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ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT (ESIA) FOR LIRA-GULU-NEBBI-ARUA TRANSMISSION LINE PROJECT

FINAL REPORT

MARCH 2016

WSP

ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT (ESIA) FOR THE LIRA-GULU-NEBBI-ARUA TRANSMISSION LINE PROJECT

UETCL

Final report

Project n° : 131-25275-00
Date : March 2016

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Reference to be cited:

WSP (2016). Environmental and Social Impact Assessment (ESIA) for the Lira-Gulu-Nebbi-Arua Transmission Line Project*ESIA Lira-Gulu-Nebbi-Arua Transmission Line - Final Report,* produced for UETCL. Multiple pagination and appendices. Ref no 131-25275-00

ABBREVIATIONS

AEWA	African-Eurasian Migratory Waterbirds Agreement
AIDS	Acquired Immune Deficiency Syndrome
APP	Air Pollution Potential
ARV	Antiretroviral Drug
Asl	Above Sea Level
BP	Bank Procedures
CAA	Civil Aviation Authority
CBO	Community-Based Organizations
DDP	District Development Plan
DLB	District Land Boards
DLSP	District Livelihood Support Program
DRC	Democratic Republic of Congo
DWRM	Directorate of Water Resources Management
BID	Background Information Document
CBD	Convention on Biological Diversity
CITES	Convention on International Trade in Endangered Species of Wild Fauna and Flora
CNH	Critical Natural Habitat
DIA	Direct Impact Area
EAP	Environmental Action Plan
EIA	Environmental Impact Assessment
ESIA	Environmental Impact Assessment
EIAR	Environmental and Social Impact Assessment Regulations
EMF	Electromagnetic Field
EN	Endangered
ERA	Electricity Regulatory Agency
ESC	Environmental and Social Components
ESIA	Environmental and Social Impact Analysis
ESMP	Environmental and Social Management Plan
GBIF	Global Biological Information Facility
GD	Game Department
GIS	Geographical Information System
GoU	Government of Uganda
GPS	Global Positioning System
HC	Health Center
HIV	Human Immunodeficiency Virus
HMIS	Health Management Information System
HSD	Health Sub Districts
IAS	Invasive alien species
IBA	Important Bird Area
IDP	Internally Displaced Person
IMR	Infant Mortality Rate
INDIA	Indirect Impact Area
ITCZ	Inter-Tropical Convergence Zone
IUCN	International Union for Conservation of Nature

JCRC	Joint Clinical Research Centre
JICA	Japan International Cooperation Agency
Km	Kilometer
LC	Local Council
LGNA	Lira, Gulu, Nebbi and Arua
LLG	Lower Local Government
M	Meter
MDG	Millennium Development Goals
MAAIF	Ministry of Agriculture, Animal Industry and Fisheries
MEMD	Ministry of Energy and Mineral Development
MFNP	Murchison Falls National Park
MLHUD	Ministry of Lands, Housing and Urban Development
MOU	Memorandum of Understanding
MPs	Members of Parliament
MWE	Ministry of Water and Environment
NAADS	National Agriculture Advisory Services
NDP	National Development Plan
NEA	National Environment Act
NEMA	National Environment Management Authority
NFA	National Forest Authority
NGO	Non-Governmental Organizations
NP	National Parks
NPA	National Planning Authority
NT	Near Threatened
NTC	National Teachers College
NUSAF	Northern Uganda Social Action Fund
NWSC	National Water and Sewerage Corporation
OP	Operational Policies
PCR	Physical Cultural Resources
PLWHA	People Living With HIV/AIDS
PMTCT	Prevention of Mother-to-Child Transmission
PMU	Project Management Unit
PNFP	Private-Not-for-Profit
POU	Project Oversight Unit
PRDP	Peace, Recovery and Development Plan
PWD	People with Disabilities
RAP	Resettlement Action Plan
REA	Rural Electrification Agency
RoW	Right of Way
RRH	Regional Referral Hospital
SNE	Special Needs Education
Sq	Square
STD	Sexually transmitted Disease
STI	Sexually transmitted Infection
TBD	To be determined
TFR	Total Fertility Rate
UBOS	Uganda Bureau of Statistics

UCC	Uganda College of Commerce
UEB	Uganda Electricity Board
UEDCL	Uganda Electricity Distribution Company Limited
UEGCL	Uganda Electricity Generation Company Limited
UETCL	Ugandan Electricity Transmission Company Limited
UGX	Ugandan Shilling
UPE	Universal Primary Education
UPPET	Universal Post Primary Education & Training
USAID	United States Agency for International Development
USE	Universal Secondary School
UTC	Uganda Technical School
UWA	Uganda Wildlife Authority
VESC	Valued Environmental and Social Components
VC	Ventilation Co-efficient
VCT	Voluntary Counselling and Testing
VHT	Village Health Team
VHTs	Village Health Teams
VIP	Ventilated Improved Pit
VU	Vulnerable
WFP	Water for a Production
WHO	World Health Organisation

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EXECUTIVE SUMMARY

The Government of Uganda (GoU) intends to increase the transmission capacity in the Northern Region. The proposed Lira-Gulu-Nebbi-Arua 132 kV transmission line (the project), which is part of the overall national grid system plan identified in UETCL's Grid Development Plan, involves the construction and operation of a 132 kV power transmission line linking Northwestern towns of Lira, Gulu, Nebbi and Arua (LGNA). The overall project objectives are: 1) to provide adequate transmission infrastructure to meet the energy needs of the Ugandan population, 2) to improve availability, reliability, and quality of power supply in Northern Uganda and 3) to facilitate rural electrification and improve the standard of living for the population of the project area.

WSP is in charge of conducting the Project's Environmental and Social Impact Assessment (ESIA) and Resettlement Action Plan (RAP) and has worked in collaboration with the consultant in charge of the feasibility study (FS Consultant). This report presents the outcomes of the ESIA on the preferable line route option which was identified following analyses conducted by both the FS Consultant and WSP. It is divided in eight main chapters, including the Introduction, project description, alternatives analysis, review of the Ugandan legal and institutional frameworks, stakeholder consultation activities, baseline environmental and social conditions, potential environmental and social impact assessment, Environmental and Social Management Plan (ESMP).

Three line route options were proposed by the FS Consultant. They all link planned substations, namely the existing Lira substation, which will be expanded, as well as new substations that will be built in Gulu, Nebbi and Arua. WSP analyzed these three line route options using a comparative approach based on valued environmental and social components (VESC). Following analysis, WSP recommended option 1 over the whole length of the project, as it is the option that raises the least environmental and social issues. The FS Consultant also recommended option 1 following a separate analysis.

The project involves construction of a 132 kV transmission line over a total length of 314 km. The project configuration includes two circuits of 132 kV alternative current, mounted on a single row of double-circuit pylons. Use of lattice steel pylons has been retained for the entire length of the Project. The tower height will range from 30 to 39 metres, except for the particular case of the Nile River crossing towers which will range between 54 and 57 metres due to the longer span they have to permit. The width of the wayleave is 30 meters, as per the Electricity Act. To comply with the standards used by UETCL, a right-of-way (ROW) of 5 meter-width will be included in the wayleave, along the project's whole pylon alignment (2.5 metres each side of the center line). The rest of the wayleave will remain under their current owner's ownership, but will be subjected to restrictions of use.

An analysis of the applicable policy and legal framework was conducted, as well as an institutional framework analysis. The project notably triggers some World Bank operational policies. OP4.01 (Environmental Assessment), OP4.04 (Natural Habitats), OP4.11 (Physical Cultural Resources), OP4.12 (Involuntary Resettlement) and OP4.36 (Forests) are triggered and the ESIA and ESMP were prepared accordingly. OP 4.10 (Indigenous Peoples) is not triggered due to the absence of indigenous groups in the Project area.

Public consultation and stakeholder engagement activities were organized in order to ensure the participation of stakeholders at different stages of the ESIA and RAP processes. In total, three consultation rounds have been held at this stage, namely consultation round 1 (inception phase) and consultation round 2 (detailed study phase) and consultation round 3 (disclosure of draft ESIA and RAP). Key issues raised during consultations include the need for community sensitizations, protection of cultural and communal properties, access to local jobs and economic benefits, protection of the most vulnerable households, as well as participation of communities in the identification of compensation and resettlement alternatives.

The main impacts on the biophysical environment will be the permanent loss of vegetation and wetlands in the ROW and line route crossings through four forest reserves, Laura Central Forest being the most affected forest reserve. Other potential impacts that may occur during construction and maintenance works include soil erosion, compaction or contamination, changes in hydrology of wetlands, ground and surface water contamination, temporary air quality deterioration, increase in noise and vibration levels, as well as modification and alteration to wildlife habitats and introduction of invasive alien species. However, proper mitigation measures have been proposed to reduce or

compensate for negative impacts. These measures include, among others, restricting removal of vegetation to the minimum required, limiting activities in watercourses or wetlands to the extent possible, restoring as soon as possible any disturbed areas, decommissioning of access roads built for construction in wetlands and conducting construction activities during the dry season.

The most significant impact on the human environment will be the relocation of houses and other buildings located within the ROW. Over the whole project, a total of 480 households will be entitled to compensations for houses, and among these approximately 134 will have to relocate to other plots. In addition, other impacts include the loss of arable, grazing and pastoral lands due to vegetation clearing in the ROW, land use restrictions in the ROW due to specific ROW management requirements, damages to crops by machinery during ROW maintenance, perturbation of tourism and recreation activities, disturbance of traffic flow, etc. Adequate mitigation measures have been proposed to reduce or compensate for those negative impacts. These measures include, notably, providing compensation measures and resettlement assistance to affected households and landowners, involving traditional leaders in the resettlement process, allowing crop growing and grazing in the wayleave if plantations do not exceed 4 metres in height, rehabilitating damaged infrastructures after construction and restricting travel to and from the construction sites during low traffic. Moreover, elaboration and implementation of adequate compensation and resettlement programs, to be presented in the upcoming RAP report, will minimise potential impacts on social and environmental components.

Other significant impacts on the human environment could arise. The project will impact some cultural and archaeological heritage elements and may increase gender imbalances and in particular risks of sexual abuse and child abuse by construction worker. Project implementation could revive tensions due to the post-conflict management situation in Northern Uganda, as well as imbalance community health and security due to risks of increased HIV/AIDS transmission as well as promotion of child labour. Adequate mitigation measures have been proposed to reduce or compensate for those negative impacts. These measures include, notably, implementation of a summary Physical Resources Management Plan including a Chance Finds Procedure, implementation of strict policies against sexual abuse, underage sex and child labour, implementation of a sensitization program on HIV/AIDS, as well as implementation of a grievance redress process.

The new transmission line may also lead to positive opportunities for project affected persons (PAPs) and communities. One of the most important anticipated benefits to the population is increased electricity supply to communities and households. Other positive opportunities may occur in the form of temporary employment and business opportunities during the construction phase, including revenues from the sale of food and other consumable goods to workers from other parts of the country and abroad.

The project's ESMP will ensure that measures proposed to mitigate or optimize the project's potential impacts are effectively implemented during the construction and operation phases of the project. The ESMP proposes the implementation of monitoring and follow-up programs during the pre-construction and construction phases as well as during the operation phase, respectively. Responsibilities for the implementation and oversight of management measures are to be shared among several stakeholders, including relevant ministerial authorities, contractors, a Project Implementation Unit (PIU) and supervising engineers. Components that will be monitored are the following: soil erosion, surface water quality, state of vegetation, air quality, noise levels, damages to neighbouring properties, employment and economic development, cultural and archaeological heritage, gender relations, communities and social cohesion, community health and security and worker health and safety. Components that will be the object of a follow-up are the following: soil erosion, surface water quality, evolution of vegetation, fauna and wetlands, bird strikes monitoring, noise levels, social and economic benefits for local communities, gender relations, worker – community interactions, communities' health and safety and worker health and safety. The ESMP then provides orientations on training and capacity building requirements for its successful implementation.

Finally, the ESMP provides guidance as to management of possible minor project design modifications that could arise between the time of drafting the present ESIA and the project implementation. It states that all activities associated to the project that are not covered by the present ESIA, or not defined at appraisal shall be managed according to the same principles and be subject to the same methodology as in the present ESIA and ESMP. These activities include those related to all known project elements that are outside the present ESIA's scope, as well all those to be either added or modified at the implementation stage.

1 INTRODUCTION

1.1 BACKGROUND

The Government of Uganda intends to extend power supply to the Northern region. The proposed Lira-Gulu-Nebbi-Arua 132 kV transmission line (the project) will transmit power from the existing Lira substation via the proposed new 132/33kV substations in Gulu and Nebbi respectively, to Arua. The transmission line will cover a total distance of approximately 314 km and is expected to improve power supply in the project area which covers seven districts namely: Lira, Kole, Oyam, Gulu, Nwoya, Nebbi and Arua.

Because of the long supply lines (>100km) and low voltage profile (33 kV) from Lira, Gulu District has experienced poor power supply, security and reliability. Even though measures were undertaken to improve power quality, the increasing load demand has made it impossible for the system to cope.

Nebbi and Arua Districts have also been experiencing intermittent power supply which is of poor quality, low reliability and availability. The towns in the West Nile region are supplied by very long 33kV feeder lines connected to power plants which are fed by the 3.5 MW Nyagak 1 mini hydropower station.

The proposed transmission line is therefore expected to provide cheaper, reliable and quality power to boost socio-economic development in the northern part of the country and support agro-processing industries, among others.

It is expected that project activities during construction and operation could generate negative effects on the environment which must be mitigated and safeguarded in compliance with local and lenders environmental safeguard requirements. The present Environmental and Social Impact Analysis (ESIA) therefore identifies and assesses the potential impacts of the transmission line and associated infrastructure on both the natural and human environment and proposes appropriate mitigation measures. Concomitantly, the Resettlement Action Plan (RAP) will provide strategies for addressing involuntary resettlement including compensation issues arising from the impact of the project on people living within the project area.

1.2 REPORT OBJECTIVES AND CONTENTS

WSP Canada Inc. (WSP) is in charge of conducting the ESIA and RAP, and has worked in close collaboration with the consultant in charge of the feasibility study (FS Consultant).

The main objectives of the ESIA Phase are the following:

- To identify and assess the potential environmental and social impacts (both positive and negative) and recommend appropriate mitigation measures.
- To prepare an Environmental and Social Impact Analysis (ESIA) Report and establish a link to the upcoming RAP, which will be carried out later in the assignment.
- To prepare the Environmental and Social Management Plan (ESMP), comprising notably environmental and social management measures as well as mechanisms for their implementation.

To reach these objectives, the work conducted during the ESIA Phase includes detailed field inventories, consultations with stakeholders and relevant authorities as well as a review of available data at the regional and district levels. Results from these activities are presented in the present report which is divided in nine chapters including the present introduction as chapter 1.

The project description is presented in Chapter 2 and the three alternative power line corridors in Chapter 3. Chapter 4 presents a description of relevant institutional actors, applicable environmental laws, regulations and other requirements from Uganda and international organisations, as well as an outline of the applicable legal environmental assessment process in the country. Results from consultations with stakeholders and other relevant authorities are presented in Chapter 5. Baseline description of the physical, biological and natural environment in the study area is presented in Chapter 6. Identification and assessment of potential impacts (both positive and negative) associated to the project are detailed in Chapter 7, while the Environmental and Social Management Plan is described in Chapter 8. Chapter 9 provides the list of references.

2 PROJECT DESCRIPTION

2.1 OVERVIEW

The Government of Uganda (GoU) has prioritized the construction of the proposed Lira-Gulu-Nebbi-Arua 132kV transmission line (the project) to provide adequate transmission infrastructure to meet the power supply needs of Northern Uganda. The project is part of the overall national grid system plan identified in UETCL's Grid Development Plan.

The project would be constructed from the existing Lira 132kV Substation and pass through the proposed Gulu and Nebbi Substation sites, to the proposed Arua Substation. The Government of Uganda intends to extend the national grid to the West Nile region of Uganda and also increase the transmission capacity in the Northern region. The general objective is to provide adequate transmission infrastructure to meet the power supply needs of the West Nile region and the Northern region of Uganda. The proposed line would traverse a total of about 314 km from the Lira substation to new 132/33 kV substations in Gulu, Nebbi and Arua.

In the recent past, Gulu district has been experiencing poor supply in terms of quality and reliability mainly due to the fact that it is supplied by very long (>100 km) 33 kV lines from Lira substation. This has also resulted in high technical losses and a poor voltage profile. Although interim measures have been taken to improve the quality of supply, the increasing load has made it impossible for the system to cope. On the other hand, the entire West Nile region is fed from the 3.5 MW Nyagak 1 mini hydropower station. Arua town is supplied by very long (>100 km) 33 kV lines from the power plant to Arua via Nebbi Town. As a result, Nebbi and Arua districts have also been experiencing power supply of poor quality and low reliability.

The overall project aims are:

1. To provide adequate transmission infrastructure to meet the energy needs for the Uganda population;
2. Provision of quality, sufficient and reliable power supply to Northern Uganda;
3. Facilitate rural electrification and improve the standard of living for the population in project area.

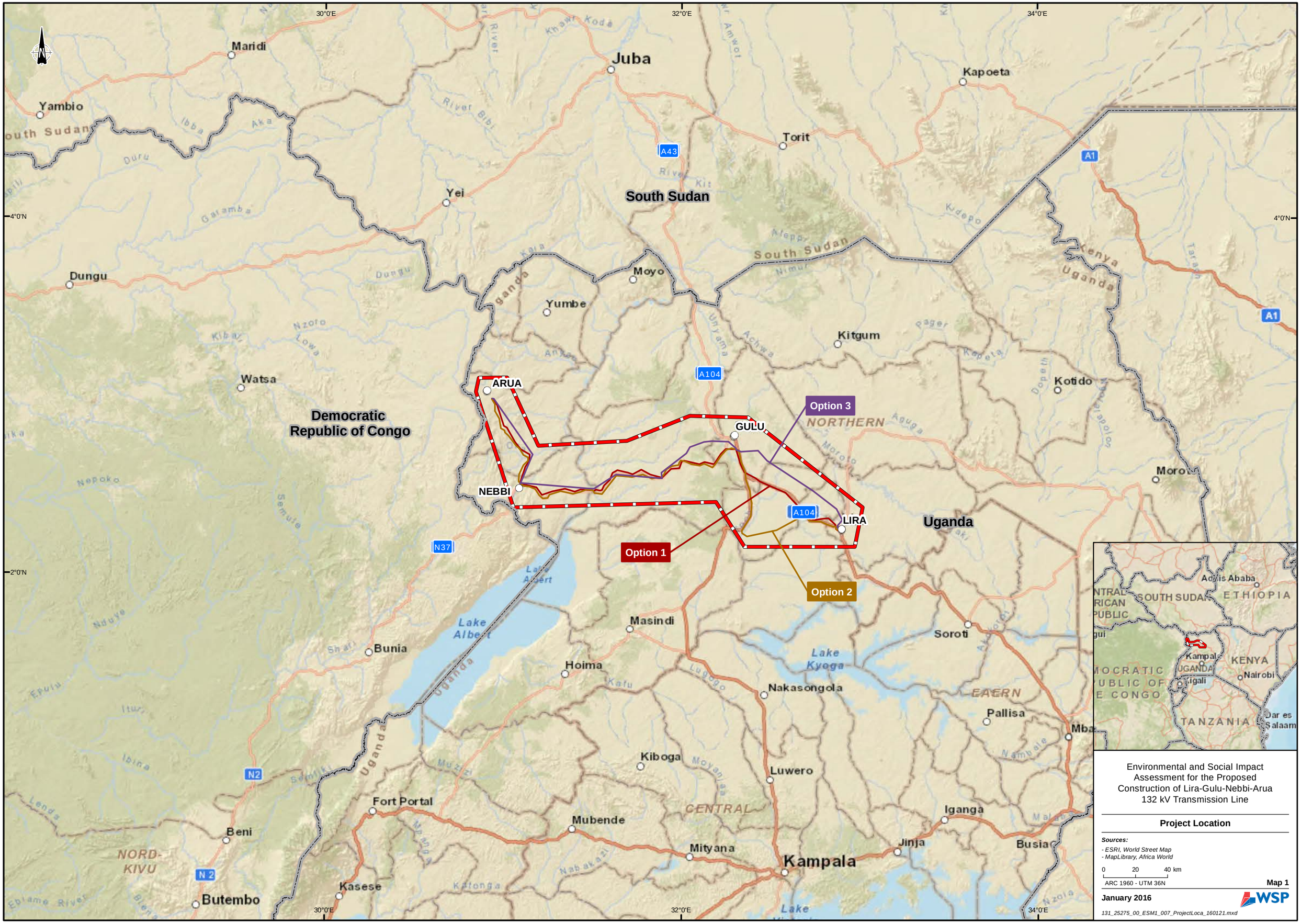
2.2 GENERAL PROJECT DESCRIPTION

The Project involves construction and operation of a 132 kV electricity transmission line, to be mounted on steel lattice, linking Northwestern towns of Lira, Gulu, Nebbi and Arua (LGNA). The width of the wayleave is 30 meters, as per the Electricity Act. However, a larger wayleave will be required at the Nile crossing site due to the larger and longer span pylons that will be installed at that specific location. Other project's characteristics include:

- → Extension of the Lira substation;
- → New substations in Gulu, Nebbi and Arua;
- → Access and maintenance roads on selected project sections;
- → 33 kV distribution lines from Gulu, Nebbi and Arua substations (excluded from ESIA/RAP scope).

2.3 LINE ROUTE OPTIONS

Three line route alternatives have been identified by the FS consultant and analysed against a number of technical, environmental and social criteria presented in their *Final Line Route Selection Report* (SMEC, 2015). Those line route alternatives are illustrated on Map 1 below.


30°0'E
32°0'E
34°0'E
4°0'N
2°0'N
Maridi
Juba
Kapoeta
Yambio
Torit
Yei
South Sudan
Dungu
Moyo
Yumbe
Kitgum
Watsa
ARUA
Democratic
Republic of Congo
Option 3
GULU
NORTHERN
Kotido
NEBBI
LIRA
Uganda
Option 1
Option 2
Masindi
Soroti
Bunia
Hoima
Nakasongola
Pallisa
Kiboga
Luwero
Fort Portal
Mubende
Iganga
Jinja
Busia
Mityana
Kampala
Beni
NORD-
KIVU
Butembo
Kasese
A43
A104
A1
N37
N2
N 2
Lake
Albert
Lake
Kyoga
Addis Ababa
ETHIOPIA
SOUTH SUDAN
KENYA
Kampala
Nairobi
UGANDA
TANZANIA
Dar es
Salaam
Environmental and Social Impact
Assessment for the Proposed
Construction of Lira-Gulu-Nebbi-Arua
132 kV Transmission Line
Project Location
Sources:
- ESRI, World Street Map
- MapLibrary, Africa World
0 20 40 km
ARC 1960 - UTM 36N
Map 1
January 2016
WSP
131_25275_00_ESM1_007_ProjectLoca_160121.mxd

As a result of the FS consultant's analyses, Option 1 was identified as the preferable option. It can be described as follows:

- Option 1 has a total length of 314km traversing the districts of Lira, Kole, Oyam and Gulu to meet the Kamdini-Gulu highway at Bobi trading center via Aboke, Icheme and Ngai trading centers. From Bobi, the line moves parallel to the Gulu highway on the left hand side up to the proposed Gulu substation at Okoro trading centre.
- From Gulu substation, the line moves parallel with the Gulu-Koch road on the left hand side via Anaka Town Council to the upcoming Olwiyo substation (whose construction is excluded from the LGNA project and shall be undertaken under the Karuma – Lira interconnection project). From Olwiyo, the route takes on the right hand side to avoid going through Murchison falls National Park and proceeds through Purongo, Lolim up to Pakwach. Unlike other options that cross the River Nile very close to the Pakwach Bridge, this line route option has been designed to cross the Nile about 800m away north of the Pakwach bridge. The line then continues on the right hand side parallel to the Pakwach-Nebbi highway up to Nebbi substation. Similarly, the line retains the right hand side of the Nebbi-Arua highway from Nebbi substation up to Arua substation.

It should be noted that Uganda Wildlife Authority has confirmed in a letter that the Project line route does not cross Murchison Falls National Park's territory (see appendix 2-1).

The details of the route are shown in Table 2-1 below. An overview of the line route and other project components is provided on Map 2 below.

It should also be noted that a slight diversion is being proposed to the West of the Pakwach area, in order to avoid a small dam project that is in advanced planning phase. Some coordinates in table 2-1 below could therefore change slightly. Details of that diversion are as follows:

- The diversion is carried out by only moving forward one angle point AP51. All other angle points remain same.
- Old coordinates for AP 51 UTM 36 Arc 60 N E 328293 N 273455
- New Coordinates of for AP 51 UTM 36 Arc 60 N E 325919 N 273652
- The line cannot be diverted toward road side because of telecommunication installation (communication mast) between water reservoir and road.
- Distance from old AP 51 to New AP 51 is about 2.4 km

Table 2-1 Detailed Project Line Route

Srt No.	Ahead Span (M)	Line Angle	Structure Name	Tower Height (M)	Extension (M)	Easting - X	Northing - Y	Elevation -Z (MSL)	Remarks
1	**208.3**		**DDE (0-45 Deg)**	**30**		**487119.0**	**248149.0**	**1099.0**	**132kV D/C Overhead Line Start from Lira 132kV Sub-Station** **Circuit-1 loded with AAAC Neon** **Circuit-2 loded with AAAC Neon** **Earthwire 1 loded with OPGW** **Earthwire 2 loded with OHSW** **11kV Line Crossing**
2	245.5	19.8	DC (10-30 Deg)	30	+3m Ext	486928.0	248066.0	1094.3	
3	101.1	-60.5	DE (60-90 Deg)	30		486683.0	248050.0	1089.0	
4	142.4	50.0	DD (30-60 Deg)	30		486639.0	247959.0	1087.7	
5	247.0	13.5	DC (10-30 Deg)	30		486501.0	247924.0	1083.7	
6	349.4	38.8	DD (30-60 Deg)	30		486254.0	247921.0	1076.7	
7	328.8		DA (0-2 Deg)	30	+3m Ext	485979.0	248136.5	1073.5	
8	346.5		DA (0-2 Deg)	30		485720.2	248339.3	1076.7	
9	355.0		DA (0-2 Deg)	30	+3m Ext	485447.4	248553.0	1073.1	
10	323.3	52.7	DD (30-60 Deg)	30		485168.0	248772.0	1067.2	
11	317.0		DA (0-2 Deg)	30		485172.3	249095.3	1072.3	
12	323.5		DA (0-2 Deg)	30		485176.5	249412.3	1073.3	
13	317.3		DA (0-2 Deg)	30		485180.8	249735.7	1072.1	
14	270.9	-40.0	DD (30-60 Deg)	30		485185.0	250053.0	1066.9	
15	259.9		DA (0-2 Deg)	30		485013.5	250262.8	1068.4	Line Cross the Lira-Gulu Highway 33kV line Crossing 11kV Line Crossing
16	282.5	32.5	DD (30-60 Deg)	30	+15m Ext	484849.0	250464.0	1064.0	
17	330.1		DA (0-2 Deg)	30	+3m Ext	484815.6	250744.5	1066.6	
18	334.2		DA (0-2 Deg)	30		484776.5	251072.3	1065.3	
19	329.2		DA (0-2 Deg)	30		484737.0	251404.1	1063.5	
20	326.6	-40.5	DD (30-60 Deg)	30		484698.0	251731.0	1063.8	
21	355.0		DA (0-2 Deg)	30		484458.1	251952.7	1063.7	
22	358.1		DA (0-2 Deg)	30	+3m Ext	484197.4	252193.6	1061.9	
23	328.4		DA (0-2 Deg)	30		483934.4	252436.7	1061.3	
24	331.2		DA (0-2 Deg)	30		483693.2	252659.6	1062.3	
25	331.0		DA (0-2 Deg)	30		483449.9	252884.4	1061.1	
26	359.4		DA (0-2 Deg)	30		483206.8	253109.0	1059.6	
27	343.8		DA (0-2 Deg)	30		482942.9	253353.0	1061.9	
28	352.1		DA (0-2 Deg)	30	+3m Ext	482690.4	253586.3	1066.3	
29	330.1		DB (0-10 Deg)	30		482431.8	253825.3	1067.5	
30	335.6		DA (0-2 Deg)	30		482189.3	254049.3	1062.8	Dirt Road
31	328.0		DA (0-2 Deg)	30		481942.8	254277.1	1067.6	
32	336.8		DA (0-2 Deg)	30		481701.9	254499.7	1066.4	
33	344.4		DA (0-2 Deg)	30		481454.6	254728.3	1061.7	
34	351.6		DA (0-2 Deg)	30		481201.7	254962.0	1058.9	
35	341.7		DA (0-2 Deg)	30		480943.4	255200.7	1060.1	
36	324.7		DA (0-2 Deg)	30		480692.5	255432.6	1064.7	
37	316.9	-49.0	DD (30-60 Deg)	30		480454.0	255653.0	1067.5	
38	321.6		DA (0-2 Deg)	30		480139.0	255618.3	1062.8	Dirt Road
39	329.5		DA (0-2 Deg)	30		479819.3	255583.1	1058.2	
40	333.0		DA (0-2 Deg)	30		479491.8	255547.1	1056.7	
41	331.6		DA (0-2 Deg)	30		479160.8	255510.6	1055.7	
42	332.8		DA (0-2 Deg)	30		478831.1	255474.3	1056.4	
43	331.1		DA (0-2 Deg)	30		478500.3	255437.9	1058.5	
44	340.0		DA (0-2 Deg)	30		478171.2	255401.6	1060.5	
45	316.0		DA (0-2 Deg)	30		477833.2	255364.4	1064.1	
46	320.8		DA (0-2 Deg)	30		477519.1	255329.8	1069.1	
47	322.8		DA (0-2 Deg)	30		477200.2	255294.7	1071.4	
48	314.3		DA (0-2 Deg)	30		476879.4	255259.4	1071.3	
49	314.3	-2.9	DB (0-10 Deg)	30		476567.0	255225.0	1068.8	
50	317.4		DA (0-2 Deg)	30		476256.7	255174.8	1069.5	
51	330.7		DA (0-2 Deg)	30		475943.4	255124.2	1066.4	
52	316.7		DA (0-2 Deg)	30		475617.0	255071.4	1062.3	
53	350.5		DA (0-2 Deg)	30		475304.4	255020.9	1054.2	Permanent Swamp
54	334.4		DA (0-2 Deg)	30		474958.3	254964.9	1051.9	Permanent Swamp
55	330.3		DA (0-2 Deg)	30		474628.2	254911.5	1056.8	
56	319.7		DA (0-2 Deg)	30		474302.1	254858.8	1060.0	
57	327.9		DA (0-2 Deg)	30		473986.4	254807.8	1060.6	
58	365.6		DA (0-2 Deg)	30		473662.8	254755.5	1056.3	
59	329.9		DA (0-2 Deg)	30		473301.9	254697.1	1055.6	
60	334.5		DA (0-2 Deg)	30		472976.2	254644.5	1062.6	
61	345.0		DA (0-2 Deg)	30	+3m Ext	472646.0	254591.1	1066.7	
62	322.9		DA (0-2 Deg)	30		472305.4	254536.0	1065.7	
63	334.1		DB (0-10 Deg)	30		471986.7	254484.5	1060.9	
64	331.4		DA (0-2 Deg)	30		471656.8	254431.1	1057.2	
65	354.5		DA (0-2 Deg)	30		471329.7	254378.2	1060.7	
66	344.1		DA (0-2 Deg)	30	+3m Ext	470979.7	254321.7	1062.5	
67	341.4		DA (0-2 Deg)	30		470640.1	254266.7	1059.3	
68	319.5		DA (0-2 Deg)	30		470303.1	254212.3	1055.0	
69	338.7		DA (0-2 Deg)	30		469987.7	254161.3	1052.4	Permanent Swamp - Okkole River
70	339.7		DA (0-2 Deg)	30		469653.3	254107.2	1049.6	Permanent Swamp - Okkole River
71	335.0	49.4	DD (30-60 Deg)	30		469318.0	254053.0	1049.7	Permanent Swamp - Okkole River
72	332.5		DA (0-2 Deg)	30		469062.1	254269.2	1049.3	Permanent Swamp - Okkole River
73	331.9		DA (0-2 Deg)	30		468808.1	254483.8	1049.4	Permanent Swamp - Okkole River
74	333.7		DA (0-2 Deg)	30		468554.6	254698.0	1047.7	Permanent Swamp - Okkole River
75	337.1		DA (0-2 Deg)	30		468299.7	254913.4	1045.8	Permanent Swamp - Okkole River
76	334.1		DA (0-2 Deg)	30		468042.3	255130.9	1045.2	Permanent Swamp - Okkole River
77	356.3		DA (0-2 Deg)	30		467787.1	255346.5	1045.5	Permanent Swamp - Okkole River
78	299.5		DA (0-2 Deg)	30		467514.9	255576.5	1048.3	Permanent Swamp - Okkole River
79	335.6		DA (0-2 Deg)	30		467286.2	255769.8	1053.6	
80	320.6		DA (0-2 Deg)	30		467029.8	255986.4	1056.2	
81	310.8		DA (0-2 Deg)	30		466784.9	256193.3	1058.7	
82	310.8		DA (0-2 Deg)	30		466547.5	256394.0	1058.0	Permanent Swamp
83	343.4		DA (0-2 Deg)	30		466310.0	256594.6	1053.3	Permanent Swamp
84	329.4		DA (0-2 Deg)	30		466047.8	256816.2	1048.8	Permanent Swamp
85	336.2		DA (0-2 Deg)	30		465796.2	257028.8	1048.7	
86	317.1		DA (0-2 Deg)	30		465539.4	257245.7	1052.3	
87	320.9		DA (0-2 Deg)	30		465297.2	257450.4	1051.2	
88	275.0		DA (0-2 Deg)	30	+3m Ext	465052.1	257657.5	1057.8	Lira-Gulu Road crossing 33kV Line Crossing
89	355.3	24.8	DC (10-30 Deg)	30		464842.0	257835.0	1065.3	
90	350.1		DA (0-2 Deg)	30	+3m Ext	464691.8	258157.0	1065.0	

Srt No.	Ahead Span (M)	Line Angle	Structure Name	Tower Height (M)	Extension (M)	Easting - X	Northing - Y	Elevation -Z (MSL)	Remarks
91	382.5		DA (0-2 Deg)	30		464543.7	258474.3	1064.6	
92	359.4		DA (0-2 Deg)	30	+3m Ext	464382.0	258820.9	1064.2	Dirt Road connecting to Lira-Gulu
93	355.7		DA (0-2 Deg)	30	+3m Ext	464230.0	259146.6	1066.0	
94	359.7		DA (0-2 Deg)	30		464079.7	259468.9	1065.4	
95	351.8		DA (0-2 Deg)	30	+3m Ext	463927.5	259794.9	1066.3	
96	347.1		DA (0-2 Deg)	30	+3m Ext	463778.8	260113.7	1070.0	Line Pass near to Aboki
97	374.8		DA (0-2 Deg)	30		463632.0	260428.2	1067.6	Line Pass near to Aboki
98	350.7		DA (0-2 Deg)	30		463473.6	260767.9	1069.2	Line Pass near to Aboki Dirt Road
99	327.0		DA (0-2 Deg)	30		463325.3	261085.7	1080.9	Line Pass near to Aboki
100	332.5	-18.1	DC (10-30 Deg)	30		463187.0	261382.0	1087.0	
101	309.8		DA (0-2 Deg)	30		462959.7	261624.7	1088.5	
102	310.8		DA (0-2 Deg)	30		462747.8	261850.8	1084.9	
103	352.5		DA (0-2 Deg)	30		462535.3	262077.6	1077.5	
104	315.6		DA (0-2 Deg)	30		462294.4	262334.8	1074.1	
105	321.9		DA (0-2 Deg)	30		462078.6	262565.1	1083.4	
106	304.1		DA (0-2 Deg)	30		461858.5	262800.1	1084.6	Dirt Road
107	336.7		DA (0-2 Deg)	30		461650.6	263022.0	1081.6	
108	305.5		DA (0-2 Deg)	30		461420.4	263267.7	1081.1	Dirt Road
109	311.8		DA (0-2 Deg)	30		461211.5	263490.7	1090.0	
110	314.4		DA (0-2 Deg)	30		460998.4	263718.2	1093.7	
111	388.0		DA (0-2 Deg)	30		460783.4	263947.7	1091.9	
112	334.4		DA (0-2 Deg)	30		460518.2	264230.8	1095.9	
113	305.0		DA (0-2 Deg)	30		460289.6	264474.8	1108.9	
114	302.6		DA (0-2 Deg)	30		460081.0	264697.4	1115.3	
115	317.5		DA (0-2 Deg)	30		459874.2	264918.3	1115.1	
116	353.7		DB (0-10 Deg)	30	+3m Ext	459657.1	265150.0	1105.1	
117	325.7		DA (0-2 Deg)	30		459415.3	265408.1	1108.3	
118	325.6		DA (0-2 Deg)	30		459192.7	265645.7	1116.2	
119	333.6		DA (0-2 Deg)	30		458970.0	265883.4	1112.4	
120	334.0		DA (0-2 Deg)	30		458741.9	266126.9	1108.0	
121	321.9		DA (0-2 Deg)	30		458513.6	266370.6	1107.3	Dirt Road
122	330.8		DA (0-2 Deg)	30		458293.5	266605.5	1106.8	
123	304.5		DA (0-2 Deg)	30		458067.4	266846.9	1103.9	
124	327.8		DA (0-2 Deg)	30		457859.2	267069.2	1098.0	
125	357.4		DA (0-2 Deg)	30		457635.1	267308.4	1085.8	
126	355.6		DA (0-2 Deg)	30		457390.7	267569.2	1075.4	
127	321.1		DA (0-2 Deg)	30		457147.6	267828.7	1073.7	
128	339.5		DA (0-2 Deg)	30		456928.0	268063.1	1070.8	Ankeye-Ichme road crossing
129	330.4		DA (0-2 Deg)	30		456695.9	268310.9	1068.1	Luyam River crossing - Permanent Swamp
130	357.8		DB (0-10 Deg)	30		456470.0	268552.0	1061.9	
131	356.9		DA (0-2 Deg)	30	+3m Ext	456225.4	268813.1	1067.7	Dirt Road
132	334.5		DA (0-2 Deg)	30		455981.4	269073.6	1075.1	
133	330.2		DA (0-2 Deg)	30	+3m Ext	455752.7	269317.7	1080.4	
134	323.7		DA (0-2 Deg)	30		455527.0	269558.6	1080.3	
135	354.5		DA (0-2 Deg)	30		455305.7	269794.9	1077.3	
136	297.7		DA (0-2 Deg)	30		455063.3	270053.6	1085.5	
137	324.9		DA (0-2 Deg)	30		454859.8	270270.9	1092.6	
138	333.5		DA (0-2 Deg)	30		454637.7	270508.0	1095.2	
139	332.9		DA (0-2 Deg)	30		454409.6	270751.3	1096.8	
140	335.5		DA (0-2 Deg)	30		454182.1	270994.3	1097.0	

Srt No.	Ahead Span (M)	Line Angle	Structure Name	Tower Height (M)	Extension (M)	Easting - X	Northing - Y	Elevation -Z (MSL)	Remarks
141	372.5		DA (0-2 Deg)	30		453952.7	271239.2	1087.6	Dirt Road
142	316.5	-23.5	DC (10-30 Deg)	30		453698.0	271511.0	1092.1	
143	316.4		DA (0-2 Deg)	30		453407.6	271636.7	1090.3	
144	384.5		DA (0-2 Deg)	30		453117.2	271762.3	1084.0	
145	310.6		DA (0-2 Deg)	30		452764.3	271915.0	1082.8	
146	305.4		DA (0-2 Deg)	30		452479.2	272038.4	1084.6	
147	351.2		DA (0-2 Deg)	30		452199.0	272159.7	1079.4	
148	330.5		DA (0-2 Deg)	30		451876.6	272299.2	1075.2	
149	333.4		DA (0-2 Deg)	30		451573.3	272430.4	1072.3	
150	329.4		DA (0-2 Deg)	30		451267.4	272562.8	1069.7	Permanent Swamp
151	331.0		DA (0-2 Deg)	30		450965.0	272693.6	1067.2	Permanent Swamp
152	359.8		DA (0-2 Deg)	30		450661.3	272825.1	1062.7	
153	325.1		DA (0-2 Deg)	30		450331.1	272968.0	1060.8	
154	329.2		DB (0-10 Deg)	30		450032.8	273097.1	1064.9	
155	351.1		DA (0-2 Deg)	30	+3m Ext	449730.6	273227.8	1064.0	
156	345.5		DA (0-2 Deg)	30		449408.4	273367.3	1057.8	
157	340.9		DA (0-2 Deg)	30		449091.2	273504.5	1054.3	
158	328.7		DA (0-2 Deg)	30		448778.4	273639.8	1054.8	
159	364.2		DA (0-2 Deg)	30		448476.8	273770.4	1054.3	
160	351.0		DA (0-2 Deg)	30	+3m Ext	448142.5	273915.0	1056.1	
161	348.4		DA (0-2 Deg)	30		447820.4	274054.4	1060.8	
162	341.1		DA (0-2 Deg)	30	+3m Ext	447500.7	274192.7	1062.0	
163	367.3		DA (0-2 Deg)	30		447187.7	274328.2	1060.2	
164	352.3		DA (0-2 Deg)	30	+3m Ext	446850.6	274474.1	1060.2	
165	339.7		DA (0-2 Deg)	30		446527.2	274614.0	1058.4	
166	317.7		DB (0-10 Deg)	30		446215.5	274748.9	1057.5	
167	328.5		DA (0-2 Deg)	30		445923.9	274875.1	1066.3	
168	336.4		DA (0-2 Deg)	30		445622.5	275005.5	1070.8	
169	332.4		DA (0-2 Deg)	30		445313.7	275139.1	1071.0	
170	348.0		DA (0-2 Deg)	30		445008.7	275271.1	1072.2	
171	320.3		DA (0-2 Deg)	30		444689.3	275409.3	1074.9	Nagi - Kulakula Road Crossing Line passes near to Nagi
172	329.3		DA (0-2 Deg)	30		444395.4	275536.5	1080.6	Line Passes Near to Nagi
173	317.3		DA (0-2 Deg)	30		444093.1	275667.3	1088.4	
174	316.0		DA (0-2 Deg)	30		443801.9	275793.4	1093.7	
175	329.5		DA (0-2 Deg)	30		443511.8	275918.9	1093.1	
176	347.2		DA (0-2 Deg)	30		443209.4	276049.7	1089.8	
177	329.2		DA (0-2 Deg)	30		442890.7	276187.6	1095.7	
178	339.2		DB (0-10 Deg)	30		442588.6	276318.4	1096.5	
179	321.4		DA (0-2 Deg)	30		442277.3	276453.1	1093.1	
180	328.1		DA (0-2 Deg)	30		441982.4	276580.7	1095.1	
181	326.5		DA (0-2 Deg)	30		441681.2	276711.0	1093.3	
182	341.3		DA (0-2 Deg)	30		441381.5	276840.7	1090.4	
183	340.2		DA (0-2 Deg)	30		441068.2	276976.3	1087.8	
184	288.5		DA (0-2 Deg)	30		440756.0	277111.4	1088.2	
185	354.2		DA (0-2 Deg)	30		440491.2	277226.0	1083.2	
186	330.2		DA (0-2 Deg)	30		440166.2	277366.6	1075.8	Line Passes Near to Onekgwok School
187	328.9		DA (0-2 Deg)	30		439863.1	277497.8	1071.2	
188	335.5		DA (0-2 Deg)	30		439561.3	277628.4	1064.2	
189	329.8		DA (0-2 Deg)	30		439253.4	277761.6	1060.4	Permanent Swamp
190	333.6		DA (0-2 Deg)	30		438950.7	277892.6	1056.4	Permanent Swamp

Srt No.	Ahead Span (M)	Line Angle	Structure Name	Tower Height (M)	Extension (M)	Easting - X	Northing - Y	Elevation -Z (MSL)	Remarks
191	336.2		DA (0-2 Deg)	30		438644.6	278025.1	1052.3	Permanent Swamp
192	338.9		DA (0-2 Deg)	30		438336.0	278158.6	1050.9	Line from structure #192 to structure #201 runs parallel to Lira-Gulu highway
193	326.9		DA (0-2 Deg)	30		438025.0	278293.2	1051.7	
194	317.1	16.0	DC (10-30 Deg)	30		437725.0	278423.0	1053.0	
195	325.9		DA (0-2 Deg)	30		437479.9	278624.3	1052.5	
196	352.5		DA (0-2 Deg)	30		437228.0	278831.1	1052.4	
197	343.9		DA (0-2 Deg)	30	+3m Ext	436955.6	279054.8	1052.9	
198	331.1		DA (0-2 Deg)	30		436689.8	279273.1	1052.3	
199	356.1		DA (0-2 Deg)	30		436433.9	279483.2	1052.5	
200	345.0		DA (0-2 Deg)	30	+3m Ext	436158.7	279709.3	1053.5	
201	348.8		DA (0-2 Deg)	30		435892.1	279928.2	1052.9	
202	297.0		DB (0-10 Deg)	30		435622.5	280149.6	1057.8	Lira-Gulu Road crossing
203	341.8		DA (0-2 Deg)	30	+3m Ext	435393.0	280338.1	1063.4	
204	310.4		DA (0-2 Deg)	30		435128.9	280555.0	1066.2	Road Crossing
205	302.9	-11.9	DC (10-30 Deg)	30		434889.0	280752.0	1065.7	
206	361.8		DA (0-2 Deg)	30		434620.2	280891.6	1060.1	
207	331.2		DA (0-2 Deg)	30		434299.2	281058.3	1055.2	
208	338.6		DA (0-2 Deg)	30		434005.3	281211.0	1055.3	
209	340.2		DA (0-2 Deg)	30		433704.8	281367.0	1059.5	
210	351.7		DA (0-2 Deg)	30	+3m Ext	433402.9	281523.8	1059.1	
211	330.4		DA (0-2 Deg)	30		433090.8	281686.0	1052.0	Stream crossing
212	322.6		DA (0-2 Deg)	30		432797.5	281838.3	1051.2	
213	292.1		DA (0-2 Deg)	30		432511.2	281986.9	1054.7	Lira-Gulu Road crossing
214	330.5		DB (0-10 Deg)	30		432252.0	282121.6	1059.2	
215	350.3		DA (0-2 Deg)	30		431958.7	282273.9	1063.7	
216	330.3		DA (0-2 Deg)	30	+3m Ext	431647.9	282435.3	1066.5	
217	371.6		DA (0-2 Deg)	30		431354.8	282587.6	1065.2	
218	360.5		DA (0-2 Deg)	30	+3m Ext	431025.0	282758.8	1063.7	
219	328.3		DA (0-2 Deg)	30		430705.1	282925.0	1068.8	
220	331.4		DA (0-2 Deg)	30		430413.8	283076.3	1074.5	
221	355.2		DA (0-2 Deg)	30		430119.7	283229.0	1070.2	
222	338.0		DA (0-2 Deg)	30		429804.5	283392.7	1064.9	
223	362.3		DA (0-2 Deg)	30		429504.5	283548.5	1068.2	
224	306.4		DA (0-2 Deg)	30	+3m Ext	429183.0	283715.5	1073.2	
225	348.4		DA (0-2 Deg)	30		428911.1	283856.7	1070.2	
226	270.0		DA (0-2 Deg)	30		428601.9	284017.3	1064.3	Bob-Masindi Highway Line passes near to Kamdini
227	295.6		DB (0-10 Deg)	30		428362.3	284141.8	1061.5	
228	364.2	35.8	DD (30-60 Deg)	30		428100.0	284278.0	1059.6	
229	359.3		DA (0-2 Deg)	30		427935.9	284603.1	1057.5	Line pass near to Palenga village
230	359.1		DA (0-2 Deg)	30	+3m Ext	427774.0	284923.8	1064.9	
231	332.2		DA (0-2 Deg)	30		427612.2	285244.4	1069.7	
232	327.3		DA (0-2 Deg)	30		427462.5	285541.0	1074.6	Dirt Road
233	297.7		DA (0-2 Deg)	30		427315.0	285833.1	1078.3	
234	319.8		DA (0-2 Deg)	30		427180.9	286098.9	1078.9	
235	357.8		DA (0-2 Deg)	30		427036.8	286384.4	1074.7	
236	349.1		DA (0-2 Deg)	30		426875.6	286703.7	1069.5	
237	285.8		DA (0-2 Deg)	30		426718.2	287015.4	1070.8	
238	345.4		DA (0-2 Deg)	30		426589.5	287270.6	1068.7	
239	352.5		DA (0-2 Deg)	30		426433.8	287578.9	1065.3	
240	350.2		DA (0-2 Deg)	30		426274.9	287893.7	1070.5	

Srt No.	Ahead Span (M)	Line Angle	Structure Name	Tower Height (M)	Extension (M)	Easting - X	Northing - Y	Elevation -Z (MSL)	Remarks
241	378.8		DA (0-2 Deg)	30	+3m Ext	426117.1	288206.3	1071.2	
242	314.3		DA (0-2 Deg)	30		425946.5	288544.4	1067.1	
243	340.2		DA (0-2 Deg)	30		425804.9	288825.0	1070.0	Dirt Road Line pass near to Barogal village
244	325.2		DA (0-2 Deg)	30	+3m Ext	425651.5	289128.7	1068.3	Line pass near to Barogal village
245	373.7	10.5	DC (10-30 Deg)	30		425505.0	289419.0	1062.6	
246	343.6		DA (0-2 Deg)	30	+3m Ext	425400.3	289777.7	1062.7	
247	343.4		DA (0-2 Deg)	30		425304.1	290107.6	1059.0	
248	335.9		DA (0-2 Deg)	30		425207.9	290437.3	1058.9	
249	327.1		DA (0-2 Deg)	30		425113.9	290759.7	1062.4	
250	329.9		DA (0-2 Deg)	30		425022.3	291073.7	1067.0	
251	374.0		DA (0-2 Deg)	30		424929.9	291390.5	1067.0	
252	326.4		DA (0-2 Deg)	30	+3m Ext	424825.1	291749.5	1067.6	
253	349.6		DA (0-2 Deg)	30		424733.7	292062.9	1068.1	
254	347.5		DA (0-2 Deg)	30		424635.8	292398.5	1068.4	
255	324.4		DA (0-2 Deg)	30		424538.5	292732.2	1077.9	
256	325.7		DA (0-2 Deg)	30		424447.6	293043.6	1086.1	
257	331.8		DA (0-2 Deg)	30		424356.4	293356.3	1086.1	
258	334.5		DB (0-10 Deg)	30		424263.5	293674.8	1084.1	
259	330.1		DA (0-2 Deg)	30		424169.8	293995.9	1083.0	Dirt Road
260	356.9		DA (0-2 Deg)	30		424077.4	294312.7	1081.9	
261	330.0		DA (0-2 Deg)	30		423977.4	294655.3	1082.2	
262	322.5		DA (0-2 Deg)	30		423885.0	294972.2	1087.7	
263	323.1		DA (0-2 Deg)	30		423794.7	295281.7	1091.4	
264	334.5		DA (0-2 Deg)	30		423704.2	295591.9	1092.4	
265	307.9		DA (0-2 Deg)	30		423610.5	295912.9	1094.0	
266	314.7		DA (0-2 Deg)	30		423524.3	296208.5	1091.4	
267	361.3		DA (0-2 Deg)	30		423436.2	296510.6	1082.4	
268	328.7		DA (0-2 Deg)	30		423335.0	296857.4	1085.5	
269	326.6		DB (0-10 Deg)	30		423243.0	297173.0	1090.8	Dirt Road
270	343.4		DA (0-2 Deg)	30		423151.5	297486.5	1088.6	
271	309.7		DA (0-2 Deg)	30		423055.3	297816.2	1085.3	
272	323.5		DA (0-2 Deg)	30		422968.6	298113.4	1096.4	Barabili Dirt Road
273	**0.0**		**DDE (0-45 Deg)**	**30**		**422878.0**	**298424.0**	**1100.0**	**Line Dead End near Barabili Village (Gulu)**
274	**435.1**		**DDE (0-45 Deg)**	**30**	**+6m Ext**	**422876.0**	**298530.0**	**1099.3**	**132kV D/C Overhead Line Start fron Near Barabili Village (Gulu)** **Circuit-1 loded with AAAC Neon** **Circuit-2 loded with AAAC Neon** **Earthwire 1 loded with OPGW** **Earthwire 2 loded with OHSW**
275	386.2	-16.8	DC (10-30 Deg)	30	+9m Ext	422463.0	298667.0	1099.3	
276	321.6		DA (0-2 Deg)	30		422077.0	298677.7	1102.3	Line cross the Dirt road from barabili Village
277	331.9		DA (0-2 Deg)	30		421755.6	298686.5	1103.1	
278	299.4		DA (0-2 Deg)	30		421423.8	298695.7	1101.2	
279	327.0		DA (0-2 Deg)	30		421124.5	298704.0	1098.1	
280	345.7		DA (0-2 Deg)	30		420797.7	298713.0	1091.2	
281	337.3		DA (0-2 Deg)	30		420452.2	298722.5	1084.2	
282	358.7		DA (0-2 Deg)	30		420115.0	298731.8	1080.8	Line pass near to Onang Village
283	326.3		DA (0-2 Deg)	30		419756.5	298741.7	1084.6	
284	324.3		DA (0-2 Deg)	30		419430.3	298750.7	1090.5	
285	327.2		DB (0-10 Deg)	30		419106.1	298759.7	1092.8	

