false_easting** 500000.000 m
- **false_northing** 0.000 m

Control Points

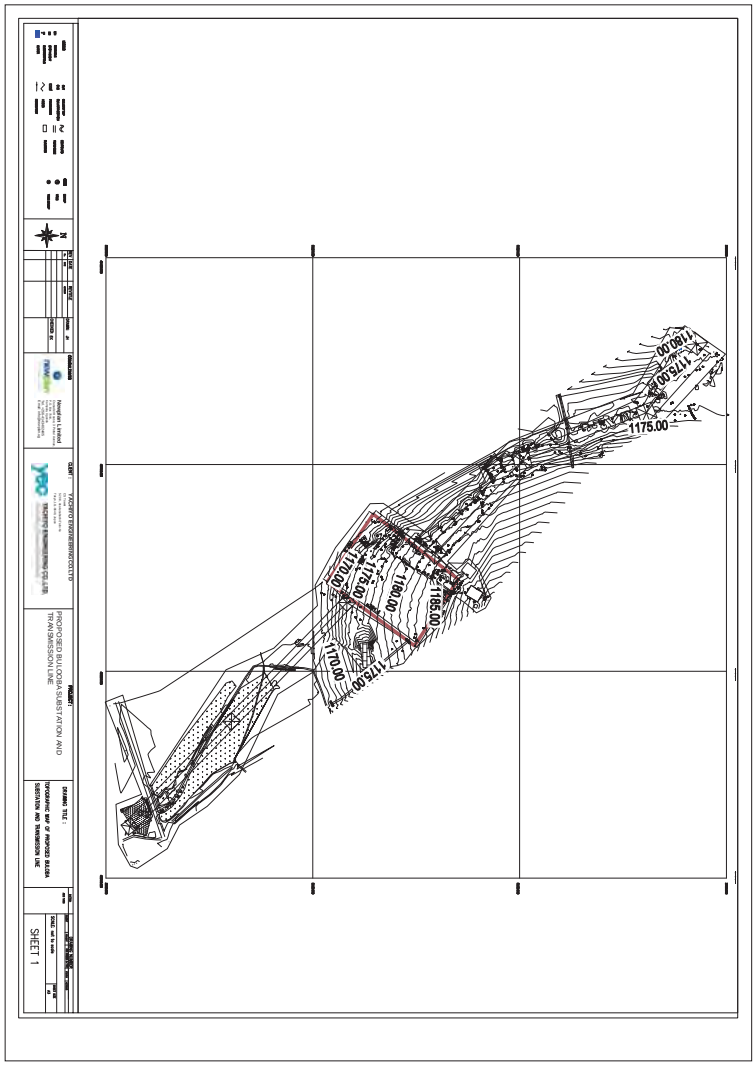
Name		Components	95% Error	Status	Control Error
71y66	East	448182.479	0.000	FIXED	
	North	39530.784	0.000	FIXED	
	Ellips height	1202.807	0.000	FIXED	

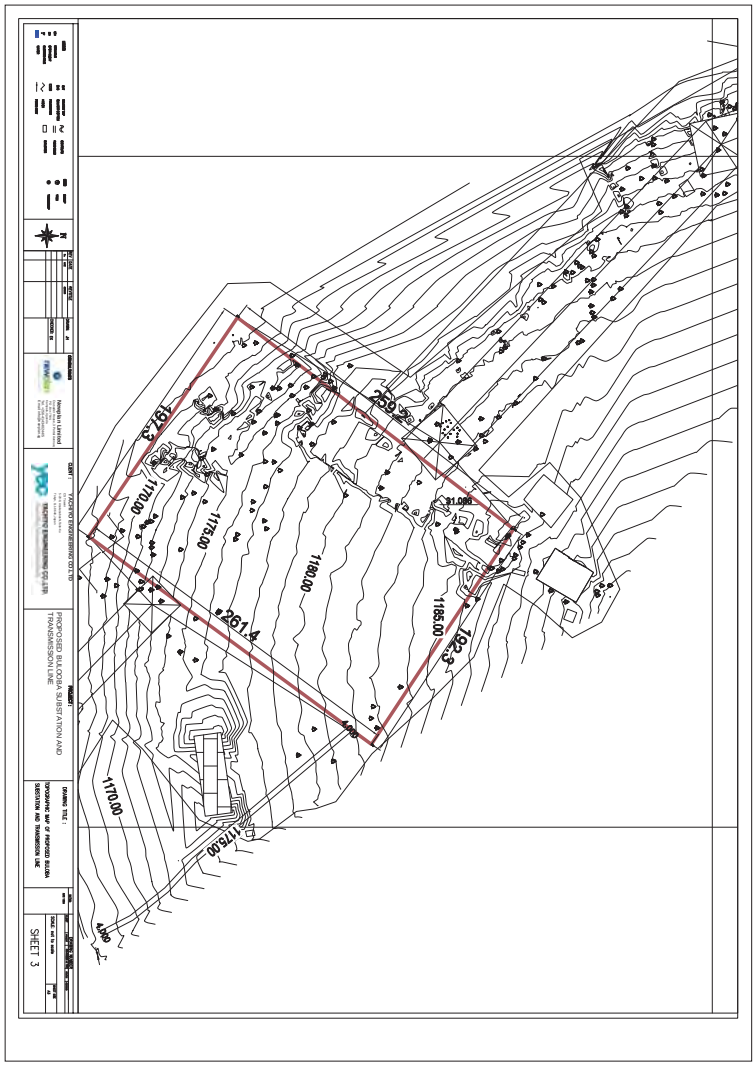
Logged Points

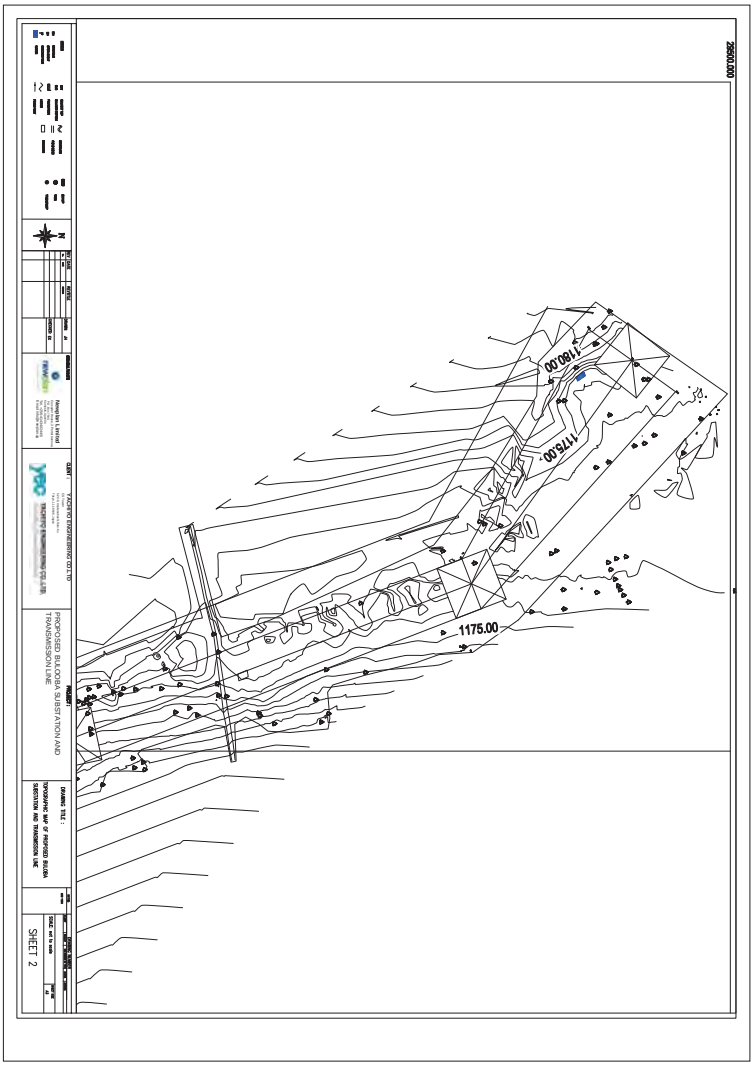
Name		Components	95% Error	Status
BSS01	East	432662.150	0.065	Processed (static)
	North	28151.921	0.074	Processed (static)
	Ellips height	1166.680	0.083	Processed (static)
BSS02	East	432326.146	0.009	Processed (static)
	North	28036.375	0.015	Processed (static)
	Ellips height	1166.893	0.020	Processed (static)
BSS03	East	432275.049	0.010	Processed (static)
	North	28601.552	0.015	Processed (static)
	Ellips height	1172.803	0.020	Processed (static)
BSS04	East	432059.723	0.009	Processed (static)
	North	28587.851	0.015	Processed (static)
	Ellips height	1172.916	0.020	Processed (static)
BSS05	East	432078.330	0.010	Processed (static)
	North	28923.758	0.015	Processed (static)
	Ellips height	1195.701	0.019	Processed (static)
BSS06	East	431585.968	0.010	Processed (static)
	North	29093.938	0.015	Processed (static)
	Ellips height	1170.918	0.019	Processed (static)
PKT BUZ	East	461118.053	0.028	Processed (static)
	North	24342.139	0.039	Processed (static)
	Ellips height	1154.613	0.048	Processed (static)
	Description	*DEFAULT*		