Srt No.	Ahead Span (M)	Line Angle	Structure Name	Tower Height (M)	Extension (M)	Easting - X	Northing - Y	Elevation -Z (MSL)	Remarks
286	320.6		DA (0-2 Deg)	30		418779.0	298768.7	1091.4	Line cross the Dirt Road connecting Barabili Village
287	326.4		DA (0-2 Deg)	30		418458.5	298777.6	1086.1	
288	346.9		DA (0-2 Deg)	30		418132.3	298786.6	1079.2	Tochi river crossing
289	311.9		DA (0-2 Deg)	30		417785.5	298796.1	1073.3	
290	323.0		DA (0-2 Deg)	30		417473.7	298804.7	1078.6	
291	311.2		DA (0-2 Deg)	30		417150.9	298813.7	1082.1	
292	325.7		DA (0-2 Deg)	30		416839.8	298822.2	1081.8	Gulu-Ongako Highway crossing Line from structure #292 to structure #201 runs parallel to Gulu-Ongako Highway
293	371.4	-45.7	DD (30-60 Deg)	30		416514.2	298831.2	1076.4	Minakulu River crossing
294	354.6		DA (0-2 Deg)	30	+3m Ext	416247.4	298572.9	1076.2	Track
295	323.6		DA (0-2 Deg)	30		415992.7	298326.2	1081.2	Line cross the stream
296	355.5		DA (0-2 Deg)	30		415760.2	298101.1	1088.3	
297	349.8		DA (0-2 Deg)	30	+3m Ext	415504.8	297853.8	1094.2	
298	349.2		DA (0-2 Deg)	30		415253.5	297610.4	1093.0	
299	331.5		DA (0-2 Deg)	30		415002.6	297367.5	1090.8	
300	353.3		DA (0-2 Deg)	30		414764.5	297136.9	1093.0	
301	395.3		DA (0-2 Deg)	30	+3m Ext	414510.7	296891.1	1093.2	
302	222.7		DB (0-10 Deg)	30	+6m Ext	414226.7	296616.1	1090.2	Line cross the stream
303	314.6		DA (0-2 Deg)	30	+3m Ext	414066.7	296461.2	1091.2	Dirt Road
304	335.2		DA (0-2 Deg)	30		413840.8	296242.4	1094.1	
305	297.8		DA (0-2 Deg)	30		413599.9	296009.2	1100.6	
306	344.3	-12.4	DC (10-30 Deg)	30		413386.0	295802.0	1109.1	Dirt Road
307	334.4		DA (0-2 Deg)	30		413195.7	295515.0	1116.0	
308	359.4		DA (0-2 Deg)	30	+3m Ext	413011.0	295236.2	1114.3	Dirt Road
309	329.0		DA (0-2 Deg)	30		412812.4	294936.7	1111.5	
310	322.4		DA (0-2 Deg)	30		412630.6	294662.5	1112.4	
311	318.6		DA (0-2 Deg)	30		412452.5	294393.8	1109.7	
312	354.9		DA (0-2 Deg)	30		412276.5	294128.2	1100.0	
313	372.4		DA (0-2 Deg)	30		412080.4	293832.4	1088.8	
314	322.8		DA (0-2 Deg)	30		411874.7	293522.0	1092.4	
315	347.1		DA (0-2 Deg)	30	+3m Ext	411696.3	293253.0	1097.2	
316	348.4		DA (0-2 Deg)	30		411504.6	292963.7	1095.5	
317	327.6		DB (0-10 Deg)	30		411312.1	292673.3	1102.3	
318	340.0		DA (0-2 Deg)	30		411131.1	292400.2	1102.1	
319	345.0		DA (0-2 Deg)	30	+3m Ext	410943.2	292116.8	1102.1	
320	356.8		DA (0-2 Deg)	30		410752.6	291829.3	1095.0	
321	340.7		DA (0-2 Deg)	30		410555.4	291531.8	1090.3	
322	288.7		DA (0-2 Deg)	30		410367.2	291247.9	1098.7	
323	334.3		DA (0-2 Deg)	30		410207.7	291007.2	1104.9	
324	325.5		DA (0-2 Deg)	30		410023.0	290728.5	1107.5	Dirt Road
325	325.8		DA (0-2 Deg)	30		409843.1	290457.2	1109.7	
326	316.9		DA (0-2 Deg)	30		409663.1	290185.7	1111.4	
327	332.0		DA (0-2 Deg)	30		409488.0	289921.5	1112.1	
328	299.7		DA (0-2 Deg)	30		409304.6	289644.8	1114.9	
329	356.7	68.2	DE (60-90 Deg)	30		409139.0	289395.0	1113.3	132kV D/C Overhead Line turn right ahead of around of 2.0 km from Ongako Village
330	344.3		DA (0-2 Deg)	30	+3m Ext	408789.8	289467.9	1113.0	

Srt No.	Ahead Span (M)	Line Angle	Structure Name	Tower Height (M)	Extension (M)	Easting - X	Northing - Y	Elevation -Z (MSL)	Remarks
331	357.1		DA (0-2 Deg)	30		408452.7	289538.2	1112.9	
332	304.6		DA (0-2 Deg)	30		408103.2	289611.2	1111.6	
333	359.8		DA (0-2 Deg)	30	+3m Ext	407805.0	289673.4	1117.6	
334	312.1		DA (0-2 Deg)	30		407452.8	289746.9	1116.2	
335	362.9		DA (0-2 Deg)	30		407147.3	289810.7	1114.9	
336	313.4		DA (0-2 Deg)	30		406792.1	289884.8	1117.3	Dirt Road
337	289.9		DA (0-2 Deg)	30		406485.2	289948.8	1120.3	
338	366.7		DA (0-2 Deg)	30		406201.4	290008.1	1111.8	
339	347.2		DA (0-2 Deg)	30	+3m Ext	405842.5	290083.0	1106.2	
340	356.0		DB (0-10 Deg)	30		405502.6	290153.9	1098.7	
341	335.4		DA (0-2 Deg)	30		405154.1	290226.6	1089.7	
342	344.4		DA (0-2 Deg)	30	+3m Ext	404825.7	290295.2	1092.0	
343	371.4		DA (0-2 Deg)	30		404488.6	290365.5	1085.2	
344	299.1		DA (0-2 Deg)	30	+3m Ext	404125.0	290441.4	1087.2	
345	366.8		DA (0-2 Deg)	30		403832.2	290502.5	1084.8	
346	320.9		DA (0-2 Deg)	30		403473.1	290577.4	1082.1	
347	352.2	-35.9	DD (30-60 Deg)	30		403159.0	290643.0	1073.8	
348	359.1		DA (0-2 Deg)	30	+3m Ext	402837.5	290499.1	1073.4	
349	310.2		DA (0-2 Deg)	30		402509.7	290352.4	1071.6	
350	343.0		DA (0-2 Deg)	30		402226.6	290225.7	1072.8	
351	326.3		DA (0-2 Deg)	30		401913.6	290085.6	1069.0	Dirt Road
352	350.0		DA (0-2 Deg)	30	+3m Ext	401615.7	289952.3	1066.2	
353	333.2		DA (0-2 Deg)	30		401296.2	289809.4	1060.3	
354	337.0		DA (0-2 Deg)	30		400992.2	289673.3	1056.4	
355	339.7		DA (0-2 Deg)	30		400684.5	289535.6	1054.4	
356	300.7		DA (0-2 Deg)	30		400374.5	289396.8	1056.0	Dirt Road
357	377.8	36.9	DD (30-60 Deg)	30	+3m Ext	400100.0	289274.0	1051.2	132kV D/C Overhead Line pass near to around of 1.0 km from koch-Amar
358	395.5		DA (0-2 Deg)	30	+3m Ext	399731.6	289357.6	1040.7	
359	317.9		DA (0-2 Deg)	30	+6m Ext	399345.8	289445.2	1033.9	Stream
360	372.2		DB (0-10 Deg)	30	+6m Ext	399035.8	289515.6	1028.9	
361	334.8		DA (0-2 Deg)	30		398672.9	289598.0	1025.7	
362	327.8		DA (0-2 Deg)	30		398346.4	289672.1	1022.1	
363	338.9		DA (0-2 Deg)	30		398026.8	289744.7	1015.6	
364	333.5		DA (0-2 Deg)	30		397696.3	289819.7	1011.7	
365	337.1		DA (0-2 Deg)	30		397371.1	289893.5	1001.2	
366	322.6		DA (0-2 Deg)	30		397042.4	289968.1	996.7	
367	327.4		DA (0-2 Deg)	30		396727.8	290039.6	995.4	
368	345.3		DA (0-2 Deg)	30		396408.5	290112.0	989.8	
369	258.6		DA (0-2 Deg)	30	+3m Ext	396071.8	290188.5	981.8	Ayago River
370	338.1		DB (0-10 Deg)	30	+3m Ext	395819.6	290245.7	985.1	
371	321.4		DA (0-2 Deg)	30		395489.9	290320.6	992.7	
372	355.5		DA (0-2 Deg)	30	+3m Ext	395176.4	290391.7	993.9	
373	376.8		DA (0-2 Deg)	30		394829.8	290470.4	990.5	
374	318.4		DA (0-2 Deg)	30		394462.4	290553.8	998.9	
375	326.4		DA (0-2 Deg)	30		394151.9	290624.3	1003.5	

Srt No.	Ahead Span (M)	Line Angle	Structure Name	Tower Height (M)	Extension (M)	Easting - X	Northing - Y	Elevation -Z (MSL)	Remarks
376	351.8		DA (0-2 Deg)	30		393833.6	290696.6	1001.5	
377	193.4		DB (0-10 Deg)	30	+3m Ext	393490.5	290774.5	995.6	Stream
378	324.3		DA (0-2 Deg)	30		393301.9	290817.3	995.0	
379	298.8		DA (0-2 Deg)	30		392985.6	290889.1	1004.2	
380	332.4		DA (0-2 Deg)	30		392694.3	290955.2	1008.1	
381	315.8		DA (0-2 Deg)	30		392370.1	291028.8	1014.7	
382	319.1		DA (0-2 Deg)	30		392062.1	291098.7	1013.1	Dirt Road
383	338.5		DA (0-2 Deg)	30		391751.0	291169.4	1001.3	
384	323.7		DA (0-2 Deg)	30		391420.9	291244.3	1008.4	
385	320.2		DA (0-2 Deg)	30		391105.2	291316.0	1015.1	
386	316.8		DA (0-2 Deg)	30		390793.0	291386.9	1013.3	
387	238.0	-30.1	DD (30-60 Deg)	30		390484.0	291457.0	1006.7	
388	365.5		DB (0-10 Deg)	30		390256.7	291386.3	994.8	
389	315.1		DA (0-2 Deg)	30	+3m Ext	389907.7	291277.8	1004.0	
390	311.5		DA (0-2 Deg)	30		389606.8	291184.3	1014.9	Nwoya-Ongako Highway crossing
391	373.2		DA (0-2 Deg)	30		389309.4	291091.8	1011.8	
392	303.8	-54.2	DD (30-60 Deg)	30		388953.0	290981.0	1007.0	132kV D/C Overhead Line turn Left near Nwoya Town
393	276.0		DA (0-2 Deg)	30		388856.3	290693.0	1010.6	
394	360.4		DA (0-2 Deg)	30		388768.4	290431.4	1006.4	
395	339.5		DA (0-2 Deg)	30		388653.7	290089.7	1000.1	
396	290.0		DA (0-2 Deg)	30		388545.6	289767.9	1005.0	
397	322.7		DA (0-2 Deg)	30		388453.3	289492.9	1002.4	
398	340.6		DA (0-2 Deg)	30		388350.5	289187.1	993.9	
399	343.3		DA (0-2 Deg)	30		388242.1	288864.2	993.0	
400	327.0		DA (0-2 Deg)	30		388132.8	288538.8	1000.4	
401	351.5		DA (0-2 Deg)	30		388028.7	288228.8	1000.2	
402	317.8		DA (0-2 Deg)	30		387916.8	287895.6	995.0	
403	324.3		DA (0-2 Deg)	30		387815.7	287594.4	1005.7	
404	297.4		DA (0-2 Deg)	30		387712.4	287287.0	1011.4	
405	313.3		DA (0-2 Deg)	30		387617.8	287005.0	1009.8	
406	348.0	67.7	DE (60-90 Deg)	30		387518.0	286708.0	994.0	
407	189.0		DB (0-10 Deg)	30	+3m Ext	387170.7	286685.6	1008.1	Railway
408	330.8		DB (0-10 Deg)	30	+3m Ext	386982.2	286673.4	1017.5	
409	334.3		DA (0-2 Deg)	30		386652.1	286652.0	1014.8	Dirt Road
410	353.4		DA (0-2 Deg)	30		386318.4	286630.5	1002.8	
411	291.6		DA (0-2 Deg)	30	+3m Ext	385965.8	286607.7	1006.7	
412	376.0		DA (0-2 Deg)	30	+3m Ext	385674.8	286588.9	1007.9	
413	300.4		DA (0-2 Deg)	30		385299.6	286564.6	1003.1	
414	311.3		DA (0-2 Deg)	30		384999.9	286545.3	1007.5	
415	284.9		DA (0-2 Deg)	30		384689.2	286525.2	1007.8	
416	288.9		DA (0-2 Deg)	30		384404.9	286506.8	1002.3	
417	339.3		DA (0-2 Deg)	30		384116.6	286488.2	988.5	
418	355.9		DA (0-2 Deg)	30		383778.0	286466.3	978.6	
419	302.2		DA (0-2 Deg)	30		383422.8	286443.3	986.9	Anaka Vilaage is at distance of 1.5km to 2.0 km
420	305.6		DA (0-2 Deg)	30		383121.2	286423.9	989.9	Dirt Road

Srt No.	Ahead Span (M)	Line Angle	Structure Name	Tower Height (M)	Extension (M)	Easting - X	Northing - Y	Elevation -Z (MSL)	Remarks
421	328.0		DA (0-2 Deg)	30		382816.3	286404.2	988.0	
422	315.2	-40.0	DD (30-60 Deg)	30		382489.0	286383.0	984.2	
423	321.7		DA (0-2 Deg)	30		382261.0	286165.3	979.3	
424	314.8		DA (0-2 Deg)	30		382028.3	285943.2	971.8	
425	347.1		DA (0-2 Deg)	30		381800.6	285725.8	957.3	
426	320.6		DA (0-2 Deg)	30		381549.6	285486.2	961.4	
427	317.5		DA (0-2 Deg)	30		381317.7	285264.8	971.8	
428	368.0		DA (0-2 Deg)	30		381088.1	285045.6	972.9	
429	369.1		DA (0-2 Deg)	30	+3m Ext	380821.9	284791.5	964.2	
430	359.9		DA (0-2 Deg)	30		380554.9	284536.6	964.3	
431	304.8		DA (0-2 Deg)	30		380294.5	284288.0	976.7	
432	319.5		DA (0-2 Deg)	30		380074.0	284077.5	984.0	
433	320.4		DA (0-2 Deg)	30		379842.9	283856.9	985.3	
434	322.8		DA (0-2 Deg)	30		379611.2	283635.7	984.1	
435	332.4		DA (0-2 Deg)	30		379377.7	283412.7	977.8	
436	334.1		DA (0-2 Deg)	30		379137.3	283183.2	975.2	
437	315.5		DB (0-10 Deg)	30		378895.6	282952.5	981.7	
438	318.7		DA (0-2 Deg)	30		378667.4	282734.7	991.6	
439	345.0		DA (0-2 Deg)	30		378437.0	282514.7	993.1	
440	253.2		DA (0-2 Deg)	30		378187.4	282276.4	994.7	
441	262.8		DA (0-2 Deg)	30		378004.3	282101.6	1008.6	Anaka- Olwiyo Dirt Road crossing
442	299.6		DA (0-2 Deg)	30		377814.2	281920.1	1004.7	
443	167.9		DA (0-2 Deg)	30	+3m Ext	377597.5	281713.2	995.4	Railway
444	332.4		DA (0-2 Deg)	30		377476.0	281597.3	990.8	
445	318.3		DA (0-2 Deg)	30		377235.5	281367.7	986.6	
446	258.7		DA (0-2 Deg)	30		377005.3	281147.9	986.0	
447	271.2		DA (0-2 Deg)	30		376818.2	280969.3	980.9	
448	172.2	-60.4	DE (60-90 Deg)	30		376622.0	280782.0	974.7	
449	**0.0**		**DDE (0-45 Deg)**	**30**		**376664.0**	**280615.0**	**973.6**	**Line Terminate at Olwiyo Village**
450	**308.9**		**DDE (0-45 Deg)**	**30**		**376644.0**	**280592.0**	**974.7**	**132kV D/C Overhead Line Start from Olwiyo Circuit-1 loded with AAAC Neon Circuit-2 loded with AAAC Neon Earthwire 1 loded with OPGW Earthwire 2 loded with OHSW**
451	317.4		DB (0-10 Deg)	30	+6m Ext	376443.3	280826.8	980.4	Anaka- Olwiyo Road crossing Railway Crossing
452	359.3	-34.2	DD (30-60 Deg)	30	+3m Ext	376237.0	281068.0	986.4	
453	336.1		DA (0-2 Deg)	30		375890.3	281162.5	987.5	
454	340.9		DA (0-2 Deg)	30	+3m Ext	375566.1	281251.0	991.6	
455	308.3		DA (0-2 Deg)	30		375237.1	281340.7	991.1	
456	299.3		DA (0-2 Deg)	30		374939.7	281421.8	986.6	
457	346.1		DA (0-2 Deg)	30		374650.9	281500.5	977.7	
458	328.2		DA (0-2 Deg)	30		374317.0	281591.6	967.9	
459	278.5		DA (0-2 Deg)	30		374000.4	281678.0	973.2	
460	341.1		DA (0-2 Deg)	30		373731.7	281751.2	973.2	

Srt No.	Ahead Span (M)	Line Angle	Structure Name	Tower Height (M)	Extension (M)	Easting - X	Northing - Y	Elevation -Z (MSL)	Remarks
461	249.0		DA (0-2 Deg)	30		373402.6	281841.0	982.3	
462	308.1		DA (0-2 Deg)	30		373162.4	281906.5	980.9	
463	359.5		DA (0-2 Deg)	30		372865.1	281987.6	968.6	
464	300.1		DA (0-2 Deg)	30		372518.3	282082.1	970.4	
465	270.6		DB (0-10 Deg)	30		372228.7	282161.1	973.3	
466	362.8		DA (0-2 Deg)	30		371967.7	282232.3	962.1	
467	316.7		DA (0-2 Deg)	30		371617.7	282327.8	964.8	
468	282.2		DA (0-2 Deg)	30		371312.2	282411.1	974.8	Purongo-Oruka Road crossing
469	348.9		DA (0-2 Deg)	30		371039.9	282485.3	967.0	
470	372.0		DA (0-2 Deg)	30		370703.2	282577.1	961.0	
471	320.5		DA (0-2 Deg)	30	+3m Ext	370344.4	282675.0	948.6	
472	381.1		DA (0-2 Deg)	30		370035.1	282759.3	959.5	
473	332.2		DA (0-2 Deg)	30		369667.5	282859.6	960.1	
474	311.6	13.0	DC (10-30 Deg)	30		369347.0	282947.0	973.2	
475	347.4		DA (0-2 Deg)	30	+3m Ext	369072.4	283094.3	972.0	
476	367.3		DA (0-2 Deg)	30		368766.3	283258.5	964.2	Dirt Road
477	309.6		DA (0-2 Deg)	30		368442.6	283432.1	972.4	
478	332.9		DA (0-2 Deg)	30		368169.7	283578.5	967.9	
479	323.6		DA (0-2 Deg)	30		367876.4	283735.8	960.8	Dirt Road
480	348.7		DA (0-2 Deg)	30		367591.2	283888.8	959.8	
481	320.8		DA (0-2 Deg)	30		367283.9	284053.6	951.3	
482	325.9		DA (0-2 Deg)	30		367001.2	284205.2	949.6	
483	384.7		DA (0-2 Deg)	30		366714.0	284359.3	943.2	
484	334.5		DA (0-2 Deg)	30		366375.0	284541.1	944.4	
485	291.7		DA (0-2 Deg)	30		366080.3	284699.2	956.0	
486	312.4		DB (0-10 Deg)	30		365823.2	284837.1	957.8	
487	340.6		DA (0-2 Deg)	30		365547.9	284984.8	952.1	
488	344.0		DA (0-2 Deg)	30		365247.7	285145.7	953.5	
489	317.3		DA (0-2 Deg)	30		364944.6	285308.3	964.6	
490	342.2		DA (0-2 Deg)	30		364665.1	285458.3	964.6	
491	313.0		DA (0-2 Deg)	30	+3m Ext	364363.5	285620.0	960.1	Dirt Road
492	317.4		DA (0-2 Deg)	30		364087.7	285768.0	976.3	
493	316.1	-55.7	DD (30-60 Deg)	30		363808.0	285918.0	981.5	
494	331.7		DA (0-2 Deg)	30		363527.7	285771.9	984.1	
495	326.0		DA (0-2 Deg)	30		363233.5	285618.6	977.4	Onegi-Obel Road
496	318.6		DA (0-2 Deg)	30		362944.5	285468.0	969.4	
497	368.4		DA (0-2 Deg)	30		362661.9	285320.8	959.7	
498	325.1		DA (0-2 Deg)	30	+3m Ext	362335.2	285150.5	956.1	
499	305.3		DA (0-2 Deg)	30		362046.9	285000.3	956.5	
500	360.9		DA (0-2 Deg)	30		361776.2	284859.2	950.6	
501	298.4		DA (0-2 Deg)	30		361456.1	284692.4	958.4	
502	276.1		DA (0-2 Deg)	30		361191.5	284554.5	960.0	
503	335.4		DA (0-2 Deg)	30		360946.7	284426.9	944.2	
504	347.9		DA (0-2 Deg)	30	+3m Ext	360649.3	284271.9	936.9	
505	322.5		DA (0-2 Deg)	30		360340.8	284111.2	936.8	
506	311.7		DA (0-2 Deg)	30		360054.7	283962.1	939.5	
507	325.5		DA (0-2 Deg)	30		359778.3	283818.1	932.7	
508	346.6		DA (0-2 Deg)	30		359489.6	283667.6	924.7	
509	237.7		DB (0-10 Deg)	30	+6m Ext	359182.2	283507.5	921.5	
510	391.7		DB (0-10 Deg)	30	+6m Ext	358971.5	283397.6	924.6	

Srt No.	Ahead Span (M)	Line Angle	Structure Name	Tower Height (M)	Extension (M)	Easting - X	Northing - Y	Elevation -Z (MSL)	Remarks
511	349.7		DA (0-2 Deg)	30	+6m Ext	358624.1	283216.6	931.5	Dirt Road
512	329.6	46.6	DD (30-60 Deg)	30		358314.0	283055.0	935.5	
513	327.9		DA (0-2 Deg)	30		358002.4	283162.6	928.3	
514	369.2		DA (0-2 Deg)	30		357692.5	283269.7	920.2	
515	323.4		DA (0-2 Deg)	30		357343.5	283390.3	920.2	
516	340.7		DA (0-2 Deg)	30		357037.9	283495.8	917.6	
517	340.9		DA (0-2 Deg)	30		356715.9	283607.1	922.0	
518	328.9		DA (0-2 Deg)	30		356393.6	283718.4	915.2	
519	357.1		DA (0-2 Deg)	30		356082.8	283825.8	914.3	
520	249.9		DB (0-10 Deg)	30	+6m Ext	355745.2	283942.4	908.4	Railway crossing
521	384.8	-5.5	DB (0-10 Deg)	30	+6m Ext	355509.0	284024.0	900.7	
522	301.0		DA (0-2 Deg)	30		355134.9	284114.1	894.4	
523	331.8		DA (0-2 Deg)	30		354842.2	284184.6	898.3	
524	293.7		DA (0-2 Deg)	30		354519.7	284262.3	898.4	
525	355.4		DA (0-2 Deg)	30		354234.1	284331.1	894.8	
526	302.0		DA (0-2 Deg)	30		353888.6	284414.3	890.1	
527	294.2		DA (0-2 Deg)	30		353595.0	284485.0	887.0	
528	355.9		DA (0-2 Deg)	30		353309.0	284553.9	878.8	
529	313.1		DA (0-2 Deg)	30		352963.0	284637.3	880.5	
530	319.3		DA (0-2 Deg)	30		352658.6	284710.6	882.8	
531	330.8		DA (0-2 Deg)	30		352348.2	284785.3	879.0	
532	332.1		DA (0-2 Deg)	30		352026.6	284862.8	870.1	
533	329.2		DB (0-10 Deg)	30		351703.7	284940.6	869.1	
534	366.7		DA (0-2 Deg)	30		351383.6	285017.7	862.0	
535	307.8		DA (0-2 Deg)	30		351027.1	285103.6	854.9	
536	305.0		DA (0-2 Deg)	30		350727.9	285175.6	862.1	
537	327.2		DA (0-2 Deg)	30		350431.3	285247.1	861.5	
538	341.2		DA (0-2 Deg)	30		350113.2	285323.7	854.0	
539	366.0		DA (0-2 Deg)	30		349781.5	285403.6	846.4	
540	299.8		DA (0-2 Deg)	30		349425.7	285489.3	846.4	
541	343.8		DA (0-2 Deg)	30		349134.2	285559.5	844.0	Stream crossing
542	251.3	-41.7	DD (30-60 Deg)	30	+3m Ext	348800.0	285640.0	835.4	Road Crossing
543	359.4		DA (0-2 Deg)	30	+6m Ext	348578.5	285521.2	832.2	
544	333.3		DA (0-2 Deg)	30		348261.8	285351.3	833.3	
545	158.4		DB (0-10 Deg)	30	+3m Ext	347968.1	285193.8	837.5	Railway Crossing
546	329.4		DB (0-10 Deg)	30	+3m Ext	347828.5	285118.9	841.1	
547	314.4		DA (0-2 Deg)	30		347538.2	284963.2	844.3	
548	335.5		DA (0-2 Deg)	30		347261.1	284814.6	841.7	
549	362.6		DA (0-2 Deg)	30		346965.5	284656.1	837.6	
550	325.3		DA (0-2 Deg)	30		346645.9	284484.7	841.8	
551	334.4		DA (0-2 Deg)	30		346359.3	284330.9	842.7	
552	329.8		DA (0-2 Deg)	30		346064.6	284172.9	843.2	
553	348.5	-41.9	DD (30-60 Deg)	30		345774.0	284017.0	844.8	
554	248.3		DB (0-10 Deg)	30	+3m Ext	345655.5	283689.3	830.0	Railway Crossing
555	373.9		DB (0-10 Deg)	30	+6m Ext	345571.0	283455.8	818.2	
556	350.8		DA (0-2 Deg)	30		345443.9	283104.2	809.1	
557	333.5		DA (0-2 Deg)	30		345324.6	282774.3	800.2	
558	361.8		DA (0-2 Deg)	30		345211.2	282460.7	794.3	
559	356.9		DA (0-2 Deg)	30	+3m Ext	345088.2	282120.5	788.1	
560	367.0		DA (0-2 Deg)	30		344966.8	281784.9	781.2	

Srt No.	Ahead Span (M)	Line Angle	Structure Name	Tower Height (M)	Extension (M)	Easting - X	Northing - Y	Elevation -Z (MSL)	Remarks
561	355.7		DA (0-2 Deg)	30	+3m Ext	344842.0	281439.8	784.6	
562	377.6		DA (0-2 Deg)	30		344721.0	281105.3	779.5	
563	329.0		DA (0-2 Deg)	30	+3m Ext	344592.6	280750.2	778.3	
564	328.1		DA (0-2 Deg)	30		344480.7	280440.9	782.0	
565	318.1		DA (0-2 Deg)	30	+3m Ext	344369.2	280132.3	779.3	
566	385.1		DA (0-2 Deg)	30		344261.0	279833.2	767.3	
567	315.0	26.6	DC (10-30 Deg)	30		344130.0	279471.0	770.0	
568	385.2		DA (0-2 Deg)	30		343901.4	279254.2	755.4	
569	190.7		DB (0-10 Deg)	30	+6m Ext	343621.9	278989.1	748.2	Railway Crossing
570	335.8		DB (0-10 Deg)	30	+3m Ext	343483.5	278857.9	757.4	
571	333.1		DA (0-2 Deg)	30		343239.9	278626.8	756.5	
572	361.7		DA (0-2 Deg)	30		342998.2	278397.6	757.6	
573	304.2		DA (0-2 Deg)	30	+3m Ext	342735.8	278148.7	766.4	
574	310.5		DA (0-2 Deg)	30		342515.0	277939.3	772.4	
575	370.7		DA (0-2 Deg)	30		342289.7	277725.7	759.1	
576	336.1		DA (0-2 Deg)	30	+3m Ext	342020.7	277470.6	752.8	
577	273.2		DA (0-2 Deg)	30		341776.9	277239.3	771.7	
578	387.6		DA (0-2 Deg)	30	+3m Ext	341578.7	277051.3	776.4	
579	356.1		DA (0-2 Deg)	30	+3m Ext	341297.4	276784.6	775.3	
580	326.0		DA (0-2 Deg)	30		341039.0	276539.5	781.7	
581	356.2		DA (0-2 Deg)	30	+3m Ext	340802.5	276315.1	769.2	
582	358.7	-22.6	DC (10-30 Deg)	30		340544.0	276070.0	753.9	
583	409.7		DA (0-2 Deg)	30	+3m Ext	340398.7	275742.1	735.8	
584	341.7		DA (0-2 Deg)	30		340232.8	275367.5	728.9	
585	280.3		DA (0-2 Deg)	30		340094.4	275055.1	735.4	
586	354.3		DA (0-2 Deg)	30		339980.9	274798.8	728.1	
587	345.7		DA (0-2 Deg)	30		339837.4	274474.9	720.6	
588	351.5		DA (0-2 Deg)	30		339697.4	274158.9	730.6	
589	348.3		DA (0-2 Deg)	30	+3m Ext	339555.0	273837.5	722.5	
590	365.3		DA (0-2 Deg)	30		339414.0	273519.0	713.6	
591	320.5	50.5	DD (30-60 Deg)	30		339266.0	273185.0	706.5	
592	308.2		DA (0-2 Deg)	30		338957.3	273098.7	692.3	
593	319.1		DA (0-2 Deg)	30		338660.5	273015.7	681.1	
594	314.8		DA (0-2 Deg)	30		338353.2	272929.8	682.9	
595	315.8	32.3	DD (30-60 Deg)	30		338050.0	272845.0	695.9	
596	279.8		DA (0-2 Deg)	30		337747.5	272935.8	685.6	
597	296.3		DA (0-2 Deg)	30		337479.6	273016.3	674.8	
598	216.6		DB (0-10 Deg)	30	+3m Ext	337195.7	273101.5	658.6	Railway Crossing
599	309.9		DB (0-10 Deg)	30	+3m Ext	336988.3	273163.9	649.3	Dirt Road
600	249.8	18.0	DC (10-30 DEG)-1	30	+9m Ext	336691.4	273253.0	637.7	Anchor Tower Transmission Line Corriodor splited in three section to divide the foundation forces in three part. Each section is built with two phase wire and two earthwire

Srt No.	Ahead Span (M)	Line Angle	Structure Name	Tower Height (M)	Extension (M)	Easting - X	Northing - Y	Elevation -Z (MSL)	Remarks
601	1004.8	-17.7	RX (10-30) - RX_C	57		336491.0	273391.6	627.4	Nile River Crossing Section 1 of 3, containing two phase and two OHSW wire, One OHSW on each side used reduce the shielding height, AAAC Neon conductor replaced with ACSS conductor between Structure #601 to #602 to reduce the sag and tower height Special Type of tower used for supprot for river crossing
602	261.1	-13.9	RX (10-30) - RX_C	57		335530.1	273685.4	625.8	ACSS (HTLS) conductor replace by AAC Neon
603	1005.1	17.9	RX (10-30) - RX_C	57		336441.7	273248.8	626.9	Nile River Crossing Section 2 of 3, containing two phase and two OHSW wire, One OHSW on each side used reduce the shielding height, AAAC Neon conductor replaced with ACSS conductor between Structure #603 to #604 to reduce the sag and tower height Special Type of tower used for supprot for river crossing
604	263.4	19.9	RX (10-30) - RX_C	57		335480.2	273541.6	625.8	ACSS (HTLS) conductor replace by AAC Neon
605	1000.8		RX (0-10) - RX_B	54		336463.0	273321.0	626.9	Nile River Crossing Section 3 of 3, containing two phase and two OHSW wire, One OHSW on each side used reduce the shielding height, AAAC Neon conductor replaced with ACSS conductor between Structure #605 to #606 to reduce the sag and tower height Special Type of tower used for supprot for river crossing
606	251.6	2.8	RX (0-10) - RX_B	54		335506.0	273614.0	625.8	Anchor Tower All three section re-join
607	292.2	-80.6	DE (60-90) -1	30	+6m Ext	335269.4	273699.5	627.1	
608	299.9		DA (0-2 Deg)	30		335126.4	273444.7	627.7	
609	368.7	21.2	DE (60-90 Deg)	30		334979.7	273183.1	628.3	Dirt Road
610	330.9		DA (0-2 Deg)	30	+3m Ext	334695.3	272948.5	631.1	Dirt Road

Srt No.	Ahead Span (M)	Line Angle	Structure Name	Tower Height (M)	Extension (M)	Easting - X	Northing - Y	Elevation -Z (MSL)	Remarks
611	230.3	54.6	DD (30-60 Deg)	30	+3m Ext	334440.0	272738.0	624.2	
612	253.5		DA (0-2 Deg)	30		334217.6	272797.9	624.6	
613	286.2		DA (0-2 Deg)	30	+6m Ext	333972.8	272863.7	624.6	Stream crossing
614	380.5		DB (0-10 Deg)	30	+9m Ext	333696.4	272938.1	626.5	
615	350.6	-10.3	DC (10-30 Deg)	30		333329.0	273037.0	628.9	Dirt Road
616	328.7		DA (0-2 Deg)	30		332979.6	273066.0	633.7	Pakwach Town is at distance of 1.0km to 1.5 km
617	321.2		DA (0-2 Deg)	30		332652.0	273093.2	639.1	
618	333.7		DA (0-2 Deg)	30		332332.0	273119.8	637.4	
619	356.5		DA (0-2 Deg)	30		331999.4	273147.4	638.2	Dirt Road
620	329.4		DA (0-2 Deg)	30	+3m Ext	331644.1	273176.8	647.4	
621	352.6		DA (0-2 Deg)	30		331315.8	273204.1	653.5	Pakwach - Pacego Road crossing
622	301.4		DA (0-2 Deg)	30		330964.4	273233.3	652.3	
623	342.0		DA (0-2 Deg)	30		330664.1	273258.2	651.8	
624	346.3		DB (0-10 Deg)	30		330323.3	273286.5	646.3	
625	318.5		DA (0-2 Deg)	30		329978.2	273315.1	644.5	
626	332.1		DA (0-2 Deg)	30		329660.8	273341.5	643.1	
627	338.9		DA (0-2 Deg)	30		329329.8	273368.9	643.7	
628	350.3		DA (0-2 Deg)	30		328992.0	273397.0	649.9	
629	351.1		DA (0-2 Deg)	30	+3m Ext	328642.9	273426.0	659.0	
630	333.4	-16.4	DC (10-30 Deg)	30		328293.0	273455.0	668.5	
631	314.2		DA (0-2 Deg)	30		327966.5	273387.8	671.0	
632	355.1		DA (0-2 Deg)	30		327658.7	273324.5	671.1	
633	318.8		DA (0-2 Deg)	30		327310.9	273252.9	667.9	
634	369.9		DA (0-2 Deg)	30		326998.6	273188.6	666.5	
635	323.3		DA (0-2 Deg)	30		326636.3	273114.0	671.7	
636	330.8		DA (0-2 Deg)	30		326319.6	273048.9	676.8	
637	331.1		DA (0-2 Deg)	30		325995.6	272982.2	677.1	
638	331.7		DA (0-2 Deg)	30		325671.3	272915.4	676.9	
639	322.1		DA (0-2 Deg)	30		325346.4	272848.6	673.9	
640	342.4		DA (0-2 Deg)	30		325031.0	272783.6	677.0	
641	358.2		DB (0-10 Deg)	30		324695.6	272714.6	675.9	
642	356.5		DA (0-2 Deg)	30	+3m Ext	324344.8	272642.4	679.8	
643	342.0		DA (0-2 Deg)	30		323995.6	272570.6	685.6	
644	355.4		DA (0-2 Deg)	30	+3m Ext	323660.6	272501.6	690.2	
645	335.7		DA (0-2 Deg)	30		323312.5	272430.0	694.9	
646	358.8		DA (0-2 Deg)	30		322983.7	272362.3	702.0	550 mtr Distance from Gulu-Arua Road
647	337.2		DA (0-2 Deg)	30	+3m Ext	322632.2	272290.0	715.4	
648	342.1	28.2	DC (10-30 Deg)	30		322302.0	272222.0	724.9	
649	352.8		DA (0-2 Deg)	30	+3m Ext	321974.1	272319.6	711.6	
650	321.7		DA (0-2 Deg)	30		321636.0	272420.3	709.2	
651	304.0		DA (0-2 Deg)	30		321327.7	272512.1	719.9	
652	319.0		DA (0-2 Deg)	30	+3m Ext	321036.3	272598.9	721.6	
653	361.1		DA (0-2 Deg)	30		320730.6	272689.9	712.0	
654	329.9		DA (0-2 Deg)	30		320384.5	272793.0	713.9	
655	344.0		DA (0-2 Deg)	30		320068.3	272887.2	724.7	
656	350.2		DA (0-2 Deg)	30	+3m Ext	319738.6	272985.4	725.1	
657	358.5		DA (0-2 Deg)	30		319403.0	273085.3	721.1	
658	317.8		DA (0-2 Deg)	30		319059.3	273187.6	721.8	
659	343.8		DA (0-2 Deg)	30	+3m Ext	318754.8	273278.3	732.5	
660	368.5		DB (0-10 Deg)	30		318425.3	273376.4	736.4	

Srt No.	Ahead Span (M)	Line Angle	Structure Name	Tower Height (M)	Extension (M)	Easting - X	Northing - Y	Elevation -Z (MSL)	Remarks
661	366.5		DA (0-2 Deg)	30	+3m Ext	318072.1	273481.6	741.9	
662	324.6		DA (0-2 Deg)	30		317720.9	273586.2	752.6	
663	326.0		DA (0-2 Deg)	30		317409.8	273678.9	756.4	
664	322.0		DA (0-2 Deg)	30		317097.3	273771.9	756.2	
665	326.8		DA (0-2 Deg)	30		316788.7	273863.8	751.0	1400 mtr Distance from Pateng Trading center
666	339.6		DA (0-2 Deg)	30		316475.5	273957.1	743.8	Dirt Road
667	324.1	-28.9	DC (10-30 Deg)	30		316150.0	274054.0	743.3	
668	375.2		DA (0-2 Deg)	30	+3m Ext	315833.4	273984.8	737.2	
669	344.5		DA (0-2 Deg)	30		315466.9	273904.6	730.7	
670	349.4		DA (0-2 Deg)	30		315130.4	273831.0	730.1	Dirt Road
671	315.5		DA (0-2 Deg)	30		314789.0	273756.3	742.1	
672	308.0		DA (0-2 Deg)	30		314480.8	273688.9	750.5	
673	331.7		DA (0-2 Deg)	30		314179.9	273623.1	752.0	
674	330.6		DA (0-2 Deg)	30	+3m Ext	313855.9	273552.3	739.1	
675	348.0		DA (0-2 Deg)	30		313532.9	273481.6	748.7	
676	354.6		DA (0-2 Deg)	30		313192.9	273407.3	745.8	
677	329.9		DA (0-2 Deg)	30	+3m Ext	312846.5	273331.5	754.6	675 mtr Distance from Gulu-Arua Road 675 mtr Distance from Paila
678	340.2		DA (0-2 Deg)	30		312524.2	273261.0	760.4	
679	318.9		DA (0-2 Deg)	30		312191.9	273188.4	764.1	
680	338.2		DB (0-10 Deg)	30		311880.4	273120.2	767.0	
681	347.2		DA (0-2 Deg)	30		311550.0	273048.0	770.9	
682	353.6		DA (0-2 Deg)	30	+3m Ext	311210.8	272973.8	775.6	
683	340.3		DA (0-2 Deg)	30		310865.3	272898.2	784.6	
684	335.9		DA (0-2 Deg)	30		310532.9	272825.5	794.9	
685	296.4		DA (0-2 Deg)	30		310204.8	272753.8	812.0	
686	308.6		DA (0-2 Deg)	30		309915.2	272690.4	826.0	
687	367.9		DA (0-2 Deg)	30		309613.7	272624.5	827.1	
688	375.3		DA (0-2 Deg)	30		309254.3	272545.9	823.3	
689	246.8		DA (0-2 Deg)	30		308887.7	272465.7	834.1	
690	365.0		DA (0-2 Deg)	30		308646.6	272413.0	835.3	
691	350.2	-6.0	DB (0-10 Deg)	30		308290.0	272335.0	835.6	
692	321.8		DA (0-2 Deg)	30		307957.7	272224.7	836.0	
693	369.8		DA (0-2 Deg)	30		307652.2	272123.3	833.5	
694	348.9		DA (0-2 Deg)	30	+3m Ext	307301.2	272006.8	838.0	
695	292.9		DA (0-2 Deg)	30		306970.1	271896.9	851.5	
696	382.6		DA (0-2 Deg)	30		306692.1	271804.7	854.8	
697	345.1		DA (0-2 Deg)	30		306329.0	271684.2	843.5	
698	348.5		DA (0-2 Deg)	30		306001.5	271575.5	844.5	
699	345.4		DA (0-2 Deg)	30		305670.8	271465.7	849.8	
700	335.3		DA (0-2 Deg)	30		305343.0	271356.9	860.7	
701	330.5		DA (0-2 Deg)	30		305024.8	271251.3	873.6	
702	338.1		DA (0-2 Deg)	30		304711.1	271147.2	885.4	
703	374.7		DB (0-10 Deg)	30		304390.2	271040.7	887.1	
704	311.1		DA (0-2 Deg)	30		304034.6	270922.7	899.6	
705	364.9		DA (0-2 Deg)	30	+3m Ext	303739.4	270824.7	914.5	
706	294.7		DA (0-2 Deg)	30		303393.1	270709.8	926.8	
707	355.0		DA (0-2 Deg)	30		303113.4	270616.9	935.0	
708	326.4		DA (0-2 Deg)	30		302776.4	270505.1	946.3	
709	344.2		DA (0-2 Deg)	30		302466.6	270402.3	958.9	
710	336.1		DA (0-2 Deg)	30	+3m Ext	302140.0	270293.9	969.7	

Srt No.	Ahead Span (M)	Line Angle	Structure Name	Tower Height (M)	Extension (M)	Easting - X	Northing - Y	Elevation -Z (MSL)	Remarks
711	355.0	73.4	DE (60-90 Deg)	30		301821.0	270188.0	975.0	805 mtr Distance from Gulu-Arua Road 805 mtr Distance from Nyaravur Village
712	385.2		DA (0-2 Deg)	30	+3m Ext	301617.5	270478.8	967.1	
713	288.6		DA (0-2 Deg)	30		301396.6	270794.4	988.7	
714	377.1		DA (0-2 Deg)	30	+3m Ext	301231.1	271030.9	1002.7	
715	313.0		DA (0-2 Deg)	30	+3m Ext	301014.8	271339.9	1009.9	
716	367.5		DA (0-2 Deg)	30	+3m Ext	300835.4	271596.3	1005.6	
717	336.0		DA (0-2 Deg)	30		300624.6	271897.4	997.0	
718	341.0		DA (0-2 Deg)	30		300432.0	272172.7	998.5	
719	317.0		DA (0-2 Deg)	30		300236.4	272452.1	996.9	
720	314.0		DA (0-2 Deg)	30		300054.7	272711.8	1011.3	
721	367.8		DA (0-2 Deg)	30		299874.6	272969.0	1013.1	
722	335.0		DA (0-2 Deg)	30	+3m Ext	299663.7	273270.4	1007.0	
723	384.2		DA (0-2 Deg)	30		299471.6	273544.9	1002.8	723 mtr Distance from Gulu-Arua Road 723 mtr Distance from Pakwiyo Village
724	336.8		DA (0-2 Deg)	30		299251.3	273859.6	1004.2	
725	354.5		DA (0-2 Deg)	30	+3m Ext	299058.2	274135.5	1005.5	Pakwiyo-Akanyo Road crossing
726	328.5		DA (0-2 Deg)	30		298854.9	274426.0	1000.4	
727	342.8		DA (0-2 Deg)	30		298666.6	274695.1	992.1	
728	363.7	-42.5	DD (30-60 Deg)	30		298470.0	274976.0	976.6	
729	355.2		DA (0-2 Deg)	30	+3m Ext	298114.9	275055.0	962.5	
730	340.4		DA (0-2 Deg)	30		297768.3	275132.2	953.0	
731	357.5		DA (0-2 Deg)	30		297436.0	275206.1	945.4	Dirt Road
732	313.6		DA (0-2 Deg)	30		297087.0	275283.8	946.6	
733	344.8		DA (0-2 Deg)	30		296781.0	275351.9	940.5	
734	323.1		DA (0-2 Deg)	30		296444.4	275426.9	944.0	
735	340.3		DA (0-2 Deg)	30		296129.0	275497.1	955.9	
736	364.3		DA (0-2 Deg)	30	+3m Ext	295796.8	275571.0	958.9	
737	363.1		DA (0-2 Deg)	30		295441.2	275650.1	952.4	
738	279.5		DA (0-2 Deg)	30		295086.8	275729.0	959.4	
739	330.8		DA (0-2 Deg)	30		294814.0	275789.7	964.4	Akaba-Akanyo Road crossing
740	386.0		DA (0-2 Deg)	30		294491.1	275861.6	955.0	
741	314.1		DA (0-2 Deg)	30		294114.2	275945.5	958.1	560 mtr Distance from Gulu-Arua Road 723 mtr Distance from Akaba Village
742	318.3		DA (0-2 Deg)	30		293807.7	276013.7	955.9	
743	378.0		DA (0-2 Deg)	30	+3m Ext	293497.0	276082.9	941.7	Stream crossing
744	341.0		DB (0-10 Deg)	30		293128.0	276165.0	942.3	
745	295.6		DA (0-2 Deg)	30		292796.3	276243.7	950.4	
746	347.0		DA (0-2 Deg)	30		292508.7	276312.0	956.8	
747	399.5		DA (0-2 Deg)	30	+3m Ext	292171.1	276392.1	947.9	
748	288.8		DA (0-2 Deg)	30	+6m Ext	291782.3	276484.3	936.8	Stream crossing
749	352.6		DB (0-10 Deg)	30	+3m Ext	291501.3	276551.0	941.1	
750	343.4		DA (0-2 Deg)	30	+3m Ext	291158.2	276632.5	952.6	Nebbi Airport Road crossing 620 mtr Distance from Gulu-Arua Road 2000 mtr Distance from Nebbi Airport

Srt No.	Ahead Span (M)	Line Angle	Structure Name	Tower Height (M)	Extension (M)	Easting - X	Northing - Y	Elevation -Z (MSL)	Remarks
751	336.1		DA (0-2 Deg)	30		290824.0	276711.8	954.8	
752	329.8		DA (0-2 Deg)	30		290497.0	276789.4	958.1	
753	329.2		DA (0-2 Deg)	30		290176.1	276865.5	960.1	
754	346.2		DA (0-2 Deg)	30		289855.8	276941.5	959.1	
755	351.8		DA (0-2 Deg)	30		289518.9	277021.5	959.4	3500 mtr Distance from Nebbi Town
756	345.9		DA (0-2 Deg)	30		289176.7	277102.7	968.1	
757	347.2		DA (0-2 Deg)	30	+3m Ext	288840.1	277182.6	980.4	
758	347.7		DA (0-2 Deg)	30	+3m Ext	288502.3	277262.7	986.0	
759	**0.0**		**DDE (0-45 Deg)**	**30**		**288164.0**	**277343.0**	**985.4**	**Line Terminate at Nebbi Substation 3300 mtr Distance from Nebbi Town**
760	**322.0**		**DDE (0-45 Deg)**	**30**		**288154.0**	**277407.0**	**983.5**	**132kV D/C Overhead Line Start from Nebbi Sub-Station Circuit-1 loded with AAAC Neon Circuit-2 loded with AAAC Neon Earthwire 1 loded with OPGW Earthwire 2 loded with OHSW**
761	327.8		DA (0-2 Deg)	30		288252.6	277713.5	977.5	
762	325.6		DA (0-2 Deg)	30		288353.0	278025.6	971.9	Dirt Road
763	309.2		DA (0-2 Deg)	30		288452.8	278335.6	968.2	
764	317.4		DA (0-2 Deg)	30		288547.4	278629.9	963.7	
765	351.6		DA (0-2 Deg)	30		288644.6	278932.0	956.1	
766	215.0		DA (0-2 Deg)	30	+6m Ext	288752.3	279266.7	950.6	Stream
767	364.1		DB (0-10 Deg)	30	+3m Ext	288818.2	279471.5	950.4	
768	344.9		DA (0-2 Deg)	30		288929.7	279818.1	951.0	
769	333.0		DA (0-2 Deg)	30		289035.3	280146.4	956.3	
770	346.9		DA (0-2 Deg)	30	+3m Ext	289137.3	280463.4	960.7	
771	328.1		DA (0-2 Deg)	30		289243.5	280793.6	960.9	Dirt Road
772	326.1		DA (0-2 Deg)	30		289344.0	281106.0	958.3	
773	361.5		DA (0-2 Deg)	30		289443.9	281416.4	950.2	710 mtr Distance from Gulu-Arua Road 710 mtr Distance from Okubu Village
774	381.6		DA (0-2 Deg)	30	+3m Ext	289554.6	281760.5	946.9	
775	361.0		DA (0-2 Deg)	30	+3m Ext	289671.5	282123.8	950.0	Dirt Road
776	328.5		DA (0-2 Deg)	30	+3m Ext	289782.1	282467.5	949.7	
777	362.5		DA (0-2 Deg)	30		289882.7	282780.2	945.3	
778	339.1		DA (0-2 Deg)	30		289993.7	283125.3	943.8	
779	324.5		DA (0-2 Deg)	30		290097.6	283448.1	949.0	1220 mtr Distance from Gulu-Arua Road 1220 mtr Distance from Anyiribu Village
780	339.1		DA (0-2 Deg)	30		290196.9	283757.0	948.4	Dirt Road
781	333.6		DA (0-2 Deg)	30		290300.8	284079.8	944.5	
782	333.1		DA (0-2 Deg)	30		290402.9	284397.3	931.6	
783	352.2		DA (0-2 Deg)	30		290504.9	284714.4	920.6	
784	323.7		DA (0-2 Deg)	30		290612.8	285049.7	910.8	
785	351.3		DB (0-10 Deg)	30		290712.0	285357.9	904.8	

Srt No.	Ahead Span (M)	Line Angle	Structure Name	Tower Height (M)	Extension (M)	Easting - X	Northing - Y	Elevation -Z (MSL)	Remarks
786	343.7		DA (0-2 Deg)	30		290819.6	285692.3	898.9	
787	339.4		DA (0-2 Deg)	30		290924.8	286019.5	897.3	
788	304.3		DA (0-2 Deg)	30		291028.8	286342.5	899.7	
789	298.4		DA (0-2 Deg)	30		291121.9	286632.2	904.9	
790	334.6		DA (0-2 Deg)	30		291213.3	286916.2	909.0	
791	354.8		DA (0-2 Deg)	30		291315.8	287234.8	903.7	
792	328.3		DA (0-2 Deg)	30		291424.5	287572.5	891.1	Gulu-Arua Road crossing
793	329.8	17.2	DC (10-30 Deg)	30		291525.0	287885.0	886.4	
794	319.8		DA (0-2 Deg)	30		291714.2	288155.2	882.8	
795	370.8		DA (0-2 Deg)	30		291897.5	288417.2	881.0	
796	317.8		DA (0-2 Deg)	30	+3m Ext	292110.2	288721.0	880.3	
797	360.0		DA (0-2 Deg)	30		292292.4	288981.4	881.8	
798	318.4		DA (0-2 Deg)	30		292498.9	289276.3	884.4	
799	327.5		DA (0-2 Deg)	30		292681.4	289537.1	886.0	
800	330.4		DA (0-2 Deg)	30		292869.2	289805.4	886.0	
801	327.2		DA (0-2 Deg)	30		293058.7	290076.1	886.5	
802	333.5		DA (0-2 Deg)	30		293246.3	290344.1	883.9	
803	323.4		DA (0-2 Deg)	30		293437.6	290617.3	880.0	
804	358.6		DA (0-2 Deg)	30		293623.0	290882.3	874.7	
805	331.9		DA (0-2 Deg)	30		293828.7	291176.1	863.9	
806	315.6	-32.3	DD (30-60 Deg)	30		294019.0	291448.0	863.4	
807	350.7		DA (0-2 Deg)	30		294033.9	291763.3	850.7	
808	325.7		DA (0-2 Deg)	30		294050.4	292113.5	836.7	
809	341.0		DA (0-2 Deg)	30		294065.7	292438.9	824.5	
810	334.5		DA (0-2 Deg)	30		294081.8	292779.5	813.1	
811	341.4		DA (0-2 Deg)	30		294097.5	293113.7	802.5	300 mtr Distance from Gulu-Arua Road 300 mtr Distance from Okollo Village
812	331.6		DA (0-2 Deg)	30		294113.6	293454.8	798.7	
813	354.5		DA (0-2 Deg)	30		294129.2	293786.0	800.3	
814	321.2		DA (0-2 Deg)	30	+3m Ext	294145.9	294140.2	798.7	
815	360.0		DA (0-2 Deg)	30		294161.0	294461.0	792.5	
816	293.1		DB (0-10 Deg)	30	+3m Ext	294178.0	294820.6	776.5	Nyagak River Crossing
817	344.0		DA (0-2 Deg)	30	+6m Ext	294191.8	295113.3	777.4	
818	334.1	-62.9	DE (60-90 Deg)	30		294208.0	295457.0	782.3	
819	342.1		DA (0-2 Deg)	30		293918.1	295623.0	790.1	
820	317.0		DA (0-2 Deg)	30		293621.2	295793.1	802.2	Okollo - Baribu Road Crossing
821	337.8		DA (0-2 Deg)	30		293346.1	295950.6	809.0	
822	332.9		DA (0-2 Deg)	30		293053.0	296118.5	817.9	
823	328.0		DA (0-2 Deg)	30		292764.1	296283.9	830.0	
824	334.3		DA (0-2 Deg)	30		292479.4	296446.9	844.6	
825	329.3		DA (0-2 Deg)	30		292189.3	296613.1	852.1	
826	322.5		DA (0-2 Deg)	30		291903.5	296776.7	859.4	
827	320.5		DB (0-10 Deg)	30		291623.7	296937.0	865.7	
828	326.7		DA (0-2 Deg)	30		291345.5	297096.3	868.9	
829	324.4		DA (0-2 Deg)	30		291062.0	297258.7	869.7	Dirt Road
830	362.9		DA (0-2 Deg)	30		290780.5	297419.9	870.4	1090 mtr Distance from Gulu-Arua Road 1090 mtr Distance from Okollo Village