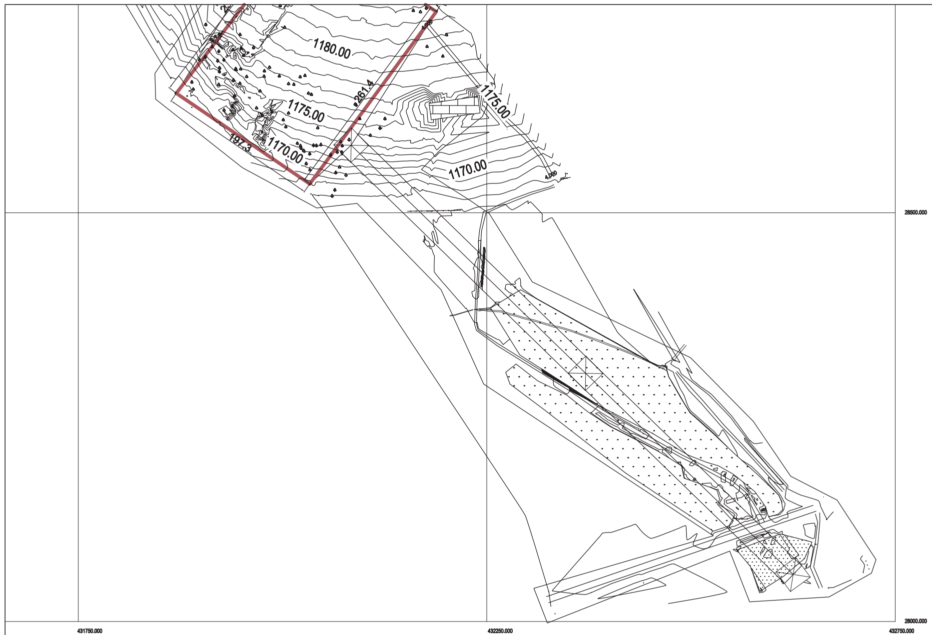
3 APPENDIX

Appendix 1: Topographic Surveying Map









LEGEND

MH MAN HOLE
SH SPOT HEIGHT
ELECTRIC POLE
WATER
C/T CULVERT TOP
C/B CULVERT BOTTOM
FOUNDATION
HEDGE
FENCE POST
CONTOURS
ROAD EDGE
BUILDINGS
SWAMP
TREE
TREE STUMP

N

REV	DATE	REVTITLE
No.	DATE	REVISION

DRAWN: JH

CHECKED: EK

CONSULTANTS

Newplan Limited
Crusader House, 3 Portal Avenue,
P.O. Box 7544,
Kampala, Uganda
Tel. +256-414340244/5
Email: info@newplan.ug

CLIENT : YACHIYO ENGINEERING CO.LTD
CS Tower
5-20-8, Asakusabashi,Taito-ku
Tokyo, 111-0053, Japan

YACHIYO ENGINEERING CO.,LTD

PROJECT :
PROPOSED BULOOBA SUBSTATION AND TRANSMISSION LINE

DRAWING TITLE :
TOPOGRAPHIC MAP OF PROPOSED BULOBA SUBSTATION AND TRANSMISSION LINE

DATUM: ARC 1960

DRAWING NUMBER

SCALE: not to scale

SHEET SIZE A3

SHEET 4

Intended for

Uganda Electricity Transmission Company Limited (UETCL)

Document type

Topographic Surveying

Date

December, 2015

GREATER KAMPALA TRANSMISSION NETWORK PROJECT IN THE REPUBLIC OF UGANDA

KAWAALA SUBSTATION TOPOGRAPHIC SURVEYING

YACHIYO ENGINEERING CO.,LTD.
Consulting Engineers & Architects

KAWAALA SUBSTATION TOPOGRAPHIC SURVEYING

Revision **00**

Date **29.12.2015**

Made by **JH**

Checked by **EK**

Approved by **DA**

Yachiyo Engineering Co. Ltd,
5-20-8 Asakusabashi, Taito-ku
Tokyo 111-8648, Japan

NEWPLAN Limited
Crusader House
Plot 3 Portal Avenue
P.O. Box 7544, Kampala
Uganda
T +256 414 340 243/4/5

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1 INTRODUCTION

1.1 About Report

This report mainly deals with the topographic surveying based on surveying work which was conducted in November 2015. This report identify and map the contours of the ground and existing features on the surface of the earth or slightly above or below the earth's surface (i.e. trees, buildings, streets, walkways, manholes, boundary lines and the lines of easements on or crossing the property , etc...).

1.2 Background

Yachiyo Engineering Company Ltd (YEC) were commissioned by Japan international cooperation agency (JICA) to carry out a preparatory survey for the improvement of the greater Kampala metropolitan area transmission system in the republic of Uganda. Yachiyo Engineering Company Limited (YEC) intended to upgrade the substation which was constructed in the period 2008-2012 known as Kawaala substation in Namungoona. This will involve construction of a substation and associated infrastructure. In order to upgrade the mentioned substation, Topographic Surveying were required in order for a designer to accurately show zoning and other agency required setbacks.

Following decision of conducting Topographic Surveying at Kawaala substation in Namungoona, Newplan limited have been contracted by Yachiyo Engineering Company Ltd (YEC) to carry out a Topographic surveying and Geotechnical investigation in Namungoona, Kampala district.

1.3 The consultant

Following a competitive bidding procedure Newplan Limited were appointed by Yachiyo Engineering Company Ltd (YEC) to carry out Topographic surveying and Geotechnical investigation. The Contract for the Topographic surveying and Geotechnical investigation was signed on 10th November 2015 and the assignment commenced on 16th November, 2015.

This report, together with the Geotechnical report, represent the conclusion of the Kawaala substation Topographic surveying and Geotechnical investigation contract.

1.4 Project Description

Kawaala substation is located in Namungoona, a local town suburb located in kawempe division. It is located approximately 6km North West of Kampala city centre accessible via Nakibinge road off Hoima road. The approximate centroid of the project area coordinates is 36 N 448650 UTM 37400. It is neighbouring a residential area generally consisting of one storey high buildings in the North, West and South with an access road east of the site. The elevation of the project area varies between 1181 to 1195amsl.

Kawaala substation is an existing substation with developments on the site. The project area incorporated within the site boundary is approximately 14,000m^2.

The project area is classified under tropical climate with temperatures ranging from 15 to 29 ^{0}C. The project area receives rain in in two different season, March to May and in August to December. The mean annual rainfall is between 1125mm and 1350mm.

1.5 Scope

The scope of the assignment included preparation of a detailed topographic map of the areas where the substation is located and surroundings including buildings, drainage channel and all access roads. Measurement (using suitable methods) of the control points were to provide a reliable base for the surveys. Scope of works for above will be as follows:

1. Obtaining relevant survey data/maps for the area mentioned.
2. The field work – This will involve laying out survey control stations and picking of the details on site with TOTAL STATION survey equipment.
   a) Boundary confirmation
   b) Picking of x,y,z position of all existing manmade and natural ground features. This includes but not limited to accurate positions of buildings, roads, etc..
   c) Picking ground positions and levels of sewer lines, drains, spot heights
3. Map production – This will involve plotting of details picked on site to produce the survey plan / map. The plan / map will show all details and contour lines for the site. This will be done using AutoCAD Civil 3D.

2 METHODOLOGY

2.1 Personnel and Equipment

The survey team was led by Eria Kamegero as the Senior Surveyor, assisted by Julius Habalurema plus field assistants. Equipment consisted of CHC X900 dual frequency differential GPS units and a Leica TCR 705 Total station.

2.2 Datum

The survey was based on the National Grid based on the Clarke 1880 modified spheroid, the Transverse Mercator projection and the UTM Arc 1960 datum as shown in **Error! Reference source not found.**2.1.

Table 2. 1: Assumptions made for the topographic survey

Parameter	Description
Projection Type	Transverse Mercator
Zone	Universal Transverse Mercator Zone 36 (UTM Zone 36)
Zone Parameters	
Central Meridian	33^{0} East
Scale factor at Central Meridian	0.9996
Longitude of Grid Origin	0^{0} E
Latitude of Grid Origin	0^{0} N
False Easting	500,000m
False Northing	0.000m
Datum Name	Arc 1960 New
Reference Ellipsoid	Clarke 1880 Modified with the following parameters: a = 6378249.145m 1/f = 293.465

2.3 Permanent Markers

The ground markers were made of iron pins approximately 1m long, driven into the ground and surrounded by concrete about 40 cm diameter and at least 30 cm deep. The points were selected in positions related to those described in the T.O.R, and meant for measurement of specific areas of the project.

2.4 Field Measurements

These were based on the control points set up at strategic positions around the site that were established using the GPS Real time kinematic fixing method using national geodetic points as base stations for the established points. The rest of the topographic points were acquired by traversing using a Leica TCR 705 total station and the traverse was tied onto the earlier established points.

Points 71Y97 was used for that purpose, fixing three new points around the project site namely NSS01, NSS02 and NSS03. The rest of the project points were then based on NSS01, NSS02 and NSS03 (see **Error! Reference source not found.**2).

Table 2. 2: Summary of field measurements

Point	X (m)	Y (m)	Z (Height)
NSS01	448686.408	37435.485	1193416
NSS02	448712.931	37395.100	1192.176
NSS03	448662.977	37363.264	1189.382

3 APPENDIX

Appendix 1: Topographic Surveying Map

PROJECT :

TOPOGRAPHIC AND GEO-TECHNICAL INVESTIGATIONS SURVEY ON KAWAALA SUBSTATION

DRAWING TITLE :

TOPOGRAPHIC MAP OF KAWAALA SUBSTATION AND ITS SURROUNDING

Topographic Survey Report
Proposed Mukono Substation and Transmission line

Intended for
Uganda Electricity Transmission Company Limited (UETCL)

Document type
Topographic Survey Report

Date
March 2016

TOPOGRAPHIC SURVEY REPORT

PROPOSED MUKONO SUBSTATION AND TRANSMISSION LINE

PROPOSED MUKONO SUBSTATION AND TRANSMISSION LINE

Revision **00**

Date **31.03.2016**

Made by **CS**

Checked by **EK**

Approved by **DA**

Yachiyo Engineering Co. Ltd,
5-20-8 Asakusabashi, Taito-ku
Tokyo 111-8648, Japan

NEWPLAN Limited
Crusader House
Plot 3 Portal Avenue
P.O. Box 7544, Kampala
Uganda
T +256 414 340 243/4/5

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1. INTRODUCTION

1.1 About Report

This report mainly deals with the topographic surveying based on surveying work which was conducted in March 2016. This report identify and map the contours of the ground and existing features on the surface of the earth or slightly above or below the earth's surface (i.e. trees, buildings, streets, walkways, manholes, boundary lines and the lines of easements on or crossing the property , etc…).

1.2 Background

Yachiyo Engineering Company Ltd (YEC) were commissioned by Japan international cooperation agency (JICA) to carry out a preparatory survey for the improvement of the greater Kampala metropolitan area transmission system in the republic of Uganda. Yachiyo Engineering Company Limited (YEC) intended to put up a new substation known as Mukono substation in Mukono. This will involve construction of a substation, transmission line and associated infrastructure. In order to construct the mentioned substation, Topographic Surveying was required in order for a designer to accurately show zoning and other agency required setbacks.

Following decision of conducting Topographic Surveying at Mukono substation in Mukono, Newplan limited have been contracted by Yachiyo Engineering Company Ltd (YEC) to carry out a Topographic surveying and Geotechnical investigation in Mukono, Mukono district.

1.3 The consultant

Following a competitive bidding procedure Newplan Limited were appointed by Yachiyo Engineering Company Ltd (YEC) to carry out Topographic surveying and Geotechnical investigation. The Contract for the Topographic surveying and Geotechnical investigation was signed on 11th March 2016 and the assignment commenced on 12th March, 2016.

This report, together with the Geotechnical report, represent the conclusion of the Mukono substation Topographic surveying and Geotechnical investigation contract.

1.4 Project Description

Mukono substation is located in Mukono district, Central Uganda that encircles Kampala, Uganda's capital city. It is located approximately 26km by road from the capital centre, Kampala. The approximate centroid of the project area coordinates is UTM WGS 84 36N 480723.000mN 42566.000mE. The elevation of the project area varies between 1170 to 1100amsl.