Srt No.	Ahead Span (M)	Line Angle	Structure Name	Tower Height (M)	Extension (M)	Easting - X	Northing - Y	Elevation -Z (MSL)	Remarks
831	340.7		DA (0-2 Deg)	30		290465.6	297600.2	868.5	
832	315.4		DA (0-2 Deg)	30		290170.0	297769.5	876.0	
833	321.5		DA (0-2 Deg)	30		289896.3	297926.3	884.2	
834	297.7		DA (0-2 Deg)	30		289617.3	298086.0	894.8	
835	323.2		DA (0-2 Deg)	30		289358.9	298234.0	911.3	
836	343.3		DA (0-2 Deg)	30	+3m Ext	289078.4	298394.6	907.7	
837	293.3		DA (0-2 Deg)	30		288780.5	298565.2	914.2	
838	344.4	22.3	DC (10-30 Deg)	30		288526.0	298711.0	901.3	260 mtr Distance from Gulu-Arua Road
839	351.9		DA (0-2 Deg)	30		288314.5	298982.8	893.0	
840	346.0		DA (0-2 Deg)	30		288098.3	299260.5	895.8	
841	353.1		DA (0-2 Deg)	30		287885.8	299533.6	906.0	
842	355.9		DA (0-2 Deg)	30	+3m Ext	287669.0	299812.2	919.2	
843	332.3		DA (0-2 Deg)	30		287450.4	300093.1	932.1	
844	358.9		DA (0-2 Deg)	30	+3m Ext	287246.3	300355.3	933.3	
845	330.3		DA (0-2 Deg)	30		287025.8	300638.6	933.8	770 mtr Distance from Gulu-Arua Road 770 mtr Distance from Opa Village
846	348.9		DA (0-2 Deg)	30		286823.0	300899.2	936.6	Dirt Road
847	280.8		DB (0-10 Deg)	30		286608.6	301174.6	944.4	Dirt Road
848	307.3		DA (0-2 Deg)	30		286436.2	301396.2	954.3	
849	318.9		DA (0-2 Deg)	30		286247.5	301638.7	951.8	
850	349.3		DA (0-2 Deg)	30		286051.6	301890.3	941.7	
851	324.2		DA (0-2 Deg)	30		285837.1	302166.0	930.9	
852	358.5		DA (0-2 Deg)	30		285638.0	302421.8	927.3	580 mtr Distance from Gulu-Arua Road 580 mtr Distance from Anya Village
853	301.5		DA (0-2 Deg)	30		285417.8	302704.8	930.2	
854	329.9		DA (0-2 Deg)	30		285232.6	302942.7	936.0	
855	315.7	8.2	DB (0-10 Deg)	30		285030.0	303203.0	946.6	
856	304.7		DA (0-2 Deg)	30		284873.5	303477.1	950.9	610 mtr Distance from Gulu-Arua Road 610 mtr Distance from Okomi Village
857	362.6		DA (0-2 Deg)	30		284722.4	303741.7	946.6	
858	332.2		DA (0-2 Deg)	30		284542.7	304056.6	952.9	Dirt Road
859	332.6		DA (0-2 Deg)	30		284378.0	304345.1	959.2	890 mtr Distance from Gulu-Arua Road 890 mtr Distance from Uleppi Village
860	329.8		DA (0-2 Deg)	30		284213.1	304633.9	967.4	
861	331.9		DA (0-2 Deg)	30		284049.5	304920.3	973.8	
862	310.7		DA (0-2 Deg)	30		283885.0	305208.5	980.1	
863	299.4		DA (0-2 Deg)	30		283730.9	305478.4	986.3	
864	328.2		DA (0-2 Deg)	30		283582.5	305738.3	986.6	
865	357.3		DA (0-2 Deg)	30		283419.8	306023.3	979.7	
866	332.6		DA (0-2 Deg)	30		283242.6	306333.6	977.0	Dirt Road
867	361.3		DB (0-10 Deg)	30		283077.8	306622.5	979.9	
868	354.8		DA (0-2 Deg)	30	+3m Ext	282898.6	306936.3	986.5	Uleppi-Alijoda Road Crossing
869	399.5		DA (0-2 Deg)	30	+3m Ext	282722.7	307244.4	984.9	
870	312.7		DA (0-2 Deg)	30	+3m Ext	282524.6	307591.3	975.0	

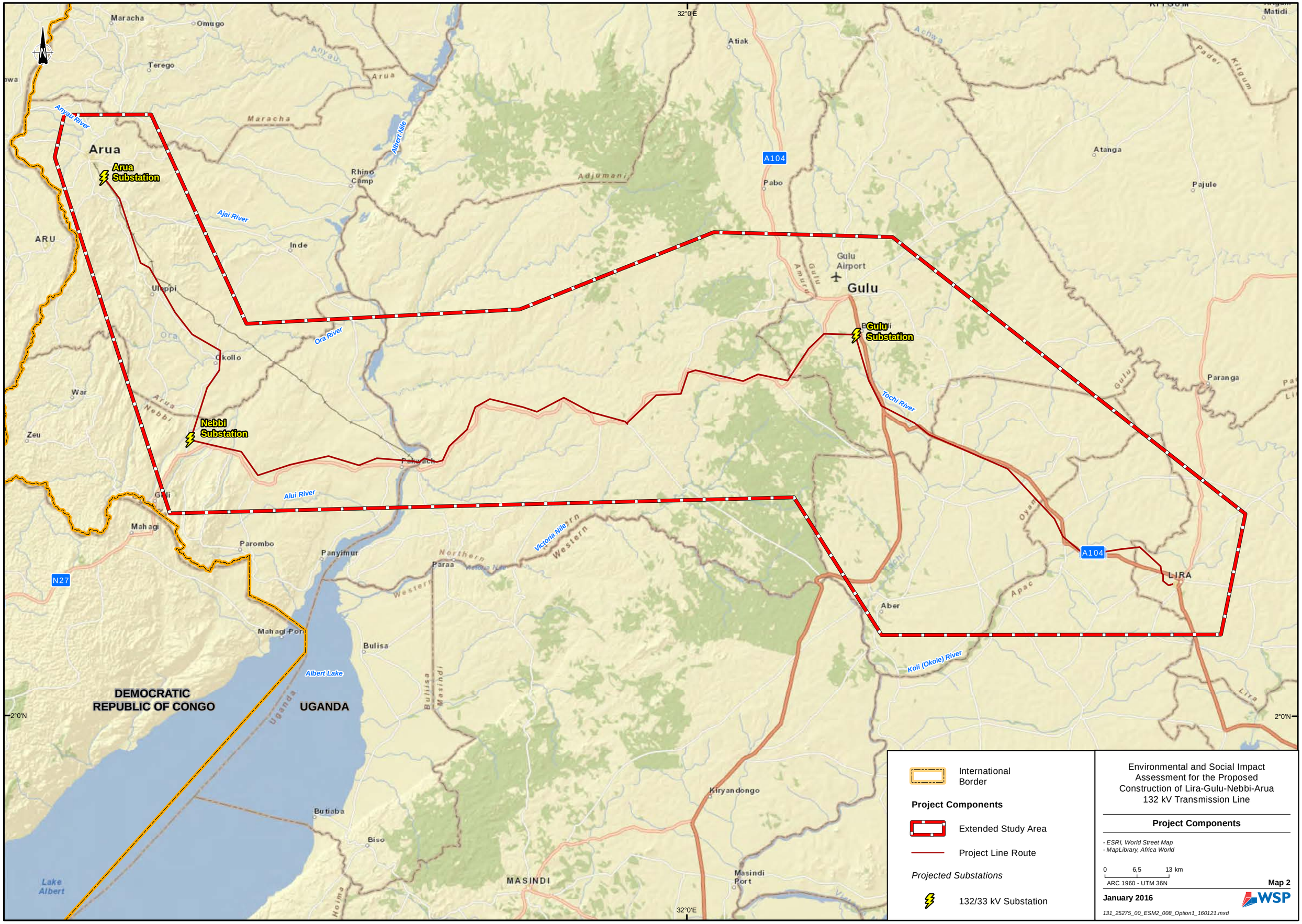
Srt No.	Ahead Span (M)	Line Angle	Structure Name	Tower Height (M)	Extension (M)	Easting - X	Northing - Y	Elevation -Z (MSL)	Remarks
871	329.8		DA (0-2 Deg)	30		282369.6	307862.9	982.2	
872	408.0		DA (0-2 Deg)	30		282206.1	308149.2	978.9	
873	314.0		DA (0-2 Deg)	30		282003.8	308503.6	989.1	
874	311.0		DA (0-2 Deg)	30		281848.1	308776.2	1002.5	
875	293.4		DA (0-2 Deg)	30		281693.9	309046.3	1008.8	
876	331.3		DA (0-2 Deg)	30	+3m Ext	281548.5	309301.1	997.6	
877	352.3		DA (0-2 Deg)	30	+6m Ext	281384.2	309588.8	995.6	
878	310.0		DA (0-2 Deg)	30		281209.5	309894.8	1018.5	
879	320.5		DB (0-10 Deg)	30		281055.8	310164.0	1019.2	
880	322.5		DA (0-2 Deg)	30		280896.9	310442.3	1020.2	
881	340.3		DA (0-2 Deg)	30		280737.0	310722.4	1010.3	
882	381.1		DA (0-2 Deg)	30		280568.3	311017.9	998.3	
883	328.4		DA (0-2 Deg)	30	+3m Ext	280379.4	311348.9	999.8	
884	344.5		DA (0-2 Deg)	30		280216.6	311634.0	1004.6	
885	314.1		DA (0-2 Deg)	30		280045.7	311933.2	1008.2	
886	315.1	-31.1	DD (30-60 Deg)	30		279890.0	312206.0	1011.2	
887	326.9		DA (0-2 Deg)	30		279614.8	312359.5	1026.8	
888	274.5		DA (0-2 Deg)	30		279329.3	312518.7	1043.8	
889	337.3		DA (0-2 Deg)	30		279089.6	312652.4	1044.3	
890	205.8		DA (0-2 Deg)	30		278795.0	312816.7	1046.2	
891	299.5		DA (0-2 Deg)	30		278615.3	312916.9	1033.6	
892	345.4		DA (0-2 Deg)	30		278353.7	313062.8	1007.5	
893	337.7	42.7	DD (30-60 Deg)	30		278052.0	313231.0	991.2	
894	365.2		DA (0-2 Deg)	30		277947.1	313552.0	980.3	Bondo-Jeko Road Crossing 1080 mtr Distance from Bondo Village
895	248.9		DA (0-2 Deg)	30	+3m Ext	277833.6	313899.0	974.8	Stream
896	364.4		DA (0-2 Deg)	30	+3m Ext	277756.2	314135.7	969.8	870 mtr Distance from Gulu-Arua Road
897	336.6		DA (0-2 Deg)	30		277642.9	314482.1	976.5	
898	333.0		DA (0-2 Deg)	30		277538.3	314802.0	990.7	
899	305.3		DA (0-2 Deg)	30		277434.8	315118.5	995.3	Dirt Road
900	344.7		DA (0-2 Deg)	30		277339.9	315408.7	991.9	
901	367.1		DA (0-2 Deg)	30		277232.8	315736.2	980.4	
902	360.0		DA (0-2 Deg)	30		277118.7	316085.1	979.5	
903	326.7		DA (0-2 Deg)	30		277006.9	316427.3	990.8	
904	297.2		DA (0-2 Deg)	30		276905.3	316737.8	1002.6	
905	302.9		DA (0-2 Deg)	30		276813.0	317020.3	1005.2	
906	280.5		DA (0-2 Deg)	30		276718.8	317308.2	998.5	
907	351.6		DB (0-10 Deg)	30	+6m Ext	276631.6	317574.8	990.1	Stream
908	404.4		DA (0-2 Deg)	30	+3m Ext	276522.4	317909.0	988.2	630 mtr Distance from Gulu-Arua Road 630 mtr Distance from Arivu Village
909	321.1		DA (0-2 Deg)	30	+3m Ext	276396.7	318293.4	998.4	Dirt Road
910	344.2		DA (0-2 Deg)	30		276296.9	318598.5	1002.3	
911	324.4		DA (0-2 Deg)	30		276189.9	318925.7	990.4	Dirt Road
912	316.0		DA (0-2 Deg)	30		276089.1	319234.0	984.1	
913	252.8		DB (0-10 Deg)	30	+6m Ext	275990.9	319534.4	974.5	
914	388.9		DA (0-2 Deg)	30	+3m Ext	275912.3	319774.6	971.7	
915	369.2		DA (0-2 Deg)	30		275791.5	320144.3	979.1	

Srt No.	Ahead Span (M)	Line Angle	Structure Name	Tower Height (M)	Extension (M)	Easting - X	Northing - Y	Elevation -Z (MSL)	Remarks
916	202.8		DA (0-2 Deg)	30		275676.7	320495.2	1001.5	
917	390.2		DA (0-2 Deg)	30		275613.7	320687.9	1007.0	
918	338.0		DA (0-2 Deg)	30		275492.4	321058.8	999.0	
919	332.4		DA (0-2 Deg)	30		275387.4	321380.1	1001.4	
920	357.2		DA (0-2 Deg)	30		275284.1	321696.0	1005.4	
921	363.7		DA (0-2 Deg)	30	+3m Ext	275173.1	322035.5	1009.7	
922	311.3		DA (0-2 Deg)	30		275060.0	322381.2	1021.0	
923	341.0		DA (0-2 Deg)	30		274963.3	322677.1	1035.6	Dirt Road
924	373.0		DA (0-2 Deg)	30		274857.3	323001.2	1037.8	
925	410.3		DA (0-2 Deg)	30	+3m Ext	274741.4	323355.7	1047.1	
926	290.7		DB (0-10 Deg)	30		274613.9	323745.7	1082.2	
927	318.4		DA (0-2 Deg)	30		274523.5	324022.0	1103.4	
928	329.0		DA (0-2 Deg)	30		274424.6	324324.6	1118.9	
929	314.4		DA (0-2 Deg)	30		274322.3	324637.3	1150.0	
930	362.6		DA (0-2 Deg)	30		274224.6	324936.1	1164.7	
931	333.8		DA (0-2 Deg)	30	+3m Ext	274111.9	325280.8	1170.0	
932	335.8		DA (0-2 Deg)	30		274008.2	325598.1	1187.4	Arua-Ajia Road Crossing
933	295.4		DA (0-2 Deg)	30		273903.8	325917.3	1195.5	370 mtr distance from Olewu Village
934	329.6	-18.4	DC (10-30 Deg)	30		273812.0	326198.0	1199.6	
935	358.9		DA (0-2 Deg)	30		273615.8	326462.9	1184.2	
936	367.6		DA (0-2 Deg)	30		273402.2	326751.2	1171.3	
937	275.8		DA (0-2 Deg)	30		273183.4	327046.6	1169.5	
938	259.3		DA (0-2 Deg)	30		273019.2	327268.3	1159.9	
939	353.8		DA (0-2 Deg)	30		272864.9	327476.6	1142.3	340 mtr Distance from Gulu-Arua Road
940	353.3		DA (0-2 Deg)	30	+6m Ext	272654.3	327760.9	1119.4	Stream
941	314.5		DA (0-2 Deg)	30		272444.0	328044.8	1129.3	
942	354.6		DA (0-2 Deg)	30		272256.8	328297.5	1138.1	
943	283.0		DA (0-2 Deg)	30	+3m Ext	272045.8	328582.5	1149.6	Dirt Road
944	336.3		DA (0-2 Deg)	30		271877.3	328809.8	1161.3	
945	283.3		DA (0-2 Deg)	30	+3m Ext	271677.2	329080.1	1149.4	
946	291.6		DA (0-2 Deg)	30		271508.6	329307.7	1161.3	
947	303.0	-4.3	DB (0-10 Deg)	30		271335.0	329542.0	1160.7	
948	323.2		DA (0-2 Deg)	30		271136.8	329771.2	1159.1	
949	309.8		DA (0-2 Deg)	30		270925.5	330015.7	1162.3	
950	**0.0**		**DDE (0-45 Deg)**	**30**		**270722.9**	**330250.1**	**1178.7**	**Line Terminate at Arua Substation, 120 mtr Distance from Gulu-Arua Road**

Source: SMEC (2015)

For the Nile River Crossing, the following coordinates are the preferred option:

TOWER NO.	TOWER DESCRIPTION	EASTING – X	NORTHING - Y
600	Anchor Tower – DC+9	336691.40	273253.00
601	River Crossing Tower – RX_C	336491.05	273391.48
602	River Crossing Tower – RX_C	335530.17	273685.40
603	River Crossing Tower – RX_C	336441.70	273248.80
604	River Crossing Tower – RX_C	335530.17	273685.40
605	River Crossing Tower – RX_B	336463.00	273321.00
606	River Crossing Tower – RX_B	335480.20	273541.60
607	Anchor Tower – DE+6	335311.62	273454.39


32°0'E
2°0'N
Maracha
Omugo
Terego
Anyau
Arua
Anyau River
Maracha
Albert Nile
Arua
Arua Substation
Rhino Camp
Adjumani
Atiak
A104
Pabo
Achwa
Pader
Kitgum
Matidi
Atanga
Pajule
Ajai River
ARU
Inde
Ulappi
Gulu Airport
Gulu
Amuru
Gulu
Gulu Substation
Ora River
Ora
Okollo
War
Arua
Nebbi
Nebbi Substation
Zeu
Paluvach
Tochi River
Paranga
Gulu
Alui River
Gili
Mahagi
Parombo
Panyimur
Victoria Nile
Northern
Western
Paraa
Murchison Falls
Western
N27
Aber
Oyam
Apac
LIRA
A104
Mahagi-Port
Bulisa
Albert Lake
Koli (Okole) River
Bulisa
Masindi
DEMOCRATIC REPUBLIC OF CONGO
UGANDA
Uganda
Lira
Kiryandongo
Butiaba
Biso
Lake Albert
MASINDI
Masindi Port
Hoima
International Border
Project Components
Extended Study Area
Project Line Route
Projected Substations
132/33 kV Substation
Environmental and Social Impact Assessment for the Proposed Construction of Lira-Gulu-Nebbi-Arua 132 kV Transmission Line
Project Components
- ESRI, World Street Map
- MapLibrary, Africa World
0 6,5 13 km
ARC 1960 - UTM 36N
Map 2
January 2016
WSP
131_25275_00_ESM2_008_Option1_160121.mxd

2.4 PROJECT AREA OF INFLUENCE

The Project area of influence can be defined as the area around the project which may be impacted by the project development. This area includes both the Direct Impact Area (DIA) and Indirect Impact Area (INDIA), based on the intensity of impacts that can be expected.

The DIA is conceived as the area within which direct project impacts are expected to be contained. The LGNA project's DIA comprises a 30 m wide servitude corridor running for the entire distance of the proposed 314 km transmission line from Lira to Arua towns, as well as the project substation sites. However, this does not mean that the entire DIA will be impacted evenly. This rather forms the basis for assessing the risks associated with predicted impacts. The key DIA areas include: pylon construction points, worker campsites (temporary), access roads, substation locations, soil disposal sites especially from substations (to be identified at construction phase), wetland areas, planted and natural forests, as well as wildlife dispersal zones.

The INDIA refers to areas that are surrounding the DIA, which may not be directly affected by the project but may be influenced by activities anticipated after the project has commenced. These areas include: local communities along the proposed project corridor on either side, people who may use roads in the project area, the woodlands, forests and the Murchison Conservation area and infrastructure like water, schools, etc.

2.5 PROJECT COMPONENTS

The following section provides a general description of the project's various components, while detailed project characteristics are described in the project's Final feasibility and detailed design studies.

The project components are the following:

- The Lira-Gulu-Nebbi-Arua 132kV transmission line
- Substations (extension of Lira substation and construction of new substations)
- Wayleave acquisition and clearance

Other project features include:

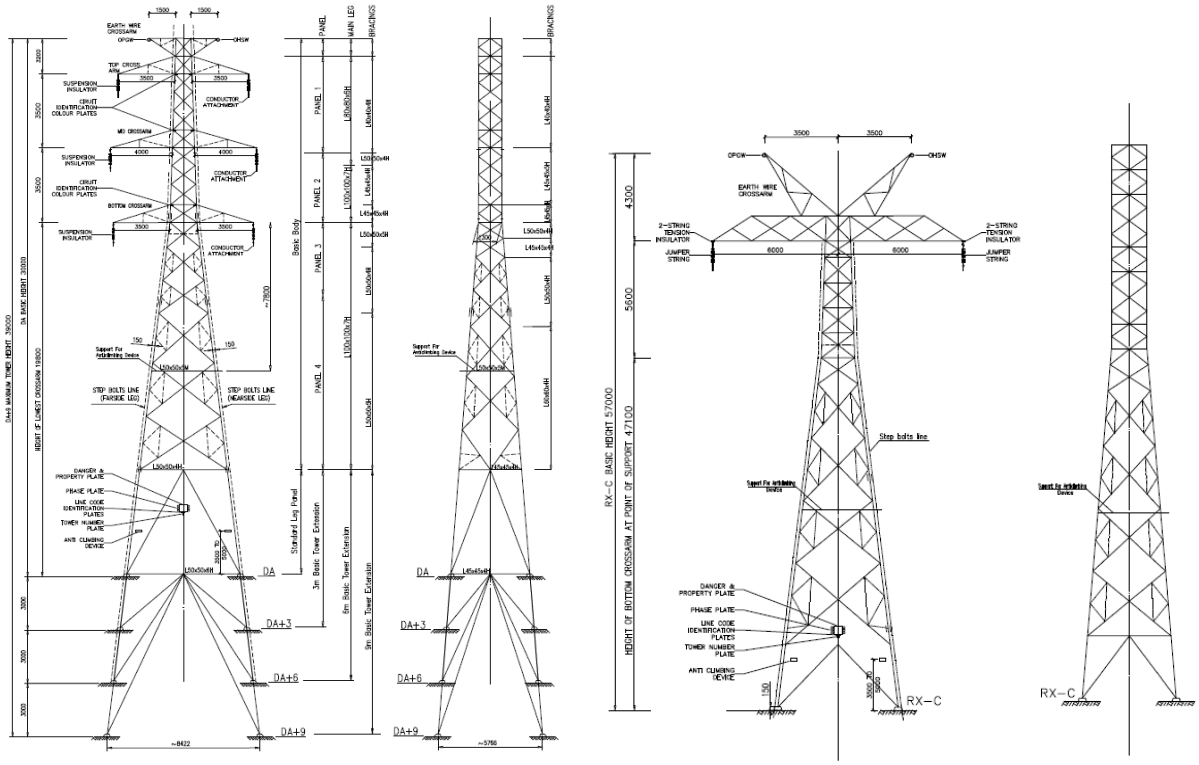
- Access roads;
- 33 kV distribution lines (excluded from the ESIA scope);
- Vegetation control.

2.5.1 LIRA-GULU-NEBBI-ARUA 132 KV TRANSMISSION LINE

2.5.1.1 VOLTAGE, NUMBER OF CIRCUITS AND TOWER DESIGN

The FS consultants' recommended project configuration includes two circuits of 132 kV alternative current, mounted on a single row of double-circuit lattice steel pylons. The proposed type of structure is the self-supporting double-circuit lattice structure with vertical conductor configuration. Special structures will also be used for the Nile crossing sections, consisting in three rows of self-supporting lattice structures supporting two conductors in horizontal configuration. Those two tower categories are illustrated in figure 2-1 below.

Figure 2-1 Main Projected Tower Configurations



SMEC 2015

Tower heights (from top of foundations to top of pylons) are projected to range between 30 and 39 metres for lattice steel suspension and angle tower (regular pylons, figure 2-1, left). Tower heights will range between 54 and 57 metres for river-crossing towers (figure 2-1, right).

It should be noted that use of monopoles was discussed for sensitive areas, notably the Nile crossing area considering the sensitive viewpoints there. However, that option was rejected due to a series of considerations outlined by SMEC representatives and detailed below:

- Use of monopoles is not technically optimal for the terminal and Nile crossing towers. Indeed, due to their reduced mechanical strength, monopoles at the Nile crossing site would have to be significantly larger than the selected terminal tower design, thereby cancelling any landscape preservation benefits;
- Again due to their reduced mechanical strength, use of monopoles is not technically optimal for angle towers. While feasible, “angle monopoles” would have required double pole structures, thereby cancelling their landscape preservation benefits;
- Installation of monopole structures at or near the Nile crossing / Murchison Falls site would present logistical difficulties, adding to the project costs. Indeed, while lattice steel structures can be transported relatively easily as individual members and assembled on site, monopoles are made of much larger parts which would require special transportation arrangements which could prove difficult considering available transport infrastructures.

2.5.1.2 PHASE CONDUCTORS AND INSULATORS

The project will use a double circuit transmission line using double and single all-aluminium alloy conductor (AAAC) - Neon. As for insulators, the FS consultants recommend using long rod silicon rubber.

2.5.1.3 TOWER FOUNDATIONS

Various types of foundations suitable for lattice steel structures are planned along the project alignment, chief among which are concrete foundations, commonly used in Uganda. As per required by UETCL guidelines, piling will be used for some pylon foundations in wetland areas. As per specified in SMEC's Transmission Line Design Report, final tower foundation design will be performed by the Contractor due to the variance of geotechnical conditions along the Project line route.

2.5.2 SUBSTATIONS

2.5.2.1 EXTENSION TO EXISTING LIRA 132/33KV SUBSTATION

The existing Lira substation is located in Lira Town in the Northern Region of Uganda, and is connected to the Opuyo substation by an existing 132 kV transmission line.

The project is projected to entail the conversion of the Lira 132kV substation to a double busbar substation, including:

- Extension and upgrading the 132kV side to double busbar arrangement;
- Installation of a 132kV transmission line bay for the connection of the Gulu line.

According to SMEC (2015), the existing Lira substation has adequate space to cater for the upgrades above.

2.5.2.2 ADDITIONAL SUBSTATIONS

Proposed Gulu, Nebbi and Arua 132/33kV Substations

These are proposed green-field substations for which no infrastructure currently exists. Their location is presented on Map 2 above. The projected coordinates of these substations are provided in Table 2-2.

Table 2-2 Coordinates for the additional 132/33kV substations

SUBSTATION	EASTING	NORTHING
Gulu		
G-SS-1	422864.1918	298583.3851
G-SS-2	423010.6518	298615.7805
G-SS-3	423064.6442	298371.6805
G-SS-4	422918.1842	298339.2850
Nebbi		
N-SS-1	288170.8765	277296.7744
N-SS-2	288148.8054	277445.1417
N-SS-3	288000.4380	277423.0705
N-SS-4	288022.5092	277274.7032
Arua		
A-SS-1	270716.255	330437.5496
A-SS-2	270810.6995	330321.1697
A-SS-3	270694.2264	330226.6497
A-SS-4	270599.7064	330343.1228

Olwiyo 132/33kV Substation

A new 132/33kV substation is planned to be constructed at Olwiyo under the Karuma Interconnection Project. It's siting and design is excluded from the scope of the LGNA project. However, its presence was considered in the line route selection process in order to allow interconnecting the projects for better quality and reliability of power supply.

Switching Station in Vicinity of Lira

UETCL is currently considering options to relieve existing Lira Substation due to the challenge of heavily built up municipality area around lira town where the substation is located, and in order to allow interconnecting the many transmission projects in the Northern region, for better quality and reliability of power supply. Those additional facilities will likely include an additional switching station to be located outside Lira municipality as well as a short line for linkage. Those facilities are excluded from the scope of the LGNA project. However, as per mentioned in Chapter 9, those additional works will be treated and compensated according to the same principles as the present ESIA and RAP.

2.5.3 WAYLEAVE ACQUISITION

As per the Electricity Act, the width of the wayleave along the Project routing will be 30 meters.

As per UETCL's Right of Way (RoW) and Wayleave Guidelines, UETCL will purchase a strip of 5 meters along the project's whole pylon alignment (2.5 metres each side of the center line) as a right-of-way. The rest of the wayleave will remain under their current owner's ownership, but will be subjected to restrictions of use. Figure 2-3 below illustrates the RoW / Wayleave configuration.

However, a larger wayleave will be required at the Nile crossing site due to the three rows of larger and longer span pylons that will be installed at that specific location. As per illustrated in figure 2-3 below, the area covered by this extended wayleave will be limited to the shores of the Nile river. The maximum width required is 180 metres.

Figure 2-2 Project RoW / Wayleave Configuration

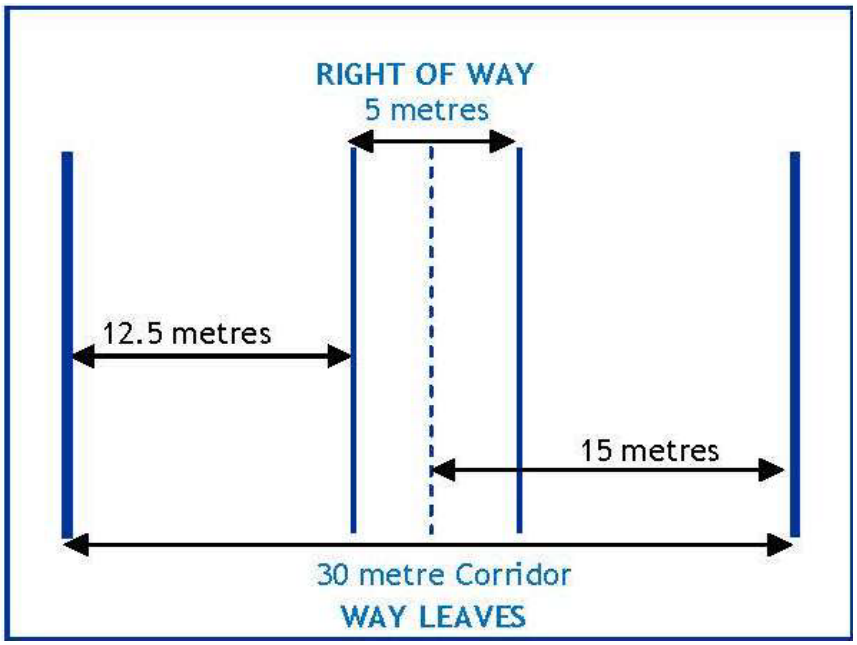


Figure 2-3 Project Wayleave Configuration, Nile Crossing Site

2.5.4 CLEARANCE

The tables below describe minimum clearances to be maintained for different conditions.

Table 2-3 Vertical Clearance

Description	Minimum clearances (m)
Clearance to Ground	7.1
Highway	8.1
Clearance to Building (from Highest Object)	5.0
Telecom line	3.5
Trees, forests, plantation	3.8
Sport field	13.5
Ordinary Railroads	8.5
Steel bridge, Steel frame weir conductor, electric train	5.0
The highest point of a ship on where the tide highest water on traffic	5.0

Source: SMEC, 2015.

Table 2-4 Horizontal clearance

Description	Minimum clearances (m)
To Center line of Roads, bridges, pipeline	100
To Center line of Power and communication circuit	50
Clearance to Building (from Nearest point)	2.75

Source: SMEC, 2015

Table 2-5 Power Line Clearance

Applicable to	Minimum clearance for 132 kv line (m)	Location of proposed 132 kv line during crossing
11 kV	3.5	Above
33 kV	3.5	Above
66 kV	3.5	Above
132 kV	3.5	Above
220 kV	4.58	Below

For aviation facilities, best practice is to request permission from airport / authorities if line runs near their infrastructures when the risk to the security of either party is significant. In case of the LGNA project, the only airfield located near the line route is the Nebbi airfield. Written approval of the line route from Uganda Civil Aviation Authority is appended to the present report in appendix 2-2.

2.5.5 EXPECTED LIFESPAN

The expected lifespan of the electricity transmission line and substations vary according to technical specifications. Generally speaking[1], the economic life of transmission assets fall into the following ranges:

- Transmission lines Steel tower 55-60 years;
- Transmission lines Steel pole: 55 years;
- Transmission cables: 40-50 years;
- Substation Switch Bay and Establishments: 45-60 years.

2.5.6 OTHER PROJECT FEATURES

2.5.6.1 ACCESS ROADS

UETCL representatives have confirmed in a meeting held at UETCL offices on June 25th, 2015 that UETCL requires building of a permanent maintenance road in the RoW along the whole project alignment, linking all pylons. This requirement originates from the understanding that UETCL have experienced a significant reduction of theft and vandalism where such roads are provided.

In wetland areas, access road construction would involve backfilling with hard ground and installing culverts for water flow. UETCL representatives have therefore confirmed in another meeting held at UETCL offices on January 14th, 2016 that no permanent access roads will be built in wetland areas. Temporary road building requirements in wetlands will be minimized by performing all construction activities in wetland areas during the dry season. All access roads will also be decommissioned after construction activities in order to minimize permanent Project footprint in sensitive ecosystems.

Additional access road designs/routings will be determined prior to construction.

2.5.6.2 33KV DISTRIBUTION LINES

33kV distribution lines are planned to come out of each of the proposed 132/33 kV Substations at Gulu, Nebbi and Arua, in order to allow for rural electricity supply. The details of the areas to be electrified are provided in appendix 2-3. It should be noted that the siting and design of these 33 kV lines are excluded from the scope of the project's ESIA and RAP. However, as per mentioned in Chapter 9, those additional works will be treated and compensated according to the same principles as the present ESIA and RAP.

2.5.6.3 VEGETATION CONTROL

Vegetation control practices under consideration in the wayleave are based on UETCL's common practices for vegetation control. Those practices are outlined below:

- Minimal vegetation control in wetland areas, as wetland vegetation is mainly composed of papyrus which does not grow to heights that would pose a risk to the Project;
- In dry land areas, vegetation control will be necessary and based exclusively on manual labour. No herbicides are to be used for vegetation control along the Project's line route.

[1] The official lifespan of the infrastructures is also determined by cost of replacement, maintenance, ambient conditions, etc. This estimate was retrieved from a study commissioned by the National Transmission Corporation (Transco) of Philippines: *Asset Revaluation Project report*, July 2005.

2.5.7 OTHER PROJECTS

As per mentioned in section 2.2 above, the project is part of the overall national grid system plan identified in UETCL's Grid Development Plan, in order to solve power availability issues in Uganda's Northern Province. According to UETCL, projects listed in Table 2-6 below are also planned and at various implementation stages.

Table 2-6 Additional Power Development Projects In or Near the Project Area[2]

NAME/ AREA OF PROJECT	OBJECTIVES	STATUS
PROJECT CURRENTLY BEING IMPLEMENTED		
Karuma – Lira transmission line	Improvement of reliability, availability and quality of supply	Currently under implementation
Nkenda-Hoima 220 kV transmission line	Provision of adequate transmission infrastructure to meet the energy needs of Uganda and improve power supply quality and security within the region.	Currently under construction
Tororo-Lira 123 kV transmission line	Improvement of reliability and power supply quality	Currently under construction
Mbarara-Mirama 220 kV transmission line	Provide a regional grid interconnection for power trade and improvement in steady power supply	Currently under construction
Karuma Interconnection 400 kV	Evacuation of power from Karuma HPP and supporting rural electrification program	Currently under construction
Bujagali-Tororo 220 kV transmission line	Regional power trade	Currently under construction
Mbarara-Nkenda 220 kV transmission line	Improvement of reliability and quality of supply in the western region of Uganda Provision of transmission capacity to evacuate power from other generation plants in the West.	Currently under construction
Kawanda-Masaka 220 kV transmission line	Improvement of reliability, availability and quality of power supply	Currently under construction
PLANNED PROJECTS		
Hoima –Kinyara-kafu 220kV transmission line (92km)	Improvement of reliability and availability of the grid as well as supporting power evacuation from generation plants in the project area	• Conclusion of feasibility study ESIA&RAP study ongoing
Ayago interconnection 400kV project(10km)	Provision of adequate transmission capacity to evacuate power generated at proposed Ayago HPS	• Conclusion of feasibility study, ESIA and RAP study ongoing. • GoU signed MoU with china Ghezhouba Group of companies(CGGC) contractor for implementation of both the HPP(Hydro Power Project) and IP (Interconnection project) • To be financed by china EXIM Bank
Lira-Gulu-Nebbi-Arua 132kV (314)km	Improvement of Availability, reliability and quality of power supply	• Feasibility study ESIA and RAP is ongoing • financed by IDA,WB under ESDP
Lira-Gulu-Agago 132kV (140km)	Provision of transmission capacity to evacuate power from Agago/Achwa 88MW power plant	• Procurement of consultant for technical assessment, detailed design, ESIA and RAP and supervision EPC works ongoing • Funded by GoU

[2] http://www.uetcl.com/index.php/site-administrator/2014-01-29-09-45-30

NAME/ AREA OF PROJECT	OBJECTIVES	STATUS
Gulu-Kitgum 132kV transmission line and Kitgum Substation	Improvement of reliability, availability and quality of supply	• Sourcing for financing
Karuma-Tororo 400kV transmission line	Improvement of reliability, availability and quality of supply	• Sourcing for financing

2.6 PROJECT COST AND SCHEDULE

2.6.1 COST

The total Project cost is estimated at USD 73 750 000. The following table provides a general breakdown of key elements of the project.

Table 2-7 Project Cost Breakdown[3]

ITEM	DESCRIPTION	TOTAL COST (000 US$)
1	Substation extension at the existing Lira substation to include Busbar extension and Line Bays to accommodate Gulu Lines;	3 269
2	90km Lira - Gulu 132V Double Circuit transmission Line using Double AAAC Neon and 132kV Lattice Steel Tower with one OHGW and one OPGW	14 072
3	Construction of 132/33 kV, 2 x 32/40 MVA new Gulu substation complete with Line Bays to Lira and Nebbi (or Olwiyo) as well as switchgear adequate for 4x33 kV indoor outgoing line feeders;	7 837
4	160km Gulu-Nebbi (via Olwiyo) 132V Double Circuit transmission Line using Single AAAC Neon and 132kV Lattice Steel Tower with one OHGW and one OPGW	25 018
5	Construction of 132/33 kV, 2 x 32/40 MVA new Nebbi substation complete with Line Bays to Arua and Gulu (or Olwiyo) as well as switchgear adequate for 4 x 33 kV indoor outgoing line feeders;	6 751
6	63km Nebbi - Arua 132V Double Circuit transmission Line using Single AAAC Neon and 132kV Lattice Steel Tower with one OHGW and one OPGW	9 851
7	Construction of 132/33 kV, 2 x 15/20 MVA new Arua substation complete with Line Bay to Nebbi as well as switchgear adequate for 4 x 33 kV indoor outgoing line feeders;	6 281
8	Construction of 2 x 33 kV distribution lines from Gulu to areas identified by the Rural Electrification Agency to facilitate rural electrification.	252
9	Construction of 2 x 33 kV distribution lines from Nebbi to areas identified by the Rural Electrification Agency to facilitate rural electrification.	196
10	Construction of 2 x 33 kV distribution lines from Arua to areas identified by the Rural Electrification Agency to facilitate rural electrification.	224
11	**SUBTOTAL FOR 33KV DISTRIBUTION LINES**	**672**
12	**SUBTOTAL FOR 132KV TRANSMISSION LINES**	**48 941**
13	**SUBTOTAL FOR 132KV SUBSTATIONS**	**24 137**
14	**TOTAL PROJECT COST ESTIMATES**	**73 750**

[3] SMEC Final Feasibility Study

2.6.2 IMPLEMENTATION SCHEDULE

The Project implementation schedule is provided in the following table:

Table 2-8 Project Implementation Schedule[4]

ITEM DESCRIPTION		HANDOVER DEADLINE
314km of 132kV double circuit transmission line from Lira substation to Arua substation passing through Gulu and Nebbi Substation	Start Date: Jan 2017 End Date: Jul 2018 Duration: 18 Months	Aug 2018
• Extension of 132kV Lira substation • Construction of 132/33 kV Gulu substation • Construction of 132/33 kV Nebbi substation • Construction of 132/33 kV Arua substation	Start Date: Jan 2017 End Date: Jul 2018 Duration: 18 Months	Aug 2018
33kV Distribution Lines	Start Date: Jan 2017 End Date: Jul 2018 Duration: 18 Months	Aug 2018

[4] SMEC Final Feasibility Study

3 ALTERNATIVES ANALYSIS

The present line route alternatives analysis aims to contribute to selection of the project line route option which has been conducted by UETCL and the FS consultant (SMEC 2015), by comparing line route options against mainly environmental and social evaluation criteria.

3.1 DEVELOPMENT AND DESCRIPTION OF LINE ROUTE OPTIONS

Line route options were developed by the FS consultant and presented in their *Final Line Route Selection Report* (SMEC, 2015). The WSP team has transposed the line route coordinates presented in that report in its geographical information system (GIS) and used it to compare options.

3.2 LINE ROUTE ALTERNATIVES

Three line routing options have been identified for interconnecting Lira, Gulu, Nebbi and Arua substations. Those contemplated routing options are described hereafter.

3.2.1 LINE ROUTE OPTION 1

According to SMEC (2015), the project's line route option 1 can be described as follows:

- Option 1 has a total of 315km traversing the districts of Lira, Oyam and Gulu to meet the Kamdini-Gulu highway at Bobi trading center via Aboke, Icheme and Ngai trading centers. From Bobi, the line moves parallel to the Gulu highway on the left hand side up to the proposed Gulu substation at Okoro trading centre.
- From Gulu substation, the line moves parallel with the Gulu-Koch road on the left hand side via Anaka Town Council to Olwiyo substation. From Olwiyo, the route takes on the right hand side to avoid going through Murchison falls National Park and proceeds through Purongo, Lolim up to Pakwach. Unlike other options that cross the River Nile very close to the Pakwach Bridge, this line route option has been designed to cross the Nile about 800m away north of the Pakwach bridge. The line then continues on the right hand side parallel to the Pakwach-Nebbi highway up to Nebbi substation. Similarly, the line retains the right hand side of the Nebbi-Arua highway from Nebbi substation up to Arua substation.

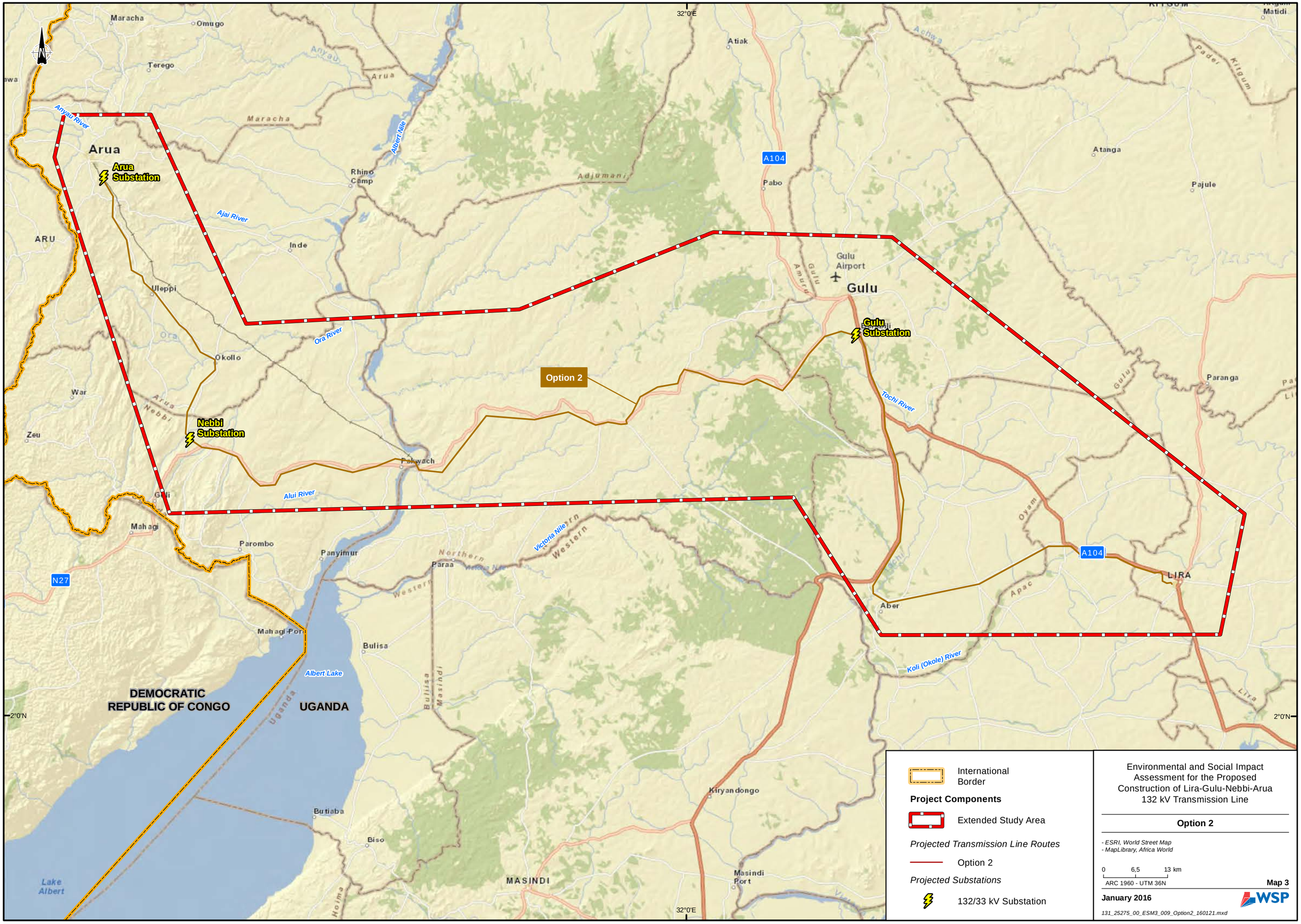
See Map 2 above for presentation of line route option 1.

3.2.2 LINE ROUTE OPTION 2

According to SMEC (2015), the project's line route option 2 can be described as follows:

- Option 2 has a total of 359 km and has been routed from Lira substation to move westwards parallel to Karuma-Lira transmission line on the right hand side up to Kamdini. In this case, the Karuma-Lira transmission corridor would simply be expanded to accommodate 2 transmission lines up to Kamdini. The line then moves northwards parallel to Kamdini-Gulu highway on the right hand side up to the Gulu substation via Minakulu and Bobi trading centers.
- From Gulu substation, the line runs parallel to Gulu-Koch road on the right hand side via Anaka Town Council to Olwiyo substation. From Olwiyo, the line route takes on the left hand side and goes through the fringes of the Murchison falls National Park via Purongo, Lolim up to Pakwach Bridge and crosses the Nile River about 60 meters north of the Pakwach Bridge. The line then continues on the left hand side parallel to Pakwach-Nebbi highway up to Nebbi substation and retains the left hand side of the Nebbi-Arua highway up to Arua substation.

Map 3 below presents line route option 2.

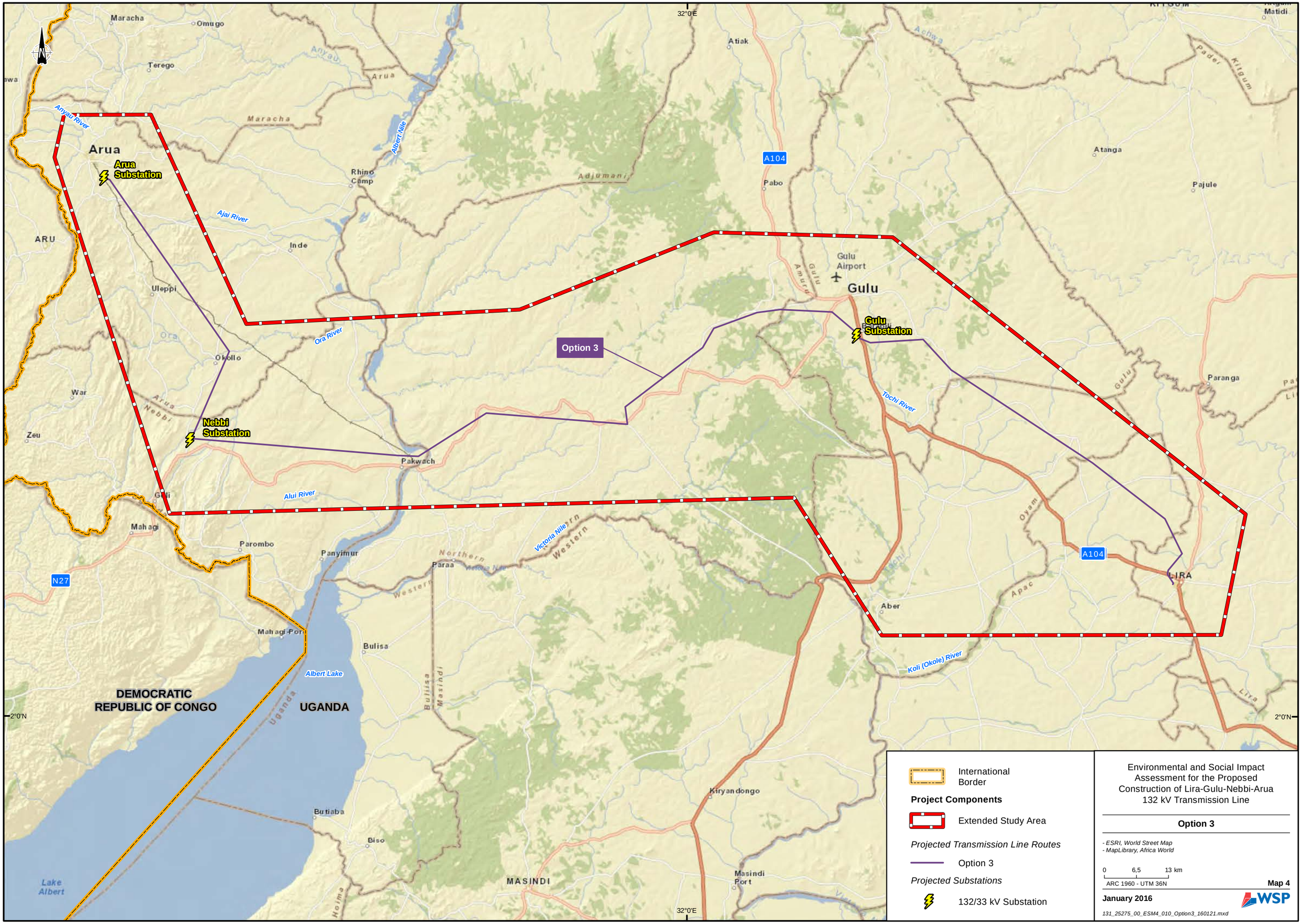

32°0'E
2°0'N
Maracha
Omugo
Terego
Anyau
Arua
Maracha
Anyau River
Albert Nile
Atiak
A104
Achwa
Pader
Kitgum
Matidi
Atanga
Pajule
Pabo
Arua
Arua Substation
Rhino Camp
Adjumani
Ajai River
ARU
Inde
Uleppi
Ora
Ora River
Okollo
Gulu Airport
Gulu
Gulu Amuru
Gulu Substation
Option 2
Paranga
Tochi River
War
Arua Nebbi
Nebbi Substation
Zeu
Pakwach
Alui River
Oyam
A104
Mahagi
Parombo
Panyimur
Victoria Nile
Northern
Western
Paraa
Albert Nile
LIRA
N27
Aber
Apac
Mahagi Port
Bulisa
Koli (Okole) River
Albert Lake
DEMOCRATIC REPUBLIC OF CONGO
UGANDA
Uganda
Bulisa Masindi
Kiryandongo
Butiaba
Biso
Lira
Lake Albert
MASINDI
Hoima
Masindi Port
International Border
Project Components
Extended Study Area
Projected Transmission Line Routes
Option 2
Projected Substations
132/33 kV Substation
Environmental and Social Impact Assessment for the Proposed Construction of Lira-Gulu-Nebbi-Arua 132 kV Transmission Line
Option 2
- ESRI, World Street Map
- MapLibrary, Africa World
0 6,5 13 km
ARC 1960 - UTM 36N
Map 3
January 2016
WSP
131_25275_00_ESM3_009_Option2_160121.mxd

3.2.3 LINE ROUTE OPTION 3

According to SMEC (2015), the project's line route option 3 can be described as follows:

- Option 3 has a total of 307km and has been routed from Lira substation to move northeast of Lira-Kamdini Highway towards the railway line via Adyel division, Omito parish, Lira district. The route then moves up to Gulu substation parallel to the railway line on the left had side. From Gulu substation, the line retains the left hand side of the railway line up to Anaka Town Council and then takes on the right side of the railway line up to Olwiyo substation. From Olwiyo, the line continues to follow the railway line via Purongo, Lolim up to Pakwach. Along the Olwiyo-Pakwach segment, the line takes on the left side of the railway line for approximately the first 30km and thereafter switches to the right for the remaining distance to Pakwach. Option 3 is routed to cross the River Nile approximately 2km north of the Pakwach Bridge. From Pakwach, the line moves north of Option 1 and Option 2 generally in a straight line to Nebbi substation. From Nebbi, the line maintains similar orientation eastwards in respect to Option 1 and 2 up to Arua substation.

Map 4 below presents line route option 3.


32°0'E
Maracha
Omugo
Terego
Anyau
Arua
Maracha
Anyau River
Albert Nile
Arua
Arua Substation
Rhino Camp
Adjumani
Atiak
A104
Pabo
Achwa
Pader
Kitgum
Matidi
Atanga
Pajule
Ajai River
ARU
Inde
Uleppi
Gulu Airport
Gulu
Gulu Amuru
Gulu Substation
Ora River
Ora
Okollo
Option 3
Tochi River
Paranga
War
Arua Nebbi
Nebbi Substation
Zeu
Pakwach
Gulu
Alui River
Mahagi
Parombo
Panyimur
Victoria Nile
Northern
Western
Paraa
Victoria Nile
Western
Oyam
Tochi
A104
LIRA
N27
Aber
Apac
Mahagi Port
Bulisa
Albert Lake
Koli (Okole) River
DEMOCRATIC REPUBLIC OF CONGO
UGANDA
Uganda
Bulisa Masindi
Lira
2°0'N
2°0'N
Kiryandongo
Butiaba
Biso
Lake Albert
MASINDI
Masindi Port
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32°0'E
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- ESRI, World Street Map
- MapLibrary, Africa World
0 6,5 13 km
ARC 1960 - UTM 36N
Map 4
January 2016
131_25275_00_ESM4_010_Option3_160121.mxd

3.3 LINE ROUTE EVALUATION METHODOLOGY

The methodology used for selecting the preferable line route option is based on an analytical approach that integrates quantitatively comparable valued environmental and social components (VESC). The line route options were then compared according to those metrics. The alternatives analysis methodology adopted by WSP looks at complex problems characterized by a mixture of sometimes competing constraints. It provides different ways of disaggregating a complex problem, of measuring the extent to which options avoid constraints according to their respective weighting.

It should be noted that the alternatives analysis methodology used in the present report is based on the comparative analysis of comparable sections of each line route option, as opposed to comparing the complete line routes against one another. This methodology was adopted in order to allow optimization of the project design, in order to maximize impact avoidance. Line route sections to be considered were established in order to be comparable and to ensure that the project objectives were reached. Those sections are as follows:

- Lira substation – Gulu substation;
- Gulu substation – Olwiyo;
- Olwiyo – Nile crossing;
- Nile crossing – Nebbi substation;
- Nebbi substation – Arua substation.

Each individual line route section is evaluated against a set of criteria moderated by the Consultant's experience and appreciation of the environmental, socioeconomic and geographic status of the study area. When compared against a given criterion, the option with the least impact is awarded one "point", which is then weighted according to a weighting factor ranging between 25% and 100%. Indeed, siting criteria and VESCs have varying importance and were classified accordingly. High resistance VESCs require to either avoid the element (when physically possible, ex: national parks) or ensure its metric will be minimized (ex. resettlement requirements). As such, they can be considered as "pass or fail" criteria. Medium resistance VESCs also need to be taken into consideration in the Project design but are more easily manageable and, if impacted, can be addressed via the ESMP or RAP. Low resistance elements can offer some resistance or impose minor design constraints (ex. infrastructure and road crossings), but are otherwise easily manageable.

The Consultant used the available baseline information as well as its own experience to identify individual option comparison criteria and their appropriate weighting factors. This approach enables the ranking of individual line route section options against environmental and social constraints.

Data on comparison criteria was collected via desktop data research, satellite photo analysis and field missions. Numbers on the amount of buildings to be resettled were established by manually counting all constructions in a 30m strip over each routing option, using recent high definition satellite pictures.

3.4 ALTERNATIVES ANALYSIS AND DESIGN RECOMMENDATIONS

3.4.1 LIRA-GULU LINE ROUTE OPTIONS' COMPARISON

Table 3-1 below provides a comparison of line route options 1, 2 and 3 based on the VESCs described above, for the project's Lira – Gulu section.