Mukono substation is a non-existing substation without developments on the site. The project area incorporated within the site boundary is approximately 397,128.44m^2.

The project area is classified under tropical climate with temperatures ranging from 15 to 29 ^{0}C. The project area receives rain in in two different season, March to May and in August to December. The mean annual rainfall is between 1125mm and 1350mm.

1.5 Scope

The scope of the assignment included preparation of a detailed topographic map of the areas where the substation will be located and surroundings including buildings, drainage channel and all access roads. Measurement (using suitable methods) of the control points were to provide a reliable base for the surveys. Scope of works for above will be as follows:

1. Obtaining relevant survey data/maps for the area mentioned.
2. The field work – This will involve laying out survey control stations and picking of the details on site with TOTAL STATION survey equipment.
   a) Boundary confirmation
   b) Picking of x,y,z position of all existing manmade and natural ground features. This includes but not limited to accurate positions of buildings, roads, etc…
   c) Picking ground positions and levels of sewer lines, drains, spot heights
3. Map production – This will involve plotting of details picked on site to produce the survey plan / map. The plan / map will show all details and contour lines for the site. This will be done using AutoCAD Civil 3D.

1.6 Project Duration, Staffing and Equipment

The fieldwork for the first phase of the survey work (control establishment and sensitization) was carried out from 12th march to 14th march 2016. Work on the second phase (Picking details of features) was carried out from 15th march to 23rd march 2016.

The survey team comprised lead surveyor assisted by a field surveyor, each with two chainmen. Casual labourers were also hired to assist in the work.
The local leaders (LC1 Chairmen) were contacted during the field work to ensure ease of access to the area.

The Equipment used include; GPS (static mode for controls Measurement), Total station, and others.

The computations and drawings were processed using software.

2. TOPOGRAPHIC SURVEYS

2.1 General

Prior to commencing the field survey, a reconnaissance site visit was carried out in March 2016 together with other members of the project team for the purpose of understanding the site requirements for the survey and enable making of decisions on the best way to approach the exercise.

2.2 Controls

A Uganda national grid control (**71Y176**) was used for the exercise. It is located in Mukono at Ham Mukasa's home about 0.8km along Kayunga road from the junction at Jinja roads

Table 2-1: Primary Control Point

Primary control point					
No	**Easting**	**Northing**	**Height**	**Datum**	**Located**
71Y176	472794.898	40821.547	1226.787	Arc 1960	HAM MUKASA'S HOME IN MUKONO

2.3 Coordinate information

Projection Type: Transverse Mercator.
Zone: Universal Transverse Mercator Zone 36 (UTM Zone 36)
Zone Parameters:
Central Meridian: 33º East
Scale factor at Central Meridian: 0.9996
False Easting: 500,000m
False Northing: 0.000m
Unit: meter

The system is based on the following Geodetic Datum:
Datum Name: Arc 1960 New
Reference Ellipsoid: Clarke 1880 Modified with the following parameters:
a = 6378249.145m
1/f = 293.465

2.4 GPS Measurements

GPS measurements were carried out using the CHC X90 GNSS receivers.

2.5 Detail Points Measurement

The GPS control points were the basis for measurements of all other points. The measurements for the feature details were done using the CHC X90 GNSS receivers

2.6 Computations and Drawing

Spread sheets were used to reorganise the Total Station detail points. These are attached as separate excel files in comma separated values (csv) format with the following descriptions.

- 'hse' for house corner
- 'sh' spot height
- WF wall Fence
- 'pn' Pond
- 're' road edge
- Culvert
- WM wire mesh
- Pw Existing Power line
- Grv Grave

2.7 Problems Encountered.

There were some challenges experienced in executing the assignment as highlighted below;

1. Rains were an issue on certain days of the field work; causing interruptions to the day's work and slowing down progress.
2. Snakes were common in some sections of the site. These made it difficult for some spot heights to be picked properly.
3. The Nandangi Forest in was too thick and had monkeys that interrupted the exercise at some instances

3. APPENDICES

Appendix 1: Selected Photographs

Figure 3-1 Junction to site

Figure 3-2 Primary control

Figure 3-3 Stream in corridor

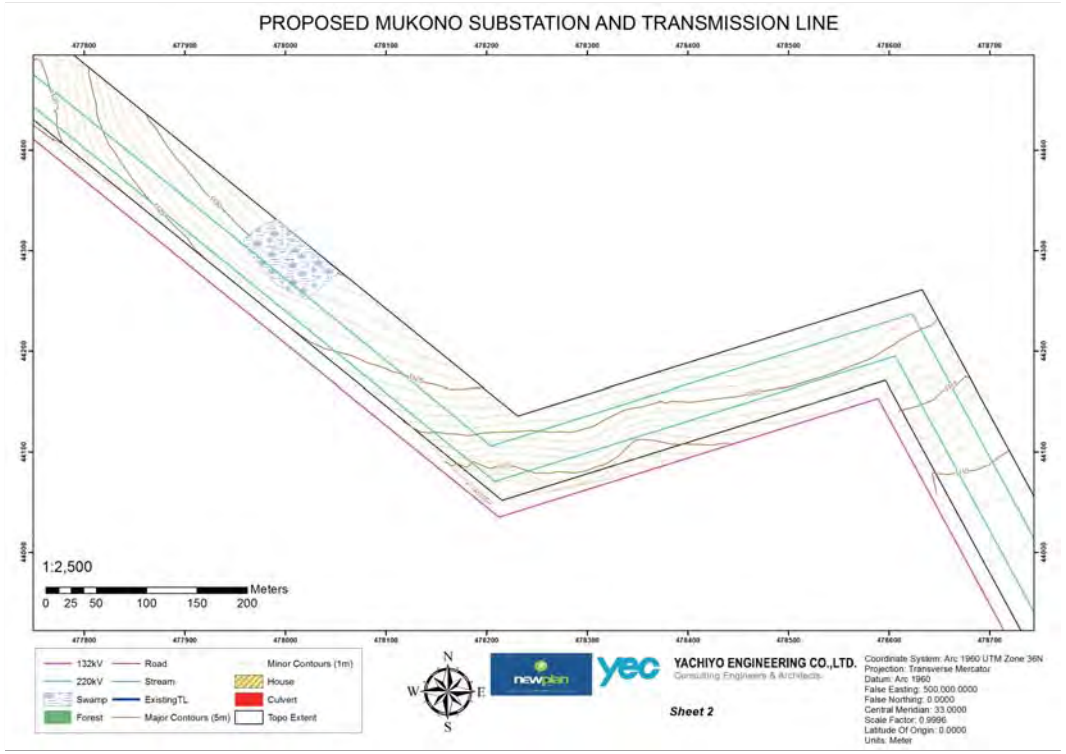
Figure 3-3 Ndandangi Forest

Figure 3-5 cassava in the corridor

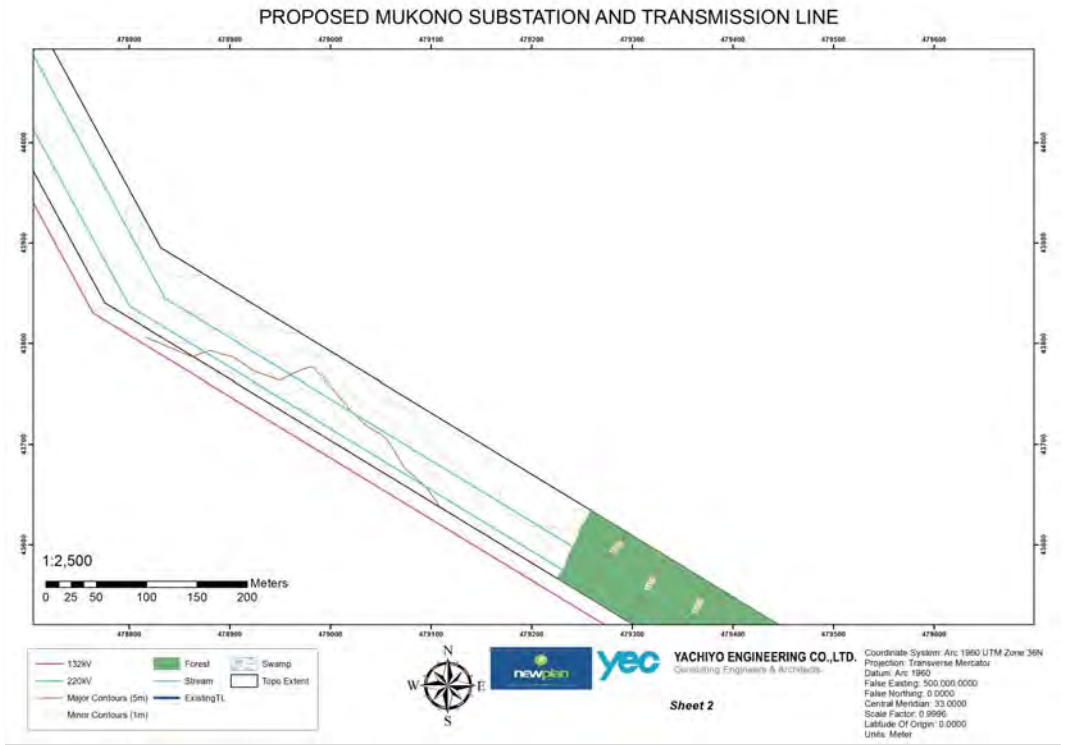
Figure3-4 Trees in the corridor

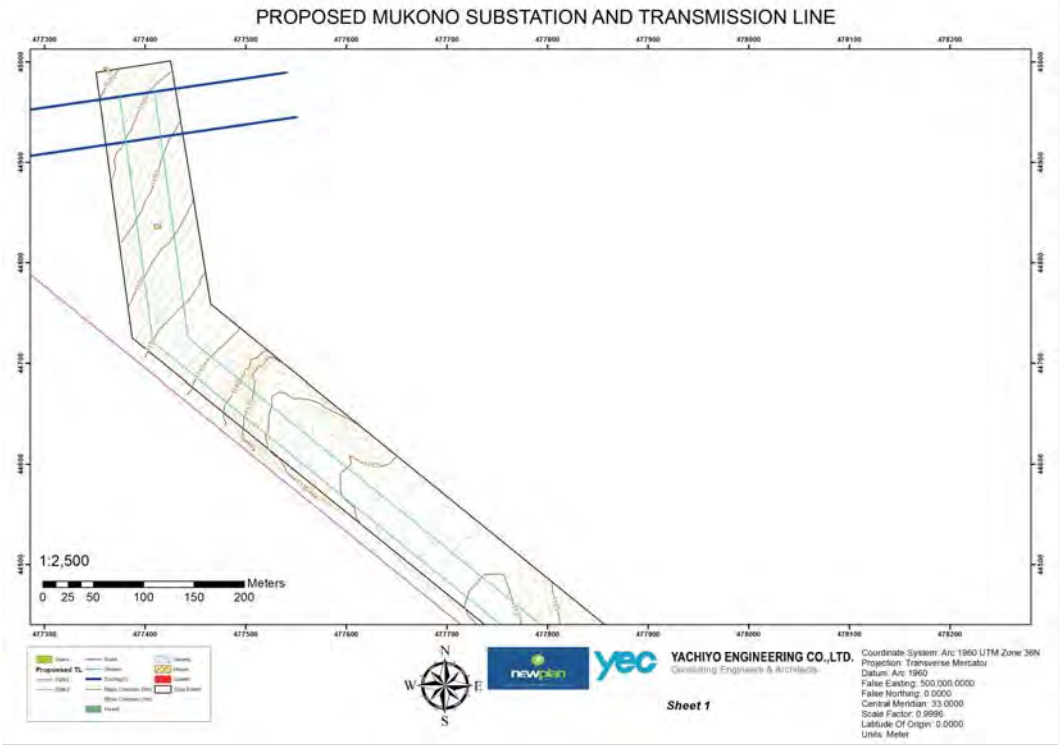
Figure 3-5 vegetation in the corridor

Figure3-6 vegetation in the corridor

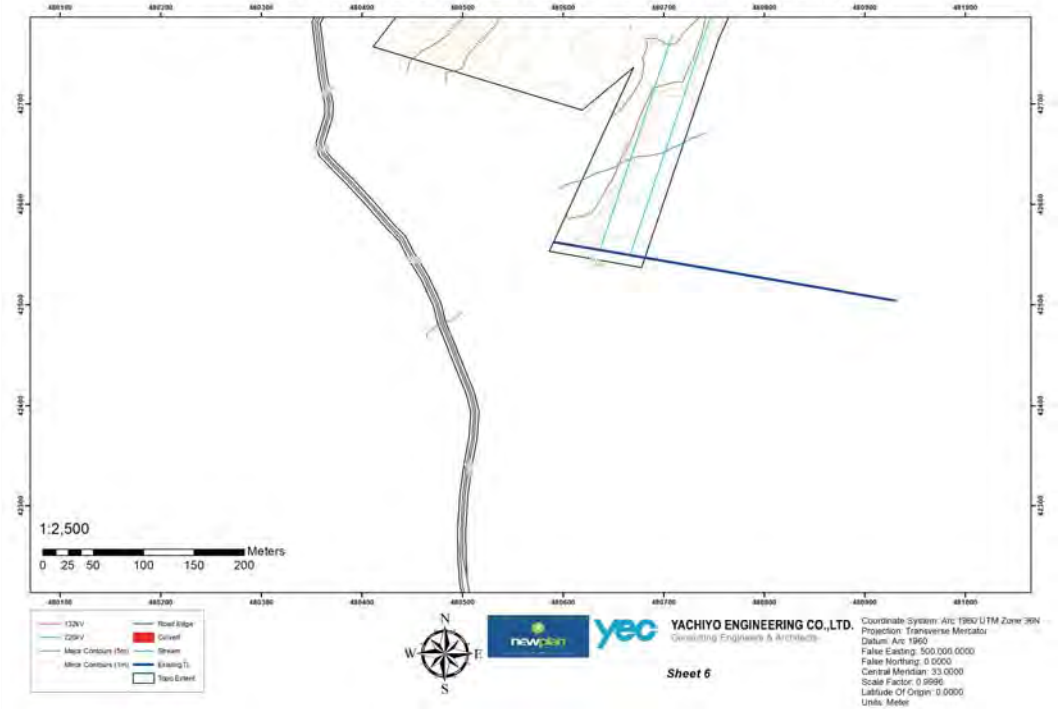


Appendix 2: Topographic Survey Drawing





PROPOSED MUKONO SUBSTATION AND TRANSMISSION LINE

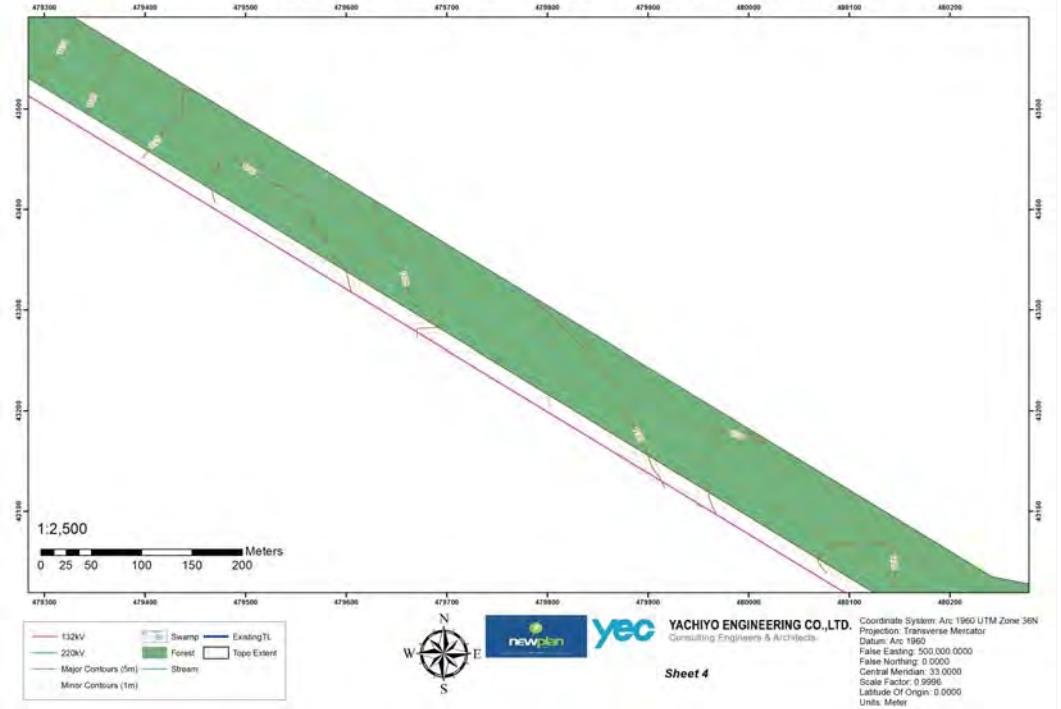


YACHIYO ENGINEERING CO.,LTD.
Consulting Engineers & Architects