Table 3-1 Line Route Alternatives Analysis, Lira – Gulu Section

Element			Option 1		Option 2		Option 3	
			Nb.	km (linear)	Nb.	km (linear)	Nb.	km (linear)
Technical Elements	Corridor length		--	90,03	--	123,04	--	90,82
	Angle towers along central axis		21,00	--	27,00	--	13,00	--
		Points	**1**		**0**		**1**	
		Weighting Factor	**25%**		**25%**		**25%**	
		Normalised evaluation	**0,25**		**0,00**		**0,25**	
HIGH RESISTANCE								
Infrastructures	Air Strips	Presence within 2km of wayleave (along strip alignment)	0,00	--	0,00	--	0,00	--
Natural / Physical Environment	Internationally designated areas (RAMSAR, IBA, etc.)	Crossings of center line	--	0,00	--	0,00	--	0,00
	National Parks	Crossings of center line	--	0,00	--	0,00	--	0,00
	Permanent Wetlands	Crossings of center line	--	4,07	--	1,38	--	4,09
Human Environment	Resettlement requirements	Large permanent buildings in wayleave	0,00	--	7,00	--	4,00	--
		Points	**1**		**1**		**0**	
		Weighting Factor	**100%**		**100%**		**100%**	
		Normalised evaluation	**1,00**		**1,00**		**0,00**	
MEDIUM RESISTANCE								
Infrastructures	Service road requirements	Sections without existing roads or tracks nearby (1km)	--	0,00	--	0,00	--	4,30
Natural / Physical Environment	Forest Reserves	Crossings of center line	--	1,25	--	1,23	--	6,83
	Forested or partly forested habitats	Crossings of center line	--	0,46	--	1,34	--	1,63
	Seasonal Wetlands	Presence on center line	--	13,07	--	20,75	--	4,12

Element			Option 1		Option 2		Option 3	
			Nb.	km (linear)	Nb.	km (linear)	Nb.	km (linear)
Human environment	Touristic sites	Presence near center line (2 km)	0,00	--	0,00	--	0,00	--
	Resettlement requirements	Temporary buildings in wayleave	258,00	--	351,00	--	163,00	--
		Small permanent buildings in wayleave	75,00	--	108,00	--	53,00	--
		Points	**2**		**2**		**3**	
		Weighting Factor	**50%**		**50%**		**50%**	
		Normalised evaluation	**1,00**		**1,00**		**1,50**	
LOW RESISTANCE								
Infrastructures	Railway	Crossings of center line	0,00	--	0,00	--	8,00	--
	Roads	Crossings of center line	9,00	--	3,00	--	2,00	--
Natural/ Physical Environment	Rivers/ streams	Crossings of center line	6,00	--	7,00	--	4,00	--
		Points	**1**		**1**		**2**	
		Weighting Factor	**25%**		**25%**		**25%**	
		Normalised evaluation	**0,25**		**0,25**		**0,50**	
OVERALL EVALUATION			**2,50**		**2,25**		**2,25**	

The wetlands affected by the line route options are presented in Appendix 3-1.

3.4.1.1 TECHNICAL CONSIDERATIONS

As shown in the table above, line route option 1 is the shortest and most direct option; however option 3 involves the least amount of angle towers. This makes options 1 & 3 susceptible to have the smallest physical footprint and therefore susceptible to have the smallest cumulative impacts.

3.4.1.2 HIGH RESISTANCE ELEMENTS

The Lira – Gulu project section could require displacing many large buildings (especially in the section exiting Lira substation) and numerous crossings of permanent wetlands. None of the line route options allow to avoid those elements altogether. Option 2 is the one with the least impact on wetlands, while Option 1 has the least impact on larger buildings.

3.4.1.3 MEDIUM RESISTANCE ELEMENTS

The Lira – Gulu project section involves significant resettlement requirements for small and temporary buildings, and Option 3 has the least impact on this element. Option 1 and 2's service road construction requirements should be minor or inexistent. While Option 2 has the least impact on forest reserves, Option 1 best minimizes crossings of forested or partly forested habitats. Option 3, for itself, is the one that best avoids seasonal wetlands.

3.4.1.4 LOW RESISTANCE ELEMENTS

Railway and road crossings command minor design considerations. Options 1 and 2 have very limited interactions with the railway, but option 3 better avoids road crossings.

Rivers and streams pose technical challenges during line construction (obstacles to be crossed) and may be polluted during construction works or may suffer from excess erosion after the wayleave is cleared. Option 3 is the one with the least river crossings.

3.4.1.5 RECOMMENDED OPTION

Considering the information mentioned above and results of the comparative evaluation, WSP hereby recommends the selection of line route option 1 for linking Lira and Gulu substations.

3.4.2 GULU – OLWIYO LINE ROUTE OPTIONS' COMPARISON

Table 3-2 below provides a comparison of line route options 1, 2 and 3 based on the VESCs described above, for the project's Gulu – Olwiyo section.

Table 3-2 Line Route Alternatives Analysis, Gulu – Olwiyo Section

Element			Option 1		Option 2		Option 3	
			Nb.	km (linear)	Nb.	km (linear)	Nb.	km (linear)
Technical Elements	Corridor length		--	57,24	--	59,17	--	59,32
	Angle towers along central axis		13,00	--	18,00	--	9,00	--
		Points	**1**		**0**		**1**	
		Weighting Factor	**25%**		**25%**		**25%**	
		Normalised evaluation	**0,25**		**0,00**		**0,25**	
HIGH RESISTANCE								
Infrastructures	Air Strips	Presence within 2km of wayleave (along strip alignment)	0,00	--	0,00	--	0,00	--
Natural / Physical Environment	Internationally designated areas (RAMSAR, IBA, etc.)	Crossings of center line	--	0,00	--	0,00	--	0,00
	National Parks	Crossings of center line	--	0,00	--	0,00	--	0,00
	Permanent Wetlands	Crossings of center line	--	0,00	--	0,00	--	0,00
Human Environment	Resettlement requirements	Large permanent buildings in wayleave	0,00	--	0,00	--	1,00	--
		Points	**1**		**1**		**0**	
		Weighting Factor	**100%**		**100%**		**100%**	
		Normalised evaluation	**1,00**		**1,00**		**0,00**	
MEDIUM RESISTANCE								
Infrastructures	Service road requirements	Sections without existing roads or tracks nearby (1km)	--	0,00	--	0,00	--	0,00
Natural / Physical Environment	Forest Reserves	Crossings of center line	--	0,00	--	0,07	--	0,00
	Forested or partly forested habitats	Crossings of center line	--	1,40	--	1,46	--	1,44
	Seasonal Wetlands	Presence on center line	--	0,57	--	0,77	--	1,45

Element			Option 1		Option 2		Option 3	
			Nb.	km (linear)	Nb.	km (linear)	Nb.	km (linear)
Human environment	Touristic sites	Presence near center line (2 km)	0,00		0,00		0,00	
	Resettlement requirements	Temporary buildings in wayleave	117,00	--	130,00	--	85,00	--
		Small permanent buildings in wayleave	5,00	--	20,00	--	7,00	--
		Points	**4**		**0**		**2**	
		Weighting Factor	**50%**		**50%**		**50%**	
		Normalised evaluation	**2,00**		**0,00**		**1,00**	
LOW RESISTANCE								
Infrastructures	Railway	Crossings of center line	1,00	--	1,00	--	1,00	--
	Roads	Crossings of center line	6,00	--	10,00	--	2,00	--
Natural/ Physical Environment	Rivers/ streams	Crossings of center line	2,00	--	2,00	--	1,00	--
		Points	**0**		**0**		**2**	
		Weighting Factor	**25%**		**25%**		**25%**	
		Normalised evaluation	**0,00**		**0,00**		**0,50**	
		OVERALL EVALUATION	**3,25**		**1,00**		**1,75**	

The wetlands affected by the line route options are presented in Appendix 3-1.

3.4.2.1 TECHNICAL CONSIDERATIONS

As shown in the table above, line route option 1 is the shortest option; however option 3 involves the least amount of angle towers. This makes options 1 & 3 susceptible to have the smallest physical footprint and therefore susceptible to have the smallest cumulative impacts.

3.4.2.2 HIGH RESISTANCE ELEMENTS

The Gulu – Olwiyo project section has a much more limited impact on high resistance elements than the Lira – Gulu one. All line routes completely avoid important protected areas and permanent wetlands. On the resettlement issue, Options 1 & 2 are the ones with the least impact on large permanent buildings. Line route options 1 & 2 are the ones with the least impact on high resistance elements.

3.4.2.3 MEDIUM RESISTANCE ELEMENTS

Option 1 also has limited impacts on medium resistance elements. It avoids forest reserves, is the one crossing the least forested habitats and seasonal wetlands, and affects the least amount of small permanent buildings. Option 3 also avoids forest reserves and is the option with the least impact on temporary buildings. Overall, Option 1 is the one with least impact on medium resistance elements.

3.4.2.4 LOW RESISTANCE ELEMENTS

Option 3 is the one with the least impact on low resistance elements, especially road and river crossings. All options entail only one railway crossing between Gulu and Olwiyo.

3.4.2.5 RECOMMENDED OPTION

Considering the information mentioned above and line route option comparative evaluation results, WSP hereby recommends the selection of line route option 1 for linking the Gulu substation to Olwiyo.

3.4.3 OLWIYO – NILE CROSSING LINE ROUTE OPTIONS' COMPARISON

Table 3-3 below provides a comparison of line route options 1, 2 and 3 based on the VESCs described above, for the project's Olwiyo – Nile crossing section.

Table 3-3 Line Route Alternatives Analysis, Olwiyo – Nile Crossing Section

Element			Option 1		Option 2		Option 3	
			Nb.	km (linear)	Nb.	km (linear)	Nb.	km (linear)
Technical Elements	Corridor length		--	51,07	--	49,87	--	42,47
	Angle towers along central axis		14,00	--	10,00	--	2,00	--
		Points	**0**		**0**		**2**	
		Weighting Factor	**25%**		**25%**		**25%**	
		Normalised evaluation	**0,00**		**0,00**		**0,50**	
HIGH RESISTANCE								
Infrastructures	Air Strips	Presence within 2km of wayleave (along strip alignment)	0,00	--	0,00	--	0,00	--
Natural / Physical Environment	Internationally designated areas (RAMSAR, IBA, etc.)	Crossings of center line	--	0,00	--	36,75	--	18,48
	National Parks	Crossings of center line	--	0,00	--	36,75	--	18,48
	Permanent Wetlands	Crossings of center line	--	0,17	--	0,48	--	0,21
Human Environment	Resettlement requirements	Large permanent buildings in wayleave	0,00	--	0,00	--	2,00	--
		Points	**4**		**1**		**0**	
		Weighting Factor	**100%**		**100%**		**100%**	
		Normalised evaluation	**4,00**		**1,00**		**0,00**	
MEDIUM RESISTANCE								
Infrastructures	Service road requirements	Sections without existing roads or tracks nearby (1km)	--	0,00	--	21,50	--	17,05
Natural / Physical Environment	Forest Reserves	Crossings of center line	--	0,00	--	0,00	--	0,00
	GOT Afwoyo	Presence on center line	1	--	0	--	0	--
	Forested or partly forested habitats	Crossings of center line	--	0,10	--	0,71	--	0,44
	Seasonal Wetlands	Presence on center line	--	0,28	--	1,74	--	1,29

Element			Option 1		Option 2		Option 3	
			Nb.	km (linear)	Nb.	km (linear)	Nb.	km (linear)
Human environment	Touristic sites	Presence near center line (2 km)	1,00		0,00		1,00	
	Resettlement requirements	Temporary buildings in wayleave	40,00	--	57,00	--	42,00	--
		Small permanent buildings in wayleave	0,00	--	12,00	--	6,00	--
Points			**5**		**2**		**1**	
Weighting Factor			**50%**		**50%**		**50%**	
Normalised evaluation			**2,50**		**1,00**		**0,50**	
LOW RESISTANCE								
Infrastructures	Railway	Crossings of center line	6,00	--	1,00	--	2,00	--
	Roads	Crossings of center line	13,00	--	1,00	--	3,00	--
Natural/ Physical Environment	Rivers/ streams	Crossings of center line	1,00	--	1,00	--	2,00	--
Points			**1**		**3**		**0**	
Weighting Factor			**25%**		**25%**		**25%**	
Normalised evaluation			**0,25**		**0,75**		**0,00**	
OVERALL EVALUATION			**6,75**		**2,75**		**1,00**	

The wetlands affected by the line route options are presented in Appendix 3-1.

3.4.3.1 TECHNICAL CONSIDERATIONS

As shown in the table above, line route option 3 is the shortest and most direct option, involving the least amount of angle towers. This makes it the option with the smallest physical footprint.

3.4.3.2 HIGH RESISTANCE ELEMENTS

The main high resistance element encountered on the Olwiyo – Nile crossing project section is the Murchison Falls National Park, which is also an internationally recognized Important Bird Area. Option 1 is the only one that avoids encumbrance within the park's territory. It is also the one avoiding the most permanent wetlands and affects no large buildings, which makes it the routing option of choice on this segment. Option 2 also avoids large buildings.

3.4.3.3 MEDIUM RESISTANCE ELEMENTS

Option 1 also has limited impacts on medium resistance elements. It avoids forest reserves and is likely to require construction of little to no access roads. It also avoids the most seasonal wetlands and forested habitats. However, it does have a limited impact on the Got Afwoyo area which is an elephant dispersal area to the North of the Murchison Falls National Park. Finally, it has the smallest resettlement requirements on permanent and temporary small buildings. Option 2, for itself, is the one that best avoids touristic sites.

3.4.3.4 LOW RESISTANCE ELEMENTS

Option 2 is the one with the least impact on low resistance elements.

3.4.3.5 RECOMMENDED OPTION

Considering the information mentioned above and line route option comparative evaluation results, WSP hereby recommends the selection of line route option 1 for the Olwiyo – Nile crossing section.

3.4.4 NILE CROSSING – NEBBI LINE ROUTE OPTIONS' COMPARISON

Table 3-4 below provides a comparison of line route options 1, 2 and 3 based on the VESCs described above, for the project's Nile crossing – Nebbi section.

Table 3-4 Line Route Alternatives Analysis, Nile Crossing – Nebbi Section

Element			Option 1		Option 2		Option 3	
			Nb.	km (linear)	Nb.	km (linear)	Nb.	km (linear)
Technical Elements	Corridor length		--	50,63	--	52,03	--	48,83
	Angle towers along central axis		10,00	--	13,00	--	4,00	--
		Points	**0**		**0**		**2**	
		Weighting Factor	**25%**		**25%**		**25%**	
		Normalised evaluation	**0,00**		**0,00**		**0,50**	
HIGH RESISTANCE								
Infrastructures	Air Strips	Presence within 2km of wayleave (along strip alignment)	0,00	--	0,00	--	1,00	--
Natural / Physical Environment	Internationally designated areas (RAMSAR, IBA, etc.)	Crossings of center line	--	0,00	--	0,00	--	0,00
	National Parks	Crossings of center line	--	0,00	--	0,00	--	0,00
	Permanent Wetlands	Crossings of center line	--	0,51	--	0,00	--	0,09
Human Environment	Resettlement requirements	Large permanent buildings in wayleave	0,00	--	0,00	--	0,00	--
		Points	**1**		**2**		**0**	
		Weighting Factor	**100%**		**100%**		**100%**	
		Normalised evaluation	**1,00**		**2,00**		**0,00**	
MEDIUM RESISTANCE								
Infrastructures	Service road requirements	Sections without existing roads or tracks nearby (1km)	--	0,00	--	0,00	--	6,60
Natural / Physical Environment	Forest Reserves	Crossings of center line	--	0,00	--	0,00	--	1,02
	Forested or partly forested habitats	Crossings of center line	--	0,07	--	0,13	--	0,12
	Seasonal Wetlands	Presence on center line	--	3,99	--	6,80	--	1,85
Human environment	Touristic sites	Presence near center line (2 km)	0,00		0,00		0,00	

Element			Option 1		Option 2		Option 3	
			Nb.	km (linear)	Nb.	km (linear)	Nb.	km (linear)
	Resettlement requirements	Temporary buildings in wayleave	73,00	--	91,00	--	210,00	--
		Small permanent buildings in wayleave	4,00	--	9,00	--	17,00	--
Points			**5**		**2**		**1**	
Weighting Factor			**50%**		**50%**		**50%**	
Normalised evaluation			**2,50**		**1,00**		**0,50**	
LOW RESISTANCE								
Infrastructures	Railway	Crossings of center line	1,00	--	0,00	--	1,00	--
	Roads	Crossings of center line	4,00	--	2,00	--	0,00	--
Natural/ Physical Environment	Rivers/ streams	Crossings of center line	3,00	--	3,00	--	3,00	--
Points			**0**		**1**		**1**	
Weighting Factor			**25%**		**25%**		**25%**	
Normalised evaluation			**0,00**		**0,25**		**0,25**	
OVERALL EVALUATION			**3,50**		**3,25**		**1,25**	

The wetlands affected by the line route options are presented in Appendix 3-1.

3.4.4.1 TECHNICAL CONSIDERATIONS

As shown in the table above, line route option 3 is the shortest and most direct option, involving the least amount of angle towers. This makes it the option with the smallest physical footprint.

3.4.4.2 HIGH RESISTANCE ELEMENTS

The main high resistance element encountered on the Nile crossing – Nebbi project section is an airstrip near Nebbi. Options 1 and 2 are the only ones located farther than 2km away from that airstrip's alignment. Option 2 completely avoids permanent wetlands, and all three routing options avoid large buildings.

3.4.4.3 MEDIUM RESISTANCE ELEMENTS

Option 1 is the one with the least impact on medium resistance elements on the Nile – Nebbi section. Options 1 and 2 are likely to require construction of little to no access roads, and have the least impact on forest reserves. Option is the one requiring the least small buildings resettlement, while option 2 has the least impact on forested habitats and option 3 best avoids seasonal wetlands.

3.4.4.4 LOW RESISTANCE ELEMENTS

Regarding low resistance elements, Option 2 completely avoids railway crossings, while Option 3 best avoids road crossings.

3.4.4.5 RECOMMENDED OPTION

Considering the information mentioned above and line route option comparative evaluation results, WSP hereby recommends the selection of line route option 1 for the Nile crossing - Nebbi section.

3.4.5 NEBBI – ARUA LINE ROUTE OPTIONS' COMPARISON

Table 3-5 below provides a comparison of line route options 1, 2 and 3 based on the VESCs described above, for the project's Nebbi – Arua section.

Table 3-5 Line Route Alternatives Analysis, Nebbi – Arua Section

Element			Option 1		Option 2		Option 3	
			Nb.	km (linear)	Nb.	km (linear)	Nb.	km (linear)
Technical Elements	Corridor length		--	62,79	--	63,84	--	63,00
	Angle towers along central axis		11,00	--	19,00	--	5,00	--
		Points	**1**		**0**		**1**	
		Weighting Factor	**25%**		**25%**		**25%**	
		Normalised evaluation	**0,25**		**0,00**		**0,25**	
HIGH RESISTANCE								
Infrastructures	Air Strips	Presence within 2km of wayleave (along strip alignment)	0,00	--	0,00	--	0,00	--
Natural / Physical Environment	Internationally designated areas (RAMSAR, IBA, etc.)	Crossings of center line	--	0,00	--	0,00	--	0,00
	National Parks	Crossings of center line	--	0,00	--	0,00	--	0,00
	Permanent Wetlands	Crossings of center line	--	0,00	--	0,00	--	0,00
Human Environment	Resettlement requirements	Large permanent buildings in wayleave	0,00	--	0,00	--	0,00	--
		Points	**0**		**0**		**0**	
		Weighting Factor	**100%**		**100%**		**100%**	
		Normalised evaluation	**0,00**		**0,00**		**0,00**	
MEDIUM RESISTANCE								
Infrastructures	Service road requirements	Sections without existing roads or tracks nearby (1km)	--	0,00	--	0,00	--	4,70
Natural / Physical Environment	Forest Reserves	Crossings of center line	--	3,80	--	5,44	--	1,56
	Forested or partly forested habitats	Crossings of center line	--	0,74	--	3,22	--	1,66
	Seasonal Wetlands	Presence on center line	--	0,45	--	0,50	--	0,59
Human environment	Touristic sites	Presence near center line (2 km)	0,00		0,00		0,00	

Element			Option 1		Option 2		Option 3	
			Nb.	km (linear)	Nb.	km (linear)	Nb.	km (linear)
	Resettlement requirements	Temporary buildings in wayleave	151,00	--	93,00	--	72,00	--
		Small permanent buildings in wayleave	2,00	--	4,00	--	0,00	--
Points			**4**		**1**		**2**	
Weighting Factor			**50%**		**50%**		**50%**	
Normalised evaluation			**2,00**		**0,50**		**1,00**	
LOW RESISTANCE								
Infrastructures	Railway	Crossings of center line	1,00	--	1,00	--	1,00	--
	Roads	Crossings of center line	0,00	--	26,00	--	0,00	--
Natural/ Physical Environment	Rivers/ streams	Crossings of center line	2,00	--	2,00	--	3,00	--
Points			**2**		**1**		**1**	
Weighting Factor			**25%**		**25%**		**25%**	
Normalised evaluation			**0,50**		**0,25**		**0,25**	
OVERALL EVALUATION			**2,75**		**0,75**		**1,50**	

The wetlands affected by the line route options are presented in Appendix 3-1.

3.4.5.1 TECHNICAL CONSIDERATIONS

As shown in the table above, line route option 1 is the shortest option, while option 3 involves the least amount of angle towers. Those two options therefore arrive *ex aequo* in terms of physical footprint.

3.4.5.2 HIGH RESISTANCE ELEMENTS

No high resistance elements are encountered on the Nebbi – Arua project section. All routing options arrive *ex aequo* on impacts on high resistance elements.

3.4.5.3 MEDIUM RESISTANCE ELEMENTS

Option 1 is the one with the least impact on medium resistance elements on the Nebbi – Arua section. It is likely to require construction of little to no access roads, and has the least impact on seasonal wetlands and forested/partly forested habitats. Option 2 is also unlikely to require construction of access road. Option 3 best avoids forest reserves. Option 3 has the lowest resettlement requirements for temporary buildings, while Option 1 affects the least and small permanent buildings.

3.4.5.4 LOW RESISTANCE ELEMENTS

Option 1 is likely to have the least impact on low resistance elements, since it best avoids road and river crossings. All routing options cross railway once. Option 2 also minimizes river crossings, while option 3 avoids road crossings.

3.4.5.5 RECOMMENDED OPTION

Considering the information mentioned above and line route option comparative evaluation results, WSP hereby recommends the selection of line route option 1 for the Nebbi - Arua section.

3.4.6 SUMMARIZED LINE ROUTING OPTION SELECTION RECOMMENDATION

In conclusion and considering the results detailed above, WSP concurs with the FS consultant's recommendation to select line route option 1 over the whole length of the Project.

As a consequence, following sections of the present report will focus their attention on line route option 1.

4 REGULATORY AND INSTITUTIONAL FRAMEWORK

This section presents the relevant institutional actors and legal texts that are important to consider for the preparation of the ESIA and RAP, as well as an outline of the applicable legal EIA processes in Uganda.

4.1 CONSTITUTIONAL REQUIREMENTS FOR ENVIRONMENTAL PROTECTION

The Constitution of the Republic of Uganda 1995 has a number of articles concerning protection of natural resources. Article XIII provides that “the obligation of protecting important natural resources on behalf of the people of Uganda” is vested with the state. Article XXVII affirms the need for sustainable management of land, air and water resources, Article 237 on Land ownership provides that Land in Uganda belongs to the citizens of Uganda and shall vest in them in accordance with the land tenure systems provided for in the Constitution. Article 242 highlights the fact that Government may, under laws made by Parliament and policies made from time to time, regulate the use of land. Article 245 addresses, among others concerns, the protection and preservation of the environment from abuse, pollution and degradation as well as managing the environment for sustainable development and promoting environmental awareness.

4.2 POLICY FRAMEWORK

4.2.1 RELEVANT NATIONAL DEVELOPMENT GOALS

4.2.1.1 UGANDA VISION 2040

The Uganda Vision 2040 is a reflection about Uganda’s aspirations and what the citizens wish their country to be by the year of 2040. It aims at improving the country’s position from low income (506$ per capita) to a competitive upper middle income country with per capita income of 9 500$. Amongst other ways to achieve such targets, Uganda needs to generate up to 42 000 MW by 2040, thus increasing its per capita electricity consumption to 3 668 kWh. In addition, access to the national grid has to increase to 80 per cent. The proposed Lira-Gulu-Nebbi-Arua 132 kV transmission line goes in the same way.

4.2.1.2 SECOND NATIONAL DEVELOPMENT PLAN (NDPII)

This plan is the second in a series of six five-year plans aimed at achieving the Uganda Vision 2040. It’s goal is to strengthen Uganda’s competitiveness for sustainable wealth creation, employment and inclusive growth.

4.2.2 UGANDA NATIONAL POLICIES

4.2.2.1 UGANDA GENDER POLICY

This policy aims a ensuring that all Government policies and programmes are consistent with the long-term goal of eliminating gender inequalities. It provides for gender balance and fair representation of marginalised groups, recognizes the role of women in society, accords equal citizenship rights, freedom from discrimination, affirmative action in favour of women, and articulates specific women’s rights including outlawing customs, traditions and practices that undermine the welfare, dignity and interests of women.

4.2.2.2 NATIONAL POLICY ON HIV/AIDS AND THE WORLD OF WORK

The Human Immunodeficiency Virus (HIV) affects the most productive segment of Uganda’s labor force and has proven to be one of the biggest obstacles for the government to achieve the Poverty Eradication Action Plan (PEAP) goals. This national policy aims at providing a framework for prevention

of further spread of HIV and mitigation of the socio-economic impact of the epidemic within the world of work in Uganda; it emphasizes the importance of promoting and protecting human rights, participation of people living with HIV/AIDS, gender equality as well as prevention, care, support and treatment as the major tool to be used in addressing the impact of HIV/AIDS in the Uganda world of work.

4.2.2.3 HEALTH SECTOR STRATEGIC PLAN III

This plan provides an overall framework for the health sector and mainly aims at contributing towards the overall development goal of the Government of Uganda (GoU) of accelerating economic growth to reduce poverty as stated in the National Development Plan (NDP). It details the priority interventions and seeks to achieve better health results and provide a framework for increased aid effectiveness.

4.2.2.4 MINERAL POLICY OF UGANDA

This policy provides a formal framework upon which the mineral sector will develop within the national strategy for poverty eradication and development and aims at maximising economic and social benefits of mineral exploitation, promoting all technically feasible and environmentally sound exploitation alternatives and stimulating innovative approaches within operators focusing on private sector driven initiatives through new fiscal and technical incentives.

4.2.2.5 UGANDA WILDLIFE POLICY

This National Policy's vision is to sustainably manage and develop Uganda's wildlife resources and healthy ecosystems and to enhance wildlife contribution to national growth, employment and socio-economic transformation. It provides a framework within which all wildlife conservation industry stakeholders (Government institutions, private sector, development partners, civil society, etc.) must operate in order to sustainably conserve and develop the wildlife resource base for national socio-economic transformation.

4.2.3 UETCL POLICIES

4.2.3.1 UETCL CORE VALUES

UETCL's work is centered on the following core values[1]:

- Self-respect and respect for others;
- Transparency and integrity;
- Innovativeness, initiative and continuous quality improvement;
- Corporate social responsibility;
- Loyalty;
- Ethical business conduct;
- Continuous learning and improvement;
- Environmentally responsible;
- Team culture;
- Best business practices and cost efficiency.

4.2.3.2 UETCL SAFETY, HEALTH AND ENVIRONMENTAL POLICY

UETCL's SHE Policy states that no work of any nature, required to be carried out by an employee or contractor of UETCL, which cannot be carried out in a safe and proper manner.

Management commits itself and takes full responsibility to enforce a series of principles at all times. Employees, contractors, customers and the general public, are expected to comply with all safety procedures and practices and take reasonable care not to do anything or create any condition that will endanger their lives, people around them and the assets of UETCL at all times. Those principles are the following:

[1] Uganda Electricity Transmission Company Limited, [date unknown]. Booklet entitled "Providing a Reliable Backbone to National Economic Growth".

- To provide a safe and healthy working environment in which all employees, visitors and contractors are aware of the need to observe safe practices to prevent injury to themselves and others.
- To comply with statutory requirements as a minimum and company safety, health and environmental rules & regulations where these are higher than the statutory requirement.
- To establish safe, healthy and environmentally sound working procedures and practices, continually monitoring their implementation for all workers, workplaces and public interface points.
- To ensure that employees are adequately trained to efficiently carry out their work in a safe, healthy and environmentally friendly manner and that they are made aware of any special safety requirements in their work area including emergency situations.
- To promote harmonious co-operation and communication between employees and management, ensuring that there is immediate implementation of viable suggestions related to health, safety and the environment.
- To ensure that all accidents including near misses and dangerous occurrences are investigated.
- To mitigate the pollution of the environment resulting from UETCL activities.
- To maintain a Safety Rules and Regulations Manual available to all employees.
- To continually improve our Safety, Health and Environmental programs and performance through periodic evaluation and implementation of appropriate corrective and preventive actions.
- To establish a Health & Safety Committee that will consult in a cooperative spirit to identify and resolve safety and health problems in support of the Company's Safety and Health programs and regulations.

4.2.3.3 UETCL HIV/AIDS POLICY

UETCL recognizes that one of the most effective ways of reducing and managing the impact of HIV&AIDS at the workplace is through the implementation of an HIV&AIDS workplace Policy and programme. Therefore a workplace HIV&AIDS Policy was developed and launched and it is now guiding the response at UETCL with interventions carried out annually. The policy is presented below.

1. Introduction

1.1 Preamble

Uganda Electricity Transmission Company Limited (UETCL)'s HIV/AIDS Policy comes from a desire to protect basic human rights, preserve the integrity of its labour force, reduce costs associated with HIV/AIDS, and respond to what the company recognizes as a global challenge.

UETCL is adopting a holistic approach to the HIV/AIDS pandemic from the dual perspective of an employer and that of a good corporate citizen, thereby providing valuable, needed and sustainable contributions.

The policy reflects this comprehensive approach, including education, de-stigmatisation, non-discrimination, reducing infections, employee health and well-being, and improving the quality of lives for infected and affected employees and their families.

1.2 Policy Objectives

The key aims of the policy are to:

- Provide information and education to all employees, on HIV/AIDS; the magnitude, impact and preventive and control measures.
- Implement non-discriminatory procedures and practices for managing individuals who have HIV/AIDS taking into account local practices, culture and any legislation.
- Comprehensively manage HIV positive employees and employees living with AIDS in the same manner as those with ether progressive and debilitating illnesses.
- Cooperate with other organizations in combating HIV/AIDS.

1.3 Policy Application

The policy applies to all operations of the company and to all employees of UETCL.

1.4 Policy Rationale

UETCL has developed the HIV/AIDS Policy for the following reasons:

1.4.1 Social Responsibility

In Uganda and the East Africa region HIV/AIDS is one of the most important and daunting health problems facing all stakeholders.

UETCL considers that it has a social responsibility to support local and global HIV/AIDS preventive and control efforts.

1.4.2 Employee Health and Well Being

Employees are critical to the success of the business. The loss of an employee is not only a personal and family tragedy, but also results in direct and indirect loss to the company in terms of medical costs, retraining, recruitment and productivity.

UETCL is committed to the protection and maintenance of the employee's health and well-being within affordable limits

1.4.3 Human and Legal rights of HIV/AIDS Infected Staff

Protection of the human rights and dignity of HIV infected staff, including those with AIDS, is essential to the prevention and control of HIV/AIDS. Employees with HIV infection need to be treated in the same way as other staff and subject to their health, may want to continue working for as long as possible.

2. Policy Structure and Principles

2.1 Education and Awareness

2.1.1 Education Programme and Dissemination of Information

UETCL will collect and disseminate information of the magnitude of the disease and developments, especially those relating to prevention.

To implement this effectively, UETCL will distribute this policy document, posters, fliers and other media based information to all employees and will encourage staff attendance at the educational and informative presentations and sessions given locally by the in- house peer educators and counselors.

UETCL will strive to make all relevant information accessible to all members of staff.

2.1.2 Support for Preventive Programmes

UETCL will identify reputable local and international non-government organizations (NGO's) and other relevant service providers, to complement and contribute to the in-house HIV/AIDS prevention and education programmes.

2.1.3 HIV/AIDS Focal Point Person

UETCL is committed to maintaining a safe environment for all its employees and customers.

UETCL will therefore take all reasonable and practical steps to ensure that a Focal Point Person is appointed as stated in the National Aids Policy document and ensure availability of first aid kits.

The HIV/AIDS Focal Point Person will keep relevant information in accordance with National Aids Policy.

2.2 Implementation Guidelines

2.2.1 Job Applicants

UETCL will not use HIV testing when recruiting job candidates.

2.2.2 HIV Testing and Screening

As a policy, HIV testing and screening of employees is voluntary. Some countries however require an HIV free status for work permit applications and for business travel. Suppliers of medical insurance and pension schemes may also demand testing.

Where testing is required under the above circumstances, the employee will be given a right of refusal, and should the employee agree then the testing will be accompanied by pre and post test counseling. Should a test prove positive, then the outcome must be regarded as a matter between the employee, management, and the doctor concerned.

2.2.3 Confidentiality of HIV/AIDS Information

UETCL employees are under no obligation to notify the Management of their HIV/AIDS status. UETCL considers medical information including HIV/AIDS status confidential, unless disclosure is legally required.

2.2.4 Harassment and Discrimination

Any form of discrimination or harassment, directly or indirectly, towards an HIV/AIDS infected employee will be considered to be misconduct warranting disciplinary action in line with the UETCL staff Regulations.

2.2.5 Isolation/ Segregation of HIV/AIDS Infected Employees

No employee will be isolated, or segregated against on the grounds of their HIV/AIDS status.

2.2.6 Sick Leave and Termination of Employment

Employees who are prevented from performing their duties due to HIV/AIDS illness will be granted sick leave or have their employment terminated in accordance with the terms and conditions describe under sick leave in UETCL staff Regulations.

2.3 Comprehensive Health Support Programme

This programme focuses on all staff, both HIV negative and HIV positive, in the following ways.

2.3.1 Condoms

Condoms will be accessible to all members of staff.

2.3.2 Sexually Transmitted Infections (STIs)

STIs increase the likelihood of transmission of the HIV, but can be easily and effectively treated. Access to information on the prevention and treatment of STIs will be provided.

2.3.3 Voluntary Counseling and Testing

UETCL will facilitate access to free, safe and confidential voluntary individual HIV testing, supported by pre-test and post-test counseling, will encourage staff to know their status and take appropriate measures.

2.4 Anti-Retroviral Therapy

UETCL will support the national Anti-retroviral Therapy strategy where the employee will be facilitated to access Anti-retrovirals offered free in outlets in the country agreed and reviewed from time to time.

All tested employees and their registered spouses, and children as stipulated in the staff Regulations will benefit.

3. Roles and Responsibilities

3.1 The Board of Directors

The Board of Directors is responsible for this document and has the mandate to review it from time to time when need arises.

3.2 UETCL Management

UETCL Management is responsible for the implementation of the UETCL HIV/AIDS Policy.

3.3 Employees

All employees shall be involved in the formulation and implementation of the guidelines.

4.3 INSTITUTIONAL ACTORS

The table below presents the relevant institutional actors in the Project's environmental assessment and resettlement process.

Table 4-1 Active Institutional Actors in the Environmental Assessment and Resettlement Process of Electricity Transmission Projects

SECTOR	INSTITUTIONAL ACTORS
Overseeing Authorities	National Planning Authority (NPA);
Energy	Ministry of Energy and Mineral Development (MEMD); Electricity Regulatory Agency (ERA); Uganda Electricity Transmission Company Limited (UETCL); UMEME former Uganda Electricity Distribution Company Limited (UEDCL); Uganda Rural Electrification Agency (REA).
Environment	National Environment Management Authority (NEMA); Uganda Wildlife Authority (UWA); National Forestry Authority (NFA); Ministry of Water and Environment (MWE);
Socioeconomic sector	Ministry of Gender, Labour and Social Development (MoGLSD)
Population resettlement and compensation	Ministry of Lands, Housing and Urban Development (MLHUD); Ministry of Agriculture, Animal Industry and Fisheries (MAAIF);
Local Authorities	Relevant district authorities.

4.3.1 OVERSEEING AUTHORITIES

4.3.1.1 NATIONAL PLANNING AUTHORITY (NPA)

The Authority was created in 2002 under the country's constitution. Its mandate is to develop, coordinate, manage and evaluate all procedures and strategies for planning and developing the country. Its main function is to produce integrated development plans as part of a medium and long term vision.

4.3.2 ENERGY SECTOR

4.3.2.1 MINISTRY OF ENERGY AND MINERAL DEVELOPMENT (MEMD)

The MEMD's mandate is to promote the sustainable exploitation and utilization of energy and mineral resources in Uganda, for social and economic development. The Ministry is concerned with matters such as energy policy, mining investments, as well as establishment of new power generating infrastructures using hydro, thermal, and solar and nuclear power.

4.3.2.2 ELECTRICITY REGULATORY AGENCY (ERA)

The Electricity Act of 1964 had established the Uganda Electricity Board as a fully state owned parastatal with monopoly on generation, transmission and distribution of electricity. It has been replaced by the Electricity Act 1999, which liberalized the electricity market in the country and established the ERA.

The ERA is established as a body corporate with capability to sue or be sued, and is responsible for the regulation of the electricity sector. It consists of five members appointed by the Minister responsible for electricity, with the approval of cabinet. As part of its mandate, ERA is inter alia responsible for the issuance and regulation of compliance with licenses, establishment of a tariff structure, approving rates of charges and terms and conditions of electricity services of transmission and distribution companies[2].

4.3.2.3 UGANDA ELECTRICITY TRANSMISSION COMPANY LIMITED (UETCL)

Uganda Electricity Transmission Company Limited (UETCL) is a Public Limited Company which was incorporated on 26th March 2001. The Company operates under policy guidance of the Ministry of Energy and Mineral Development. It is one of the three successor companies created as a result of the unbundling of Uganda Electricity Board (UEB). It is a public limited liability Company owned by the Ministry of Finance, Planning and Economic Development.

UETCL has the operational mandate that is divided into the Single buyer business and Transmission system operator. It therefore undertakes bulk power purchases and sales, import and export of energy, operation of the High Voltage Transmission Grid and plays the national system operator role.It purchases the power generated by the Uganda Electricity Generation Company Limited (UEGCL)and transmits it to local customers thru UMEME (see below) and to export markets of Kenya, Tanzania, and eventually the Democratic Republic of Congo at various interconnections points[3].

4.3.2.4 UMEME FORMER UGANDA ELECTRICITY DISTRIBUTION COMPANY LIMITED (UEDCL)

UMEME is Uganda's largest electricity distribution company. It's mandated to: Operate, maintain, upgrade and expand the distribution network; retail electricity to its customers and to improve efficiency within the electricity distribution system. It's listed on the Uganda securities exchange (USE) and on the Nairobi securities exchange (NSE) AND Investec Asset Management is the majority shareholder after a second issue in 2014[4].

4.3.2.5 UGANDA RURAL ELECTRIFICATION AGENCY

One of the Uganda Rural Electrification Agency (REA) roles is to ensure that electricity and appropriate energy services are provided to rural communities. In this current context, the REA will be an important stakeholder in implementing the project's electricity distribution component (excluded from the present ESIA) and help provide access to electricity to rural communities along the project.

[2] Electricity Regulatory Authority, 2015.Overview of Electricity Regulation in Uganda. [online] http://www.era.or.ug/index.php/sector-overview. Consulted on April 18th, 2015.
[3] Uganda Electricity Transmission Company Limited, 2015. UETCL presentation, [online] http://www.uetcl.com/. Page consulted on April 18th, 2015.
[4] UMEME. (2015). UMEME Company Profile, [online] http://www.umeme.co.ug/index.php?page=MTUw Page consulted on April 18th, 2015.

4.3.3 ENVIRONMENT SECTOR

4.3.3.1 MINISTRY OF WATER AND ENVIRONMENT (MWE)

The Ministry of Water and Environment is the lead Ministry responsible for ensuring sound environmental management. It is responsible for establishing national environment protection policies and standards, managing water resources and identifying priorities for resource developments. It is also responsible for monitoring and controlling all environmental development programs. The MWE would therefore have a lot of importance in the development of this project to insure compliance with environmental laws and regulations. NEMA is under the responsibility of the MWE.

4.3.3.2 NATIONAL ENVIRONMENT MANAGEMENT AUTHORITY (NEMA)

Under the National Environment Act, Cap 153, NEMA is the main environmental management agency in Uganda. It is responsible for coordination, monitoring and supervision of all activities in the field of the environment. NEMA's mandate is cross-sectoral and includes review and approval of all EIAs in the country. It has therefore issued guidelines on EIAs (NEMA, 2004[5]). The "Environmental Impact Assessment Regulations" were approved in 1998 by the Ugandan Parliament. Actual implementation of the EIA process remains a function of the relevant government ministries and departments, the private sector, non-governmental organizations and the general public.

4.3.3.3 UGANDA WILDLIFE AUTHORITY (UWA)

The UWA is a corporate body operating under the Ministry of Tourism, Wildlife and Antiquities. It was established by the Uganda Wildlife Act, Cap 200, which merged the then Uganda National Parks (NP) and Game Department (GD). Its main function is to ensure sustainable management of wildlife in conservation areas by coordinating, monitoring and supervising issues of wildlife management. The Wildlife Act places ownership of all wildlife in the country in the hands of the state, meaning that UWA has authority to manage wildlife in both protected and unprotected areas. Wildlife is defined as wild plants and wild animals of a species native to Uganda. For increased management effectiveness and to allow for greater community participation, UWA has zoned Uganda into six areas.

4.3.3.4 NATIONAL FORESTRY AUTHORITY (NFA)

The NFA is a corporate body operating within the Ministry of Water and Environment. It was created in 2003 under section 52 of the National Forestry and Tree Planting Act and was launched on April 26th, 2004 to replace the Forest Department. The NFA is becoming largely self-supporting through collection of fees and revenue obtained from managing forests. It can assist the Project in identifying mitigation or compensation measures where clear-cutting of forested areas will be necessary. The National Forestry Authority's (NFA) main role is to manage Central Forest Reserves on a sustainable basis and supply high quality forestry-related products and services to communities and stakeholders. Therefore, as manager of central forest reserves traversed by the project, NFA should be involved during works in forest reserves. NFA should also have a role in the implementation of planned restoration of forest reserves under the project.

4.3.4 SOCIOECONOMIC SECTOR

4.3.4.1 MINISTRY OF GENDER, LABOUR AND SOCIAL DEVELOPMENT

The ministry plays a fundamental role in creating demands for social services and laying a foundation for other sectors to improve their outcomes. The roles of this ministry also include occupational health and safety as well as child protection. Gender Officers will provide assistance and guidance to ensure that equity and social cohesion prevail in the current project. Community Development Officers at District and Sub County level should also be involved in project supervision and monitoring during implementation.

[5] NEMA. (2004). *Environmental Impact Assessment Guidelines for the Energy Sector,* 140p.

4.3.5 POPULATION RESETTLEMENT SECTOR

4.3.5.1 MINISTRY OF LANDS, HOUSING AND URBAN DEVELOPMENT (MLHUD)

The MLHUD is responsible for land, housing and urban development. It is therefore responsible for sustainable land management in Uganda. It supervises the Uganda Land Commission, which is responsible for holding and managing any land in the country which is vested in or acquired by the government in accordance with the constitution.

4.3.5.2 MINISTRY OF AGRICULTURE, ANIMAL INDUSTRY AND FISHERIES (MAAIF)

The MAAIF's role is to create an enabling environment in the agricultural sector by enhancing crop production and productivity, in a sustainable and environmentally safe manner. It also seeks to improve food and nutrition security, stimulate agricultural employment, enhance farmer revenues and widen the agricultural export base.

4.3.6 LOCAL AUTHORITIES

4.3.6.1 MINISTRY OF LOCAL GOVERNMENT

Ministry of Local Government is a Government Ministry responsible for guidance and overall vision of Government in local Governments.

The Ministry oversees the Government structures and operations at local levels in Uganda such that they are harmonized and supported to bring about socio-economic transformation of the whole country.

The Ministry composed of two Directorates of Local Government Administration and Inspection works towards sustainable, efficient and effective service delivery in the decentralized system of governance.

The Ministry of Local Government is empowered:

- To inspect, monitor, and where necessary offer technical advice/assistance, support supervision and training to all Local Governments.
- To coordinate and advise Local Governments for purposes of harmonization and advocacy.
- To act a Liaison/Linkage Ministry with respect to other Central Government Ministries and Departments, Agencies, Private Sector, Regional and International Organizations.
- To research, analyze, develop and formulate national policies on all taxes, fees, levies, rates for Local Governments.

4.3.6.2 RELEVANT DISTRICT AUTHORITIES

Officials of the relevant district authorities, including Environmental, Community Development, Labour, Gender, Probation and Health Officers will ensure regular inspection of ongoing projects in their jurisdictions and their respect of applicable environmental and social obligations.

4.4 LEGAL FRAMEWORK

The table below presents a draft list of relevant legal texts in the environmental assessment and resettlement process.

Table 4-2 Relevant Legal Documents in the Environmental Assessment and Resettlement Process of Electricity Transmission Projects

SECTOR	RELEVANT DOCUMENTS
Constitution	Constitution of the Republic of Uganda
Environmental Assessment	National Environment Statute, Cap 153; Environmental Impact Assessment Regulations, 1998 (No. 13 of 1998) Environmental Impact Assessment Public Hearing Guidelines, 1999 National Environment (Audit) Regulations, 2006 (S.I. No 12 of 2006); National Environment (Conduct and Certification of Environmental Practitioners) Regulations, 2003 (S.I. No. 85 of 2003)
Land and resettlement	Land Act (Cap. 227) Expropriated Properties Act 1983 (Cap. 87) Land Acquisition Act 1965 (Cap. 226) Local Council Courts Act, 2006 Local Council Courts Regulations, 2007 (S.I. No. 51 of 2007) Access to Roads Act 1969 (Cap. 350) Survey Act 1939 (Cap. 232) Surveyors Registration Act 1974 (Cap. 275) Town and Country Planning Act 1951 (Cap. 246)
Environment, general	National Environment (Waste Management) Regulations, 1999 (S.I. No 52 of 1999) Lira Municipality (Solid Waste Management) By-laws, 2006 (S.I. No. 15 of 2006) National Environment (Access to Genetic Resources and Benefit Sharing) Regulations, 2005 (S.I. No 30 of 2005) National Forest and Tree Planting Act, 2003 (No. 8 of 2003) Prohibition of the Burning of Grass Act (Cap. 33) Game (Preservation and Control) Act 1959 (Cap. 198) Wildlife Act, 1996 (No. 14 of 1996) Game (Preservation and Control) (Establishment of a National Wildlife Committee) Order, 1982 (S.I. No. 88 of 1982) Agricultural Chemicals (Control) Act (No. 1 of 2007) Control of Agricultural Chemicals Act (Cap. 29) Control of Agricultural Chemicals (Registration and Control) Regulations (S.I. 29-1)
Water, Air and Soil Quality	Water Statute, 1995 (Statute No. 9 of 1995) Nile Basin Initiative Act, 2002 Rivers Act 1907 (Cap 357) Water Resources Regulations (S.I. No. 33 of 1998) National Environment (Standards for Discharge of Effluent into Water or on Land) Regulations, 1999 (S.I. No. 4 of 1999) Water (Waste Discharge) Regulations, 1998 (No. 32 of 1998) National Environment (Wetlands, River Banks and Lake Shores Management) Regulations, 2000 (No. 3 of 2000) Guidelines on the management of river banks and lake shores National Environment (Mountainous and Hilly Areas Management) Regulations, 2000 (No. 3 of 2000) Guidelines on the management of hilly and mountainous areas National Environment (Minimum Standards for Management of Soil Quality) Regulations, 2001 (S.I. No. 59 of 2001) Soil Conservation Measures and Guidelines National Environment (Management of Ozone Depleting Substances and Products) Regulations, 2001 (S.I. No. 63 of 2001) National Environment (Noise Standards and Control) Regulations, 2003 (S.I. No. 30 of 2003)
Energy and Aviation	Electricity Act 1999 Electricity (Safety Code) Regulations 2003 Civil Aviation Authority Act 1991
Physical cultural resources	Historical Monuments Act 1968 (Cap. 46)
Local government	Local Government Act, 1995 (revised in Dec. 2010)

4.4.1 CONSTITUTION

The Constitution of the Republic of Uganda 1995 has a number of articles addressing natural resource protection. Article XIII provides that "the obligation of protecting important natural resources on behalf of the people of Uganda" is vested with the state. Article XXVII affirms the need for sustainable management of land, air and water resources. Article 237 on land ownership provides that land in Uganda belongs to the citizens of Uganda and shall vest in them in accordance with the land tenure systems provided for in the Constitution. Article 242 highlights the fact that the national government may, under laws made by parliament and policies made from time to time, regulate the use of land. Finally, Article 245 addresses protection and preservation of the environment from abuse, pollution and degradation, as well as environment management for sustainable development and promotion of environmental awareness.

Furthermore, article XXVI on protection from deprivation of property, the Constitution gives a right to every person to own property either individually or in association with others (1). Section 2 of this article stipulates that no "person shall be compulsorily deprived of property or any interest in or right over property of any description except where the following conditions are satisfied.

a) taking of possession or acquisition is necessary for public use or in the interest of defence, public safety, public order, public morality or public health; and

b) the compulsory taking of possession or acquisition of property is made under a law which makes provision for-

   i) prompt payment of fair and adequate compensation, prior to the taking of possession or acquisition of the property; and

   ii) a right of access to a court of law by any person who has an interest or right over the property".

The proposed Lira to Arua Electricity Transmission line construction will lead to the impact on both biophysical and social environment as well as land of different tenure systems (customary, leasehold, mailo land, freehold) structures and other properties. This law will therefore be triggered and will be useful during Resettlement Action Plan preparation

4.4.2 ENVIRONMENTAL ASSESSMENT

4.4.2.1 NATIONAL ENVIRONMENT ACT, CAP 153

The National Environment Act, Cap 153 (NEA) provides for environmental management and protection in Uganda, including the need to conduct Environmental Impact Assessment (EIA) studies in connection with some projects. The NEA's third schedule lists project categories identified as likely to have significant impacts on the environment and for which EIAs are required. Electrical infrastructures including electricity transmission lines and electrical substations are listed under the Third Schedule of the Act (Section 4 a) and are therefore required to be considered for environmental impact assessment.

Construction of transmission lines may lead to impacts on Biophysical and Social economic environment and therefore a requirement under this act that construction sites be restored to their original state and the authority may issue an environmental restoration order in matters relating to management of environment and natural resources (Section 67).

4.4.2.2 ENVIRONMENTAL IMPACT ASSESSMENT REGULATIONS, 1998 (S.I. NO. 13 OF 1998)

EIA Regulations, S.I. No. 13/1998 for conduct of EIAs were issued by NEMA and now play a central part in Uganda's environmental legal framework. Parts I to V describe the process to be followed when preparing an EIA, which is detailed in section 4.3 of the present report (see below).

This process has therefore been strictly followed and the final Environmental and social impact statement will be submitted to the Executive Director of NEMA for review and consideration of approval (section 26).

4.4.2.3 ENVIRONMENTAL IMPACT ASSESSMENT PUBLIC HEARING GUIDELINES, 1999

These Guidelines issued pursuant to the National Environment Statute of 1995 and Environment the Impact Assessment Regulations of 1998 by the Executive Director of the National Environmental Management Authority make provision with respect to public hearings as being part of environmental impact assessment. The purpose of a public hearing under these Guidelines shall be to: (a) guide the conduct of the hearings in the environmental impact assessment process especially in seeking questions and answers respecting a project under review; (b) provide for public input in the environmental impact assessment review process and receive submissions and comments from any interested party; (c) find out the validity of the predictions made in environmental impact study; and (d) seek information to assist the Executive Director to arrive at a fair and just decision and promote good governance in the environmental impact assessment process.

Construction and operation require full participation of all stakeholders and therefore these guidelines will be relevant throughout the course of project implementation.

4.4.2.4 NATIONAL ENVIRONMENT (CONDUCT AND CERTIFICATION OF ENVIRONMENTAL PRACTITIONERS) REGULATIONS, 2003 (S.I. NO. 85 OF 2003)

These Regulations provide rules for the professional conduct of Environmental Auditors and Environmental Impact Assessors and any persons prescribed by the Board to conduct environmental impact assessments or studies in accordance with these Regulations.

The object of these Regulations is to establish a system so as to ensure that environmental impact assessments or environmental audits are carried out in an independent, objective and impartial manner. The Committee of Environmental Practitioners is established under regulation 5.The Committee shall regulate certification, registration, conduct and practice of Environmental Practitioners. Regulation 26 provides for a Register of Environmental Practitioners. Every certified and registered Environmental Practitioner shall be subject to Code of Practice and Discipline of Environmental Practitioners as set out in the Fifth Schedule. The present report has been prepared by a team of professionals duly registered and permitted by NEMA to conduct Environmental and Social Impact Assessment (ESIA).

4.4.2.5 NATIONAL ENVIRONMENT (AUDIT) REGULATIONS, 2006 (S.I. NO 12 OF 2006)

These Regulations, made under section 107 of the National Environment Act, provide for a systematic, periodic and objective *ex-poste* valuation carried out to determine: how well a facility is performing in conserving the environment and its resources; the facility's compliance status with environmental regulatory requirements and the environmental management system; the overall environmental risk of the facility.

An auditor shall be certified and registered in accordance with the National Environment (Conduct and Certification of Environmental Practitioners) Regulations, 2003. Every owner or operator of a facility whose activities are likely to have a significant impact on the environment shall establish an environmental management system in accordance with these Regulations. The Executive Director of the National Environment Management Authority may enter into an environmental compliance agreement with the owner or operator of a facility.

This Act will be triggered since the 132kV power line construction, its operation and maintenance require regular audits as stipulated by NEMA.

4.4.3 LAND AND RESETTLEMENT

4.4.3.1 LAND ACT (CAP. 227)

The Land Act provides for the tenure, ownership, and management of land and dispute resolution. Subject to Article 237 of the Constitution, all land in Uganda is vested in the citizens of Uganda and is owned in accordance with either customary, freehold, mailo or leasehold land tenure systems. The land law provides security of tenure to customary and *bona fide* occupants which are likely to strengthen

their interests in conserving the land as a resource. Section 30 defines lawful and *bona fide*[6] occupancy and use of land which may be registered (freehold, mailo, lease or sub-lease).

Under the Land Act, all owners and occupiers of land are to manage it in accordance with the National Forestry and Tree Planting Act Cap 8/2003, the Mining Act Cap 9/2003, the National Environment Act, the Water Act Cap 152, the Uganda Wildlife Act Cap 200, the Town and Country Planning Act and any other relevant law.

It creates land administration institutions (Section 47-74) consisting of Uganda Land Commission, District Land Boards (DLB), and Parish Land Committees. Section 42 (7a-e) states the procedures for any compulsory acquisition of land by the Land Commission while Acquisition of land by Government or Local authority for public use is provided for under Section 43.

The Act gives valuation principles for compensation under Section 60 (1) while Section 78 requires compensation rates to be yearly approved by DLBs. The Value for customary land is the open market value, the value for buildings on land taken shall be the replacement cost in rural areas whereas 30% and 15% (of total sum assessed) disturbance allowance is to be paid if less than six months or six month notice respectively is given for vacating the land.

Land dispute resolution is by land tribunals as stipulated under Section 77 (a-e) and 78 while resolution by traditional authorities is covered by Section 89. Section 90 (2) deals with the role and function of a mediator.

This Act makes provision for the procedures and method of compulsory acquisition of land for public purposes whether for temporary or permanent use. The Government or developer is to compensate any person who suffers damage as a result of a project development. The Law provides the legal basis for Land Tribunals that deal with land acquisition cases and land disputes in Uganda. It must be mentioned that Land tribunals were suspended by the Chief Justice of Uganda. Land cases that were handled by the tribunal are now under a new Land Division at the High Court.

This act will be triggered as land will be required for the project.

4.4.3.2 LAND ACQUISITION ACT 1965 (CAP. 226)

This Act makes provision for the procedures and methods of compulsory acquisition of land for public purposes whether for temporary or permanent use. The Minister responsible for land may authorize any person to enter the land, survey the land, dig or bore the subsoil or any other thing necessary for ascertaining whether the land is suitable for a public purpose. The Government or developer is to compensate any person who suffers damage as a result. The Act requires that adequate, fair and prompt compensation is paid before taking possession of land and property. Dispute arising from the compensation to be paid should be referred to the court for decision.

The Lira-Arua Electricity Transmission Project will trigger this act, as approximately 945 hectares of land will be required for the line corridor, along with approximately 20 hectares for substations and some more land for temporarily use during construction.

4.4.3.3 LOCAL COUNCIL COURTS ACT, 2006

This Act establishes a local council court at every village, parish, town, division and sub-county level. It states that council courts shall consist of all members of the executive committee in case of a village or parish and of five members appointed by the town council, division council or sub-county council on the recommendation of the respective executive committee in case of town councils, division councils or sub-county councils. Subject to the provisions of this Act and of any other written law, every local council court shall have jurisdiction in, among other things, causes and matters of a civil nature governed only by customary law and matters relating to land. A local council court may make an order for specified reliefs. The project activities may trigger this act as some civil suits may arise related to land disputes between individuals or social conflicts between the migrant workers and the host communities.

[6] Land occupied and utilised for 12 years or more before the 1995 Constitution, unchallenged by the registered owner

4.4.3.4 LOCAL COUNCIL COURTS REGULATIONS, 2007 (S.I. NO. 51 OF 2007)

These Regulations provide with respect to the composition, management, operation, jurisdiction and procedure of the Local Council Courts and provide for some other matters such as fees and costs to be awarded by the courts.

Jurisdiction of local courts shall include; the trial and determination of disputes in respect of land held under customary tenure, trespass and damage to property. A Court shall not make an order for the attachment of the immovable or real property of a judgement debtor, crops still in the field, the dismantling of a dwelling house or the removal of the judgment debtor from the land except with the written consent of a Chief Magistrate.

This Act may be triggered as some project activities may lead to disputes but also damage to property within or outside the proposed line corridor.

4.4.3.5 ACCESS TO ROADS ACT 1969 (CAP. 350)

The Act seeks to ensure that a private landowner/developer who has no reasonable means of access to public highway may apply for leave to construct a road of access to a public highway. It establishes a mechanism of applying for an access road to public highway and a legal regime to ensure the safety of the neighbouring environment..

The Act permits the owner of any land over which an access road is to be constructed to be paid compensation in respect of the use of land, the destruction of crops or trees and other property on the land.

The Act also has provisions for grievance resolution between the developer and owner of land over which the access is to be constructed by applying to a Magistrate's Court for leave to construct a road of access.

Although the project area has a good road network, there may be a need of constructing some additional access roads during and after construction. In that case this Act will be applicable.

4.4.3.6 SURVEY ACT 1939 (CAP. 232)

This Act concerns official survey of lands on order of the Commissioner of Lands or the Minister. It also establishes the Surveyors Licensing Board and provides for licensing of land surveyors. The Board shall keep a register of licensed surveyors. The Board may authorize the licensee to act as a land surveyor in any part of Uganda or to undertake only such land surveys as the Commissioner may, from time to time, in writing, specifically authorize. One of the project activities to be undertaken is surveying to establish the project foot print and delineate land parcel within the ROW .This Act will therefore be triggered.

4.4.3.7 SURVEYORS REGISTRATION ACT 1974 (CAP. 275)

This Act makes provision for the registration of land surveyors, quantity surveyors, building surveyors, mining and hydrological surveyors and valuation surveyors, as well as land agents and other professionals responsible for the management of land or buildings. It establishes the Surveyors Registration Board and defines its functions and powers. The Act also concerns public control on surveying practices. The Board shall regulate and control the profession of surveyors and the activities of registered surveyors within Uganda and advise the Government in relation to those functions. The project will therefore use registered surveyors to survey the line route and all land parcels of PAPs within the RoW.

4.4.3.8 TOWN AND COUNTRY PLANNING ACT 2011 (CAP. 246)

This Act replaced the Town and Country Planning Act, Cap 246 which was enacted in 1951 and revised in 1964, in order to remove inconsistencies with contemporary government system. The 1951 Act was enacted to regulate and operate in a centralized 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.

To date, the Town and Country Planning Act, Cap. 246, establishes the regime of land use planning at the national and local levels in Uganda. It defines the various planned areas as well as the entities responsible for deciding on the different uses permitted in the latter. It also defines the development and implementation process of land use plans in the areas of planning. It finally provides mechanisms for compensation for owners who would be affected by the prohibition of a given usage on a territory they currently utilise.

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”.

Construction of the LGNA project will trigger this Act and therefore need to work with the project affected districts along the proposed power line route to have regulatory control to ensure that this project conforms to local physical planning requirements.

4.4.4 ENVIRONMENT, GENERAL

4.4.4.1 NATIONAL ENVIRONMENT (WASTE MANAGEMENT) REGULATIONS, 1999 (S.I. NO 52 OF 1999)

These Regulations, apply: (a) to all categories of hazardous and non-hazardous waste; (b) to the storage and disposal of hazardous waste and their movement into and out of Uganda; and (c) to all waste disposal facilities, landfills, sanitary fills and incinerators. The Regulations provide rules for the handling and disposal of such waste and provide NEMA with the necessary powers for the control of waste management in Uganda and any movement of (hazardous) waste into, from or through Uganda, from to or through any area under the jurisdiction of any other state. The Regulations also provide with respect to, among other things: cleaner production methods; a licence for transportation of or storage of waste; powers of environmental inspector; packaging and labelling of waste; operation of a waste treatment plant or disposal site; environmental impact assessment; and notification procedures and prior informed consent.

Construction of the 132kV power transmission line is likely to generate waste of different types for example, soil spoil, used oils, metallic containers and other waste from camp site; handling of these wastes has to follow the regulations. Hazardous waste such as used oil should be stored in specially designed facilities for that purpose and licensed by NEMA. Transportation of such waste should also be licensed by NEMA.

4.4.4.2 LIRA MUNICIPALITY (SOLID WASTE MANAGEMENT) BY-LAWS, 2006 (S.I. NO. 15 OF 2006)

The Lira Municipality Solid Waste Management By-laws are adopted under the Local Government Act. They aim to: establish a culture of separation of waste into different categories at the source of waste; establish an improved waste collection system that focuses on reuse and recycling of different categories of waste; enhance reduction in amount of waste transported to and disposed of at the official disposal site; and enhance the use of waste as a source for income generation. This Law will be triggered as construction of the line and the substation is likely to generate solid waste and therefore the project proponent will be obliged to manage this.

4.4.4.3 NATIONAL ENVIRONMENT (ACCESS TO GENETIC RESOURCES AND BENEFIT SHARING) REGULATIONS, 2005 (S.I. NO 30 OF 2005)

These Regulations provide for equal access to genetic resources and sharing of benefits arising from exploitation of such resources. They: (a) prescribe the procedure for access to genetic resources for scientific research, commercial purposes, bio-prospecting, conservation or industrial application; (b) provide for the sharing of benefits derived from genetic resources; and (c) promote the sustainable

management and utilization of genetic resources, so as to contribute to the conservation of the biological resources of Uganda.

The Uganda National Council for Science and Technology is designated as the competent authority for purposes of these Regulations. It shall, among other things, handle applications for access to genetic resources and establish and maintain a depository for all materials transfer agreements and associated accessory agreements. Where access to genetic resources is likely to have a significant impact on the environment, an environmental impact assessment shall be carried out.

This regulation may be triggered as construction of the line in the sensitive areas could possibly affect rare animal and plant species or introduce alien species hence causing genetic modification (to be confirmed).

4.4.4.4 NATIONAL FOREST AND TREE PLANTING ACT, 2003 (NO. 8 OF 2003)

This Act makes provision for the conservation, management and development of forest resources in Uganda and establishes the National Forestry Authority and a fund for tree planting. The purposes of the Act include the creation of an integrated forest sector, conservation of biological diversity, the devolution of functions and powers in the forest sector and the sustainable development of that sector.

Forests in Uganda are classified as: (a) central forest reserves; (b) local forest reserves; (c) community forests; (d) private forests; and (e) forest forming part of a wildlife conservation area declared under the Uganda Wildlife State, 1996. The Act provides for the declaration and management of central forest reserves, local forest reserves and community forests. Private forests and forest plantations may be registered with the District Land Boards. Management plans shall be prepared for central forest reserves, local forest reserves and community forests.

The Act further makes provision for, among other things: the protection and conservation of forest biological resources and the declaration of reserved or protected tree species; protection of forest reserves against human activities; inventory of forests; tree planting and growing; forestry licences; trade in forest produce; administration of forest resources; the establishment of the National Forestry Authority as a body corporate and regulation-making powers of the Minister.

Section 38 provides that a person intending to undertake a project or an activity which may, or is likely to have significant impact on forests shall undertake an EIA.

This Act will be triggered by the construction and implementation of the proposed 132 Electricity transmission line since about 4 forest reserves (*Engeva, Achwera, Opoka and Laura*) as well several indigenous trees.

4.4.4.5 PROHIBITION OF THE BURNING OF GRASS ACT (CAP. 33)

This Act stipulates that, notwithstanding the Local Governments Act or any other written law to the contrary, the burning of grass by any person is prohibited in all areas of Uganda, except under authority and under the supervision of specified public officers. Also, clearing of farm land and other burning for specified purposes shall be allowed. The Act also requires able-bodied men to offer, at request of specified public officers, assistance to control or extinguish fire, or to prevent the burning of grass in the area where they are present. The presence of Campsites and possibly some of the workers who smoke cigarettes during construction and electricity sparks during operation may be a source of fire and therefore the project developer should put a mechanism to control this.

4.4.4.6 GAME (PRESERVATION AND CONTROL) ACT 1959 (CAP. 198)

This Act, in its consolidated version, contains the following Schedules: Animals not to be hunted or captured throughout Uganda except under special permit; Animals which may be hunted under basic and supplementary licences, and fees for supplementary licences; Birds which may be hunted by the holder of a bird licence; Game reserves; Fees for licences; African animals not occurring in Uganda, or of which only local species and subspecies are protected, which animals and the trophies thereof are protected by international convention. The proposed LGNA transmission line passes through woodlands some of which are dispersal area for wild animals and therefore these animals may be impacted during the project construction and maintenance during operation

4.4.4.7 WILDLIFE ACT, 1996 (NO. 14 OF 1996)

This Act provides for the conservation and sustainable utilization of wildlife throughout Uganda so that the abundance and diversity of wildlife species are maintained at optimum levels commensurate with other forms of land use.

"Wildlife" means any wild plant or animal of species native in Uganda and includes wild animals which migrate through Uganda (sect. 2). Purposes of the Act are, inter alia, the conservation of the abundance and diversity of species so as to commensurate with other forms of land use, the conservation of selected examples of wildlife communities, the protection of rare, endangered and endemic species of wild plants and animals, and the ecologically acceptable control of problem animals (sect. 3). The Wildlife Authority is established under section 5 and its functions are outlined in section 6. Section 13 provides for local government wildlife committees. The Executive Director of the Authority shall prepare a comprehensive management plan for each wildlife protection area established (sect. 14). Section 26 of Chapter IV provides for historic rights of individuals in conservation areas. Section 30 of Chapter specifies various types of wildlife use rights. A Wildlife Fund is established under section 69.

The project passes through some woodlands and wetlands that are habitats to several plant and animal species. The Murchison Falls National park wildlife animal dispersal areas in much of Nwoya is crossed by the proposed line and are considered as areas of biodiversity importance because they are habitats of important flora and fauna. The wetlands are known habitats for the breeding crested crane and grazing ground for elephants. These animals will need protection, thus this Act will be relevant to this project.

4.4.4.8 AGRICULTURAL CHEMICALS (CONTROL) ACT (NO. 1 OF 2007)

This Act provides rules for the production, handling, import, export and placing on the market of agricultural chemicals and establishes the Agricultural Chemical Board and the Agricultural Chemicals Technical Committee. “Agricultural chemicals” is defined so as to include any chemicals used for promoting and protecting the health of plants. Manufacture, trade in and placing of the market of agricultural chemicals shall be done in accordance with Regulations issued under this Act. The Board shall, among other things, ensure that agricultural chemicals are duly registered and that such agricultural chemicals are used in a manner consistent and in conformity with Regulations made under this Act and shall advise the Minister on policy to regulate the quality and importation of agricultural chemicals into Uganda. The Act also provides for inspection and enforcement and defines offences. It repeals the Control of Agricultural Chemical Act.

This act could be triggered in the unlikely event where agricultural chemicals would be used for vegetation control in the RoW / wayleave. However, such an event is unlikely to happen given that UETCL longstanding work practices do not include use of pesticides for wayleave clearance and management.

4.4.4.9 CONTROL OF AGRICULTURAL CHEMICALS (REGISTRATION AND CONTROL) REGULATIONS (S.I. 29-1)

These Regulations make provision for the testing and registration of agricultural chemicals, the registration of fumigators and commercial applicators for agricultural chemicals and premises, the advertising, labelling, packaging, storage, transportation and disposal of agricultural chemicals and appeals against decisions regarding registration. A registrar shall maintain: (a) a register of agricultural chemicals; (b) a register of fumigators and commercial applicators; and (c) a register of premises. Applications for registration shall be made to the Agricultural Chemicals Board in the Forms as specified in the First Schedule. Agricultural chemicals shall be used in such a way as to safeguard the environment and be disposed of according to stipulated procedures. Monitoring of agricultural chemicals shall be mandatory by agents of manufacturers and distributors concerned to assess the impact on the environment.

These regulations could be triggered in the event where agricultural chemicals would be used for vegetation control in the RoW / wayleave. However, such an event is unlikely to happen given that UETCL longstanding work practices do not include use of pesticides for wayleave clearance and management.

4.4.5 WATER, AIR AND SOIL QUALITY

4.4.5.1 WATER ACT, CAP 152

The objectives of the statute are, inter alia, to allow for the orderly development and use of water resources for purposes other than domestic use, such as irrigation and agriculture, in ways that would minimize harmful effects to the environment. Domestic use, as interpreted herein, includes use for the purpose of irrigating a subsistence garden.

According to Part II (Water Resources) of Water Act, the Minister and the Director are responsible for the implementation of this Act which provides for:

- The use, protection and management of water resources and supply;
- Provide constitution of water and sewage authorities;
- Facilitating devolution of water supply and sewerage undertakings.

According to section 18 (1) of this Act, no person is allowed to construct or operate any water works unless authorized under this act to do so. Thus this act will be applicable since several water sources (rivers, wetlands) will be crossed.

4.4.5.2 NILE BASIN INITIATIVE ACT, 2002

This Act grants legal capacity as a body corporate to the Nile Basin, i.e. the transitional arrangement established by the Nile Basin States in 1999, to foster cooperation and sustainable development of the Nile River for the benefit of the inhabitants of those countries. The Act also provides for some financial and diplomatic arrangements. This is done in accordance with an Agreed Minute of the annual meeting of the Council of Ministers of the Nile Basin States held in Cairo, Egypt, on 14 February 2002 and the arrangements are set out in the Schedule to this Act. This Act will be triggered as the line crosses the River Nile (for about 1 km of the line will at Pakwach) and several other tributaries.

4.4.5.3 RIVERS ACT 1907 (CAP 357)

This Act provides for the control of certain activities in rivers to which this Act applies and which are specified in the Schedule to this Act. Controlled activities include dredging and use of steam vessels. They require a licence issued under this Act by the Minister. The Regulations set forth in the Third Schedule to this Act shall be endorsed on every licence to dredge. River Nile from Lake Victoria to Lake Albert is covered by this Act. The construction of the special towers to span the line across the Nile River at Pakwach may trigger this act as this may lead to some siltation of the river.

4.4.5.4 WATER RESOURCES REGULATIONS (S.I. NO. 33 OF 1998)

These Regulations provide for various aspects of water law for which provisions was made in the Water Statute, 1995. The text consists of 29 regulations which are divided into 5 Parts: Preliminary (I); Water permits (II); Water Policy Committee (III); Drilling and construction permits (IV); Miscellaneous (V).

Under this regulation citing (Section 31 (1) of the Act,) a person commits an offence who, unless authorized under this Part of the Act, causes or allows wastes to come in contact with, or be discharged into water or allows water to be polluted. This regulation may apply because construction of the power line close to water bodies may lead to water pollution.

4.4.5.5 NATIONAL ENVIRONMENT (STANDARDS FOR DISCHARGE OF EFFLUENT INTO WATER OR ON LAND) REGULATIONS, 1999 (S.I. NO. 4 OF 1999)

The standards for effluent or waste water before it is discharged into water or on land shall be as prescribed in the Schedule to these Regulations. Every industry or establishment shall install anti-pollution equipment for the treatment of effluent. This equipment shall be based on the best practicable means, environmentally sound practice and other guidelines as the Executive Director of the National environment authority may determine. Lead agencies applying standards established under these Regulations (Schedule) shall keep records in accordance with regulation 5 (6 regulations and 1 Schedule).

These regulations could be triggered during the construction phase, particularly regarding handling of effluents from workers camps and construction sites. They could also be triggered in the event of pollutant spills, particularly at substation sites, during the operation phase.

4.4.5.6 WATER (WASTE DISCHARGE) REGULATIONS, 1998 (NO. 32 OF 1998)

These Regulations concern waste water discharge and standards for effluent water. Section 4 prohibits discharge without a permit issued by the Director of Water Resources. Persons specified in section 5 may apply for a waste permit in accordance with established procedures. Criteria for the evaluation of an application are listed at section 9. Regulations also provide that an environment inspector or an analyst may at any reasonable time enter any premises and take samples.

Some aspects of the transmission line during construction and operation may generate waste water and trigger these regulations, including human wastes from people working at the project site (e.g., from labor sheds), and some liquid waste from construction processes at substation sites.

4.4.5.7 NATIONAL ENVIRONMENT (WETLANDS, RIVER BANKS AND LAKE SHORES MANAGEMENT) REGULATIONS, 2000 (NO. 3 OF 2000)

These Regulations provide for the management of wetlands and wetland resources, as well as river banks and lake shores.

On wetlands, the Regulations aim to provide for the conservation and wise use of wetlands and their resources in Uganda, to ensure water catchment conservation and flood control, to ensure the sustainable use of wetlands for ecological and other purposes, to ensure that wetlands are protected as habitats for species of fauna and flora, and to prevent pollution. The regulations establish the Technical Committee on Biodiversity Conservation which is responsible for advising on the wise use, management and conservation of wetland resources. District Environment Committees are also established. The Minister may declare protected wetlands under regulation 8. Other regulations on wetlands concern inventorying of wetlands, their use and granting of use permits.

Part III of these Regulations applies to all river banks and lake shores in Uganda. Its provisions aim at sustainable use and protection of river banks, preventing siltation of rivers and lakes, as well as controlling pollution or degrading activities. They provide for an inventory of degraded river banks to be made by local authorities and institute a permitting system for persons wishing to use river banks.

Section 34 provides that an environmental impact assessment be carried out for a project which may have significant impact on a wetland, riverbank or lakeshore in accordance with sections 19, 20, 21 of the national environment act.

These regulations are therefore triggered by the LGNA project as some portions of the line will cross wetlands and other water bodies, and therefore wetland user permits shall be obtained prior to construction activities of access roads and tower foundations occurring in wetlands.

4.4.5.8 GUIDELINES ON THE MANAGEMENT OF RIVER BANKS AND LAKE SHORES

These guidelines contain principles and rules for the management and conservation of river banks and lake shores in Uganda. They define functions and duties of Environment Officers and Local Councils and the duties of landowners notably in respect of: (a) soil engineering; (b) agroforestry; (c) mulching; (d) bunding; (e) grassing; (f) control of livestock grazing; and (g) terracing. Specified activities with respect to river banks and lake shores are controlled. Government or a local government shall not lease out or otherwise alienate any river bank and lake shores. Protection zones near to shores and banks are established. Since the opening of wetlands to establish access roads and construction of towers may eventually lead to encroachment on wetlands, these guidelines will be applicable.

4.4.5.9 NATIONAL ENVIRONMENT (MOUNTAINOUS AND HILLY AREAS MANAGEMENT) REGULATIONS, 2000 (NO. 3 OF 2000)

These Regulations regulate the sustainable use and conservation of resources in mountainous and hilly areas. It establishes principles for use and management of sloping land. This management is largely decentralized to district authorities: district councils are given the responsibility to make by-laws

identifying mountainous and hilly areas within their jurisdiction which are at risk from environmental degradation and notify NEMA of such areas. District Environment Committees may also establish sub-committees on soil conservation. Restrictions on the use of mountainous and hilly areas are established and duties of land owners in respect to use of grazing of livestock, cultivation, agroforestry and water run-off are also specified. Other provisions deal with: land use mapping, grazing, agroforestry, soil conservation, introduction of alien plant or animal species and disposal of hazardous waste. These regulations may be triggered by the Project since clearance of vegetation, establishment of access roads and building of towers in hilly areas (especially in Arua district) may lead to soil erosion on sloping land.

It should also be noted that regulation (16) 5 requires protection of soil against erosion, e.g. by closing eroding path when they start to erode or cause erosion. These requirements are likely to specifically apply to roads built for construction and maintenance of power lines.

4.4.5.10 GUIDELINES ON THE MANAGEMENT OF HILLY AND MOUNTAINOUS AREAS

These guidelines contain principles of and rules for the management of hilly and mountainous areas. They define functions and duties of District Environment Committees and other local authorities in respect of management of hilly and mountainous areas, as well as duties of land owners in respect to use for livestock grazing, cultivation, agroforestry and water run-off. Each District Council shall make by-laws identifying mountainous and hilly areas within their jurisdiction which are at risk from environmental degradation. Some areas crossed by the line, especially the hilly areas in Arua district, have a lot of sloping land. Therefore the clearing of vegetation, creation of access roads and preparation of foundations for towers could cause destabilization of soils exacerbating soil erosion with eroded soils ending up in streams and rivers affecting physical conditions of the water in these rivers. Those guidelines will therefore be triggered by the Project.

4.4.5.11 NATIONAL ENVIRONMENT (MINIMUM STANDARDS FOR MANAGEMENT OF SOIL QUALITY) REGULATIONS, 2001 (S.I. NO. 59 OF 2001)

The purpose of these Regulations is to establish and prescribe minimum standards for soil quality, to establish minimum standards for the managing quality of soil intended for agricultural use, the establishment of criteria and procedures for the measurement and determination of soil quality and to issue measures and guidelines for soil management. The fact that some Project activities may accelerate soil erosion on slopes and that others may lead to soil pollution (for example, through spills at substation sites) implies that these guidelines are applicable.

4.4.5.12 SOIL CONSERVATION MEASURES AND GUIDELINES

Soil conservation measures are prescribed and recommendations are given for the conservation of: lowlands and flat areas, land sloping in various degrees, pasture lands and range lands. Measures are required for the environmentally sound production of food, wood, and other commodities based on sustainable use of land, species and ecosystem. In most areas of Uganda the combination of several conservation practices are recommended and packages will depend on area and crops, livestock and tree species on the land. Measures regard land moving works and cultivation/agro-forestry. The proposed LGNA line route will pass through farmlands and pasture lands as well as sloping areas. Some project activities such as vegetation clearance, establishment of access roads and excavations for tower placement may accelerate soil erosion in hilly areas; remove plant species of conservation importance. Therefore soil conservation measures and guidelines should be followed by the Project.

4.4.5.13 NATIONAL ENVIRONMENT (MANAGEMENT OF OZONE DEPLETING SUBSTANCES AND PRODUCTS) REGULATIONS, 2001 (S.I. NO. 63 OF 2001)

The object of these Regulations is to: (a) regulate production, trade and use of controlled substances and products; (b) provide a system of data collection that will facilitate compliance with relevant reporting requirements; (c) promote the use of ozone friendly substances, products, equipment and technology, and (d) ensure the elimination of substances and products that deplete the ozone layer. Importing of exporting controlled substances and products requires a license. Licenses are to be issued only to applicants that have adequate and appropriate facilities and equipment to handle a controlled substance or product without causing damage to the environment. A register of all licenses is kept. A person who buys or receives a controlled substance or product shall sign an end-user declaration Form.

These regulations may be triggered by the Project in the event where operation of construction equipment (e.g. machinery, generators, etc.) or substation equipment requires cooling systems using CFCs and / or HCFCs (regulated ozone-depleting substances).

4.4.5.14 NATIONAL ENVIRONMENT (NOISE STANDARDS AND CONTROL) REGULATIONS, 2003 (S.I. NO. 30 OF 2003)

The main objects of these Regulations are to: prescribe the maximum permissible noise levels from a facility or activity to which a person may be exposed and (b) provide for the control of noise and for mitigating measures for the reduction of noise. Section 8 (1) of the regulations makes machinery owners, or facility / premises owners or occupiers, responsible for controlling noise levels from their activities so that it does not exceed permissible levels. Permissible noise levels are given in the First Schedule Part I –VIII of this regulation.

Section 8(3) provides that noise emissions exceeding permissible levels constitute an offense. Section 12 requires stakeholders identified above and whose works are likely to emit noise in excess of permissible levels to apply to the Executive Director for a high noise emission license as prescribed in Part 1 of the Second Schedule.

It also states that a local council may, in accordance with the Local Governments Act, 1997, make laws regulating noise and vibration pollution consistent with the National Environment Statute. Functions of the District Environment Committees are defined in regulation 5.

Noise can be expected to be emitted from project vehicles and equipment during construction of the power line and substations, hence making this regulation applicable.

4.4.6 ENERGY, AVIATION

4.4.6.1 ELECTRICITY ACT, 1999

The Electricity Act 1999 is explicit on power to use land including procedure for using public land as well as compulsory acquisition of private land. Section 68 of the Act provides guidelines for the placement of electricity supply lines on land, stating that a developer shall minimize damage to the environment as much as possible and ensure prompt payment of fair and adequate compensation to all interested persons for any damage or loss sustained by construction of electricity supply infrastructure. Part IV of this Act indicates that for any licence to operate, it must contain among others a review of land use for the project and the relation of the project to the local authorities, impacts of the project on private interests including the affected land owners and holders. The Act also contains provisions for land acquisition. Part VIII Section 69 of the Act stipulates that land required by the developer/licensee may be acquired by agreement with the owner. However, if privately owned, land cannot be acquired through agreement; the authorities can expropriate the land through the District Land Board and put it at the disposal of the developer. According to the Act, a 30-day notice should also be given to private property owners affected by the project. For private land, the Land Act and Constitution of Republic of Uganda require that compensation be paid to owners including issuing a 3-month or 6-month notice after receipt of compensation before owners can vacate affected properties. The 3-month or 6-month notices to vacate affected property carry a 30% and 15% “disturbance allowance” on top of the property value, respectively.

This Act will be triggered by the project since land acquisition will be required for the line corridor access roads and building substation. These aspects are detailed in the resettlement action plan (RAP) prepared for this project.

4.4.6.2 THE ELECTRICITY (SAFETY CODE) REGULATIONS, 2003

These Regulations apply to electrical systems, and to associated plant and apparatus under their ownership or control.

Although not directly relevant to the ESIA process, these regulations will be applicable to design and operation of the Project.

4.4.6.3 CIVIL AVIATION AUTHORITY ACT, 1991

This Act provides for the establishment of the Civil Aviation Authority, its duties, powers and management and for other matters connected therewith. Its application extends to all aircraft operating in Uganda airspace, whether the aircraft is of foreign or Uganda registry, as well as to Uganda aircraft operating outside of Uganda territory. It also provides for safety provisions relating to the rules of the air and air traffic services which are applicable to all aircraft.

This act may be triggered by the Project considering that existing airfields are located near the Project line route, thereby applicable safety criteria regarding interactions between aircraft and power lines must be followed.

4.4.7 PHYSICAL CULTURAL RESOURCES

4.4.7.1 HISTORICAL MONUMENTS ACT 1968 (CAP. 46)

This is an act to provide for the preservation and protection of historical monuments and objects of archaeological, paleontological, ethnographical and traditional interests and for other matters connected therewith. The definition and objects included by the terms used above are specified in section 1 of this Act. Section 8 specifies the actions that are prohibited. Section 11 stipulates that any discoveries of the objects made that are considered to be of importance according to this Act shall be reported to the conservator of antiquities or district commissioner or the curator of the museum within fourteen days.

Any person who contravenes any of the conditions issued under this act commits an offence which is to be fined as stipulated in section 19 of this Act.

Excavations that will be carried out during preparation of foundation for pylons may affect monuments or cultural property where they exist. If the situation arises the work should be suspended and appropriate authorities contacted to supervise appropriate measures to be taken. This Act will be triggered as already some archaeology sites, cultural site and historical sites have been identified during the ESIA study and other cultural properties of this nature if found, will need to be protected according to the Act.

4.4.8 HEALTH AND SAFETY

4.4.8.1 OCCUPATIONAL SAFETY AND HEALTH ACT, 2006

This is a two way Act that (1) requires employers to protect their workers and (2) charges the employees to take responsibility of their safety while at work. The Act is concerned of not only the work area but also its immediate environment. According to section 13 (1)a of the Occupational Safety and Health Act, it is the responsibility of an employer to take all measures for the protection of his or her workers and the general public from the dangerous aspects of the employer's undertaking as far as reasonably practicable, at his or her own cost. Section 19 (2) further spells out that it shall be the duty of an employer to ensure that Personal Protective Equipment provided under sub section (1) is used whenever it is required. This Act is of relevancy to this project because the contractor is obliged to guarantee the safety of all the workers that will be involved at the construction site and also the surrounding community members.

This Act is of relevance to this line construction project to guarantee the safety of all the workers that will be involved in the project and even the surrounding community members of the respective communities.

4.4.9 DECENTRALIZATION

4.4.9.1 LOCAL GOVERNMENT ACT, 1995 (REVISED IN DEC. 2010)

This Act provides the legal foundation of the Government policy on decentralization and devolution of functions, powers, and services to Local Governments. Under this Act, district and lower local councils are given the responsibility to manage their natural resources including environment at the local

government level. District natural resources committee are created and made responsible for environmental issues at district level.

Thus, Local Governments in Arua, Nebbi, Nwoya, Gulu, Oyam, Kole and Lira have been involved and consulted in the ESIA process and will be involved in issues of land acquisition, compensation and environmental and social monitoring and compliance in this project. They will be responsible for environmental and social monitoring during construction and operation of the 132kv power transmission line. Local government officers whose contributions should be sought for during project implementation must include social staff such as Gender Officers, Community Development Officers, Probation Officers (for prevention and management of penal infractions by Project workers, for example child abuse risks), as well as Labour Officers.

4.5 NATIONAL ENVIRONMENTAL AND SOCIAL ASSESSMENT PROCEDURE

The following table presents an outline of the environmental and social assessment procedure in Uganda, as per provided by the Environmental Impact Assessment Regulations. As a clarification, it should be noted that although the EIAR refers to this process as “environmental impact assessment”, project owners are also obligated to consider social issues. Indeed, many sections of the regulations refer to EIAR Schedule 1, which lists issues that are to be considered throughout the ESIA preparation and approval process. This list explicitly includes social, landscape and land use considerations. Therefore, readers analysing the following table should understand that wherever the term “environmental” is used, both environmental and social considerations are being referred to.

Table 4-3 Environmental Assessment Procedure

STAGE	SUB-STAGE	PERSON IN CHARGE	ACTION	SOURCE
Project Brief	Project brief preparation	Developer	Prepare considering issues specified in Schedule 1 of Environmental Impact Assessment Regulations, 1998 (EIAR)	EIAR, s. 5 & Schedule 1
	Project brief submission	Developer	Submit 10 copies to NEMA Executive director	EIAR, s. 6(1)
	Comment on project brief	NEMA Executive Director	If project brief conforms to requirements, NEMA Executive Director transmits to Lead Agency[7] within 7 days.	EIAR, s.6(2)
		Lead Agency	Provides comments on Project Brief within 14 days of receiving the Project Brief	EIAR, s. 7
	Consideration of Project Brief	NEMA Executive Director	Screens the Project Brief to determine whether an EIS is required	EIAR, s. 8
			Decision is communicated to the Promoter within 21 days from submission of the Project Brief.	EIAR, s. 9(1)&(4)
Terms of Reference for EIA	ToR Development	Developer	Submits draft EIA ToRs to NEMA, including all elements required by regulations	EIAR, s. 10(1) & s. 14
		NEMA	Comments / approves EIA ToRs	EIAR, s. 11(1)
	Approval of EIA experts	Developer	Upon approval of ToRs, submits names and qualifications of the experts who shall undertake the study	EIAR, s. 11(1)
		NEMA Executive Director	Approves / rejects experts	EIAR, s. 11(2)
Environmental Impact Statement	EIA	Developer	Conduct the EIA in accordance with the guidelines, an established code of practice or the written directions issued by the Executive Director.	EIAR, s. 11(3)
	Stakeholder consultations	Developer	Publicises the intended project, its anticipated effects and benefits through the mass media in a language understood by the affected communities for a period of not less than fourteen days	EIAR, s. 12(1)a)
			After expiration of the period of 14 days, holds meetings with affected communities to explain the project and its effects	EIAR, s. 12(1)b)
			Ensures that venues and times of meetings are convenient to affected persons and shall be greed with leaders of local councils	EIAR, s. 12(1)c)
	EIA	Developer	Submit Environmental Impact Statement to NEMA in accordance with EIAR requirements, in 20 copies.	EIAR, s. 13-16; s. 17(1); EIAR Schedule 1

[7] According to EIAR, the term “lead agency” designates any agency on whom NEMA delegates its functions. Concrete application of the ESIA procedure in Uganda has led to growing collaboration with other Ugandan governmental agencies (one or more) whose contributions and comments are collected in order to ensure a full multidisciplinary assessment of documents submitted by the project owner. Identification of these agencies varies according to each project’s characteristics but, on the social side, have been known to include the Ministry of Gender, Labour and Social Development, the AIDS Commission and the Ministry of Health.

STAGE	SUB-STAGE	PERSON IN CHARGE	ACTION	SOURCE
EIS Review	Administrative Review	NEMA Executive Director	Transmits the EIS to the Lead Agency and requests for comments	EIAR, s. 18(1)
		Lead Agency	Comments on the EIS within 30 days of receiving it.	EIAR, s. 18(2)
	Public Comments	NEMA Executive Director	If satisfied that the EIS is complete, invites the general public to make written comments on the EIS within 10 days from receiving comments from Lead Agency.	EIAR, s. 19
			Receives comments from general public for a period of 28 days	EIAR, s. 19 (4).
			Invites comments from persons most likely to be affected by the project, through newspaper and other mass media announcements as well as distribution of the necessary information through lower governments, in languages understood by the majority of affected persons	EIAR, s. 20
			Receives comments from affected persons for a period of 21 days after invitation has been published	EIAR, s. 20(4)
	Decision on public hearing	NEMA Executive Director	Considers comments received from Lead Agency, general public and persons likely to be affected, and determines whether a public hearing shall be held.	EIAR, s. 21
	Public Hearing	Lead Agency	Holds a public hearing on the EIS, within a period of no less than 30 days and no more than 45 days after receiving comments from general public and people likely to be affected.	EIAR, s. 22(2)
			Public hearing procedures	EIAR, s. 22-23
Decision		NEMA Executive Director	Makes a decision to approve or reject the project within 180 days from submission of the EIS. Elements taken into account listed in EIAR, s.24(1)	EIAR, s. 24(2), 25
			If project is approved, states: - conditions of approval; - period for which the approval shall remain valid; - issues a certificate of approval.	EIAR, s. 26

4.6 WORLD BANK SAFEGUARD POLICIES

The World Bank environmental and social safeguard policies include both Operational Policies (OP) and Bank Procedures (BP). Safeguard policies are designed to protect environment and society against potential negative effects of projects, plans, programs and policies. The potentially triggered safeguard policies which will be considered in the study are the following:

- OP/BP 4.01 Environmental Assessment, including public participation;
- OP/BP 4.04 Natural Habitats;
- OP/BP 4.11 Physical Cultural Resources;
- OP/BP 4.12 Involuntary Resettlement;
- OP/BP 4.20 Gender and Development;
- OP/BP 4.36 Forests.

4.6.1 OP 4.01 ENVIRONMENTAL ASSESSMENT

The purpose of OP 4.01 is to ensure that projects funded by the Bank are environmentally feasible and viable, and that decision making is improved through appropriate analysis of actions and their probable environmental impacts (OP 4.01, para 1). This policy is triggered if the project is likely to cause potential (negative) environmental risks and impacts in its zone of influence. The Project therefore triggers OP 4.01.

OP 4.01 covers:

- Impacts on the physical environment (air, water and land);
- Life environment, health and safety of populations;
- Cultural and physical resources;
- Environmental concerns at the transboundary and world levels.

Social aspects (involuntary resettlement, indigenous populations) as well as natural habitats, pest control, forestry and safety of dams are addressed by separate policies with their own requirements and procedures.

The Bank undertakes environmental screening to determine the appropriate extent and type of environmental assessment to be conducted. The Bank classifies the proposed projects into categories, depending on the type, location, sensitivity, scale of the projects and the nature and magnitude of their potential environmental impacts.

In the present case, the project has been classified as EA Category B[8]. Projects considered as category B have potential adverse environmental impacts on human populations or environmentally important areas--including wetlands, forests, grasslands, and other natural habitats—they are site-specific; few if any of them are irreversible; and in most cases mitigation measures can be designed quite readily.

For all Category B projects, during the environmental assessment process, project-affected groups and local NGOs have to be consulted about the project's environmental aspects and their views must be taken into account. The consultations must be initiated as early as possible. These groups should be consulted shortly after environmental screening, before the terms of reference for the EA are finalized and also once a draft EA report is prepared. Consultations can also be conducted throughout project implementation to address related issues that affect them.

[8] http://documents.worldbank.org/curated/en/2015/08/25247334/integrated-safeguards-data-sheet-concept-stage-uganda-grid-expansion-reinforcement-project-gerp-p133305

For meaningful consultations, all relevant material has to be provided in a timely manner prior to consultation, in a form and language that are understandable and accessible to the groups being consulted.

The main environmental and socioeconomic aspects relevant to the Project and that are addressed in the present ESIA are the following:

- Environmental:
  - The Project will cross some sensitive ecosystems, in a limited manner;
- Socioeconomic:
  - Environmental, health and safety impacts on surrounding communities and general public during construction and operation;
  - Resettlement impacts;

The risks identified above can be readily mitigated with appropriate mitigation measures, and most importantly their appropriate implementation and monitoring. The present ESIA addresses those needs and therefore satisfies OP 4.01's requirements.

4.6.2 OP 4.04 NATURAL HABITATS

The conservation policy 4.04 aims at protecting natural habitats and their biodiversity and ensuring sustainability of services and products that natural habitats supply to human societies. In principle, the WB refuses to finance what may be perceived as causing significant damages in whatever Critical Natural Habitat (CNH).

It seeks as much as possible to avoid financing, through projects, conversions or degradations of natural habitats (non-critical). These impacts should be avoided by reconsidering the project, even in its size or its extension, and/or putting in place acceptable mitigation measures, such as establishing a protected area or strengthening effective protection of CNHs. Should the project involve the significant conversion or degradation of natural habitats that are not considered as critical, and if there is no alternative solution for the project and its location, and if the complete analysis clearly shows that the project's overall benefits are significantly higher than the environmental costs, then the WB can finance the project on condition that it includes appropriate mitigation measures.

The WB defines natural habitats as land or water zones where biological communities sheltered by ecosystems are in majority made of indigenous plant and animal species, and where human activity did not fundamentally modify the zone's main ecological functions.

CNHs are defined as:

- Existing protected areas and areas officially proposed by governments to be classified among ''protected areas'' e.g. reserves that meet the criteria of the International Union for Conservation of Nature (IUCN) classifications;
- Areas traditionally recognized as protected by traditional local communities;
- Sites maintaining vital conditions for the viability of such protected areas.

Zones that may be considered as CNHs in the project area are the existing national parks, forest reserves and game reserves. Although the Project routing avoids most CNHs in the Project area, the most important one being Murchison Falls National Park, the line will cross some forest reserves. OP 4.04 is therefore triggered.

4.6.3 OP/BP 4.10 INDIGENOUS PEOPLES

The objectives of this policy are to ensure that:

- The development process fosters full respect for the dignity, human rights, and cultural uniqueness of indigenous peoples;

- Adverse effects during the development process are avoided, or if not feasible, ensure that these are minimized, mitigated or compensated;
- Indigenous peoples receive culturally appropriate and gender and inter-generationally inclusive social and economic benefits.

Desktop information research and field investigations revealed that the study area does not contain populations that qualify as Indigenous Peoples according to the World Bank Operational Policy 4.10. Therefore, OP4.10 is not triggered and no further specific investigations will be conducted on this issue.

4.6.4 OP/BP 4.11 PHYSICAL CULTURAL RESOURCES (PCR)

This policy assists in preserving PCRs and helps reduce chances of their destruction or damage. The policy considers PCRs to be resources of archaeological, paleontological, historical, architectural, religious (including graveyards and burial sites) and aesthetic or other cultural significance.

According to this policy, an investigation and inventory of PCRs likely to be affected by the project have to be conducted. This investigation should document the significance of such PCRs, and assess the nature and extent of potential impacts on them. Since many cultural resources are generally not well documented or protected by law, consultation is an important means of identifying PCRs. Such consultations include meetings with project-affected groups, concerned government authorities and relevant non-governmental organizations.

If PCRs are found during the inventory, a management plan must be prepared. This management plan must include measures to avoid or mitigate any adverse impacts on PCR, provisions for managing chance finds, any necessary measures for strengthening institutional capacity for the management of PCR, monitoring system to track the progress of these activities.

Finally, whether or not a PCR is found at the inventory phase, provisions for managing chance finds must be implemented to ensure that PCR that may be discovered is properly handled.

This policy is triggered by the Project, considering the known existence of PCRs in the RoW and wayleave, and possible additional findings during construction. Indeed, archaeological sites, historical, sacred trees, shrines and burial sites were found along the line, and around the project area, making this policy relevant. Known PCRs are discussed in section 7.2.4.5 below.

Accordingly, the present report addresses OP 4.11's requirement by including a Cultural Resources Management Plan (see Appendix 7-1).

4.6.5 OP. 4.12 INVOLUNTARY RESETTLEMENT

The main objectives of the WB Resettlement Policy (OP 4.12) are to:

- Avoid or minimize involuntary resettlement whenever feasible;
- Develop resettlement activities as sustainable development programs, providing sufficient investment resources to enable the displaced persons to share in project benefits;
- Meaningfully consult displaced persons and give them opportunities to participate in planning and implementing resettlement programs;
- Assist displaced persons in their efforts to improve their livelihoods and standards of living or at least to restore them, in real terms, to pre-displacement levels or to levels prevailing prior to the beginning of project implementation, whichever is higher.

This policy is usually applied for projects that require international financing. The World Bank OP 4.12, Annex A (Paragraphs 17-31), describes the scope (level of detail) and the elements that a resettlement plan should include. These include objectives, potential impacts, socioeconomic studies, legal and institutional framework, eligibility, valuation and compensation of losses, resettlement measures, relocation planning, community participation, grievance management procedures, implementation schedule, costs and budgets, and monitoring and evaluation.

WB OP 4.12.(6a) requires that the resettlement plan includes measures to ensure that displaced persons are (i) informed about their options and rights, (ii) consulted and offered choices among technically and economically feasible resettlement alternatives, and (iii) provided prompt and effective compensation of full resettlement costs.

WB OP 4.12 (8) requires that particular attention should be paid to the needs of vulnerable groups among those displaced such as: those below the poverty line, landless, elderly, women and children, indigenous populations, ethnic minorities.

WB.OP 4.12 (13 a) stipulates that any displaced persons and their communities and any host communities receiving them should be provided with timely and relevant information. They also should be consulted on resettlement options and offered opportunities to participate in planning, implementing and monitoring the resettlement.

WB OP4.12 (12a) states that payment of cash compensation for lost assets may be appropriate where livelihoods are land-based but only when the land taken for the project is a small fraction (less than 20%) of the affected asset and the residual is economically viable.

WB OP4.12 Para (6 b & c) state that in case of physical relocation, displaced persons should be (i) provided assistance (such as moving allowances) during relocation; and (ii) provided with residential housing, or housing sites, and, if required, agricultural sites for which a combination of productive potential, locational advantages, and other factors is at least equivalent to the advantages of the old site.

In addition displaced persons should be offered support after displacement, for a transition period, based on a reasonable estimate of the time likely to be needed to restore their livelihood and standards of living. This development assistance comes in addition to compensation measures such as land preparation, credit facilities, training, or job opportunities.

WB OP4.12 Para 13 (a) requires that appropriate and accessible grievance mechanisms are established to sort out any issues arising.

This policy is triggered by the Project as approximately 3000 households living within or having assets in the 30m corridor will go through the resettlement process. A full resettlement action plan (RAP) addressing OP 4.12's requirements has therefore been prepared and submitted in parallel with the present ESIA.

4.6.6 OP 4.36 FORESTS

The Operational Policy 4.36 is about forest protection. The major objectives of the policy are:

- Sustainable management of forests;
- Conservation of wet forest zones;
- Communities' rights respect in their traditional use of forest zones in a sustainable manner.

The Bank does not finance projects that, according to it, would involve significant conversion or degradation of critical sections of forests or essential (critical) natural habitats attached to them.

Should the project involve the significant conversion or degradation of natural forests or associated natural habitats that are not considered as critical, and if there is no alternative solution for the project and its location, and if the complete analysis clearly shows that the project's overall benefits are significantly higher than the environmental costs, then the WB can finance the project on condition that it includes appropriate mitigation measures. OP 4.36 is triggered by the Project as some forest habitats are located along the projected line route. Issues raised are therefore managed by mitigation measures described in chapter 7 below, and included in the ESMP (Chapter 8).

4.7 RELEVANT INTERNATIONAL CONVENTIONS

Uganda has signed and ratified several international agreements and conventions relating to the environment. Of relevance for the project are:

- 1968 African Convention on the Conservation of Nature and Natural Resources
- Convention on Wetlands of International Importance especially as Waterfowl Habitat (RAMSAR) 1971
- Vienna Convention for the Protection of Ozone Layer 1985
- Montreal Protocol on Substances that Deplete the Ozone Layer 1987
- Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES) 1973
- Convention concerning the protection of workers against occupational hazards in the working environment due to air pollution, noise and vibration1977
- International Convention to Combat Desertification 1992
- The Convention on Biological Diversity (CBD);
- United Nation's Framework Convention on Climate Change, 1992
- Lusaka Agreement on Co- operative Enforcement Operations Directed at Illegal Trade in Wild Flora and Fauna 1994
- Convention of the African Energy Commission, 2003
- Convention on the Conservation of Migratory Species of Wild Animals (Bonn Convention), 1979
- Agreement on the conservation of migratory waterbirds African-Eurasian Migratory Waterbirds (AEWA)
- Agreement on the Conservation of Gorillas and their Habitats (Gorilla Agreement)
- Stockholm Convention on Persistent Organic Pollutants
- Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and their Disposal.

5 PUBLIC CONSULTATION & STAKEHOLDER ENGAGEMENT PLAN

5.1 INTRODUCTION

Public consultation and stakeholder engagement form an integral and, in Uganda, mandatory part of the Environmental and Social Impact Assessment (ESIA) and Resettlement Action Plan (RAP) processes. It is defined as an iterative process by which the public's input on matters affecting them is sought and incorporated in project planning as early as possible. This chapter describes the public information and consultation process that was implemented by the consultant as part of the ESIA and RAP studies for the Lira-Gulu-Nebbi-Arua (LGNA) Electricity Transmission project.

Guidance on a clear communication and Stakeholder Engagement Plan to be implemented is presented in the ESMP (Chapter 8).

5.2 STAKEHOLDER ENGAGEMENT PLAN

5.2.1 GENERAL PLANNING FOR STAKEHOLDER ENGAGEMENT

Engagement activities were planned according to key stages, or decision moments, throughout the ESIA and RAP studies where the informed participation of stakeholders was likely to make the most significant contribution to the on-going analysis. Table 5-1 identifies these stages, or “consultation rounds”, and presents, for each of them, the specific engagement objectives, target groups and implementation periods.

Table 5-1 Specific engagement objectives and target groups according to study phases

ENGAGEMENT OBJECTIVES	TARGET GROUPS	TIMELINE
Consultation Round 1: Inception phase		
• Inform key regulatory and administrative authorities of the Project and undergoing ESIA / RAP process • Identify key environmental and social issues potentially associated with the Project • Present and validate the proposed consultation programme with stakeholders	• Concerned ministries and agencies at national level • District local governments and technical services	Nov. and Dec. 2014
Consultation Round 2 : Detailed study phase		
• Publicise the project to population of affected districts • Document affected communities’ concerns and expectations in view of the project and resettlement process • Involve communities in the localization of environmental / social sensitive elements so as to optimize the line’s final route • Capture women’s concerns and expectations • Consult with key authorities and informants on critical issues	• Affected communities • Traditional leaders • Districts local governments • Concerned ministries and agencies at national level • NGOs	Feb. and March 2015
Consultation Round 3 : Consultation on ESIA and RAP preliminary results		
• Present and validate critical elements of the draft ESIA and RAP reports with key stakeholders	• Districts local governments • Affected communities and potentially displaced households	September/ October 2015

It is to be noted that the consultation of the affected households will occur through the socio-economic survey to be undertaken as part of the RAP study. The survey will integrate a series of consultative questions seeking to assess individual households’ concerns and expectation in view of the ESIA and resettlement processes, in particular the impact mitigation measures, the compensation scheme and the resettlement assistance. The data obtained from women heads of households, as well as those obtained from representatives of other vulnerable groups, will be treated separately in order to

emphasize their points of view. Results of the socio-economic survey will be presented in the RAP report.

5.2.2 TARGET STAKEHOLDER GROUPS

Target groups for the ESIA and RAP stakeholder engagement process have included the following:

- Directly concerned ministries and national agencies;
- Districts' local government authorities and technical staff;
- Customary authorities;
- Project-affected communities and households;
- Project-affected industrial and commercial organizations
- Relevant NGOs in the fields of conservation, development and human rights.

Within these groups, the identification of stakeholder organizations was based on the project scope of works, the geopolitical and traditional setting of the project area, and previous consultations carried out under the Feasibility study by SMEC. A comprehensive list of project stakeholders, with their respective roles and responsibilities in view of the project, can be consulted at Appendix 5-1.

5.3 RESULTS FROM CONSULTATION ROUND 1 (INCEPTION PHASE)

Initial consultation meetings were conducted in November and December 2014 as part of the study's inception phase and environmental and social scoping exercise. These were performed through individual and semi-structured interviews with a limited number of key stakeholders at national and district levels. A project information memo was produced and distributed to stakeholders to support the meetings. Results for this consultation round are summarized below, both in terms of organizations reached and key issues that were raised. Participants' signatures and detailed accounts of meetings can be found in Appendix 5-2.

5.3.1 ORGANIZATIONS REACHED

Table 5-2 indicates the dates, locations and organizations met during consultation round 1.

Table 5-2 Date, location and organizations met during initial consultations for the Lira – Gulu – Nebbi – Arua transmission line.

DATE (2014)	LOCATION	ORGANIZATION
Nov. 25th	Kampala	UETCL – Planning Office
Nov. 25th	Kampala	Ministry of Water and Environment - Wetlands department
Nov. 28th	Kampala	NEMA – EIA Office
Nov. 28th	Kampala	UETCL – Environment Office
Dec. 1st	Arua	Arua District Local Government - District Health Inspector, Environment, Planning, Land Valuer Offices
Dec. 2nd	Nebbi	Nebbi District Local Government - Acting Chief Administrative Officer, Acting LCV Chairman and District Water Office
Dec. 3rd	Nwoya	Nwoya District Local Government - District Environment Office
Dec. 3rd	Gulu	Gulu District Local Government - District Development, Environment, Physical Planning and Natural Resources Offices
Dec. 4th	Oyam	Oyam District Local Government - CDO, Planning, Health and Environment Offices
Dec. 4th	Kole	Kole District Local Government - District Environment Office
Dec. 5th	Lira	Lira District Local Government – CDO, Production, Planning, Environment, Water and Health Offices

5.3.2 KEY ISSUES RAISED

Key concerns, expectations and opportunities expressed by stakeholders during initial consultations are summarized below (see Appendix 5-2 for detailed accounts of meetings).

- **Project's contribution to regional development**: Stakeholders generally expect that the extension of power supply to the region will boost economic growth, stimulate the development of small and medium scale industries and generate new trading opportunities.
- **Access to jobs**: In all districts, the officials requested that casual jobs during construction and other income generating opportunities should be availed to local residents, with special consideration for youth and women in the area.
- **Awareness and mobilization campaign**: A community mobilization and awareness campaign is recommended for informing all stakeholders about the project and its likely positive and negative impacts, as well as to dispel fears that the project is a political ploy for winning the 2016 general elections.
- **Transparent communication**: Stakeholders have expressed the wish to get accurate information and requested that continuous consultation and information meetings be maintained.
- **Compensation for project-affected people**: The adequate, transparent and effective compensation of households and individuals whose property (land, crops and structures) will be affected is a major concern. It was raised that, based on experience from previous projects in the area, people usually fear not being compensated fairly, if at all, for lost assets. The period between valuation and compensation is normally long, yet the compensation rates are usually not updated.
- **Impacts on human health**: Stakeholders have raised that project workers drawn from outside the project area and their interaction with local people can lead to tensions and provide a higher risk for the spread of communicable diseases including HIV/AIDS. HIV/AIDS awareness is considered a critical issue. Some have raised concerns over the health impacts related to over exposure to magnetic fields and radiation of the transmission lines.
- **Wetlands protection**: It was raised that opening up wetlands and backfilling to provide site for the pylons could put wetlands under intense pressure, including reclaiming for agriculture and settlement purposes, leading to their destruction. Clearing vegetation in wetlands could expose some of these areas to invasive and shrubby plants such as Mimosa pigra and Lantana camara, thus altering the habitat for the native species.

5.4 RESULTS FROM CONSULTATION ROUND 2 (DETAILED STUDY PHASE)

Consultation round 2 was performed early in the detailed ESIA and RAP study phase, in February and March 2015. It included engagement activities with both affected communities and key stakeholders at the district and national levels. Results for this consultation round are summarized below in terms of activities performed, groups reached and key issues raised. Detailed accounts of meetings can be found at Appendix 5-3.

5.4.1 ACTIVITIES PERFORMED AND ORGANIZATIONS REACHED

Engagement activities with affected communities were conducted through informative and consultative meetings with local leaders, along with open public assemblies, in all communities along the entire study corridor. To ensure the inclusion of gender issues, public assemblies were followed by separate meetings with women groups in some communities.

In support of the consultation process, a project background information document (BID) was produced and distributed in a brochure format (see Appendix 5-3A). Communities' mobilisation was mainly done by the chairpersons of the respective villages through telephone calls and public announcements. Local Council leaders were involved in meetings scheduling and selection of venues. In some cases, three to five villages converged at one same and central location. Several local leaders and public servants attended these community consultative meetings.

All the discussions were opened with a brief introduction of the project, its purpose, the purpose of the ESIA, activities to be involved and the different teams involved. The team then guided the participants to obtain their views. Questions from the participants were answered and some misconceptions about the project were clarified.

A total of 26 community meetings were held in the seven affected districts, to which attended a total of 918 individuals. Overall, 70 % of community meetings' participants were males and 30 % were females.