Coordinate System: Arc 1960 UTM Zone 36N
Projection: Transverse Mercator
Datum: Arc 1960
False Easting: 500,000.0000
False Northing: 0.0000
Central Meridian: 33.0000
Scale Factor: 0.9996
Latitude Of Origin: 0.0000
Units: Meter

Sheet 6

PROPOSED MUKONO SUBSTATION AND TRANSMISSION LINE

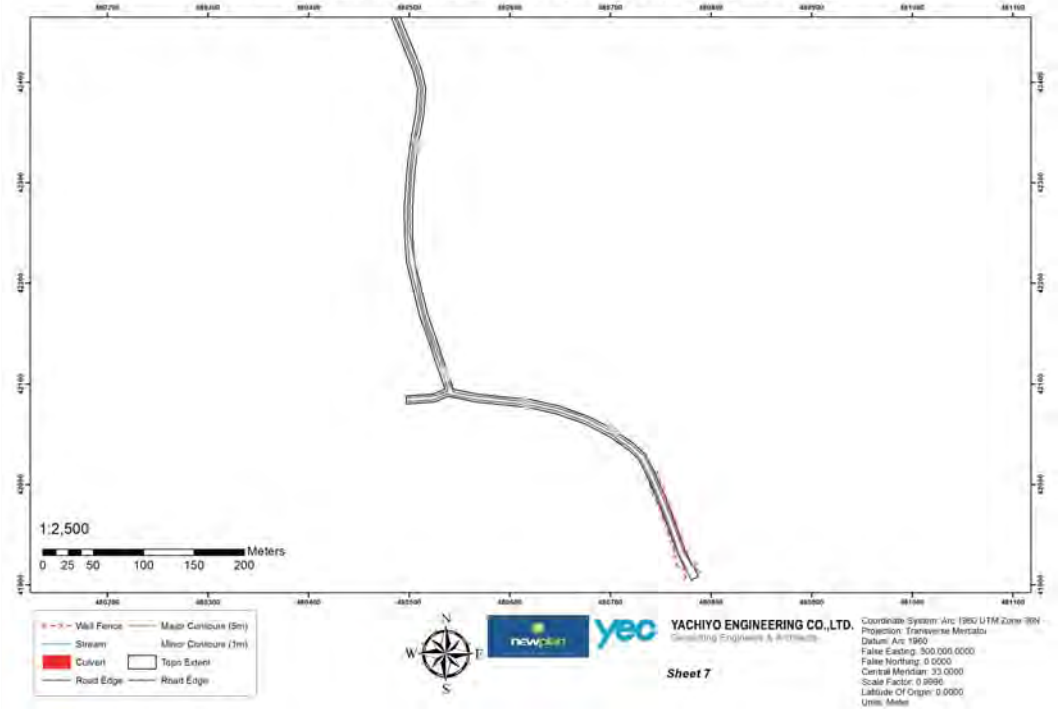


YACHIYO ENGINEERING CO.,LTD.
Consulting Engineers & Architects

Coordinate System: Arc 1960 UTM Zone 36N
Projection: Transverse Mercator
Datum: Arc 1960
False Easting: 500,000.0000
False Northing: 0.0000
Central Meridian: 33.0000
Scale Factor: 0.9996
Latitude Of Origin: 0.0000
Units: Meter

Sheet 4

PROPOSED MUKONO SUBSTATION AND TRANSMISSION LINE



YACHIYO ENGINEERING CO.,LTD.
Consulting Engineers & Architects

Coordinate System: Arc 1960 UTM Zone 36N
Projection: Transverse Mercator
Datum: Arc 1960
False Easting: 500,000.0000
False Northing: 0.0000
Central Meridian: 33.0000
Scale Factor: 0.9996
Latitude Of Origin: 0.0000
Units: Meter

Sheet 7

PROPOSED MUKONO SUBSTATION AND TRANSMISSION LINE

YACHIYO ENGINEERING CO.,LTD.
Consulting Engineers & Architects

Coordinate System: Arc 1960 UTM Zone 36N
Projection: Transverse Mercator
Datum: Arc 1960
False Easting: 500,000.0000
False Northing: 0.0000
Central Meridian: 33.0000
Scale Factor: 0.9996
Latitude Of Origin: 0.0000
Units: Meter

Sheet 5