As for traditional authorities, a representative of the King of the Alur Kingdom, Launi III, was met individually and provided with first-hand information about the project. Its advice was sought on how to optimize the line's route and enhance the resettlement process.

Finally, along with community-level meetings, a series of consultative meetings were also held at the district and national levels with representatives of local governments, concerned ministries and NGOs for in-depth discussions on specific and critical issues.

Tables 5-3 and 5-4 present the dates, locations and communities or organizations reached at the local, district and national levels during Consultation Round 2. Figure 5-1 illustrates some of the community meetings held. A full account of community meetings is presented in Appendix 5-3B, and the full list of attendees to community meetings can be consulted at Appendix 5-3C. Detailed accounts of district and national meetings is incorporated in Appendix 5-3D, along with registers of participants' signatures for the district and national levels meetings in Appendix 5-3E.

Table 5-3 Schedule of Community Consultation Meetings Held

DATE	TIME	VENUE	SUB COUNTY	DISTRICT
7th Feb 2015	11 am	Dubai Trading Center	Ajia	Arua
7th Feb 2015	2 pm	Ullepi Trading Center	Ullepi	
7th Feb 2015	5 pm	Nyio	Oluko	
8th Feb 2015	11 am	Okollo Trading Center	Okollo	
8th Feb 2015	4 pm	Arivu Sub County	Arivu	
9th Feb 2015	10 am	Anyiribu S/C	Anyiribu	
7th Feb 2015	10 am	Omyer T- Centre	Nebbi	Nebbi
7th Feb 2015	2 pm	Namrwodho P/School	Nebbi TC	
8th Feb 2015	11 am	Akaaba P/School	Kucwiny	
9th Feb 2015	10 am	Alwi s -county Hqts	Alwi	
9th Feb 2015	2 pm	Old cotton Ginnery	Panyango	
10th Feb 2015	10 am	Amor ferry village	Pakwach Council	
10th Feb 2015	2 pm	Latoro parish Hqtrs	Pulongo	Nwoya
10th Feb 2015	1 pm	Purongo SC Hqrs	Purongo	
11th Feb 2015	5 pm	Anaka Town Council	Anaka T/C	
11th Feb 2015	4 pm	Koch Goma S/C H/Q	Koch Goma	
11th Feb 2015	6 pm	Tochi village- Ongako S/C	Ongako S/C	Gulu
12th Feb 2015	11 am	Balogari Trading Center	Koro S/C	
12th Feb 2015	3 pm	Bobi P7 Primary school	Bobi	
12th Feb 2015	4 pm	Obir Village	Lakwana	
12th Feb 2015	9 am	Ngai trading centre	Ngai	Oyam
12th Feb 2015	3 pm	Omoro village	Iceme	
13th Feb 2015	10 am	Atek	Aboke	Kole
13th Feb 2015	4 pm	Kole central	Barmindiang Ps	
13th Feb 2015	4 pm	Obervilllage	Lira Municipality	Lira
14th Feb 2015	12 pm	Te-Okole P/S	Lira Sub County	

Table 5-4 Other organizations met at community, district / sub-county and national levels during Consultation Round 2

DATE	LOCATION	ORGANIZATION
Community level		
09.02.15	Anyiribu	BEMA Women's Group
09.02.15	Nebbi	Alur Kingdom
10.02.15	Anaka	Fish Monger Women Association
10.02.15	PAJONGA	Orukitam Women Group
District and Sub county levels		
06.02.15	Arua	Arua district - LCV Chairperson and Senior Local Medical Officer (SLMO)
08.02.15	Nebbi	Nebbi Town Council
09.02.15	Nebbi	Nebbi District - LCV Chairperson, District Health Officer (DHO) and Natural Resources Officer
10.02.15	Nwoya	Nwoya District - Natural Resources Officer, surveyor, District Internal Security Officer (DISO), Subcounty Chief (S/C)
11.02.15	Gulu	Gulu District – District Forest Officer (DFO)
12.02.15	Gulu	Gulu District –Assistant Chief Administrative Officer (ACAO), DHO and Lands Officer
13.02.15	Oyam	Oyam District - Natural Resources Officer and Lands Officer
13.02.15	Kole	Kole District - Environment Officer
13.02.15	Lira	Lira District - LCV Chairperson, DCAO and Health Officer
	Lira	Lira Municipality - ABER Division
Central government		
12.03.15	Kampala	Rural Electrification Agency (REA)
12.03.15	Kampala	Ministry of Water and Environment
13.03.15	Kampala	Ministry of Tourism, Wild Life and Antiquities
13.03.15	Kampala	Civil Aviation Authority (CAA)
16.03.15	Kampala	Rift Valley Railways
16.93.15	Kampala	Ministry of Land Housing and Urban Development
16.03.15	Kampala	Ministry of Energy and Mineral Development
17.03.15	Kampala	Uganda Wild Life Authority
17.03.15	Kampala	Ministry of Gender Labour and Social Development
10.07.15	Kampala	National Forestry Authority
NGOs		
13.02.15	Kole	World Vision (Kole District)
13.02.15	Kampala	Nature Uganda / Strait Talk Foundation

Figure 5-1 Some of the community meetings in pictures

Meeting at Arivu Sub County

Meeting at Anyiribu Sub County

Meeting at Purongo Sub County

Meeting at Anaka Town Council

Meeting in Dubai T/C Ajia Sub County

Meeting at Ullepi Sub County

BEMA women's group

Women's group in Anaka T/C

Key concerns, expectations and opportunities expressed by community, district and national stakeholders during Consultation Round 2 are summarized below. Detailed accounts of the meetings are inserted in Appendix 5-3 B and 5-3D.

5.4.2 KEY ISSUES RAISED AT COMMUNITY LEVEL

Key themes raised during community consultations include the need for community sensitizations, the protection of cultural and communal properties, access to local jobs and economic benefits, the protection of the most vulnerable households and the participation of communities in the identification of compensation and resettlement alternatives. Some of the most frequently raised concerns and questions are listed below:

- Fear of losing large pieces of land to UETCL for the proposed development due to the 30 m width of the required land for the corridor;
- Whether only land is to be compensated or only property on the land, or both;
- Land is customary yet proof of ownership using documents is required before compensation is affected;
- Is there any livelihood restoration programme in case a person's entire land is taken by the project?;
- Communities wanted to know how they would benefit from such a project since a high voltage transmission line would not provide power that can be directly tapped from;
- What would be done about people who would refuse the line to pass through their land?;
- Likely occurrence of accidents/electrocution if proper and adequate sensitisation is not done;
- The uncertainty of valuation process and whether the valuation exercise will be fair enough to meet their financial expectations;
- Most of the community members are not conversant with the valuation procedures and several of them expressed fear of losing their property to UETCL with no or inadequate compensation;
- The mode of compensation payment preferred is cash money although most didn't know how much to expect and how this money would be delivered to them;
- Credibility of the valuation exercise was questioned as some valuers may undervalue peoples' property and a likelihood of documenting wrong property owners;
- Some community members wanted to know if UETCL would pay for speculated development plans. Citing examples such as if a person wanted to develop their land but then it is marked as a corridor before the development takes off;
- Communities expressed unhappiness with the way compensation is handled in Uganda and stated that there is a tendency of delaying compensation and yet no value is added to cater for the lost time. They added that the developer should cater for time lost in case compensation is unnecessarily delayed;
- Community members, local leaders and some district technocrats expressed concerns about the potentially vulnerable groups in the project area, which include the elderly, the widows/widowers, the single mothers, the disabled persons and child-headed families. The concern for such vulnerable groups is getting in-kind compensation since they may not have the energy to establish new homes by themselves;
- The communities were requested to assist the RAP team to identify cultural and community properties (such as cultural sites, water sources and graves) in or near the transmission line corridor. It emerged that some graves are located within the transmission line corridor. Cultural sites used for cultural ceremonies and traditional healing are also found within the study corridor;
- The communities proposed that when the project starts, they should be given the first opportunity and priority to work as semi-skilled or non-skilled labourers. Local Council officials also emphasized the need for the contractors to recruit unskilled labour from the communities, pointing out that project implementers often import even unskilled labour, which the locals could provide.

In spite of all the above concerns and fears expressed, the project received overwhelming support in all the communities consulted. In all the meetings, participants emphasized that proper community consultation should be conducted throughout the project development.

As highlighted from the questions above, the affected communities seem to be concerned most about the extent of land to be acquired for the project and the nature of property that is to be compensated. Communities are not familiar with, and often distrustful of, the valuation procedures and compensation criteria. The consultants attempted to respond to their concerns and they were informed that further sensitization and consultations will be done before the compensation exercise begins.

Full details on issues raised at community level are provided in appendix 5-3.

5.4.3 KEY ISSUES RAISED BY THE REPRESENTATIVE OF THE ALUR KINGDOM:

The representative of the King of Alur appreciated the project and pledged full support. It pointed out to the following concerns:

- The people in the region pay heed to the King's directives and therefore, the Kingdom administrative structures could be used during community mobilization and implementation of the project;
- The project needs to consider very important cultural sites, such as Wang-Lei and Amor Ferry, in Pakwach Sub County;
- Elders in the Kingdom are vested with powers to manage community land and therefore chiefs and elders will play a key role during RAP process;
- In order for the RAP process to be effective, it is recommended to organize and meet all stakeholders in one meeting to discuss modalities of land valuation and compensation;
- Fair compensation is critical to the project's success.

5.4.4 KEY ISSUES RAISED BY DISTRICTS LOCAL GOVERNMENT REPRESENTATIVES

- District leaders pledged to help in the mobilization and sensitization of communities;
- They highlighted the need for clear and proper information disclosure about the project, taking into account that most rural community members are illiterate;
- They consider that a project of this nature is timely as it would remediate to the current situation of unreliable power in the project area and hence would represent an opportunity to support the districts development;
- People in the project area highly value their land and consider this as the indispensable asset any family can possess. The developer therefore should ensure that local people are sensitised to the objectives and benefits of the project since it involves permanent land take.

5.4.5 KEY ISSUES RAISED BY NATIONAL STAKEHOLDERS

- All national stakeholders upheld and commended the consultation process being undertaken by the consultant;
- The project should be done bearing in mind other development initiatives and plans, such as rural electrification, roads development, railways and industrial projects. This will help in dealing with cumulative environmental and social impacts;
- Ensure that adequate assessment is conducted for sensitive and fragile ecosystems (wetlands, rivers, wildlife dispersal areas close to the Murchison falls national parks, wooded savannah and forested areas) and plan for relevant mitigation measures;
- Use the services of an archaeologist to ensure that potential archaeological and paleontological artefacts are clearly identified and any chance find element secured;
- Cultural sites and burial grounds within the project study area should be identified, documented and avoided as much as possible by the line's route;
- The developer should seek permission from relevant authorities to initiate the project in areas with established installation such as aerodromes/airports, railway lines, road reserves and industrial parks. This will ensure that guidelines are adhered to and cumulative impacts are adequately handled;
- The ESIA/RAP team should do adequate consultations with affected communities and households during the preparation of the Resettlement Action Plan;
- Occupational safety and health issues must be dealt with in accordance will all relevant guidelines and laws and all workers should be trained and given personal protection equipment;
- All social issues related to the project should be properly handled including involving women and other special groups in the project decision making process.

5.5 RESULTS FROM CONSULTATION ROUND 3 (ESIA AND RAP PRELIMINARY RESULTS)

In September 2015 and October 2015, community meetings were conducted in most of the project-affected villages to inform and consult the public on key elements of the Project and the RAP framework. The public engagement approach and activities performed at this stage are described below, followed by the results achieved in terms of populations reached, issues raised and responses provided by the ESIA / RAP development team. A more detailed account of these activities can be found in the RAP report.

5.5.1 METHODS AND APPROACH

Appointments were made to meet the respective District and Sub-County officials in order to inform them about the project, introduce the consultant and prepare for the community meetings. Verbal notices to all Chairpersons of the respective villages about dates, venues and time of the respective consultation activities were given. Full account of consultations as well as consultation and disclosure material can be found in Appendix 5-4.

The Chairpersons were also requested to mobilize all members of their villages. The consultant also prepared a poster (see attached as Appendix 5-4A) and handouts in both English and local languages (Appendix 5-4B) with information about the project and its foreseen effects in terms of resettlement and land take. It was distributed to all persons who were present in the community meetings. Copies were made available to the District Environment Officer, Sub County Officials, and the Local Council I Chairpersons. In order to cater for those who could not read, it was agreed that either their children or the Chairpersons of the respective villages should read to them. In addition, a map showing the line route as it traverses through the project area was prepared and used during information dissemination. Copies of information brochures were also distributed to District, SubCounty officials and directly affected households.

Community meetings were held throughout the project area .The purpose of these meetings was to give information about the project and gather people's perceptions, opinions, suggestions and fears about the project. The community meetings acted as a forum for discussions between the project team and the community members, community leaders and opinion leaders. Minutes of the general community meetings are attached as Appendix 5-4C and lists of attendees are attached as Appendix 4-D. …

Key informant interviews and group discussions were also held with the political leaders in the project area. These included the area Chairpersons LC III and I, the Sub County Chiefs in different project areas

Table below gives a schedule of all the meetings held in September and October 2015.

Table 5-5 Stakeholder schedule of Community meetings

DISTRICT	SUBCOUNTY	DATE/TIME OF MEETING	VENUE	VILLAGES IN ATTENDANCE
ARUA	Arivu	29.09.2015 09:00am	LC1s Residence	Anzuva Village
		30.09.2015 09:00am	LC1s Residence	Adjumani Village
		01.10.2015 09:00am	LC1s Residence	Ombavu Village
		02.10.2015 09:00am	LC1s Residence	Egami Village
		02.10.2015 03:00pm	LC1s Residence	Egara Village
		03.10.2015 09:00am	LC1s Residence	Ejako Village
		03.10.2015 03:00pm	Bondo HCIV	Cinya, Buava, Onyavu
	Uleppi	03.10.2015 09:00am	Uleppi Sub County H/Q	Ave, Aribu, Muni Villages
		03.10.2015 12:30pm	Iriri Trading Center	Oyabu, Onduko, Ayira Villages
	Okollo	08.10.2015 09:00am	Zabu Primary School	Zabu Village
		13.10.2015 09:00am	Okollo TC	Ndubu, Awa, Vuu, Okollo Tc Villages
		13.10.2015 12:00pm	Ambala-Ombachi TC	Ambala-Ombachi Village
		15.10.2015 09:00am	Ayiju TC	Opibu&Ayiju Villages
	Anyiribu	14.10.2015 11:00am	Anyirirbu Sub County H/Q	Muzeetu, Peera, Peipia Villages
NEBBI	Nebbi T/C	26.09.2015 09:00am	LC I residence	Nyangam Lower/Nyangam Upper
		26.09.2015 11:00am	LC I residence	Namurwodho
	Kuchwiny	27.09.2015 03:00pm	Akaba P/S	Jupasasa
		28.09.2015 09:00am	Got-Ali TC	Got-Ali
		28.09.2015 11:30am	LC I residence	Pawo-Achwera and Achwera forest
		30.09.2015 09:00am	LC I residence	Jupamarindi
		30.09.2015 11:00am	OlagoAnyola meeting area	Olago Anyola and Atyerokoma villages
		30.09.2015 01:00pm	Orango meeting place	Orango and Obia Villages
		30.09.2015 01:00pm	LC I residence	Got-landi village
		01.10.2015 09:00am	Panyalum trading centre	Panyalum, Omol and Widyanga
	Nyaravur	02.10.2015 09:00am	Akoro meeting place	Akoro and Aciba
		02.10.2015 02:00pm	LC I residence	Warathum
	Alwi	05.10.2015 09:00am	Got-madi trading centre	Got-madi
		05.10.2015 12:00pm	LC I residence	Paila west
		06.10.2015 09:00am	Paila east meeting place	Paila east
		06.10.2015 12:00am	LC I residence	Anyom Kango
		06.10.2015 02:00pm	Pateng trading centre	Pateng east and pateng west
		07.10.2015 09:00am	Alwi primary school	puyang east and puyang west
		07.10.2015 12:00pm	LC I residence	Gabi-acutugeno
		07.10.2015 04:00pm	LC I residence	Ajikalagang
		10.10.2015 09:00am	LC I residence	Atara
	Panyango	10.10.2015 12:00pm	LC1 residence	Andibo
		11.10.2015 02:00pm	LC1 residence	Lajung
	Nebbi S/C	17.10.2015 09:00am	LC1 Residence	Pajukwi and Aryek-Patek
Nwoya	Pulongo	26.09.2015 03:00pm	Wianono	Pawat Omero West
		27.09.2015 01:00pm	PaminOlango T/C	Pamin Olango
		28.09.2015 03:00pm	Pajengo Trading Centre	Pajengo

DISTRICT	SUBCOUNTY	DATE/TIME OF MEETING	VENUE	VILLAGES IN ATTENDANCE
	Pakwach Town council	30.10.2015 02:00pm	Parish Headquarters.	Amor ferry
		09.10.2015 03:15pm	Mujugula trading centre	Mujugula & Ariera
		10.09.2015 03:20pm	LC1s Residence	Jupubira
		11.10.2015 08:00am	Jumanwal`s residence	Jupungulu
		13.10.2015 02:00pm	LC1s Residence	Puyoo east
		13.10.2015 10:00am	Pakwach Town Council	Pakwach Town Council
Gulu	Ongako	26.09.2015 10:00am	Onang	Onang, Pidaloro
		28.09.2015 10:00am	Tochi	Tochi
		2.10.2015 10:00am	Ongako sub county H/Q	Kal Centre, Abil Nino
		2.10.2015 03:00pm	Dika	Dika
		3.10.2015 02:00pm	Peya	Peya
Nwoya	Kochgoma	5.10.2015 10:00am	Kochgoma subcounty H/Q	Kal A II
		5.10.2015 02:00pm	Amaa Trading Centre	Agonga A, Amaa Kalang, Lakalac
		6.10.2015 11:00am	Okir	Okir
	Alero	7.10.2015 11:00am	Nwoya	Nwoya
	Anaka	8.10.2015 11:00am	Lapem	Lapem
		13.10.2015 03:00pm	Kweyo	Kweyo
		14.10.2015 10:30am	Onyomtil	Onyomtil
		14.10.2015 02:30pm	Akago Central	Akago
		15.10.2015 11:00am	Obira	Obira, Luyam
		16.10.2015 11:00am	Pajaa	Pajaa
	Purongo	16.10.2015 05:00pm	Labeye	Labeye
	Purongo	17.10 .2015 11:30am	Pawat Omeru East	Pawat Omeru East, Patira

Additional meetings were also held with national stakeholders. Table 5-6 indicates the dates, locations and organizations met. Detailed account of national consultations is appended as Appendix 5-4E

Table 5-6 Date, location and organizations met during additional consultations with national stakeholders.

DATE (2014)	LOCATION	ORGANIZATION
Jan 14th 2016	Kampala	Uganda Wildlife Authority – Justine Namara
Jan. 22nd 2016	Kampala	Ministry of Water and Environment – Paul Mafabi
Jan. 28th 2016	Kampala	Ministry of Gender, Labour and Social Development – MoGLSD premises

5.5.2 ISSUES RAISED DURING CONSULTATIONS

The following is a summary of issues/concern raised by meeting participants, and responses provided by the project team, during consultative meetings held in September and October 2015. Compensation

- Communities were worried that compensation for affected property (trees, houses and crops) will not be fair. *PAPs were assured that standard compensation rates will be used and all PAPs will be appropriately compensated.*
- Community were concerned that their property particularly land would be undervalued if the rate is based on district compensation rates. *On this note they were informed that the prevailing market rates for land will be used in determining the value of land.*

- PAPs wanted to know whether all affected land within Project footprint will be compensated. *It was made clear that a - 5 M wide ROW will fully be acquired by UETCL and its usage restricted and that the remaining 25m ie 12.5 m either side of the ROW will be partially acquired and compensated but will be under restricted use (not trees above 1.8 m and no construction.)*
- Communities were wondering whether this project will also not compensate some people like what happened with WENRECO in West Nile and Gulu Olwiyo road where construction is already going on before compensation. *It was made clear that UETCL is undertaking RAP process to insure that all PAPs are appropriately compensated before line construction commences.*
- What other items are compensated apart from houses? *All assets houses, trees and plants of economic values will be valued and compensated.*
- Some community members without being specific gave reference to incidences where other projects implemented before (road) convinced PAPs to fill forms and payment was never effected and were therefore wondering what happens if members are not paid. Where will the community go for redress? *In reply they were informed that UETCL projects are not implemented before compensation is completely done and all complaints cleared. People were advised all grievance will be handled by grievance committees.*
- When will compensation be made? Usually government programmes like these begin without people being compensated? *In response people were informed that the compensation will be made as soon as government gets funds for compensation and for subsequent construction works.*
- How is community land compensated? How is it handled? *In case of community land 2 or more people are registered and they receive the compensation on behalf of the community after which they share it amongst the community members.*
- The PAPs sought to know where the compensation rates would come from and whether they would be compensated the right amount. *PAPs were informed that district current valuation rates will be verified by the chief government valuer and that PAPs will be compensated according to the value of the property.They were also assured that in situations where the figures will be found low, the office of the Chief Government Valuer has a right to make recommendations on their amendment.*
- The PAPs sought to know other than the compensation what will UETCL do for them. *PAPs were informed that the project consider supporting community complementary initiatives through Community Social Responsibility (CSR).*
- The PAPs sought to know how much the compensation will be for land and permanent buildings. *PAPs were informed that there is a difference in rates for the two categories and compensation will be based on the prevailing market rates and CGV recommendations*
- The PAPs wanted to know whether CGV rates or district rates will be used during compensation. They also were concerned about the assumption that land in northern Uganda is cheap and yet this is not the case. *The PAPs were informed that rates are based on area commercial rates verified by the Chief Government Valuer (CGV)*.
- PAPs inquired whether they would be compensated fully for trees. *In response PAPs were informed that they would be fully compensated for trees in the way leave basing on approved district property rates.*
- The PAPs sought to know whether land acquired for resettlement will be compensated. *It was explained that all land for resettlement would be compensated for.*
- The PAPs sought to know whether they would be compensated enough to cover costs involved in relocating graves. *They were assured that all the costs involved in relocation of the graves will be covered*.
- The PAPs wanted to know if anthills from which local foods e.g mushrooms and white ants are harvested will be compensated. *Anthills will not be compensated.*
- PAPs wanted to know whether improvement of grave's appearance would affect compensation. *Improving the grave's appearance after assessment would be a loss because the grave will be assessed and compensated as it was during the time of assessment.*
- A member inquired whether compensation would be done if trees present at the time of valuation were all cut before actual compensation. *Compensation will be for those who have lost their trees*

as a result of the TL otherwise using the trees before compensation would mean that the property has to be reassessed hence compensation will be done only trees as present on the land.

- The PAPs wondered whether change of crops will affect compensation. *Compensation will be based on what has been assessed in the current period but may be adjusted to fit the time of compensation.*
- PAP wanted to know whether compensation was only for those with mark stones on their land. *Every PAP that falls within 30m corridor is eligible for compensation.*
- The PAP asked how compensation for a homestead located on a hill will be done. *Compensation enough to buy land in another location with similar attributes will be paid.*
- The PAPs wondered how compensation will be done if there are several occupants on customary land. *Affected households should produce certificates of customary ownership or should be confirmed as occupants by the local leadership at the time of compensation.*
- The PAPs wanted to know what happens when the PAP dies before compensation is done. *At the time of compensation, the beneficiary will receive the payment but there must be proof i.e. There must be a will or anything to show that the deceased PAP intended for that person to receive that compensation.*
- The PAPs wondered whether bare land will be compensated. *All land whether bare or not will be appropriately valuated and compensated for.*

5.5.2.1 VALUATION

- How will unfinished affected structures be valued for compensation? *The PAPs were informed that all structures are valued whether unfinished or finished based on the CGV recommendations.*
- The communities requested that in case of delayed compensation, their property should be revalued. *They were informed that what happens under such circumstances is that the current inflation rate is factored into the compensation packages.*
- Communities inquired if the structures built or crops grown after the RAP exercise will be eligible for payment. *On this note they were informed about the cut-off date (the date of property valuation i.e RAP study completion) and anything after the cut-off date will not be eligible for compensation. In addition, they were informed that they will be given up to six months to harvest their crops and remove any other infrastructure that might not be eligible for payment.*
- PAPs inquired whether they will be given time to harvest mature crops. *They were informed that they will be given time to harvest mature seasonal crops.*
- PAPs inquired whether they will be paid for crops planted after the valuation stage. *The PAPs were informed that any crops planted after the stock inventory will not be considered for payment but time will be given to enable them harvest. For that matter the PAPs were encouraged to only plant seasonal crops in the area earmarked for the project.*
- PAPs wanted know what would happen to them if they did not agree with the valuers' results because some people were not around during the valuer's visit. *They were informed that it's very important for them to be present during the counting of affected property so that they concur with the valuer's list. They were told to ensure that everything affected was included on the valuation forms before appending their signatures onto them. They were further informed that the current District Compensation rates approved by the Chief Government Valuer would be used to compute the compensation packages.*
- The PAPs wanted to know if the project was going to pay for the future income that would have been generated from the affected piece of land. *They were informed that the project will only pay for the property as found at the present state and that the guidelines used do not cover future income to be generated.*
- The community members were worried that properties like houses and land would be undervalued. *They were informed that the current District Compensation rates and values approved by the Chief Government Valuer would be used to compute and value the affected properties.*
- The community members sought to know whether different types of houses are valued the same way i.e. permanent and semi-permanent. *They were informed that houses are valued according to the construction materials.*

- The community appeals to UETCL not to involve the district officials in the valuation process because they believe the officials will deprive them of the right amount for their properties. *The communities were assured that the valuation is being done by a competent valuation team whose final report would be approved by the CGV as the overall valuer.*
- The community wanted to know whether fruit trees like mangoes and oranges are valued the same way. *They were informed that the valuation of crops ant trees are based on the district compensation rates as reflected in the approved district property rates document.*
- The PAPs sought to know why the chief government valuer was involved. *The team informed them that the role of the chief government valuer is to verify and approve the values that have been attached to their assets.*
- PAPs inquired how crops would be valued. *The PAPs were told that it would be depending on the coverage of the crops, they would either be counted or area coverage would be calculated and the value for each crop attached.*
- The community wanted to know how unviable land is handled. *On this note, they were informed that all economically unviable pieces of land will be assessed and compensated.*

5.5.2.2 RELOCATION

- Some people said that generally in the project area relocating graves is not a common phenomenon but in case this happens every affected person with graves should be asked what they prefer. This is because those with cemented graves do so for remembrance and these are likely to prefer relocation of graves. Others feel that if graves are in the corridor and will not be tampered with then they can stay. *The people were informed that culture will be considered and respected as the work is being done and the graves will be valued.*
- The community wanted to know whether the compensation will be enough to enable people relocate. *The people were assured that the compensation will be enough and it will include payment for the inconveniences.*
- The community wanted to know whether the PAPs will be given time to relocate before the project begins. *They were assured that they would be given time to relocate.*
- The communities wanted to know whether institutions like schools would be relocated in case they were affected by the line for example Orango Community P/S in Kucwiny Subcounty in Nebbi district which is crossed by the line. *The community was informed that such institutions were formerly avoided but more consultations will be made about Orango Community P/S.*
- The community wanted to know whether PAPs are helped to look for better areas for resettlement. *The community was assured that the PAPs are helped to resettle in the new places.*
- The community wanted to know whether people are given chance to relocate to areas of their choice. *The people were informed that they had a chance to choose a place of their choice provided it is accessible and affordable.*
- The PAPs wondered where they would relocate to. *It was made clear that there are relocation guidelines that would be followed in the relocation of all PAPs.*

5.5.2.3 DISPUTED LAND

The community wanted to know what happens in case the affected piece of land is disputed or even the case in court. The community was reliably informed that disputed land is not valued and is referred for future valuation and surveying once all the conflicts have been resolved.

5.5.2.4 EMPLOYMENT

The community wanted to know whether the locals will be employed especially as casual labourers. Recommendation made in the ESIA is for the communities to be given first priority for jobs available during construction.

5.5.2.5 GRIEVANCE REDRESS

- The communities wanted to know where people should go for redress in case they don't agree with the compensation package or in case they have any complaint. *The communities were advised to form grievance committees that will be presenting grievances and complaints directly to UETCL.*
- The community wanted to know the address of UETCL in case they had any complaint. *They were referred to the information brochures that give both UETCLs and the consultant's addresses.*

5.5.2.6 SAFETY ISSUES

- The community wanted to know whether it will be safe to walk under the lines after construction. *They were assured that it was totally safe to walk and work under the lines.*
- The community wanted to know whether people (for example the children) in the project area will not be electrocuted in case they touched the pylons. *The community was assured that the pylons are totally safe because they are bad conductors of electricity, However they were cautioned to control the children so as not to play on the pylons much as they are safe.*

5.5.2.7 CULTURAL ISSUES

- The PAPs sought to know what would happen to trees like Tamarindus indica (Ccwa), Tho, Vitex Doniana (Oyelo) and Butyrospermum paradoxum (Yaw) because according to Alur kingdom those trees are not supposed to be cut or else a fine is paid to the kingdom.*The team has consulted the kingdom and every effort would be made to replace every tree that would be cut.*
- The PAPs sought to know whether cultural sites like stones, trees where people go for blessings were going to be destroyed in case they are in the corridor. *The PAPs were informed that such valuable sites were avoided but in case they are in the corridor there will be consultation from the cultural institution for a way forward.*

5.5.2.8 LAND TAKE

The community wanted to know how much land would be taken because similar projects like Andibo dam project started encroaching on people's land which was not compensated for. *The team informed the community that the way leave is 30m wide of which 5m will be completely acquired and remaining 25 m will be partially acquired and allowed for utilization by the community but under restrictions from UETCL.*

5.5.2.9 COMMUNITY SOCIAL RESPONSIBILITY

The PAPs sought to know whether UETCL would do anything else for the community apart from compensation. *The ESMP prepared as part of the ESIA represents a commitment for UETCL to implement the proposed mitigation and compensation measures. The planned environmental and social surveillance and monitoring to be conducted will ensure compliance of the works with commitments and obligations listed in the ESMP, and due application of all mitigation measures.*

5.5.2.10 COMMUNITY BENEFIT

- The community wanted to know whether community access roads will be constructed as part of the project activities. *The team informed the community that the project will, as much as possible, use the already existing roads and the way leave.*
- Communities requested the project to consider supplying them with electricity so that they benefit from the project. The Government of Uganda, through the Rural Electrification Agency, will be carrying out an electrification program in some areas of the project area. Additionnally, *UETCL has committed to contact REA to ensure joint coordination of electricity distribution activities as part of the Project.*

5.5.2.11 ABSENTEE LANDLORDS

Community members inquired on how properties of absentee landlords will be handled. They were informed that the team will look for all the landlords. In addition, they were requested to submit all contact details of the absentee landlords.

5.5.2.12 REFUSAL TO SURRENDER LAND

Some PAPs asked what would happen if two homesteads refused the line from passing through their land. The question was put across to community members to respond and they said that two homesteads would not deter development. In this case, the Government's principle of "Eminent Domain", where the government has the powers to acquire land for public use but has to satisfy the acquisition requirement, must be applied. Where there is disagreement, land can be used and funds put in the Escrow Account until the case is resolved and the affected person paid.

5.5.2.13 VULNERABLE PEOPLE

The communities wanted to know what would happen to old people whose structures will be affected and yet they no longer had the energy to construct new ones. *They were informed that the government will help all vulnerable people to relocate.*

5.5.2.14 ISSUES RELATED TO GOT AFWOYO AREA

The UWA described the Got Afwoyo area as well as the environmental and social pressures it currently experiences. The UWA therefore recommends that construction be done to minimize further impacts caused by other developments such as agriculture expansion and oil prospection. Specifically, the UWA has requested the Contractor to work closely with UWA in strengthening the ranger post located close to the Got Afwoyo area for monitoring animal movement, especially that of elephants. Measures to reduce poaching are also recommended in order to prevent illegal hunting of animals during the construction phase.

On the specific issue of noise, UWA considers that noise produced during erection of a transmission line will not cause significant effect on animals, as construction in the area will be short-lived.

5.5.2.15 WETLAND ISSUES

Consultations held with the Ministry of Water and Environment led to the acknowledgment from the Ministry that transmission lines and access roads can lead to significant degradation of wetland habitats. The MWE re-emphasized the need to apply for wetland user permits prior to conduction of any works in wetland habitats, as well as the need to practice impact avoidance. Such avoidance can be achieved via positioning of pylons and access roads outside wetlands as much as possible. When construction of an access road in wetlands is unavoidable, impacts should be mitigated by dismantling it as soon as tower erection is completed and when backfilling has been done; all materials should be removed from the wetland.

It was also mentioned that The Ministry has initiated the development of Wetland management plans with Gulu, Oyam, Kole and Lira districts, particularly targeted on Kole and Tochi wetlands. The MWE proposed that UETCL support some of the prioritized action for the implementation of these plans.

5.5.2.16 GENDER, HIV/AIDS AND OTHER SOCIAL ISSUES

Consultations held with the Ministry of Gender, Labour and Social Development (MoGLSD) led to many proposals. Firstly, MoGLSD recommends that local Ministry representatives at district and sub-county levels, as well as local communities, be informed on how employment and resettlement will be handled prior to Project commencement.

The Ministry also underlined that employment of children below 18 years-old should not be hired. On gender, the Ministry stated that equal opportunity for employment should be provided to both genders, with equal pays for equivalent jobs. On sexual exploitation and abuse as well as HIV/AIDS, the Ministry recommends development of a strict code of conduct (with its participation) and implementation of sensitization campaigns among workers and communities. UETCL will develop a strict Code of Conduct and all contractors will need to follow national regulations and such Code of Conduct.

6 BASELINE

6.1 PHYSICAL ENVIRONMENT

6.1.1 CLIMATE

6.1.1.1 NATIONAL LEVEL

Uganda's climate is characterized by a wide range of climatic patterns influenced by presence of the Inter-Tropical Convergence Zone (ITCZ), topography, latitude and the presence of Lakes and swamps. In general, the climate of Uganda is mainly influenced by the dry North Easterly and Northerly air masses which cause the dry weather in much of the north as well as the dry South Easterlies which becomes moist after blowing over Lake Victoria thus causing the wet conditions in much of the South.

The country generally experiences bimodal rainfall received during the months of March to May, September to November (much pronounced in the south, west and central regions) while the remaining months (December to February, June to August) comprise Uganda's two dry seasons. Towards the North however, the rainfall pattern, although bimodal, tends to resemble one prolonged rainfall season that occurs between April and October with a short dry season (June –July), while the period from November to March is often very dry. According to BBC weather, the wettest areas are along the shores of Lake Victoria and the Western mountain district, where average annual rainfalls of over 2,100mm (Lake Victoria region) and 1,500 mm (Western highlands) occur. Parts of central and Northeast Uganda receive less than 1,000 mm of rain per year and often much less since rainfall is unreliable from year to year.

This expanse of elevated terrain results in a more moderate climate than otherwise would be expected by the country's equatorial location. The different altitudes in the country contribute to variations in mean monthly temperatures. The presence of mountains influences temperature regimes to the extent where higher areas have temperature as low as 10°C. The country's temperature range between 16°C and 34°C.Mean annual temperatures range from about 16°C in the South-Western highlands to 25°C in the Northwest; and the Northeast becoming more arid with temperatures exceeding 30° C.

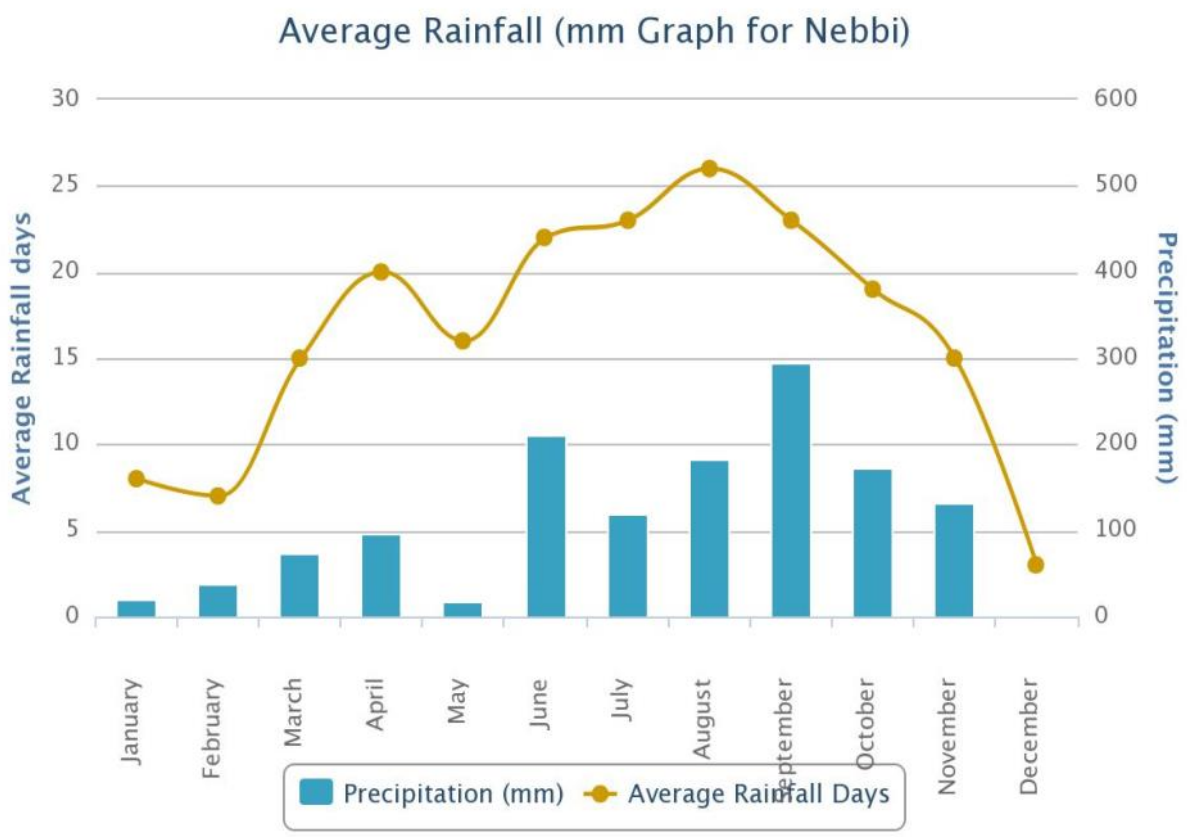
6.1.1.2 EXTENDED STUDY AREA

The project area has a bi-modal rainfall pattern with light rains between April and October. The wettest season (normally August and September) receives about 120 mm per month. The average total rainfall is 1250 mm per year. The mean monthly evaporation ranges from 130 mm to 180 mm. In the dry season (December to March), temperatures in this part of the country remain high throughout.

ARUA DISTRICT

Arua district has a bi-modal rainfall pattern with first rains occurring in the months of March and May, and the second in the months of July to November .This is followed by the dry season from December to March. During this time, the East Westerly winds result into frequent windstorms that exacerbate the dry conditions in the district. The wettest month is normally September which receives about 300 mm. The average annual total rainfall is 1250 mm. The mean monthly evaporation ranges from 130 mm – 180 mm. Average monthly rainy days/rainfall for Arua District are indicated in Figure 6-1.

Figure 6-1 Average Rainfall Graph for Nebbi for the period 2000-2012



Source: www.worldweatheronline.com

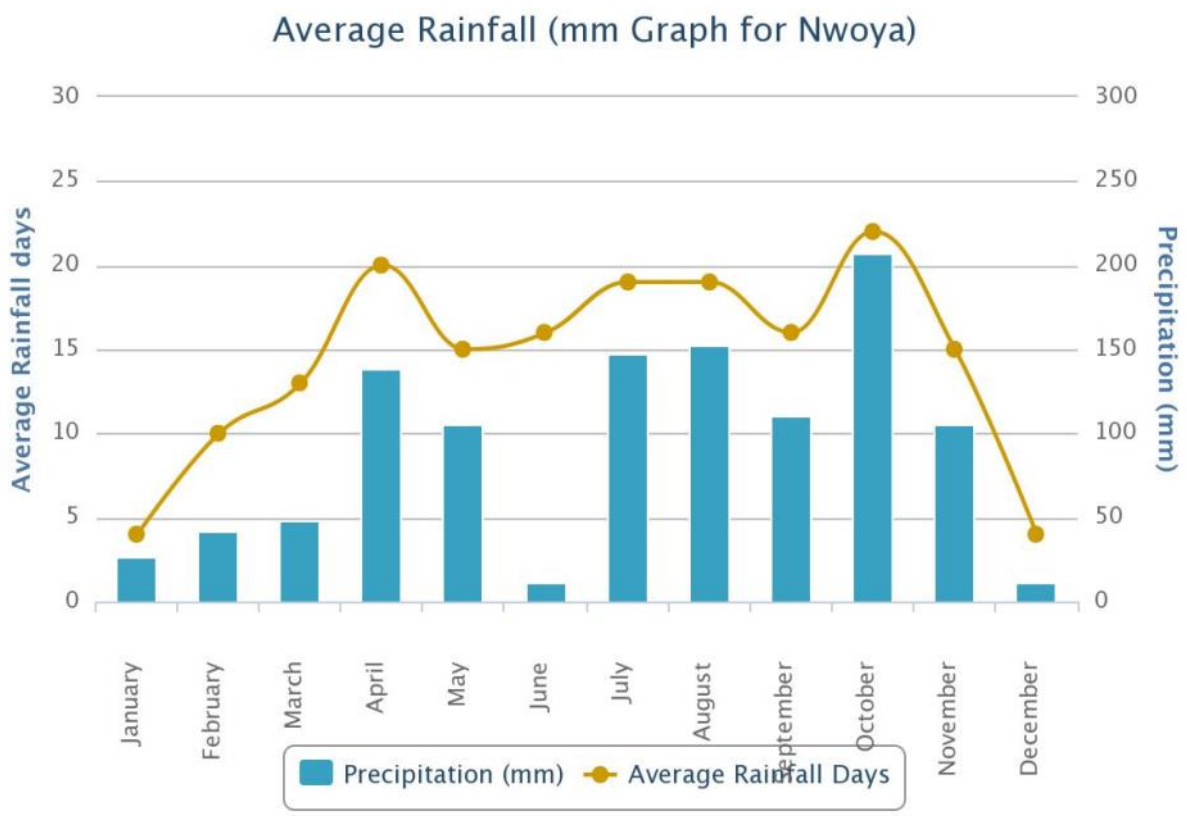
Mean annual minimum temperature in the district is between 17.5 C and 20 C whereas the mean maximum annual temperature is 30 C. Temperatures are generally high throughout the year for the whole Nebbi district and tend to be higher towards the Albert Nile, where elevation drops to approximately 650 m.

NWOYA DISTRICT

Nwoya district has moderate rainfall occurring from April to November, punctuated by occasional short-lived dry spells in June as well from December to March. The wettest months are April -May and July to November with the highest peak in October (more than 200 mm). The average annual rainfall is 1250 mm and monthly evaporation lies between 130 mm and 180 mm.

The dry season commences in December ending in March during which period high temperatures of over 30˚C are experienced. The mean annual minimum and maximum temperatures are 17.5˚C and 30˚C respectively (Uganda Atlas, 1998). Figure 6-2 shows monthly average rainfall received in the district for the period 2000-2012.

Figure 6-2 Average Rainfall Graph for Nwoya for the period 2000-2012



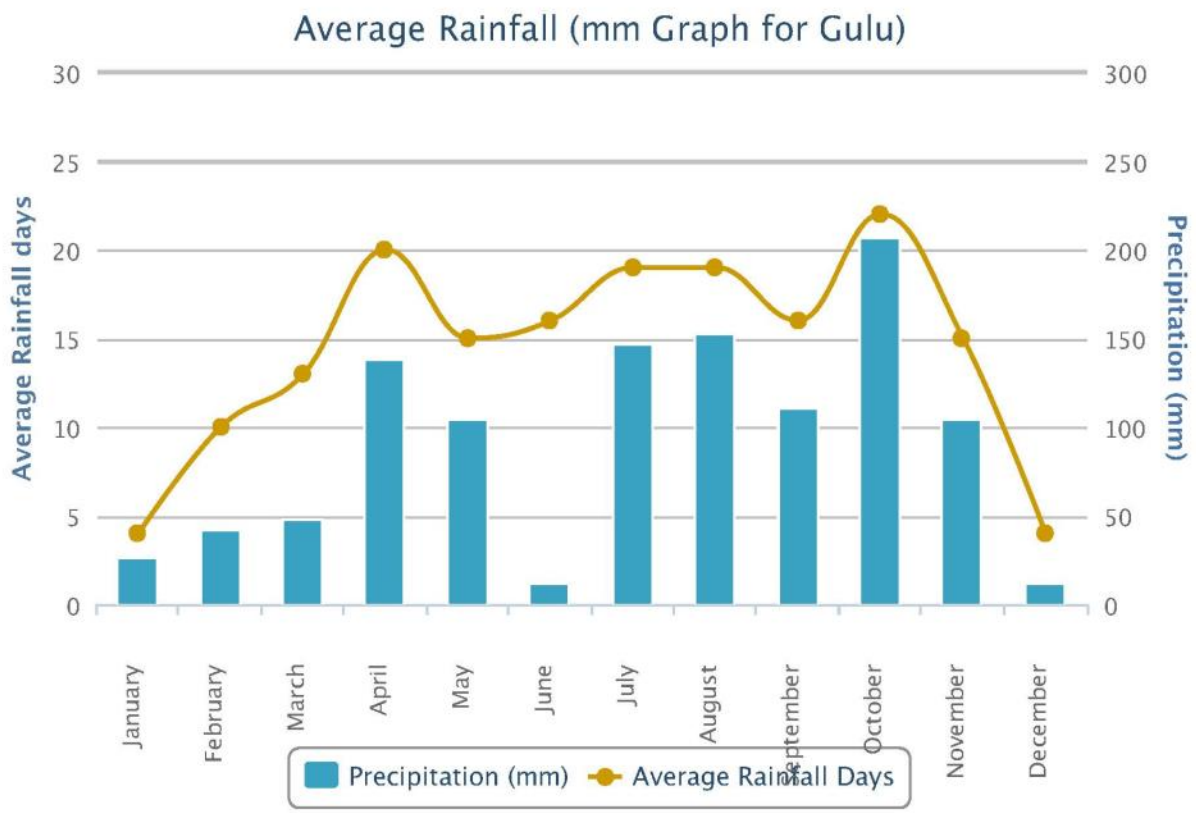
Source: www.worldweatheronline.com

Nwoya's temperature is relatively constant during the year with high temperature at a diurnal range of 4°C.

GULU DISTRICT

The climate of Gulu district is influenced by the Inter-Tropical Convergence Zone (ITCZ), bringing rain and thunderstorms during periods of April-May and again in October-November. Rainfall is mainly conventional and often occurs in the afternoon and evenings. The district therefore receives bimodal rainfall pattern with average annual rainfall of about 1530 mm falling in 93 days. The wet season extends from April to November, with peaks in July, August and October. The district experiences drought in December to March and a short dry period in June. The monthly mean average rainfall ranges between 25 mm in January and 200 mm in October.

Figure 6-3 Average Rainfall Graph for Gulu for the period 2000-2012



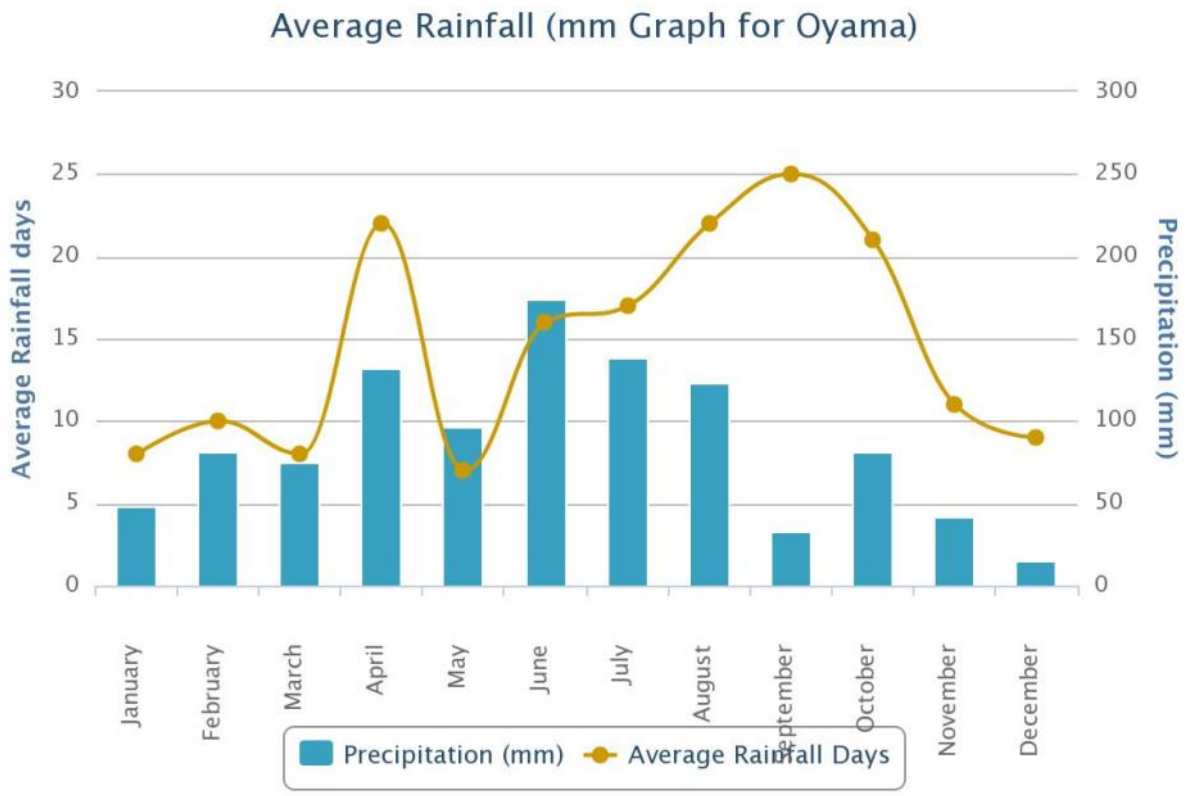
Source: www.worldweatheronline.com

The mean maximum temperature ranges from 21°C (July to August) to 24.5°C (January and February), while mean minimum temperature is about 16°C.

OYAM DISTRICT

As illustrated in Figure 6-4 below, Oyam has only one rainy season which extends from April to November, with the peak amount of rainfall days occurring between August to mid-October and a secondary peak occurring in April. The largest amounts of rain fall between April and August. In an unpublished study undertaken in 2007(cited in DWRM, 2012), the Directorate of Water Resources Management (DWRM)estimated average annual rainfall at 1340 mm with some spatial variation from about 1500 mm in the South to 1200 mm in western areas. During the dry season, the driest months are December to February.

Figure 6-4 Average Rainfall Graph for Oyama for the period 2000-2012

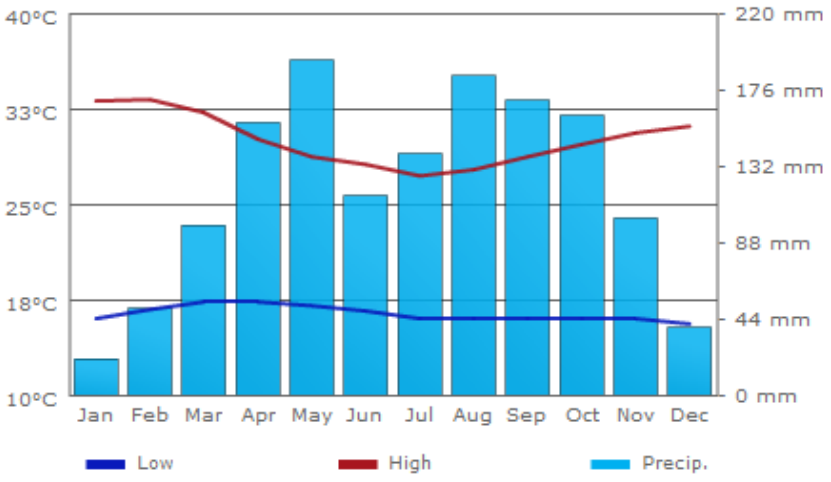


Source: www.worldweatheronline.com

LIRA AND KOLE DISTRICTS

The climate of Lira and Kole districts is influenced by the Inter-Tropical Convergence Zone (ITCZ) and by the large swamp area surrounding the southern part of the district. As described in a study undertaken by DWRM in 2007 (unpublished report, cited in DWRM, 2012), both districts lie within an area that receives an average annual rainfall of between 1000 mm to 1500 mm. Although the rainfall pattern shows a bimodal distribution, it has a single rainy season extending from April to November but broken in June and July with a short dry season .Peak rainfall occurs in August to October and a secondary peak in April/May.

Figure 6-5 Climate Chart for Lira and Kole Districts



The high rainfall days occur in the months of April, May, and August to September with the main dry season occurring from November to March, and a short dry spell from June to July.

The average minimum and maximum temperatures of Lira District are 22.5°C and 25°C respectively. Absolute maximum temperature hardly goes beyond 36°C and absolute minimum hardly falls below 13°C.

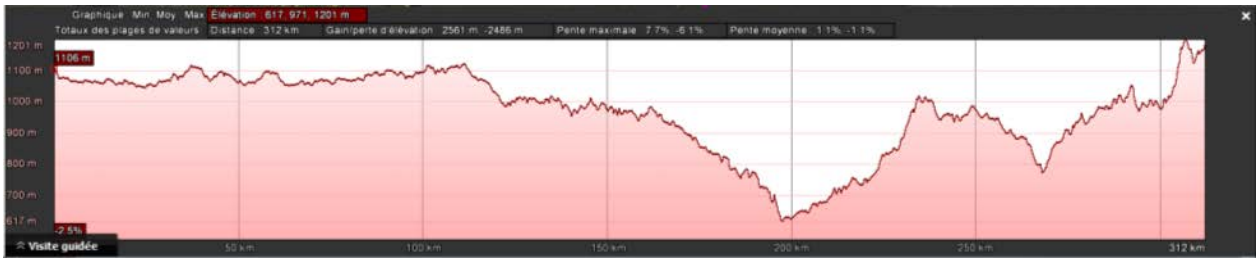
6.1.2 GEOLOGY, TOPOGRAPHY AND SOILS

6.1.2.1 TOPOGRAPHY

The project area is located in districts whose altitudinal range lie between 600 m and 1400 m above sea level (asl). The Nile River is the lowest point at an altitude of about 600 m asl, while the highest point is found approximately 13 km south from Nebbi, at an altitude of about1406 m asl.

Altitudinal range along the Project line route itself (starting in Lira and ending in Arua) is illustrated in Figure 6-6 below. The Nile crossing area is clearly visible around kilometer point 195 (approx.).

Figure 6-6 Altitudinal range along Project line route

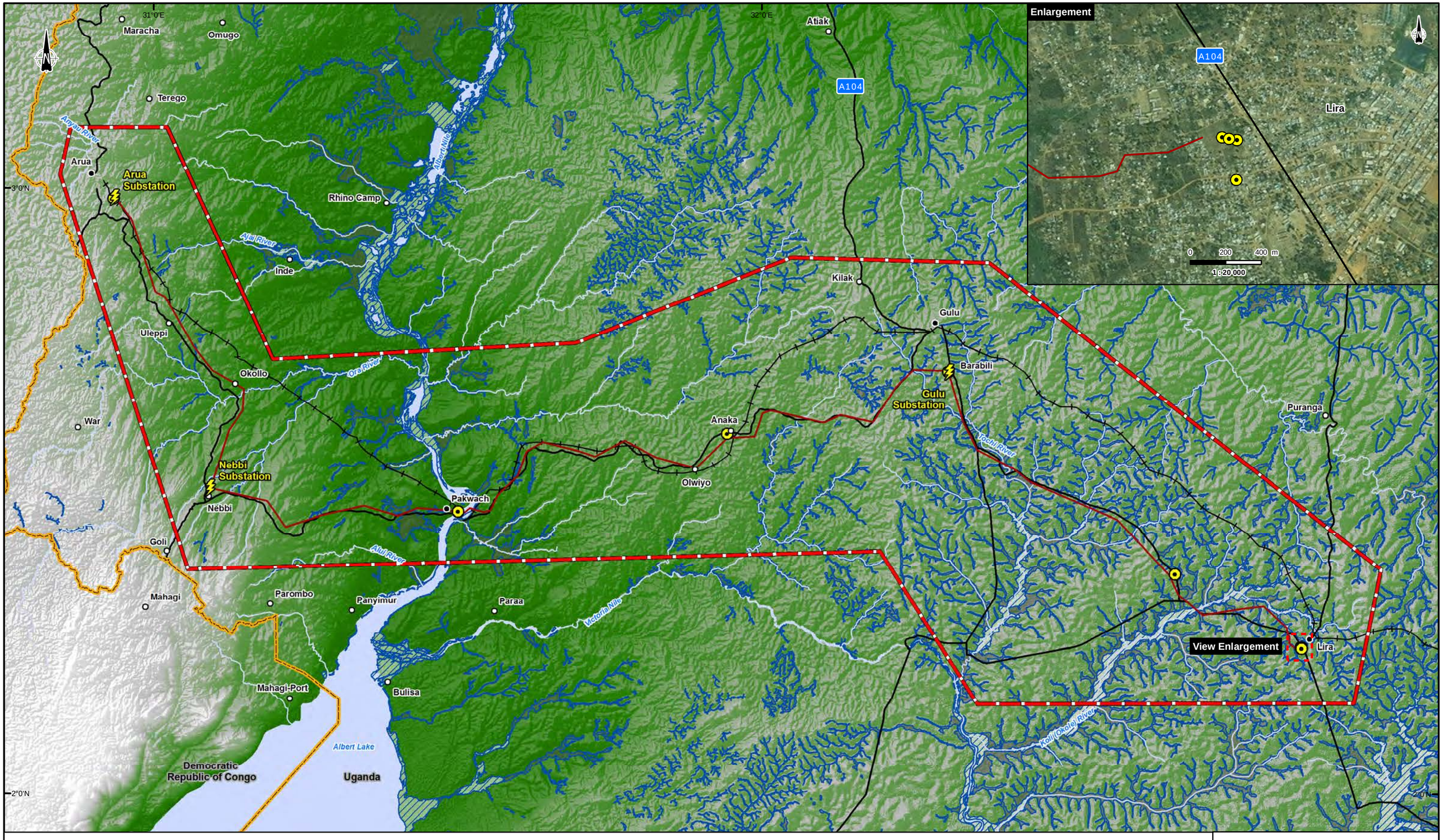


Source: Google Earth (2015)

Generally, landscape in the study area consists of open plains interrupted by occasional hills, mountains and inselbergs. There are three topographical zones in the study area:

- Madi Plateau: Occurs at an altitude of about 900 m above sea level. It occupies the eastern parts of the Arua district including Madi-Okollo County through which much of the line passes.
- Western Highland: This upper plateau occurs at an altitudinal range of 1200 m to 1800 m above sea level. The parent rocks include basement complex metamorphose which is responsible for the formation of the hilly terrain. This zone does not however fall directly in the project area.
- Rift Valley: The Rift Valley escarpments are highest in the south and fade off to the north. They consist of several fault camps arranged, roughly parallel with the Albert Nile. These scarps separate the Rift Valley plains from the Madi Plateau.

Physical environment components in the project area are illustrated on map 5 below.



International Border
City
Village
Road
Railroad
River
Lake

Permanent Wetland
Seasonal Wetland
132/33 kV Projected Substation

Altitude Range

High: 2 414 m
Low: 1 m

Project Components

Extended Study Area
Project Line Route

Field Measurement Sites

Noise Levels and Electromagnetic Field Levels

Sources:

- SRTM (Shuttle Radar Topography Mission)
- Satellite Image: ESRI World Imagery, DigitalGlobe (2011-09-01)
- Map Library, Africa World
- Wetland Extent and Waterbodies : World Resssources Institute
- Railroads : DIVA-GIS and digitalized from National Geographic World Map
- Roads and Rivers : Digitalized from National Geographic World Map
- Projected Electric Line: SMEC, Feasibility Study for Lira-Gulu-Nebbi-Arua 132 kV Transmission Projects - Line Route Selection Report Final

Environmental and Social Impact Assessment for the Proposed Construction of Lira-Gulu-Nebbi-Arua 132 kV Transmission Line

Physical Environment

0 6,5 13 km
ARC 1960 - UTM 36N

Map 5

January 2016

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Picture 6-1 Hill top in Arua

Picture 6-2 Gentle plains of Nebbi district

Picture 6-3 Typical Landscape in Nwoya District

6.1.2.2 GEOLOGY

The geology of Uganda is dominated by ancient (Precambrian) crystalline rocks (including granites), which constitute around 90% of the land area. The main rock groups are charmockites, acid gneisses and pyroxene gneisses evident on hill tops where grey granite and gneiss are left exposed in many

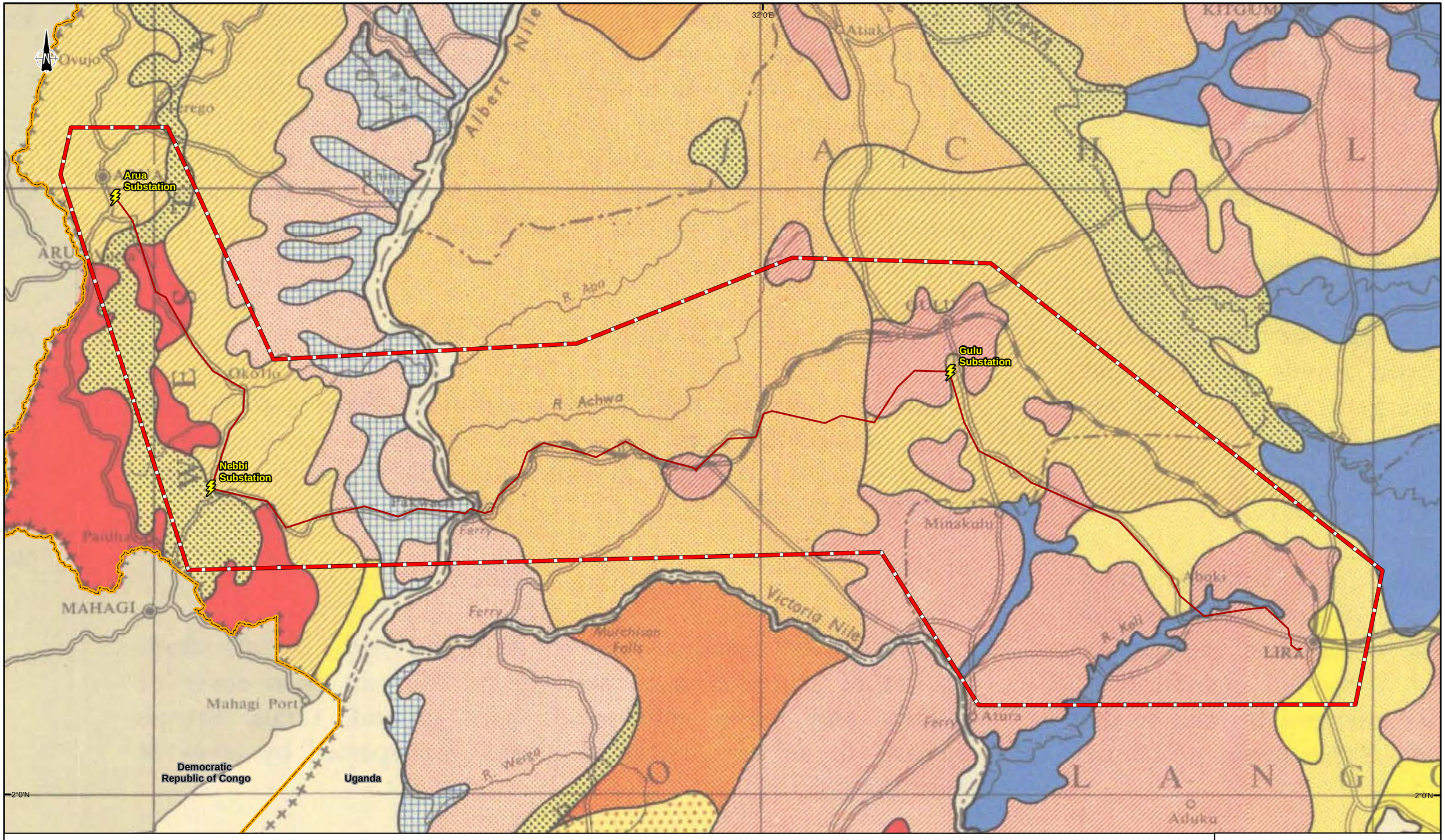
places. The remaining rock types are dominantly younger volcanic and sedimentary rocks. The volcanic rocks are either associated with the major East African Rift Valley which extends along the western border and incorporates the crater lakes; or in the east, along the border with Kenya (British Geological Survey, 2001). Picture 6-4 shows an exposed granite rock near Okollo trading centre.

Picture 6-4 Expansive granite rock in Okollo sub county

The crystalline rocks of Uganda are generally covered by 'regolith', a layer of weathered material which varies from rock fragments near the interface with the bedrock, to well-weathered soil and hardened laterite at the ground surface. The regolith layer varies in thickness but is typically of the order of 30 m (Taylor and Howard, 1994).

6.1.2.3 SOILS

In line with the Uganda Government Soil Classification Map (Uganda Government, 1967), the most dominant soil type in Uganda is ferralitic soil which accounts for about two thirds of the soils found in the country (NEMA, 1996). Map 6 displays soil types in the extended study area.



International Border

Project Components

Extended Study Area

Project Line Route

132/33 kV Projected Substation

Soils Types

Weakly Developed Soils

Lithosols

Not Differentiated

Vertisols

Topographic

Not Differentiated

Eutrophic Soils of Tropical Regions

On Alluvial Deposits

Ferrallitic Soils

Dominant Colour Yellowish

On Sandy Sediments

Not Differentiated

Mainly Sandy Loams

Mainly Sandy Clay Loams

Dominant Colour Red

On Loose Sandy Sediments

Not Differentiated

Mainly Sandy Loams

Mainly Sandy Clay Loams

Ferruginous Tropical Soils

Mainly Freely Drained

Complex with Black Clays

Complex with Lithosols

Hydromorphic Soils

Mineral Hydromorphic Soils

Sources:

- Uganda Soils, © Uganda Government, 1967
- Map Library, Africa World
- Projected Electric Line: SMEC, Feasibility Study for Lira-Gulu-Nebbi-Arua 132 kV Transmission Projects - Line Route Selection Report Final

Environmental and Social Impact Assessment for the Proposed Construction of Lira-Gulu-Nebbi-Arua 132 kV Transmission Line

Soil Types

0 6,5 13 km

ARC 1960 - UTM 36N

Map 6

January 2016

WSP

131_25275_00_ESM6_012_SoilTypes_160121.mxd

According to Map 6, ferrallitic soils cover more than 61.4 % of the extended study area, while about 27.5 % is covered by ferruginous tropical soils (lithosols). Other soil types found in the study area are weakly developed soils with lithosols (4.7 %), vertisols (2.6 %) and eutrophic soils of tropical regions (0.9 %). Table 6-1 provides details on soil types found in the extended study area and the percentage of area covered by each soil type.

Ferrallitic Soils

Ferrallitic soils are extremely weathered soils with diffused horizon boundaries. According to Duchaufour (1982), the commonest type of ferrallitic soils are those which have been formed from weathering of acidic rocks (e.g.: gneiss, granite, etc.) and which possess kaolinite layer deep in their profile. The following subdivisions of ferrallitic soils are found in the extended study area:

- *Sandy loams*: these soils are dominated by sand particles, but contain enough clay and sediment to provide some structure and fertility. These soils have fine texture with loose structures, which are easily eroded and leached.
- *Sandy clay loams*: these soils occur on flat ridge tops or on top of undulating topography. These soils are fine textured with loose structures, which are erodible and easily leached.
- *Mineral hydromorphic soils*: these soils, linked to the presence of a temporary or permanent aquifer that is close to the surface, can be found in lake basins, river beds and low clay plains (Andersen et *al.*, 2005). Hydromorphic soils are influenced by permanent or seasonal waterlogging, thus they are poorly drained highly and easily leached (FAO/UNEP, 1992). In the study area, these soils are found along the Koli River.

Ferruginous Tropical Soils - Lithosols

These soils are very shallow, occurring mainly on steep slopes often with exposed rock debris. According to the FAO, lithosols are at risk of very severe erosion (FAO, 1993). Only the western part of the study area near to the RDC border is covered by this type of soils.

Eutrophic Soils of Tropical Regions on Alluvial Deposits

This soil class is associated with riverbeds and drainage ways and are mainly present in the flatter topography or wide valleys. Alluvial soils often have little profile development though some of them can develop mineral A horizons, organic O horizons or a humose organic-rich Ah horizon with some weakly developed subsoil features. In the extended study area, they are mainly found along Albert Lake and in Lira District.

Weakly Developed Soils

These soils are found in the Rift Valley. They are characterized by indistinct or weakly developed horizons, which, if developed, are generally restricted to surface organic horizons or surface mineral (A) horizons resting directly onto rock or little-altered parent material

Vertisols

Vertisols are dark coloured clayey soils occurring in the low-lying seasonally wet areas. In the extended study area, these soils occur along the Albert Nile in the north-western districts of Arua and Nebbi. These soils have 30 % or more clay, usually dominated by montmorillonite, which causes shrinking and cracking during the dry season and swelling during the wet season. Vertisols have high productivity as long as the inherent constraints are tackled; they are very hard and difficult to work in the dry season, and excessively moist in and sticky during the wet season.

Table 6-1 Soil types in the study area

SOIL TYPE	SOIL SUBDIVISIONS	LOCATION	AREA (KM^2)	PERCENTAGE OF THE STUDY AREA (%)
Weakly Developed Soils with Lithosols	Not differentiated	In Arua and Nebbi Districts	551.8	4.7
Eutrophic Soils of Tropical Regions -	On alluvial deposits	IIn Nebbi District along Albert Lake and in Lira district.	109.1	0.9
Ferruginous Tropical Soils -	Lithosols	In Arua and Nebbi Districts	3247.1	27.5
Ferrallitic soils - Dominant colour yellowish	On sandy sediments	In Lira District	619.5	5.3
	Mainly sandy loams	In Arua, Okollo, Barabili and Gulu District (Omoro County)	3037.8	25.8
Ferrallitic soils - Dominant colour red	On loose sandy sediments	Along the Albert Nile and the Victoria Nile Rivers	554.3	4.7
	Mainly sandy loams	In Olwiyo, Lira, Gulu	2722.1	23.1
	Mainly sandy clay loams	In Arua and Nebbi Districts near to the RDC border and	300.1	2.5
Ferralitic Soils - Hydromorphic soils	Mineral hydromorphic soils	In Noyam District, along the Koli River	224.9	1.9
Vertisols - Topographic	Not differentiated	Along the Albert Nile River and Albert Lake	307.2	2.6

Note: The extended study area covers a total area of 11795.3 km^2, from which about 225 km^2 is covered by water.

Although some parts crossed by the line route corridor have steep slopes, topography in the study area is relatively uniform. As a result, there is low to medium potential for soil erosion in the entire study area (NEMA, 1998). However, sensitivity to soil erosion could increase in the future because of the extensive loss of vegetation cover caused by seasonal fires, increased vegetation clearing for agricultural purposes and cutting of trees for the production of charcoal.

Soil is fairly fertile especially along valleys and some alluvial deposits found on the lower portions of the slopes are relatively more fertile. The soil fertility is generally medium and support subsistence agriculture in almost all areas crossed by the project except in Okollo and Anyiribu, where rocky expanses have made the soils to be shallow and therefore unproductive. However, soils in these areas are used for cattle grazing.

6.1.3 WATER RESOURCES

At the national level, Uganda has an abundance of water resources covering an area of nearly 44 000 km^2. This area is made up of over 36 000 km^2 of open water, 5 100 km^2 of swamps, and over 2 000 km of main rivers.

6.1.3.1 SURFACE WATER

The surface water resources in Uganda, which lies in the upper Nile catchment, fall into eight main sub-basins, namely:

- Lake Victoria (shared with Kenya and Tanzania),
- Victoria Nile,
- Kyoga Nile,
- Albert Nile,

- the lakes George and Edward,
- River Achwa, and
- Kidepo Valley sub-basin.

The following three sub-basins are found in the extended study area, namely:

- Albert Nile
- Victoria Nile
- River Achwa

Table 6-2 Catchment yields and outflows of sub-basins found in the extended study area

BASIN	TOTAL AREA* (km^2)	ANNUAL AVERAGE YIELD (mm)	MEAN FLOW (m^3/s)
Victoria Nile	57 669	133.05	1 120.35
River Achwa	26 868	102.01	42.91
Albert Nile	20 004	96.45	1 262.45

Source: DWD, 1998
Note: * Total area in Uganda

The Victoria Nile basin is located in the central-western part of the country. It includes rivers Kafu, Tochi, Koli and the Victoria Nile itself. Kole, Oyam and Nwoya districts lie within the basin. Most of Oyam district drains to the south-west into the Victoria Nile basin via the Tochi River. Kole district lies almost entirely within the Victoria Nile basin and drainage is into the River Koli (Okole), which flows to the west and into the Victoria Nile. River Koli empties into Lake Kyoga.

The Victoria Nile flows through Lake Kyoga into Lake Albert. Lake Albert also receives water from Semliki River, which originates in the Mufumbiru Mountains in RDC and flows through Lake Edward to Lake Albert. The combined waters of the Semliki and the Victoria Nile leave Lake Albert at the northern end and become the Albert Nile, which then flows into Sudan.

Tha Albert Nile basin, located in the northwest part of the country, stretches from Panyimur Sub-county to Wadelai Sub-county bordering Arua District. The main inflows include Kivuje, Ayila, Oceke, Akello, Ocunga, Nyakumba, Ora, Mututu, Kalolo, Olyejo, Wangnyang and Kopio.

The Achwa River basin is located in the north eastern part of the country. Most of Kole district drains to the south and west into this river, while a small area of Oyam and Kole districts drains to the north east into this river.

6.1.3.2 WETLANDS

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

As displayed in Map 5 above, wetlands in the extended study area are whether permanent or seasonal. In general, permanent wetlands occur in the bank of rivers (riparian wetlands) whether seasonal wetlands occur in the river flood plains (flood plain wetlands). In the extended study area, permanent wetlands are generally papyrus swamps and cover an area of about 231.73 km^2, while seasonal wetlands are generally grassy swamps and cover an area of about 786.61 km^2.

All major wetland systems found in the study area are associated with the main rivers including Albert Nile, Victoria Nile, Achwa, Koli and Tochi. Picture 6-5 shows a permanent wetland associated with the Albert Nile. Appendix 3-1 presents the wetlands crossed by the various line route options.

Picture 6-5 A permanent wetland associated with the Albert Nile

WETLAND CROSSINGS

Major wetland crossings along the Project line route have been identified. Major crossings are those where the line spans wetlands for a length of 400 meters or more, which is likely to require installation of pylons inside wetlands. Figure 6-7 below provides an illustration of segments where bird diverters are to be installed along the project line route. Table 6-3 below provides a detailed description of each of those segments.

Figure 6-7 Overview of Major Wetland Crossings

Table 6-3 Detailed description of major wetland crossings

SEGMENT	BEGINNING	END	APPROX. LENGTH (M)
1	PK 1,85	PK 6,15	430 m
2	PK 3.65	PK 4.46	820 m
3	PK 4.7	PK 5.13	430 m
4	PK 5.8	PK 6.65	840 m
5	PK 11.9	PK 13.4	1465 m
6	PK 22.4	PK 24.8	2440 m
7	PK 26.6	PK 27.6	1035 m
8	PK 50.9	PK 51.9	1005 m
9	PK 67.6	PK 68.3	670 m
10	PK 69	PK 69.8	760 m

6.1.3.3 GROUND WATER

Groundwater is the most important source of potable water in Uganda, especially in the rural areas, and provides 80% or more of the water supply.

In Uganda, four main geological environments can be identified in terms of groundwater occurrence:

- Precambrian 'basement', which underlies most of Uganda and, therefore, of most significance for rural water supplies,
- Tertiary - Quaternary sediments within the Rift Valley system in western Uganda;
- Volcanic rocks, the largest occurrence of which is in the southern Karamoja region, close to the Kenyan border ; and
- River/alluvial sediments located along valley floors.

In general, water is abstracted from both the fractured bedrocks and from the overlying weathered regolith. Tubewells are the most common means of groundwater abstraction, although protected dug wells are also used in some parts of the country (British Geological Survey, 2001).

6.1.4 AIR, NOISE AND ELECTROMAGNETIC FIELDS

6.1.4.1 AIR QUALITY

The air pollution potential (APP) of an area may be defined as the ability or inability of its atmosphere to disperse or dilute pollutants that may be emitted into it. Data from meteorological department Entebbe has been used to estimate the APP at Nebbi. The APP at Nebbi was therefore evaluated by estimating the ventilation co-efficient (VC) as well as the maximum mixing height throughout the seasons. This is shown in Table 6-4.

Table 6-4 Estimated Pollution Potential for Nebbi Area

	OCTOBER	JANUARY	APRIL	JULY
Ventilation Coefficient X $10^4 M^2 S^{-1}$	1.4	1.1	1.6	1.4
Maximum mixing height in km	0.5	0.9	0.5	0.6

Source: Adapted from S.A.K. Magezi, 1985

As shown in Table 6-4, the lowest APP is exhibited in April and October, while January is the month of highest pollution potential. In all cases the pollution potential is low (VC higher than $600 m^2$/sec or a maximum mixing height < 1.0 km). On specific days, the potential can be high whenever there is a stratified atmosphere above (as in case of a temperature inversion).

Potential sources of air pollution in the extended study area are mostly the dusts generated when vehicles run over the gravel roads, as well as wind erosion during the dry season.

6.1.4.2 NOISE LEVELS

Baseline noise levels in the Project area were measured using a sound level meter (model AWA5661) at seventeen (17) selected points. These points correspond to the sensitive social receptors located near the 30 m corridor, which include residences, trading canters, schools, and substations.

Residential areas away from the trading centres or roads, and those with sparse settlements along the line route had low noise levels.

Table 6-5 Current Noise Levels at different sensitive receptors

LOCATION	NOISE LEVEL dBA (Leq)	COORDINATES (Arc, 1960, 36 N UTM) X	Y	DISTANCE TO THE CORRIDOR
Proposed Substation Arua	41.2	0270374	0330256	Proposed location for substation
Packwach Trading Centre	54.8	0333324	0273033	At the trading centre
Anaka Trading Centre	61.8	0382431	0287207	Within the trading centre about 1km
Gulu Comprehensive	42.7	0422840	0298520	100 m from the Gulu substation
Lira Substation	58.1	0487230	0248150	7 m
Lira Substation	47.6	0487270	0248141	33 m from Transformer-East fence
Lira-Tororo 132 kV line	50.1	0487314	0248134	196 m from Transformer under 132kv line
House outside Lira Substation	66.8	0487310	0247912	210 m from substation
Aboke Trading Centre	44.4	0464229	0261519	1km

Note: Construction activities shall not be carried out at night. Therefore measurements were carried out during the day.

Noise was relatively high at trading centers such as Pakwach, Anaka and Lira because of their location near busy main roads, and in areas with business establishments (shops, music shops, among others). These noise levels are beyond permissible limit for mixed residential areas for day time (55 dBA) (See Table 6-6) as per the National Environment (Noise and Control) Regulations, 2003.

Table 6-6 Regulations 6 (1) Maximum Permissible Noise Levels for General Environment

FACILITY	NOISE LIMITS Day	dB (A) (Leq) 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

Note: Time frame used: Day: 6.00 a.m. - 10.00 p.m.
Night: 10.00 p.m. - 6.00a.m.

6.1.4.3 ELECTROMAGNETIC FIELDS

Baseline electromagnetic fields (EMF) were measured along the existing 132kV Soroti- Lira line near the Lira substation being the same size as the proposed 132kV line, and therefore likely to emit similar radiation that may affect humans that are exposed to the line.

The electromagnetic fields were measured using a Nuclear Radiation Monitor (Radalerttm100). Measurements were also taken at different locations as indicated in Table 6-7 to obtain the radiation

that the neighboring community is presently exposed to relative to the distance from 132kV line and substation.

Table 6-7 Electromagnetic Fields measurements at different locations in the project area

LOCATION	ELECTRO MAGNETIC FIELDS (HZ)	COORDINATES (Arc, 1960, UTM) X	Y	APPROXIMATE DISTANCE TO THE CORRIDOR
Arua Substation	0.0001	0270374	0330256	Within the corridor
Packwach Trade Centre	0.0554	0333324	0273033	At the trading centre
Anaka Trade Centre	0.0175	0382431	0287207	Within the trading centre about 1 km
Gulu Comprehensive Substation	0.0106	0422840	0298520	100 m
Lira Substation	0.7731	0487230	0248150	7 m
Tororo – Lira line 132 kV line	0.1233	0487314	0248134	196m from Transformer under 132kv line
Lira Substation	0.7611	0487270	0248141	33 m from Transformer-East fence
House outside Lira substation	0.7423	0487310	0247912	210m from substation
Aboke Trade Centre	0.0278	0464229	0261519	Over 1 km from Line

There are no major EMF Standards by World Health Organisation. However, ICNIRP Guidelines (ICNIRP, 2014) recommend that the induced electric field should not exceed the frequency range of 1 Hz. Results of the EMF measurements indicate frequency ranges which are within permissible limits of exposure. The highest measurement was located at the existing Lira substation (0.7423 Hz) and its surroundings (0.7731 Hz).

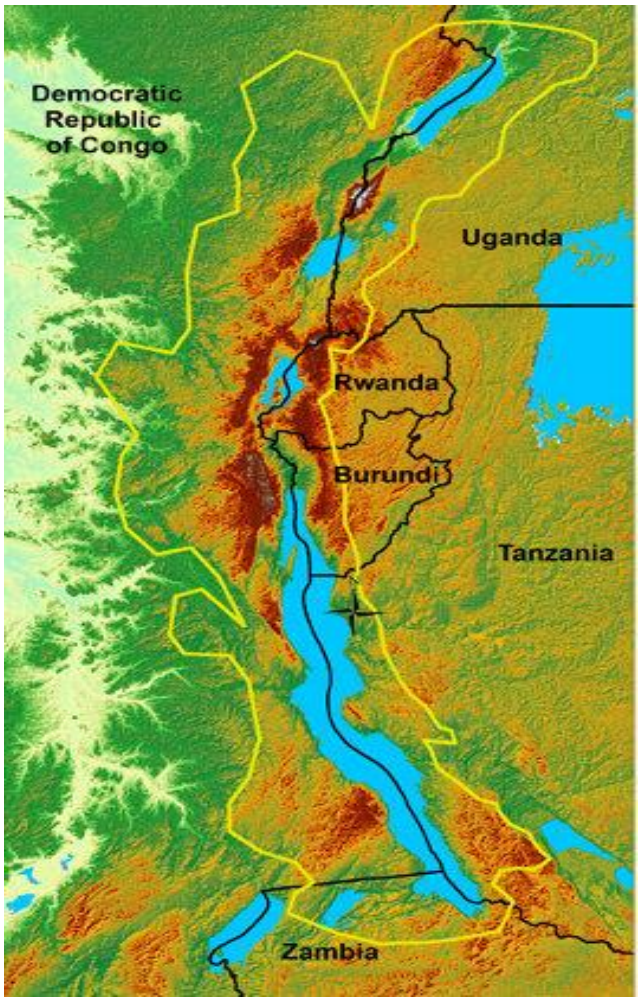
6.2 BIOLOGICAL ENVIRONMENT

6.2.1 REGIONAL BIODIVERSITY CONTEXT

Uganda is very rich in biodiversity which makes it one of the preferred ecotourism destinations in Africa. Out of a total surface area of 241,551 km2 (both land and water), 25,981.57 km2 (10%) is gazetted as wildlife conservation areas and 24% is gazetted as forest reserves. Uganda has 10 National Parks, 12 Wildlife Reserves, 10 wildlife sanctuaries, 5 community wildlife areas, 506 central forest reserves, 191 local forest reserves, 34 Important Bird Areas and 11 RAMSAR sites over its territory. It is however estimated that over 50% of Uganda's wildlife resources still remain outside designated protected areas, mostly on privately owned land.

The study area lies at the Northern margin of the Albertine Rift, which is considered to be one of the regions of the planet with the highest biodiversity. It extends from the northern tip of Lake Albert down to the southern tip of Lake Tanganyika and encompasses the rift valley, the lakes in the rift and the natural vegetation on the escarpment above the rift (Figure 6-8). This region has been identified as an 'Endemic Bird Area' by Birdlife International (Thirgood and Heath, 1994; Stattersfield et al, 1998) and recently it has been made a Biodiversity Hotspot as a part of the Eastern Afromontane by Conservation International (Birdlife International, 2012). As such it is recognized as an area of global importance for conservation.

Figure 6-8 Location of the Albertine Rift



Reference : Plumtre et al., 2003.

Analyses of vertebrates' diversity across Africa show that the Albertine Rift has a rich biodiversity and hosts important numbers of endemic mammals, birds, reptiles and amphibians species. The Albertine Rift region is home to 39 % of terrestrial mammal species, 52 % of land bird species, 14 % of reptile species, and 19 % of amphibian species found throughout Africa. A variety of geographic components combining cliffs, high peaks, mountains, valleys, plains, rivers and lakes, as well as the transition between different bio-geographical regions, explain the presence of such high biodiversity value in that area. Most of these wildlife species are present in different protected areas that still display intact natural habitats.

The regional biodiversity context is illustrated in map 7 below.

6.2.2 BIOLOGICAL BASELINE, STUDY AREA

6.2.2.1 METHODOLOGY

The biodiversity study was conducted in early February 2015. The different habitat types present in the study area were surveyed in order to provide a representative description of the flora and fauna (Map 8). Efforts were made to survey distinguish plant communities, habitats of high ecological importance (forest stands, wetlands, riverine habitat, etc.), and forest reserves.

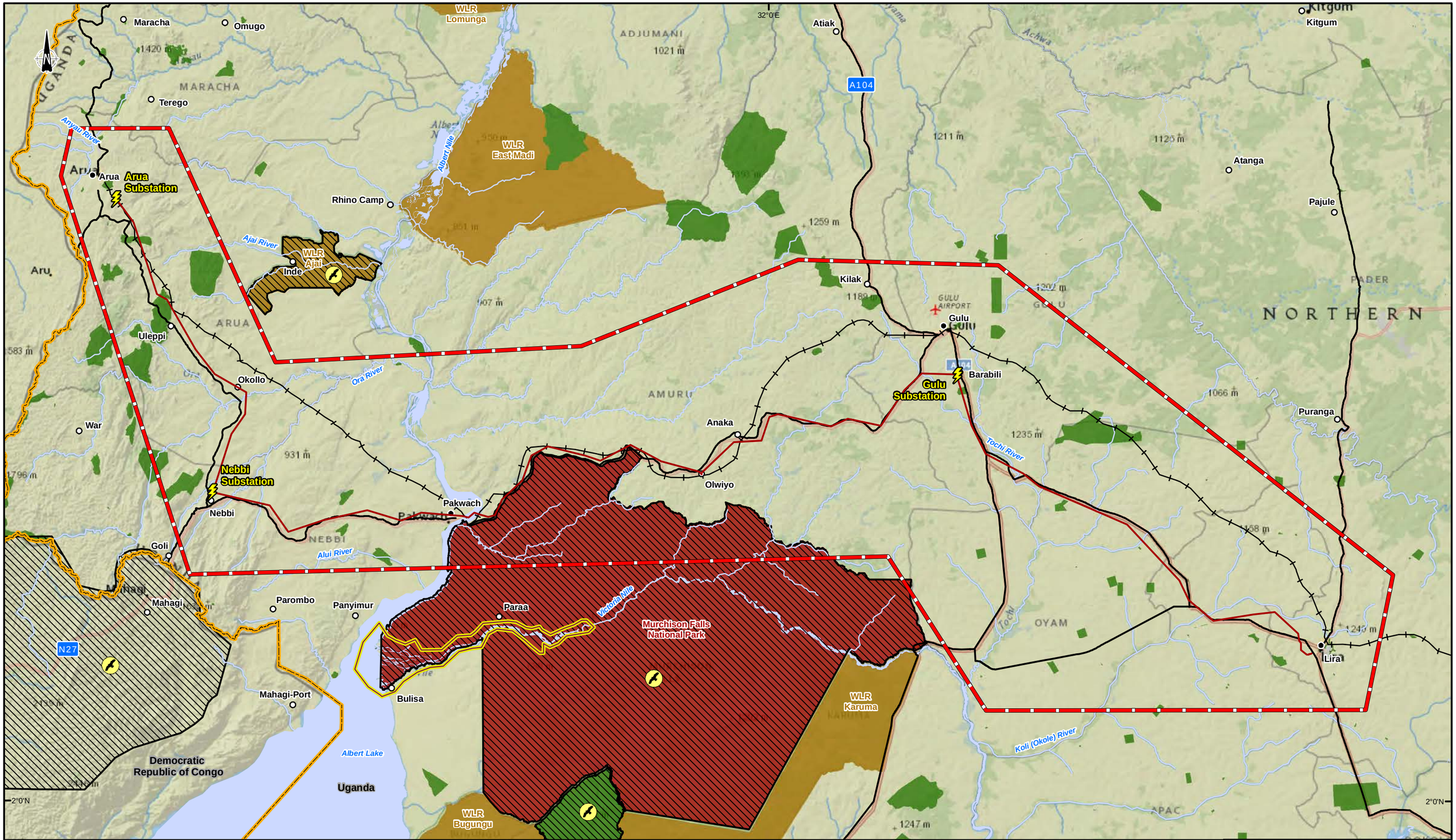
Taxonomic groups were selected in order to get a representative overview of species and include plants, reptiles, amphibians, birds and mammals.

To assess the vegetation structure and species compositions in the project area, the main vegetation communities were identified using maps and literature about the study area. Plant species diversity and abundance were assessed using circular plots (10-m radius). A geographical positioning system (GPS) and camera were used to locate and take photos of the plots. Within a plot, trees and shrubs were enumerated and nested plots of 2 m radius were used to survey the abundance of forbs and graminoïds. Plant species encountered outside the plots but within the study area were noted to produce the best possible species list for the project area. To complete species identification, voucher specimens were collected and compared with the specimens at the National Herbarium at Makerere University. Reference documents, including the FTEA (Polhill et al., 1954) and field guides, such as 115 Ugandan grasses (Phillips et al., 2001), were used during the identification process.

Fauna surveys were undertaken on 25 survey sites. At each survey site, transects were walked by fauna specialist and presence or signs of presence were recorded. Map 8 shows the location of the survey sites.

In order to complete the surveyed species list with species potentially present inside the study area, a literature review as well as the compilation of known occurrences from the Global Biological Information Facility (GBIF, 2015) have been done. The following area has been considered for the GBIF database inquiry.

The abundance of flora and fauna species has been determined using the DAFOR scale, which is a tool allowing to visually assess the abundance of any species on a semi-quantitative or qualitative level. As for the diversity, dominance and evenness indices, they will be considered as part of flora and fauna surveys to be conducted prior to construction works. The results from these surveys and related indices will then serve as reference values as part of future monitoring studies (see Chapter 8).



International border
City
Village
Road
Railroad
River
Lake

Project Components

Extended Study Area
Project Line Route
132/33 kV Projected Substation

Biological Environment

International Designated Area

Important Bird Area
Proposed Ramsar Site (Albert Delta Wetland)

National Protected Areas

Forest Reserve
Wildlife Reserve
National Park

Sources:

- *Topographic Map: National Geographic World Map*
- *Regions and Districts Limits: Maplibrary.org*
- *Subcounty Boundary, Protected Areas and Waterbodies: World Resources Institute*
- *Railroads: DIVA-GIS and Digitalized from National Geographic World Map*
- *Ramsar Site: ramsar.org*
- *Roads and Waterline : Digitalized from National Geographic World Map*
- *Projected Electric Line: SMEC, Feasibility Study for Lira-Gulu-Nebbi-Arua 132 kV Transmission Projects - Line Route Selection Report Final*

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Regional Biodiversity Context

0 6,5 13 km
ARC 1960 - UTM 36N

Map 7

January 2016

WSP

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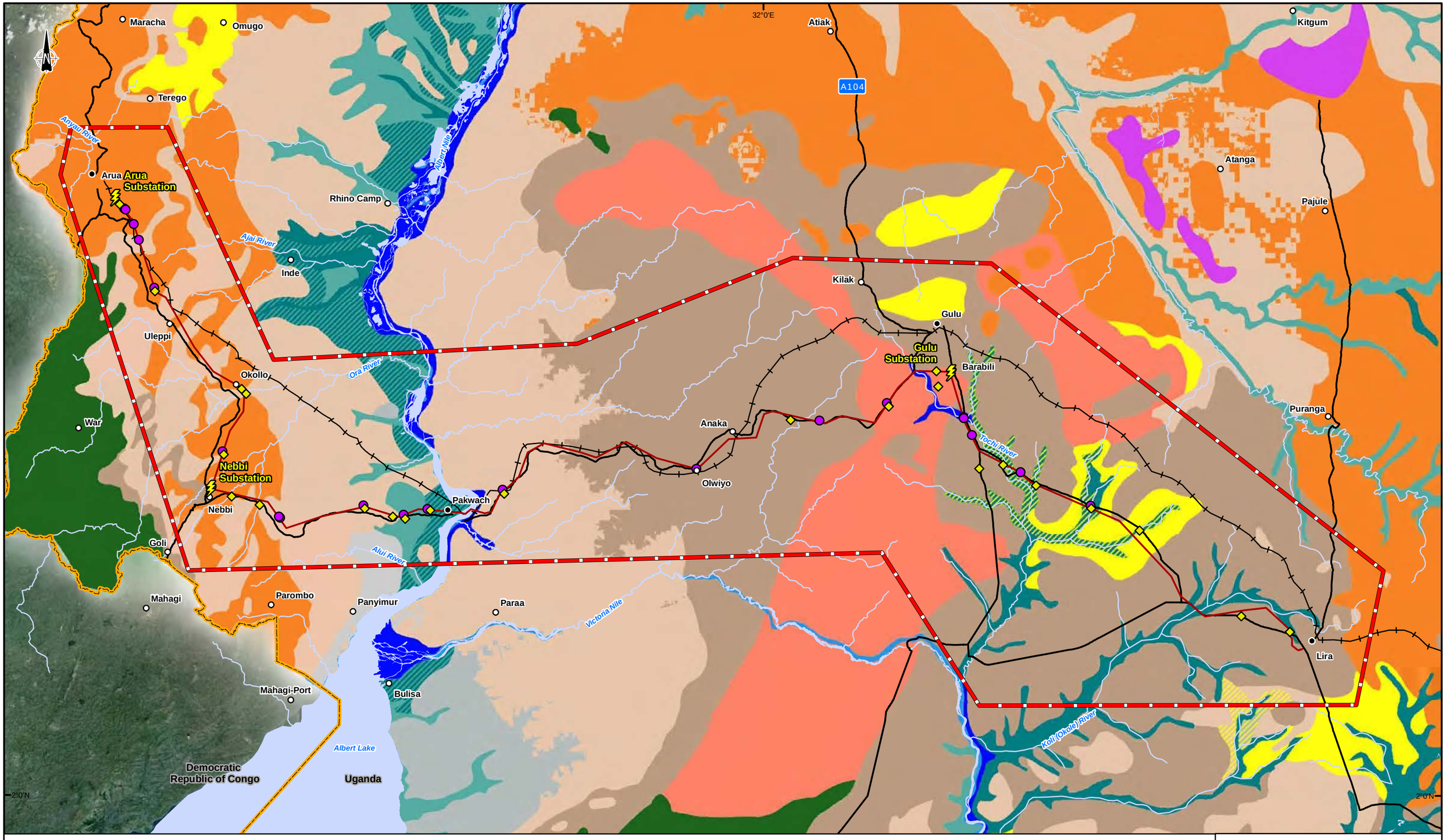

International Border
City
Village
Road
Railroad
River
Lake

Project Components

Extended Study Area
Project Line Route
132/33 kV Projected Substation

Biological Survey Sites

Flora Survey Site
Fauna Survey Site

Vegetation Types

Combretum Wooded Grassland / Acacia-Commiphora Deciduous Wooded Grassland
Palm Wooded Grasslands
Combretum Wooded Grassland / Miombo Woodland
Vitellaria Wooded Grassland
Evergreen and Semi-Evergreen Bushland and Thicket + Riverine Wooded Vegetation
Freshwater Swamp
Semi-Evergreen Guineo-Congolian Rain Forest
Edaphic Wooded Grassland
Vitex-Phyllanthus-Sapium-Terminalia and Terminalia glaucescens Woodlands
Upland Acacia Wooded Grassland
Grasslands
Woodland
Lowland Bamboo

- *Vegetation Types: World Agroforestry Centre (2012), vegetationmap4africa.org*
- *Map Library, Africa World*
- *Wetland Extent and Waterbodies: World Resssources Institute*
- *Railroads: DIVA-GIS and digitalized from National Geographic World Map*
- *Roads and Rivers: Digitalized from National Geographic World Map*
- *Projected Electric Line: SMEC, Feasibility Study for Lira-Gulu-Nebbi-Arua 132 kV Transmission Projects - Line Route Selection Report Final*

Environmental and Social Impact Assessment for the Proposed Construction of Lira-Gulu-Nebbi-Arua 132 kV Transmission Line

Vegetation Types

0 6,5 13 km
ARC 1960 - UTM 36N

Map 8

January 2016

WSP

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Figure 6-9 Area considered for the GBIF database inquiry

6.2.2.2 VEGETATION TYPES

Multiple factors have an influence on the habitat types that are present inside the selected corridor as well as their distribution. Grasslands and Wooded grasslands is the most represented natural vegetation type. The selected corridor partly encompasses the Murchison Falls National Park, which lies at the northern end of the Albertine Rift Valley, where the sweeping Bunyoro escarpment tumbles into vast, palm-dotted savannah. Large patches of grassland can be found along the Nebbi-Uleppi road and north of Murchison Falls National Park. Topography variations lead to the presence of montane forests where the elevation is greatest. Within the grasslands dominated landscape, presence of watercourses is considered as a structuring factor with the humid conditions allowing for hydromorphic species to grow. Consequently, riverine forests follow the hydrological network. The study area also comprises multiple seasonal and permanent wetlands, notably between Lira and Gulu with the Nek-Gwok swamp, Bar Apwo swamp along Lira Kamdin road and Apuro wetland in Kole district. Seasonal wetland species include *Echinochloa pyramidalis, Loudetia simplex, Cyperus spp., Fimbristylis dichotoma, Cissampelos mucronata, Leersia hexandra* and *Polygonum salicifolium. Cyperus papyrus, Phragmites mauritiana, Phoenix reclinata* were among the many permanent wetland species (SMEC International Pty Ltd, 2014).

However, natural vegetation cover inside the selected corridor has been reduced by human presence as it is mainly covered by modified habitats. The main activities leading to habitat degradation are bush fires, subsistence farming involving natural vegetation clearing, and harvest of fuel-wood. Habitat degradation intensifies near roads, villages and watercourses, where agricultural activities have encroached on natural vegetation. The agricultural landscape dominates the project area between Lira and Anaka and shows various successional stage of vegetation considering the presence of fallow lands (SMEC International Pty Ltd, 2014). Natural vegetation gains in dominance in less accessible areas and also within the Murchison Falls National Park's limits, where integrity of natural habitats is high and the proportion of preserved vegetation reaches its maximum.

A variety of habitat types are located inside the selected corridor. Map 8 shows the distribution of potential natural vegetation inside the study area. It does not consider anthropic vegetation as agricultural field and tree plantations. The main vegetation types that have been identified inside the study area are the following and their description and typical associated species are presented below:

- Grasslands and Wooded grassland
- Wetlands
- Riverine habitats
- Secondary forests
- Agricultural mosaic
- Tree plantations

Grassland and Wooded grassland:

Grasslands are the most represented habitat type present inside the study area. They generally have a discontinuous tree cover and a dense grassy herbaceous layer. Wooded grasslands are dominated by grasses and occasionally other herbs, with widely scattered or grouped trees and shrubs, the canopy cover of which does not exceed 40% (White, 1983). *Combretum*-based wooded grasslands are the most represented vegetation types. They are usually dominated by *Grewia simlis*, *Piliostigma thoningii*, *Combretum molle*, *Annona senegalensis* with *Imperata cylindrica* and *Hyparrhenia filipendula* among several other herbaceous-weedy species. *Echinochloa* grassland is largely dominated by *Aeschynomeneela phroxylon* and *Mimosa pigra* for woody species and they can be found close to wetlands in Lira, Nwoya, and Oyam districts. *Vitellaria paradoxa* (shea butter tree), a species listed as vulnerable on IUCN's red-list, was found in this habitat type and is sparsely distributed within the project corridor.

Wooded Grassland

Wetlands:

Wetlands can be found along the banks of the Victoria Nile or along other watercourses and in seasonally inundated areas. Flooding frequency and drainage conditions of the soil determine the vegetation structure and its species composition. Permanent wetlands are generally dominated by papyrus (*Cyperus papyrus*) (Chapman et al. 2001). They are common along the entire course of the Nile River and, more specifically in the project area, in Pakwach and Nwoya districts. Marshes and swamps are the most common seasonal wetlands. Their vegetation is dominated by perennial grasses with sparsely distributed trees or palms (*Raphia sp.*).

Papyrus swamp

Okele wetland

Riverine habitats:

Riverine habitats are located alongside streams or rivers and are dominated by herbaceous species with a few trees, or by forests. The stretch of natural vegetation is generally narrow on both sides of the watercourse and is followed by farmlands. Flooding frequency and drainage conditions of the soil determine the vegetation structure and its species composition. In agricultural areas, stream or river banks are dominated by perennial grasses and herbaceous species such as *Vernonia amygdalina* and shrub species such as *Harrisonia abyssinica*. A very sparse tree layer dominated by *Acacia sp.* can also be present. The riverine forest has a tree layer dominated by *Vitex doniana, Syzygium guineense, Erythrina abyssinica, Piliostigma thoningii*, with *Imperata cylindrica* as the dominant species in the lower vegetation layer. *Mimosa pigra*, an invasive plant species, was recorded inside a riverine forest.

Riverine forest

Secondary forests:

Secondary forests are forests which have regrown after a major disturbance, such as logging, agricultural conversion or fuelwood harvest. They have a closed canopy of trees and an understory composed of herbaceous species and shrubs. The species composition varies inside the project area. The canopy is composed of different tree and palm species, such as *Acacia gerradii*, *Raphia farinefra*, and *Markhamia platycalyx*, with an understory of *Microglossa pyrifolia, Achyranthes aspera*, and *Piper umbellatum*, with understory growths of *Microglossa pyrifolia, Senna hirsuta* and *Achyranthes aspera.*

Secondary forest

Agricultural mosaic:

Within the project area, the vegetation has been transformed mainly from wooded savanna to an agro-eco zone dominated by settlements, cassava and maize cultivation, as well as charcoal burning (Kindt *et al.* 2011). Other important crops grown in this area include beans, sorghum and sesame. Some natural trees are still scattered in the areas dedicated to crops, such as *Albizia zygia*, *Vitellaria paradoxa*, and *Acacia neptunica* and have been left because they are used by the local population. Agricultural lands are sometimes interspersed with fallow land and other patches of natural vegetation. Areas under fallow are dominated by undergrowth trees while the herbaceous vegetation is dominated by *Panicum maximum*, *Ageratum conyzoides*, *Leonoti snepetifolia* and *Brachiaria brizantha*. These agro ecosystems are widely distributed throughout the Project area where the areas have been under settlements.

Agricultural mosaic – Fallow land

Tree plantations:

Along the roads, there are many scattered patches of planted trees, which include *Eucalyptus* species. They are located in small patches along the Project's proposed right-of-way, within the peripheries of wetlands as well as in extensive lands that are flat. Pine trees have been planted within gazetted forest reserves and on independent farmers' land. Plantations are mostly found in Nebbi and Nwoya Districts. *Tectona grandis* has been planted both as patches and individual trees in Nwoya, Arua and Nebbi Districts.

Eucalyptus plantation

6.2.2.3 FLORA

A total of 179 species from 46 families were recorded along the power line, within an area of 50m along the corridor at selected sites (Table 6-8). *Poaceae* was the most dominant family constituting 31.2% of the total species recorded, followed by *Fabaceae* with 20.4% of the total species. There were several families with only one recorded species, such as *Acanthaceae, Celastraceae*, and *Convolvulaceae*. 67% of the surveyed species are trees, inclunding schrubs, contributing for 67% of the total recorded species. The most abundant trees and shrubs are *Combretum collinum, Combretum molle, Acacia hockii, Balanites aegyptiaca, Brideliascleroneura, Grewia trichocarpa, Vitellaria paradoxa and Khaya senegalensis.* They were widely scattered within the project area. The most dominant life forms in terms of abundance are usually herbs and grasses but they respectively only represent 23% and 7% of the surveyed species. The dominant grasses and herbaceous species include *Hyparrhenia filipendula*, *Brachiariabrizantha, Eragrostis racemosa, Sporobolus africana, Hyperthelia dissoluta, Setaria sphacelata,* and *Sporobolus pyramidalis.* The comprehensive list of surveyed species is presented below.

Table 6-8 List of surveyed flora species

FAMILY	SPECIES	LIFEFORM	ABUNDANCE	IUCN STATUS
Acanthaceae	*Achyranthesaspera*	Herb	A	
Acanthaceae	*Dicliptera maculata*	Herb	R	
Acanthaceae	*Dyschoristenagchana*	Herb	F	
Acanthaceae	*Lankasteria elegans*	Herb	R	
Acanthaceae	*Mimulopis cicatricosa*	Herb	R	
Acanthaceae	*Rhinacanthus virens*	Herb	R	
Acanthaceae	*Thunbergiaerecta*	Herb	F	
Anacardiaceae	*Lannea barteri*	Tree	R	
Anacardiaceae	*Lannea schweinfurthi*	Tree	R	
Anacardiaceae	*Lannea welwitschii*	Tree	R	
Anacardiaceae	*Sclerocarya birrea*	Tree	R	
Annonaceae	*Annona senegalensis*	Tree	R	
Annonaceae	*Artabotryslikimensis*	Herb	R	
Annonaceae	*Cleistopholis patens*	Tree	R	
Annonaceae	*Monanthotaxis buchananii*	Herb	F	
Annonaceae	*Uvaria angolensis*	Herb	F	
Annonaceae	*Uvariopsis congensis*	Tree	R	
Annonaceae	*Xylopia staudtii*	Tree	R	
Apiaceae	*Steganotaenia araliacea*	Tree	R	
Apocynaceae	*Rauvolfia vomitoria*	Tree	R	
Apocynaceae	*Saba comerensis*	Liana	F	
Arecaeae	*Borassus aethiopum*	Tree	O	
Asclepiadaceae	*Periploca linearifolia*	Herb	F	
Asclepiadaceae	*Periploca nigrescens*	Herb	F	
Asclepiadaceae	*Secamone stellaman*	Herb	F	
Asclepiadaceae	*Secamone stuhlmannii*	Herb	F	
Asparagaceae	*Asparagus africanum*	Herb	F	
Aspleniaceae	*Asplenium erectum*	Herb	F	
Asteraceae	*Vernonia smithiana*	Herb	O	
Basellaceae	*Basella alba*	Herb	F	
Bignoniaceae	*Kigelia africana*	Tree	F	

FAMILY	SPECIES	LIFEFORM	ABUNDANCE	IUCN STATUS
Bignoniaceae	*Stereospermum kunthianum*	Tree	F	
Boraginaceae	*Cordia millenii*	Tree	R	
Capparaceae	*Capparis tomentosa*	Herb	F	
Capparaceae	*Maerua duchesnei*	Tree	F	
Celastraceae	*Elaeodendron buchananii*	Tree	O	
Celastraceae	*Loeseneriella africana*	Herb	O	
Celastraceae	*Maytenus heterophylla*	Tree	O	
Celastraceae	*Maytenus senegalensis*	Tree	O	
Celastraceae	*Maytenus undata*	Tree	O	
Celastraceae	*Salacia elegans*	Herb	R	
Combretaceae	*Combretum collinum*	Tree	F	
Combretaceae	*Combretum fragrans*	Tree	R	
Combretaceae	*Combretum fuscum*	Herb	O	
Combretaceae	*Combretum molle*	Tree	A	
Combretaceae	*Terminalia brownii*	Tree	O	
Combretaceae	*Terminalia schemperiana*	Tree	O	
Commelinaceae	*Commelina benghalensis*	Herb	A	
Commelinaceae	*Polyspathapaniculata*	Herb	R	
Connaraceae	*Agelaea pentagyna*	Herb	F	
Cucurbitaceae	*Coccinea mildbraedii*	Herb	O	
Dichapetalaceae	*Tapura fischeri*	Tree	O	
Dilleniaceae	*Tetracera potatoria*	Liana	F	
Ebenaceae	*Diospyros abyssinica*	Tree	O	
Ebenaceae	*Diospyros mespiliformis*	Tree	O	
Erythroxylaceae	*Erythroxylum fischeri*	Tree	O	
Euphorbiaceae	*Acalypha ornata*	Tree	F	
Euphorbiaceae	*Acalypha villicaulis*	Herb	F	
Euphorbiaceae	*Alchornea laxiflora*	Tree	R	
Euphorbiaceae	*Argomuellera macrophylla*	Tree	F	
Euphorbiaceae	*Bridelia ndellensis*	Tree	R	
Euphorbiaceae	*Croton sylvaticus*	Tree	R	
Euphorbiaceae	*Flueggea virosa*	Tree	O	
Euphorbiaceae	*Hymenocardia acida*	Tree	R	
Euphorbiaceae	*Mallotus oppositifolius*	Tree	O	
Euphorbiaceae	*Margaritariadiscoidea*	Tree	R	
Euphorbiaceae	*Suregadaprocera*	Tree	R	
Fabaceae	*Abrus canescens*	Liana	R	
Fabaceae	*Abrus fruticulosus*	Liana	R	
Fabaceae	*Abrus precatorius*	Liana	R	
Fabaceae	*Acacia gerrardii*	Tree	O	
Fabaceae	*Acacia hockii*	Tree	O	
Fabaceae	*Acacia neptunica*	Tree	F	
Fabaceae	*Acacia pentagona*	Herb	R	
Fabaceae	*Acacia seyal*	Tree	R	

FAMILY	SPECIES	LIFEFORM	ABUNDANCE	IUCN STATUS
Fabaceae	*Albizia coriaria*	Tree	O	
Fabaceae	*Albizia ferruginea*	Tree	O	VU
Fabaceae	*Albizia grandibracteata*	Tree	O	
Fabaceae	*Albizia gummifera*	Tree	R	
Fabaceae	*Albizia zygia*	Tree	F	
Fabaceae	*Baphia wollastonii*	Tree	R	
Fabaceae	*Cassia mannii*	Tree	R	
Fabaceae	*Cassia petersiana*	Tree	R	
Fabaceae	*Craibia brownii*	Tree	R	
Fabaceae	*Daniellia oliveri*	Tree	R	
Fabaceae	*Entada rheedii*	Herb	O	
Fabaceae	*Erythrinaa byssinica*	Tree	R	
Fabaceae	*Lonchocarpus laxiflorus*	Tree	R	
Fabaceae	*Mildbraediodendron excelsum*	Tree	R	
Fabaceae	*Piliostigma thonningii*	Tree	F	
Fabaceae	*Tamarindus indica*	Tree	F	
Fabaceae	*Tetrapleura tetraptera*	Tree	R	
Flacourtiaceae	*Flacourtia indica*	Tree	F	
Flacourtiaceae	*Rawsonia lucida*	Tree	R	
Guttiferae	*Psorospermum febrifugum*	Tree	R	
Loganiaceae	*Strychnos innocua*	Tree	F	
Loganiaceae	*Strychnos mitis*	Tree	R	
Marantaceae	*Trachyphrynium braunianum*	Herb	O	
Melastomataceae	*Dissotis decumbens*	Herb	O	
Meliaceae	*Ekebergia capensis*	Tree	R	
Meliaceae	*Khaya anthotheca*	Tree	R	VU
Meliaceae	*Pseudocedrela kotschyi*	Tree	R	
Meliaceae	*Toona ciliata*	Tree	R	
Meliaceae	*Trichilia dregeana*	Tree	F	
Meliaceae	*Trichilia prieureana*	Tree	F	
Meliaceae	*Turraea nilotica*	Tree	R	
Meliaceae	*Turraea vogelioides*	Tree	R	
Melianthaceae	*Bersamaa byssinica*	Tree	R	
Menispermaceae	*Cissampelos mucronata*	Herb	F	
Menispermaceae	*Tiliacora funifera*	Herb	O	
Moraceae	*Antiaris toxicaria*	Tree	O	
Moraceae	*Ficus glumosa*	Tree	O	
Moraceae	*Ficus ingens*	Tree	O	
Moraceae	*Ficus mucuso*	Tree	R	
Moraceae	*Ficus natalensis*	Tree	R	
Moraceae	*Ficus polita*	Tree	R	
Moraceae	*Ficus sur*	Tree	R	
Moraceae	*Ficus trichopoda*	Tree	R	

FAMILY	SPECIES	LIFEFORM	ABUNDANCE	IUCN STATUS
Moraceae	*Ficusvallis choudea*	Tree	R	
Moraceae	*Millicia excelsa*	Tree	O	NT
Moraceae	*Morus mesozygia*	Tree	O	
Moraceae	*Treculia africana*	Tree	O	
Ochnaceae	*Ochna holstii*	Tree	R	
Oleaceae	*Jasminum pauciflorum*	Herb	O	
Pandanaceae	*Pandanus chiliocarpus*	Tree	O	
Passifloraceae	*Adenia bequaertii*	Herb	R	
Phytolaccaceae	*Hilleria latifolia*	Herb	O	
Phytolaccaceae	*Phytolacca dodecandra*	Tree	R	
Poaceae	*Digitaria diagonalis*	Grass	A	
Poaceae	*Hyparrhenia collina*	Grass	A	
Poaceae	*Hyparrhenia diplandra*	Grass	A	
Poaceae	*Hyperrhania rufa*	Grass	A	
Poaceae	*Hyperthelia dissoluta*	Grass	A	
Poaceae	*Imperata cylindrica*	Grass	A	
Poaceae	*Olyra latifolia*	Grass	A	
Poaceae	*Oplismenus hirtellus*	Grass	A	
Poaceae	*Panicum maximum*	Grass	A	
Poaceae	*Pseudechinolae napolystachya*	Grass	O	
Poaceae	*Sateria megaphylla*	Grass	A	
Poaceae	*Sporoborus africanus*	Grass	A	
Poaceae	*Urochloa panicoides*	Grass	R	
Polygalaceae	*Securidaca longependuculata*	Tree	O	
Rhamnaceae	*Lasiodiscus mildbraedii*	Tree	R	
Rubiaceae	*Coffea canephora*	Tree	O	
Rubiaceae	*Gardenia vogelii*	Tree	F	
Rubiaceae	*Keetia gueinzii*	Herb	O	
Rubiaceae	*Morinda lucida*	Tree	R	
Rubiaceae	*Oxyanthus unilocularis*	Tree	R	
Rubiaceae	*Rothmannia urceliformis*	Tree	O	
Rubiaceae	*Vangueria africana*	Herb	O	
Rubiaceae	*Vangueria apiculata*	Tree	O	
Rutaceae	*Fagaropsis angolensis*	Tree	R	
Rutaceae	*Vepris nobilis*	Tree	F	
Salicaceae	*Oncoba spinosa*	Tree	F	
Salicaceae	*Trimeria grandifolia*	Tree	O	
Sapindaceae	*Aphania senegalensis*	Tree	R	
Sapindaceae	*Blighia unijugata*	Tree	R	
Sapindaceae	*Glenniea africana*	Tree	R	
Sapotaceae	*Chrysophyllum albidum*	Tree	O	
Sapotaceae	*Englerophytum oblancoelata*	Tree	R	
Sapotaceae	*Mimusops bagshawei*	Tree	O	
Sapotaceae	*Pouteria altissima*	Tree	R	

FAMILY	SPECIES	LIFEFORM	ABUNDANCE	IUCN STATUS
Sapotaceae	*Vitellaria paradoxa*	Tree	O	VU
Simaroubaceae	*Harrisonia abyssinica*	Tree	O	
Sterculiaceae	*Cola gigantea*	Tree	R	
Sterculiaceae	*Sterculiase tigera*	Tree	R	
Tiliaceae	*Glyphaea brevis*	Tree	R	
Tiliaceae	*Grewia mollis*	Tree	R	
Ulmaceae	*Celtis zenkeri*	Tree	F	
Ulmaceae	*Holoptelea grandis*	Tree	O	
Ulmaceae	*Trema orientaris*	Tree	O	
Urticaeae	*Urtica massaica*	Herb	O	
Violaceae	*Rinorea ardisiiflora*	Tree	O	
Violaceae	*Rinorea brachypetala*	Tree	O	
Violaceae	*Rinorea ilicifolia*	Tree	O	
Vitaceae	*Ampelocissus africana*	Herb	F	
Vitaceae	*Cissus quadriangularis*	Herb	A	
Vitaceae	*Vitex doniana*	Tree	O	

[a] – Abundance levels, according to the DAFOR scale, of the individual species in the project area: D – Dominant; A – Abundant; F – Frequent; O – Occasional, R – Rare.
IUCN redlist status, where applicable : VU-Vulnerable, NT-Near-Threatened

Species of conservation interest

Field records supported by literature indicate that *Vitellaria paradoxa* (*Sapotaceae*) is vulnerable according to IUCN and is experiencing a reduction in its population globally. Furthermore, its area of occupancy, extent of occurrence, and quality of habitat are declining with inference to the potential levels of exploitation (IUCN, 2015). Three timber species that are suffering heavy exploitation were also surveyed in the study area: *Milicia excelsa* (NT), *Khaya anthotheca* (VU), and *Albizia ferruginea* (VU). *Milicia excelsa* is common and its natural regeneration is good in open habitat while *Khaya anthotheca* and *Albizia ferruginea* used to be common and widespread, but mature individuals are becoming rare (IUCN, 2015).

There were no citations of locally or nationally threatened plant species. However, some species such as *Markhamia platycalyx, Entandrophragma sp and Albizia coriaria,* which are listed on Uganda's list of 'Reserved Tree Species' by the National Forestry Authority, were recorded within the project corridor, implying they are considered of conservation value. None of these species has a restricted habitat range.

Invasive species

Invasive species are plants species which become established in natural or semi natural ecosystems or habitats, and are agents of change that threaten native biological diversity or species, causing negative impacts. *Mimosa pigra*, an exotic invasive shrub, was recorded at two localized sites in the study area. The two occurrences show very low abundance of the shrub. The species can establish itself in savannas, grasslands, disturbed areas, wetlands, agricultural areas, plantations, natural forests, urban areas, and along streams (GISD, 2005).

6.2.2.4 BIRDS

Being a landlocked country, Uganda falls at the confluence of a number of Africa's centers of endemism or biomes in Central Africa, each with characteristic avian fauna. Because of the ecological importance of some local habitats for biodiversity protection, a few internationally designated areas are located inside or at the margin of the study area. These areas are essentially Important Bird Areas (IBA), hosting important bird diversity. They are illustrated on Map 7 and described in Table 6-9.

Table 6-9 Important Bird Areas inside or at the margin of the study area

IMPORTANT BIRD AREA	BRIEF DESCRIPTION
Murchison Falls National Park	Covering an area of 3,800 km^2, Murchison Falls National Park is dominated by savannahs and tall grass prairies with thick brush, woodland and forest patches in higher and wetter areas. The Victoria Nile flows through the park and forms a delta at its confluence with Lake Albert where thick papyrus swamps can be found. The park features s more than 460 bird species due to its important habitat diversity, as well as the highest concentration of Nile crocodiles in the world and a number of large mammals, including some of conservation concern.
Ajai Wildlife Reserve	Ajai Wildlife Reserve's feature of interest is Ajai's island, which lies in the center of a seasonally waterlogged swamp fed by two rivers. The reserve consists of grasslands, swamps and seasonally-flooded woodlands and covers 15,800 ha. Four out of the 12 bird species restricted to the Lake Victoria Basin biome and healthy populations of larger mammals can be found in this reserve.
Lendu Plateau (located in DRC)	Located at the margin of the study area, in the Democratic Republic of Congo, Lendu Plateau covers 410,000 ha of grassy plateaus with few trees and small remnants of montane forests. The area features one species of the Lake Victoria Basin biome and lowland forests transition probably still contains important population of primates and ungulates.

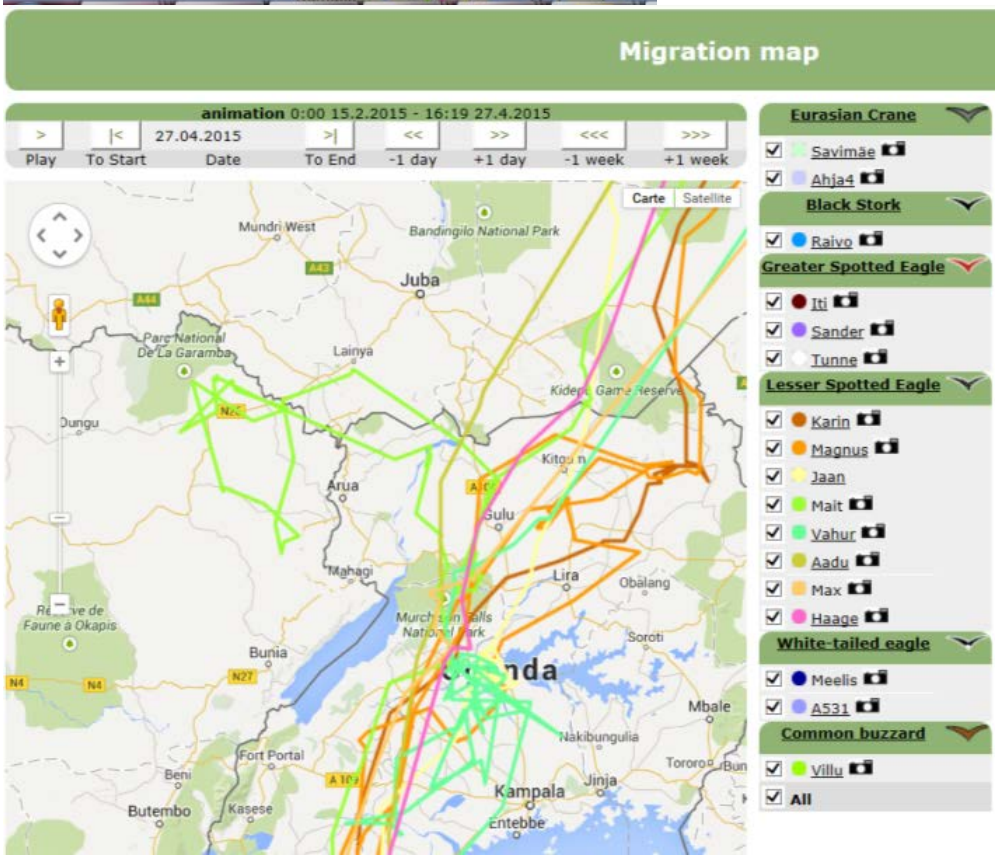
Even if the Project line corridor mainly hosts disturbed habitats, presence of high quality habitats in the study area can have an influence on bird species' presence or potential presence. A total of 45 bird species were identified during 2015 biological surveys (Table 6-10). The Grey Crowned Crane (*Balearica regulorum*) was the only globally endangered bird species on the IUCN red list recorded (IUCN, 2014).

Savannahs in the vicinity of MFNP are potential habitats for the Lappet-faced Vulture (VU), White-headed Vulture (VU), Hooded Vulture (EN), Egyptian Vulture (EN), White-backed Vulture (EN), Pallid Harrier (NT) and Bateleur (NT) which are all threatened species. However, they have not been recorded during the 2014 and 2015 surveys.

One globally endangered species, Prigogine's Greenbull, two vulnerable species, Shoebill and Chapin's Flycatcher, and nine near threatened species have been recorded in the Important Bird Areas present in or close to the project area. These species potentially use suitable habitats that are located outside those protected areas and thus, are potentially present in the study area. However, they were not recorded in the 2014 and 2015 surveys.

Many bird species are known to use or pass through the savannah-dominated landscape that can be found in Uganda and surrounding countries (Pearson, 1990) during their migration. The two major flyways passing through the Project area are the Black Sea/Mediterranean Flyway and the East Asia/East Africa Flyway. Flyways passing through Uganda and Lake Victoria basin are mainly active from mid-October to mid-December. Figure 6-10 shows Eurasian crane, Black stork, Greater spotted eagle, Lesser spotted eagle, White-tailed eagle and common buzzard migration from Europe to East Africa with a high convergence of their routes going to the Murchison Falls National Park, known as a critical site for birds by Wetlands International (Wetlands International, 2015).

Figure 6-10 Birds migration inside the study area



Crested crane in the MFCA Wetland near Pakwach Bridge

Table 6-10 List of bird species present or potentially present inside the study area

SPECIES NAME				BIOLOGICAL SURVEYS – KNOWN PRESENCE INSIDE STUDY AREA			EXISTING DATA - KNOWN OCCURRENCE INSIDE OR AT THE MARGIN OF THE STUDY AREA			
SCIENTIFIC NAME	COMMON NAME	IUCN STATUS	WATERBIRDS	Wetland	Savannah	Riverine habitats	Biological data from smec	Murchison falls np	Ajai wildlife reserve	Lendu plateau
Accipiter badius	Shikra						X			
Actophilornis africanus	Jacana		X				X			
Amaurornis flavirostris	Black Crake						X			
Amblyospiza albifrons	Grosbeak Weaver						X			
Anastomus lamelligerus	African Open-Billed Stork		X				X			
Andropadus nigriceps	Eastern Mountain Greenbul									X
Andropadus virens	Little Greenbul						X			
Apalis personata	Black-Faced Apalis									X
Apaloderma vittatum	Bar-Tailed Trogon									X
Apus affinis	Little Swift						X			
Apus apus	Eurasian Swift						X			
Ardea cinerea	Grey Heron		X	X			X			
Ardea goliath	Goliath Heron		X	X						
Ardea melanocephala	Black-Headed Heron		X	X	X		X			
Ardea purpurea	Purple Heron		X	X			X			
Balaeniceps rex	Shoebill	VU	X					X	X	
Balearica regulorum	Grey Crowned Crane	EN	X	X			X			
Batis minor	Black-Headed Batis						X			
Batis orientalis	Grey-Headed Batis						X			

SPECIES NAME				BIOLOGICAL SURVEYS – KNOWN PRESENCE INSIDE STUDY AREA			EXISTING DATA - KNOWN OCCURRENCE INSIDE OR AT THE MARGIN OF THE STUDY AREA			
SCIENTIFIC NAME	COMMON NAME	IUCN STATUS	WATERBIRDS	Wetland	Savannah	Riverine habitats	Biological data from smec	Murchison falls np	Ajai wildlife reserve	Lendu plateau
Bostrychia hagedash	Hadada		X				X			
Bradypterus alfredi	Bamboo Warbler									X
Bradypterus carpalis	White-Winged Scrub-Warbler							X		
Bubulcus ibis	Cattle Egret		X	X	X		X			
Camaroptera brachyura	Grey-Backed Camaroptera				X	X	X			
Campethera tullbergi	Tullberg's Woodpecker									X
Centropus monachus	Blue-Headed Coucal			X						
Centropus superciliosus	White-Browed Coucal				X		X			
Cercotrichas hartlaubi	Brown-Backed Scrub-Robin						X			
Ceyx picta	African Pygmy Kingfisher						X			
Chalcomitra senegalensis	Scarlet-Chested Sunbird						X			
Chlorocichla laetissima	Joyful Greenbul									X
Chlorocichla prigoginei	Prigogine's Greenbul	EN								X
Chrysococcyx caprius	Diederik Cuckoo						X			
Chrysococcyx cupreus	African Emerald Cuckoo						X			
Chrysococcyx klaas	Klaas' Cuckoo						X			
Cinnyricinclus sharpii	Sharpe's Starling									X
Cinnyris chloropygia	Olive-Bellied Sunbird						X			
Cinnyris cuprea	Copper Sunbird						X			
Cinnyris venusta	Variable Sunbird						X			
Circus aeruginosus	Eurasian Marsh Harrier						X			
Circus macrourus	Pallid Harrier	NT						X		
Circus ranivorus	African Marsh Harrier						X			
Cisticola cantans	Singing Cisticola						X			
Cisticola chiniana	Rattling Cisticola						X			
Cisticola chubbi	Chubb's Cisticola									X
Cisticola erythrops	Red-Faced Cisticola			X	X	X	X			
Cisticola galactotes	Winding Cisticola						X			
Cisticola juncidis	Zitting Cisticola						X			
Cisticola lateralis	Whistling Cisticola						X			
Cisticola natalensis	Croaking Cisticola				X	X				
Cisticola ruficeps	Red-Pate Cisticola							X	X	
Colius striatus	Speckled Mousebird			X	X		X			
Columba albinucha	White-Naped Pigeon	NT								X
Coracias caudata	Lilac-Breasted Roller			X	X		X			

SPECIES NAME				BIOLOGICAL SURVEYS – KNOWN PRESENCE INSIDE STUDY AREA			EXISTING DATA - KNOWN OCCURRENCE INSIDE OR AT THE MARGIN OF THE STUDY AREA			
SCIENTIFIC NAME	COMMON NAME	IUCN STATUS	WATERBIRDS	Wetland	Savannah	Riverine habitats	Biological data from smec	Murchison falls np	Ajai wildlife reserve	Lendu plateau
Coracina graueri	Grauer's Cuckooshrike	NT								X
Corvinella corvina	Yellow-Billed Shrike							X		
Corvus albus	Pied Crow						X			
Corythaeola cristata	Great Blue Turaco						X			
Cossypha heuglini	White-Browed Robin-Chat						X			
Crinifer zonurus	Eastern Grey Plantain-Eater						X			
Cryptospiza jacksoni	Dusky Crimson-Wing									X
Cuculus clamosus	Black Cuckoo						X			
Cyanomitra olivacea	Olive Sunbird						X			
Cyanomitra verticalis	Green-Headed Sunbird						X			
Cypsiurus parvus	African Palm Swift			X	X	X	X			
Dendropicos goertae	Grey Woodpecker						X			
Dicrurus adsimilis	Fork-Tailed Drongo			X	X	X	X			
Dioptrornis fischeri	White-Eyed Slaty Flycatcher									X
Dryoscopus gambensis	Northern Puffback				X		X			
Elanus caeruleus	Black-Shouldered Kite				X		X			
Elminia albiventris	White-Bellied Crested-Flycatcher									X
Elminia longicauda	African Blue-Flycatcher						X			
Emberiza affinis	Brown-Rumped Bunting							X		
Emberiza flaviventris	African Golden-Breasted Bunting						X			
Estrilda astrild	Common Waxbill						X			
Estrilda nonnula	Black-Crowned Waxbill						X			
Estrilda troglodytes	Black-Rumped Waxbill							X	X	
Euplectes afer	Yellow-Crowned Bishop						X			
Euplectes axillaris	Fan-Tailed Widowbird						X			
Euplectes hordeaceus	Black-Winged Red Bishop						X			
Euplectes macrourus	Yellow-Mantled Widowbird						X			
Eurystomus glaucurus	Broad-Billed Roller			X	X		X			
Falco naumanni	Lesser Kestrel							X		
Francolinus squamatus	Scaly Francolin						X			
Glareola nordmanni	Black-Winged Pratincole	NT	X					X		
Glareola nuchalis	Rock Pratincole		X					X		
Gypohierax angolensis	Palm-Nut Vulture						X			
Halcyon chelicuti	Striped Kingfisher						X			

SPECIES NAME				BIOLOGICAL SURVEYS – KNOWN PRESENCE INSIDE STUDY AREA			EXISTING DATA - KNOWN OCCURRENCE INSIDE OR AT THE MARGIN OF THE STUDY AREA			
SCIENTIFIC NAME	COMMON NAME	IUCN STATUS	WATERBIRDS	Wetland	Savannah	Riverine habitats	Biological data from smec	Murchison falls np	Ajai wildlife reserve	Lendu plateau
Halcyon leucocephala	Grey-Headed Kingfisher						X			
Halcyon senegalensis	Woodland Kingfisher						X			
Haliaeetus vocifer	African Fish Eagle						X			
Hedydipna collaris	Collared Sunbird						X			
Hirundo abyssinica	Lesser Striped Swallow						X			
Hirundo angolensis	Angola Swallow					X	X			
Hirundo rustica	Barn Swallow						X			
Hylia prasina	Green Hylia						X			
Illadopsis pyrrhoptera	Mountain Illadopsis									X
Kaupifalco monogrammicus	Lizard Buzzard			X	X		X			
Kupeornis chapini	Chapin's Mountain-Babbler	NT								X
Lagonosticta rara	Black-Bellied Firefinch							X		
Lagonosticta rubricata	African Firefinch						X			
Lagonosticta senegala	Red-Billed Firefinch						X			
Lamprotornis chalcurus	Bronze-Tailed Glossy-Starling							X	X	
Lamprotornis chalybaeus	Greater Blue-Eared Glossy Starling						X			
Lamprotornis chloropterus	Lesser Blue-Earedstarling						X			
Lamprotornis purpureiceps	Purple-Headed Starling						X			
Lamprotornis purpureus	Purple Glossy-Starling							X	X	
Lamprotornis purpuropterus	Rüppell's Long-Tailed Starling						X			
Lamprotornis splendidus	Splendid Glossy Starling						X			
Laniarius aethiopicus	Tropical Boubou						X			
Laniarius erythrogaster	Black-Headed Gonolek			X	X	X	X			
Laniarius mufumbiri	Papyrus Gonolek	NT					X	X	X	
Lanius collaris	Common Fiscal			X	X					
Lanius excubitoroides	Grey-Backed Fiscal			X	X		X			
Lanius gubernator	Emin's Shrike							X	X	
Leptoptilos crumeniferus	Marabou Stork		X				X			
Lonchura bicolor	Black-And-White Mannikin						X			
Lonchura cucullata	Bronze Mannikin				X	X	X			
Lophaetus occipitalis	Long-Crested Eagle				X		X			
Lybius bidentatus	Double-Toothed Barbet						X			
Lybius leucocephalus	White-Headed Barbet						X			

SPECIES NAME				BIOLOGICAL SURVEYS – KNOWN PRESENCE INSIDE STUDY AREA			EXISTING DATA - KNOWN OCCURRENCE INSIDE OR AT THE MARGIN OF THE STUDY AREA			
SCIENTIFIC NAME	COMMON NAME	IUCN STATUS	WATERBIRDS	Wetland	Savannah	Riverine habitats	Biological data from smec	Murchison falls np	Ajai wildlife reserve	Lendu plateau
Macronyx croceus	Yellow-Throated Longclaw						X			
Malimbus rubricollis	Red-Headed Malimbe						X			
Megaceryle maxima	Giant Kingfisher						X			
Melaenornis edolioides	Northern Black Flycatcher						X			
Merops bulocki	Red-Throated Bee-Eater						X	X	X	
Merops oreobates	Cinnamon-Chested Bee-Eater									X
Merops pusillus	Little Bee-Eater			X	X		X			
Microcarbo africanus	Long-Tailed Cormorant		X	X			X			
Milvus migrans	Black Kite			X	X	X	X			
Motacilla aguimp	African Pied Wagtail					X	X			
Motacilla flava	Yellow Wagtail				X					
Muscicapa lendu	Chapin's Flycatcher	VU								X
Musophaga rossae	Ross's Turaco						X			
Myrmecocichla nigra	Sooty Chat						X			
Nectarinia alinae	Blue-Headed Sunbird									X
Nectarinia erythrocerca	Red-Chested Sunbird						X	X		
Nectarinia kilimensis	Bronze Sunbird				X	X	X			X
Nectarinia preussi	Northern Double-Collared Sunbird									X
Nectarinia reichenowi	Golden-Winged Sunbird									X
Nesocharis capistrata	White-Cheeked Oliveback							X	X	
Nigrita canicapilla	Grey-Headed Negrofinch						X			
Numida meleagris	Helmeted Guineafowl						X			
Onychognathus walleri	Waller's Starling									X
Oreolais pulchra	Black-Collared Apalis									X
Oriolus larvatus	African Black-Headed Oriole						X			
Oxylophus jacobinus	Black-And-White Cuckoo						X			
Oxylophus levaillantii	Levaillant's Cuckoo					X				
Passer griseus	Grey-Headed Sparrow						X			
Phoeniculus purpureus	Green Wood-Hoopoe						X			
Phylloscopus laetus	Red-Faced Woodland-Warbler									X
Phylloscopus trochilus	Willow Warbler			X	X					
Platysteira cyanea	Brown-Throated Wattle-Eye						X			
Plocepasser superciliosus	Chestnut-Crowned Sparrow-Weaver							X	X	

SPECIES NAME				BIOLOGICAL SURVEYS – KNOWN PRESENCE INSIDE STUDY AREA			EXISTING DATA - KNOWN OCCURRENCE INSIDE OR AT THE MARGIN OF THE STUDY AREA			
SCIENTIFIC NAME	COMMON NAME	IUCN STATUS	WATERBIRDS	Wetland	Savannah	Riverine habitats	Biological data from smec	Murchison falls np	Ajai wildlife reserve	Lendu plateau
Ploceus baglafecht	Baglafecht Weaver						X			X
Ploceus castanops	Northern Brown-Throated Weaver						X	X		
Ploceus cucullatus	Black-Headed Weaver						X			
Ploceus heuglini	Heuglin's Masked-Weaver								X	
Ploceus insignis	Brown-Capped Weaver									X
Ploceus jacksoni	Golden-Backed Weaver						X			
Ploceus melanogaster	Black-Billed Weaver									X
Ploceus nigerrimus	Vieillot's Black Weaver						X			
Ploceus pelzelni	Slender-Billed Weaver						X			
Ploceus superciliosus	Compact Weaver						X			
Ploceus velatus	Vitelline Masked Weaver						X			
Poeoptera stuhlmanni	Stuhlmann's Starling									X
Pogoniulus bilineatus	Yellow-Rumped Tinkerbird						X			
Pogoniulus chrysoconus	Yellow-Fronted Tinkerbird						X			
Pogoniulus scolopaceus	Speckled Tinkerbird						X			
Pogonornis rolleti	Black-Breasted Barbet								X	
Poicephalus meyeri	Brown Parrot						X			
Polyboroides typus	African Harrier-Hawk						X			
Prinia leucopogon	White-Chinned Prinia						X			
Prinia subflava	Tawny-Flanked Prinia			X	X	X	X			
Prionops plumatus	White-Crested Helmet-Shrike						X			
Psalidoprocne albiceps	White-Headed Saw-Wing						X			
Pternistis icterorhynchus	Heuglin's Francolin							X		
Pternistis nobilis	Handsome Francolin									X
Ptilostomus afer	Piapiac			X	X		X	X	X	
Pycnonotus barbatus	Common Bulbul			X	X	X	X			
Riparia cincta	Banded Martin						X			
Riparia paludicola	Plain Martin						X			
Riparia riparia	Sand Martin						X			
Rynchops flavirostris	African Skimmer	NT	x					X		
Saxicola rubetra	Whinchat			X	X					
Schoutedenapus myoptilus	Scarce Swift						X			
Scleroptila streptophora	Ring-Necked Francolin	NT						X		
Scopus umbretta	Hamerkop		X				X			
Serinus burtoni	Thick-Billed Seedeater									X

SPECIES NAME				BIOLOGICAL SURVEYS – KNOWN PRESENCE INSIDE STUDY AREA			EXISTING DATA - KNOWN OCCURRENCE INSIDE OR AT THE MARGIN OF THE STUDY AREA			
SCIENTIFIC NAME	COMMON NAME	IUCN STATUS	WATERBIRDS	Wetland	Savannah	Riverine habitats	Biological data from smec	Murchison falls np	Ajai wildlife reserve	Lendu plateau
Serinus citrinelloides	African Citril						X			
Serinus frontalis	Yellow-Browed Citril									X
Serinus koliensis	Papyrus Canary							X		
Serinus mozambicus	Yellow-Fronted Canary			X			X			
Serinus striolatus	Streaky Seedeater									X
Sheppardia aequatorialis	Equatorial Akalat									X
Stizorhina fraseri	Rufous Flycatcher-Thrush				X					
Streptopelia capicola	Ring-Necked Dove			X	X	X	X			
Streptopelia decipiens	African Mourning Dove			X	X	X				
Streptopelia semitorquata	Red-Eyed Dove			X	X	X	X			
Streptopelia senegalensis	Laughing Dove			X	X	X	X			
Sylvietta leucophrys	White-Browed Crombec									X
Tachymarptis aequatorialis	Mottled Swift						X			
Tauraco leucolophus	White-Crested Turaco							X	X	
Tchagra australis	Brown-Crowned Tchagra						X			
Tchagra minutus	Marsh Tchagra						X			
Telacanthura ussheri	Mottled Spinetail						X			
Terathopius ecaudatus	Bateleur	NT					X			
Terpsiphone bedfordi	Bedford's Paradise-Flycatcher	NT								X
Terpsiphone viridis	African Paradise-Flycatcher						X			
Threskiornis aethiopicus	Sacred Ibis		X				X			
Tockus alboterminatus	Crowned Hornbill						X			
Tockus nasutus	African Grey Hornbill						X			
Treron calva	African Green-Pigeon						X			
Treron waalia	Bruce's Green-Pigeon						X			
Turdoides plebejus	Brown Babbler			X	X		X			
Turdoides sharpei	Sharpe's Pied-Babbler							X		
Turdus pelios	African Thrush						X			
Turtur afer	Blue-Spotted Wood-Dove			X	X	X	X			
Turtur tympanistria	Tambourine Dove						X			
Uraeginthus bengalus	Red-Cheeked Cordon-Bleu						X			
Urocolius macrourus	Blue-Naped Mousebird			X	X		X			
Vanellus senegallus	African Wattled Lapwing		X				X			

SPECIES NAME				BIOLOGICAL SURVEYS – KNOWN PRESENCE INSIDE STUDY AREA			EXISTING DATA - KNOWN OCCURRENCE INSIDE OR AT THE MARGIN OF THE STUDY AREA			
SCIENTIFIC NAME	COMMON NAME	IUCN STATUS	WATERBIRDS	Wetland	Savannah	Riverine habitats	Biological data from smec	Murchison falls np	Ajai wildlife reserve	Lendu plateau
Vidua chalybeata	Village Indigobird						X			
Vidua macroura	Pin-Tailed Whydah						X			
Zoothera piaggiae	Abyssinian Ground-Thrush									X
Zosterops senegalensis	Yellow White-Eye						X			

IUCN redlist status, where applicable : EN-Endangered, VU-Vulnerable, NT-Near-Threatened

Out of the eighteen waterfowl species that are potentially present in the study area, seven were observed in the wetlands surveyed in 2015 (Table 6-11). Waterbirds include species that are ecologically dependent on wetlands for at least part of a year. They adapt their strategies to survive the changing seasons and to exploit temporarily inundated habitats (Dodman and Diagana, 2006). Waterbird movement is influenced by food and water availability, which is directly related to rainfall patterns. Wetlands are used by different species, during varying periods of the year and for different reasons, underlying the importance of maintaining natural flooding cycles. Temporary wetlands can therefore be important for waterbirds, although their use might not be regular.

Species of conservation interest

A total of 231 bird species are potentially present in the study area. Six species are considered globally endangered, five species are vulnerable and ten species are near threatened. The Grey Crowned Crane (*Balearica regulorum*) was the only globally Endangered species recorded along the project area corridor. It was seen in a wetland going through MFNP near Pakwach Bridge. The species shows a preference for short to medium height open grasslands adjacent to wetlands for foraging, and breeds within or at the edges of wetlands especially in marshes with water 1 m deep and with emergent vegetation 1 m above the water. It roosts in water along rivers or in marshes, or perches on nearby trees. The nest is a circular platform of uprooted grasses and sedges concealed in tall emergent vegetation (greater than 1 m in height) in or along the margins of wetlands such as marshes (Del Hoyo et al. 1996) with water c.1 m deep (BirdLife International, 2013).

Table 6-11 presents details about the species of conservation concern whose range extends across the project area.

Table 6-11 Species of conservation interest present or potentially present inside the proposed corridor

SCIENTIFIC NAME	COMMON NAME	THREAT CATEGORY	HABITAT
Balearica regulorum	Grey Crowned Crane	EN	S/W
Chlorocichla prigoginei	Prigogine's Greenbul	EN	F/W
Balaeniceps rex	Shoebill	VU	W
Muscicapa lendu	Chapin's Flycatcher	VU	F
Circus macrourus	Pallid Harrier	NT	S
Columba albinucha	White-Naped Pigeon	NT	F
Coracina graueri	Grauer's Cuckooshrike	NT	F
Glareola nordmanni	Black-Winged Pratincole	NT	W
Kupeornis chapini	Chapin's Mountain Babbler	NT	F
Laniarius mufumbiri	Papyrus Gonolek	NT	W
Rynchops flavirostris	African Skimmer	NT	River, lake and shores
Scleroptila streptophora	Ring-Necked Francolin	NT	S
Terathopius ecaudatus	Bateleur	NT	S
Terpsiphone bedfordi	Bedford's Paradise-Flycatcher	NT	F

IUCN redlist status, where applicable : EN-Endangered, VU-Vulnerable, NT-Near-Threatened
Habitat : F-Forest, S-Savanna, W-Wetland

6.2.2.5 MAMMALS

Several species of large wild animals have been reported in the project area, particularly in Murchison Falls National Park and the adjacent woodland savannahs. MFCA hosts 76 species of mammals including four of the "big five": leopards, buffaloes, lions (Vulnerable), and elephants (Vulnerable) (Appendix 6-1). Other species present in MFCA include: Jackson's hartebeest, bushbucks, Uganda kob, waterbucks, warthogs, giraffes, crocodiles, and hippopotamuses (Vulnerable). Primates, such as olive baboons common on roadsides as well as blue and red-tailed monkeys and black-and-white colobus common in forest sectors, are also known to inhabit the national park. However, encounters with large mammals during the present field study were very rare. The mammals opportunistically encountered during the surveys were the elephant *(Loxodonta africana*), Uganda kob (*Kobus kob thomasi*), warthog (*Phacochoerus africanus*), hippopotamus (*Hippopotamus amphibious*) and olive baboons (*Papio anubis*). Vervet monkeys (*Chlorocebus pygerythrus*) were recorded in a forest in Onyona Central village. The Hippo dung in Got Ofwoyo village in Nwoya close to the River Nile is an indication that Hippos go out at night to graze in the surrounding savannahs.

The Sitatunga (*Tragelaphus spekii*), is a papyrus-specialist species known to evolve in the extensive papyrus swamps in the project area. Sitatungas used to be abundant in the Project area wetlands. However, they have become very rare since they are frequently hunted for game meat and wetlands are under increasing pressure from agricultural production and bush fires.

The Global Biodiversity Information Facility (GBIF) database was used to complete the data collected during surveys. Consequently, 15 mammal species and 14 bat species were identified as potential users of the study area (Table 6-12).

Table 6-12 Mammals observed or potentially present in the study area.

MAMMALS		IUCN	OBSERVED IN 2015
Alcelaphus buselaphus	Hartebeest		
Arvicanthis niloticus	African Grass Rat		
Ceratotherium simum	White Rhinoceros	NT	
Chlorocebu pygerythrus	Vervet monkeys		x
Crocidura olivieri	Olivier's Shrew		
Crocidura parvipes	Small-footed Shrew		
Crocidura turba	Tumultuous Shrew		
Dendromus melanotis	Gray African Climbing Mouse		
Dendromus mystacalis	Chestnut Climbing Mouse		
Hippopotamus amphibius	Hippopotamus	VU	x
Kobus ellipsiprymnus	Waterbuck		
Kobus kob thomasi	Uganda kob		x
Loxodonta africana	Elephant	VU	x
Mus musculoides	House mouse		
Ourebia ourebi	Oribi		
Papio anubis	Olive baboon		x
Phacochoerus africanus	Common Warthog		x
Sylvicapra grimmia	Common Duiker		
Tragelaphus scriptus	Bushbuck		
Tragelaphus spekii	Sitatunga		
Bats			
Eidolon helvum	African Straw-coloured Fruit-bat	NT	
Epomophorus labiatus	Ethiopian Epauletted Fruit Bat		
Eptesicus somalicus	Somali Serotine		
Lavia frons	Yellow-winged Bat		
Micropteropus pusillus	Peter's Dwarf Epauletted Fruit Bat		
Nycteris hispida	Hairy Long-eared Bat		
Pipistrellus nanus	Banana Pipistrelle Bat		
Pipistrellus rueppellii subsp. fuscipes	Rüppel's Pipistrelle		
Pipistrellus tenuipinnis	Slenderwinged Pipistrelle Bat		
Rhinolophus fumigatus	Rüppell's Horseshoe Bat		
Scotophilus dinganii	African Yellow House Bat		
Scotophilus leucogaster	White-bellied Yellow Bat		
Tadarida pumila	Little Free-tailed Bat		
Taphozous mauritianus	Mauritian Tomb Bat		

Picture 6-6 Some of the animals encountered

Elephant in MFNP wetland near Pakwach bridge

Uganda Kobs and Warthog in MFNP, close to Got Afwoyo Village

Warthog in MFNP near Pakwach bridge

Hippopotamuses in Wetland along the Nile

Species of conservation interest

The hippopotamus (*Hippopotamus amphibius*), a globally endangered species has been observed in the study area. Murchison Falls National Park hosts one of Uganda's main hippopotamus populations (Lewison and Oliver, 2008). Population estimate numbers for MFNP is around a few thousands. The hippopotamus is known to use both aquatic and terrestrial habitats. It requires a large permanent water body to retreat during the day and open grasslands for grazing at night. Population numbers are decreasing due to illegal hunting for meat and ivory and habitat loss (Lewison and Oliver, 2008). In the study area, hippopotamuses were observed in a wetland along the Nile and hippopotamus dung was observed in Got Ofwoyo village (Nwoya), an indication that Hippos go out at night to graze in the surrounding savannas.

The elephant, a vulnerable species was also observed in the study area. The elephant uses a variety of habitats including dense forests, open and closed savannas, and grasslands. Populations in Eastern Africa are currently increasing (Blanc, 2008).

6.2.2.6 REPTILES AND AMPHIBIANS

Reptiles

Eighteen species of reptiles are potentially present in the project area according to the GBIF (Table 6-13). An inventory also took place, 75-km south of Gulu, in 2010 for the Karuma Hydro-Power Project Environmental and Social Impact Assessment (EIPL, 2011). Surveyed species were also included in the list of potential species presented in Table 6-14. The Nile crocodile is a common reptile inside the MFNP. No threatened species according to IUCN has been recorded.

Table 6-13 Reptile species potentially present in the project area.

REPTILES		IUCN
Agama agama	Common Agama	
Bitis arietans	Gemeine Puffotter	
Bitis gabonica	Gaboon Viper	
Bitis nasicornis	Rhinoceros Viper	
Causus rhombeatus	Common Night Adder	
Chamaeleo gracilis	Gracile Chameleon	
Coronella coronata	Eastern Crowned Snake	
Crocodylus niloticus	Nile Crocodile	
Crotaphopeltis hotamboeia	Red-lipped Snake	
Dasypeltis scabra	Common Egg Eater	
Dendroaspis jamesoni kaimosae	Western Forest Green Mamba	
Dromophis lineatus	Zambian Whip Snake	
Geochelone pardalis	Leopard Tortoise	
Hemidactylus brooki	Brook's Gecko	
Kinixys belliana	Bell's Hinge Tortoise	
Lamprophis fuliginosus	Brown House Snake	
Leptotyphlops scutifrons	Peter's worm Snake	
Lycophidion ornatum	Forest Wolf Snake	
Mabuya maculilabris	Boulenger's Mabuya	
Mabuya quinquetaeniata	Rainbow Skink	
Naja haje	Arabian Cobra	
Naja melanoleuca	Black and White Cobra	
Natrix olivacea	Olive Marsh Snake	
Philothamnus bequaerti	Bequaert's Green Snake	
Philothamnus heterolepidotus	Slender Green Snake	
Typhlops lineolatus	Common Lined Worm Snake	
Varanus niloticus	Nile Monitor	

Amphibians

An amphibian inventory took place 75-km south of Gulu in 2010, for the Karuma Hydro-Power Project's Environmental and Social Impact Assessment (EIPL, 2011). Surveyed species were also included in the list of potential species presented in Table 6-14. No species recorded is considered threatened by IUCN. However, the Degen's toad (*Bufo vittatus)* is classified as Data Deficient.

Table 6-14 Potential amphibian species in the study area

AMPHIBIANS		IUCN
Afrixalus osorioi	Osorio's Spiny Reed Frog	
Amietia angolensis	Angola River Frog	
Bufo gutturalis	African Common Toad	
Bufo vittatus	Degen's toad	DD
Hemisus marmoratus	Marbled Snout-burrower	
Hoplobatrachus occipitalis	Crowned Bullfrog	
Hyperolius pusillus	Waterlily Reed Frog	
Hyperolius viridiflavus	Common Reed Frog	
Kassina senegalensis	Senegal kassina	
Leptopelis bocagii	Bocage's Tree Frog	
Phrynobatrachus natalensis	Natal Dwarf Puddle Frog	
Ptychadena porosissima	Grassland ridged frog	
Xenopus victorianus	Mwanza Frog	

6.2.2.7 FISH

The hydrological network inside the study area is ramified and composed of a variety of water courses, lakes and wetlands. The extensive papyrus swamps are dominated by *Echinochloa* spp. and *Cyperus spp*. and support fishing which is an important economic activity for women and children (Picture 6-7). The main species of fish harvested include Lung Fish (*Clarias sp.)*, *Oreochromis niloticus and Haplochromi*s sp. Occurrences of Nile Jewel Cichlid (*Micropanchax loati*) and Uganda Nothobranch (*Nothobranchius ugandensis*) are also noted in the GBIF database.

The project area will cross the Albert Nile which starts from the northern tip of Lake Albert and travels about 220 km to the Uganda-South Sudan border. Fishing catches show that dominant species in the Albert Nile are Nile tilapia (*Oreochromis niloticus*), which account for 15% of total catches, closely followed by Ragoogi (*Brycinus nurse*), *Clarias gariepinus*, kisinja (*Barbus bynni*), *Protoperus aethiopicus*, *Bagrus bayad*, Nile perch (*Lates spp.*), *Alestes baremose*, and *Hydrocinus forskalli* (NaFIRRI, 2012). Other fish species found in Lake Albert were also considered (Campbell et al. 2005). A complete list of potential species in the project area can be found in Table 6-15.

Table 6-15 Observed and potential fish species in the project area

SPECIES / TAXA	ALBERT NILE	LAKE ALBERT	IUCN	OBSERVED IN 2015
Alestes baremose	X	X		
Alestes macrolepidotus	X			
Auchenoglanis occidentalis	X	X		
Bagrus bayad	X	X		
Bagrus docmak	X	X		
Barbus bynni	X	X		
Barbus perince	X	X		
Brycinus nurse	X	X		
Cichlidae sp.		X		
Citharinus latus		X		
Clarias gariepinus	X	X		x
Distichodus niloticus	X	X		
Marcusenius victoriae	X		EN	
Gnathonemus longibarbis	X			

SPECIES / TAXA	ALBERT NILE	LAKE ALBERT	IUCN	OBSERVED IN 2015
Haplochromis sp.	X	X		x
Hydrocynus forskali	X	X		
Hyperopisus bebe	X	X		
Labeo coubie	X			
Labeo forskalii		X		
Labeo horie	X	X		
Lates macrophthalmus		X	EN	
Lates niloticus		X		
Lates spp / Nile perch	X	X		
Malapterurus electricus	X	X		
Marcusenius spp.		X		
Hippopotamyrus grahami	X			
Micropanchax loati	Small waterbodies, swamps and irrigation ditches			
Mormyrus hasselquistii		X		
Mormyrus kannume	X	X		
Mormyrus macrocephalus	X	X		
Mormyrops anguilloides	X			
Mormyrus niloticus	X	X		
Neobola bredoi		X		
Nothobranchius ugandensis	Swamps and roadside ditches			
Oreochromis leucostictus	X	X		
Oreochromis niloticus	X	X		x
Polypterus senegalus		X		
Protopterus aethiopicus	X	X		
Sarotherodon galileus		X		
Schilbe intermedius		X		
Synodontis afrofischeri	X	X		
Synodontis frontosus	X			
Synodontis schall	X	X		
Synodontis victoriae	X	X	NT	
Tilapia zillii	X	X		

Picture 6-7 Fishing activities

Women and children fishing in Okole wetland

Young boys fishing in KuluAladu wetland

Clarias gariepinus

Oreochromis niloticus and *Clarias gariepinus*

Species of conservation interest

Two species associated to Lake Albert, Albert Nile or both are considered globally endangered and one species is near threatened. Victoria stonebasher (*Marcusenius victoriae)*, which is endangered according to IUCN, is found in shallow inshore waters near river mouths on soft or rocky bottoms in or near swamps (Bavona et al. 2006). Albert Lates (*Lates macrophthalmus*) is endemic to Lake Albert where it is found in waters more than 18 m deep (Twongo, 2006). Lake Victoria Squeaker (*Synodontis victoriae*) is near threatened and it inhabits shallow waters of lakes and rivers in both soft and hard substrates. The species' assessment could be upgraded to vulnerable in the near future due to ongoing decline in area of occupancy (Twongo and Hanssens, 2006). Due to the limited impacts of the project on fish habitats, fish species were not officially surveyed in 2015.

6.3 PROTECTED AREAS

6.3.1 MURCHISON FALLS NATIONAL PARK

The transmission line passes close to the Murchison Falls National Park which is one of the four savannah parks in Uganda recognized for its uniqueness and importance for biodiversity conservation (Lamprey, 2000). It is the main representation of the Sudanian vegetation form in East Africa. Because of the wildlife concentration it shows, IUCN has accorded to it a high level of conservation priority (UWA 2001). The National Park boasts a rich avifauna, with a checklist of more than 451 species, due to its large size and wide range of habitats. The convergence zone between Lake Albert and the delta forms a shallow area that is important for waterbirds, especially the Shoebill (*Balaeniceps rex*).

It is the only park in Uganda with a viable population of Rothschild's giraffe (*Giraffa camelopardalis rothschildi*). It also boasts Uganda's largest population of Jackson's hartebeest (*Alcelaphus buselaphus jacksoni*) which has been nearly or completely eliminated from other protected areas in Uganda, and is one of the few places in Uganda with populations of soft-shelled turtle (*Trionyx triunguis*) (Olupot et al. 2010). The stretch of river between Murchison Falls and the delta has one of the biggest concentrations of Nile crocodile (*Crocodylus niloticus*) in the world.

6.3.2 FOREST RESERVES

The power line corridor passes through three forest reserves. These reserves are not managed as strict protected areas, but rather for the sustainable use of natural resources and ecosystems. The central and local forest reserves that are crossed by the selected corridor are presented in table 6-16.

Table 6-16 Central and local forest reserves crossed by the selected corridor

FOREST RESERVES	LENGTH OF THE CORRIDOR INSIDE THE FR (KM)
Achwera Local Forest Reserve	0,13
Laura Central Forest Reserve	2,61
Opaka Central Forest Reserve	1,25
Enjeva Central Forest Reserve	1,18

6.3.3 GOT AFWOYO AREA

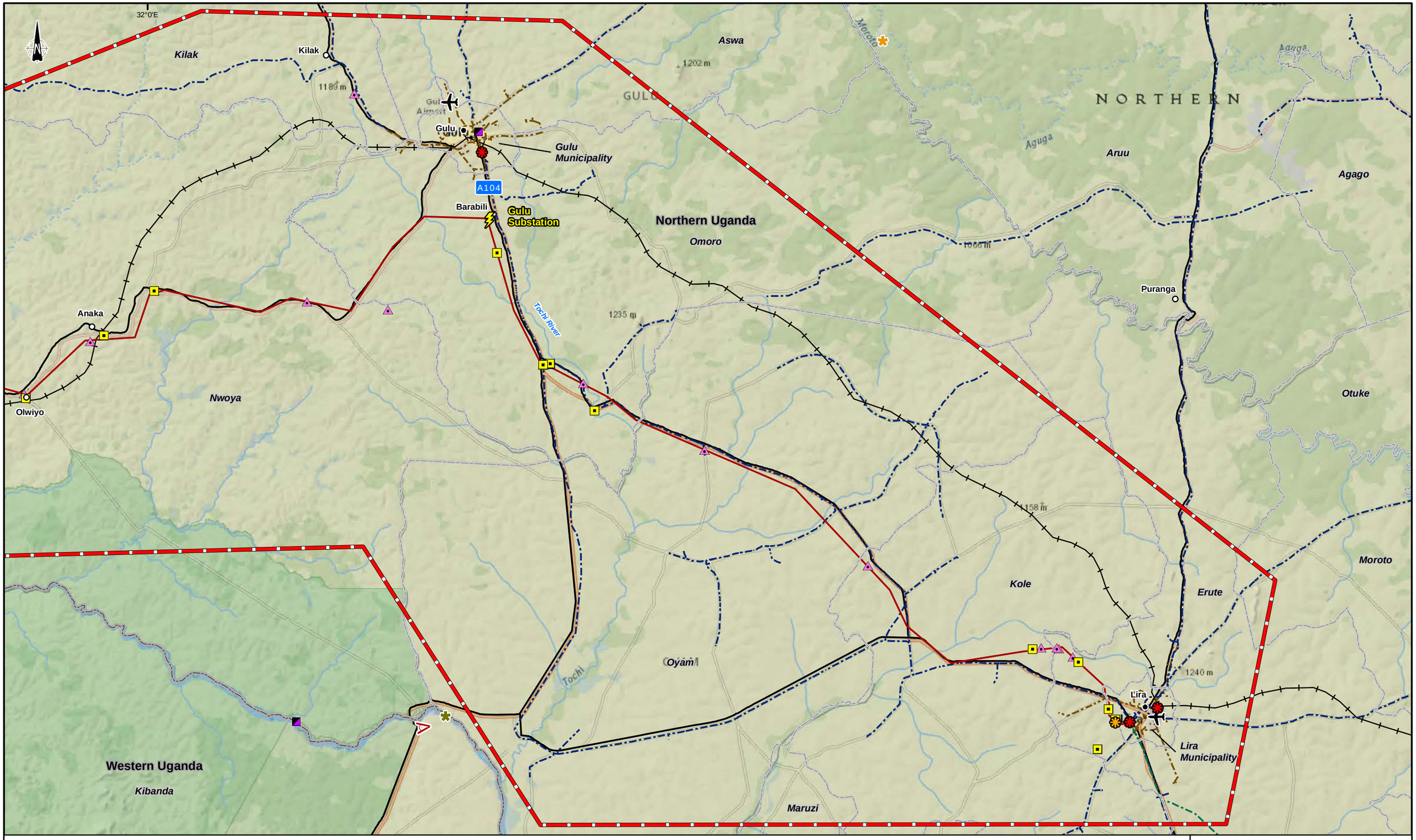
The Got Afwoyo area is not an officially protected area. It is however a known wildlife dispersal area/corridor adjacent to the Murchison Falls National Park on its North side, where some wildlife living in the Park cross to graze.

According to Uganda Wildlife Authority representatives, the precise extent and perimeter of this area is not known since land ownership is not under UWA's jurisdiction, but is owned by individuals. Much of the land at the moment is unused but there are signs of new developments taking place in some portions which may curtail wildlife movement, such as agriculture expansion and oil exploration. Total and Civicon oil prospecting companies are located in the Got Afwoyo area.

In the past this area was known a corridor for elephant migration between Murchison falls and East Madi Wildlife reserve, formerly known as the Kilak Controlled Hunting Area. Today, some wild herbivores such as buffaloes, elephants, warthogs, hippopotamuses and antelopes are known to forage in the Got Afwoyo area. Animals usually cross from the Park across the Highway and railway line to the Nile wetland near Pakwach and to the unused Got Afwoyo area and then go back in the Park.

6.4 HUMAN ENVIRONMENT

Maps 9a, 9b and 9c below illustrate the main human environment components located in the study area.



International Border
Region Boundary
District Boundary
City
Village
River
Lake

Infrastructures
Airport
Road
Railroad

Sensitives View Points
Murchison Falls National Park

Sensitives Sites
Physical Cultural Resources
Touristic / Historical Site
Other Sensitive Site

Electric Infrastructures
MEMD Generation Site - Under Construction
Licensed MEMD Generation Site
Existing Distribution Substation
Existing UETCL Transmission Substation
Electric Line Under Construction, 11 kV
Electric Line Under Construction, 33 kV
Electric Line, 132 kV

Project Components
Extended Study Area
Project Line Route
132/33 kV Projected Substation

Sources :

-Topographic Map: National Geographic World Map
- Regions and Districts Limits: Maplibrary.org
- Sensitives ViewPoints: www.ugandawildlife.org
- Subcounty Boundary, Protected Areas, and Waterbodies: World Resources Institute
- Existing Uganda Electricity Transmission Network : http://data.energy-gis.opendata.arcgis.com/
- Railroads: DIVA-GIS and Digitalized from National Geographic World Map
- Roads and Waterline: Digitalized from National Geographic World Map
- Projected Electric Line: SMEC, Feasibility Study for Lira-Gulu-Nebbi-Arua 132 kV Transmission Projects - Line Route Selection Report Final

Environmental and Social Impact Assessment for the Proposed Construction of Lira-Gulu-Nebbi-Arua 132 kV Transmission Line

Human Environment - Lira-Gulu

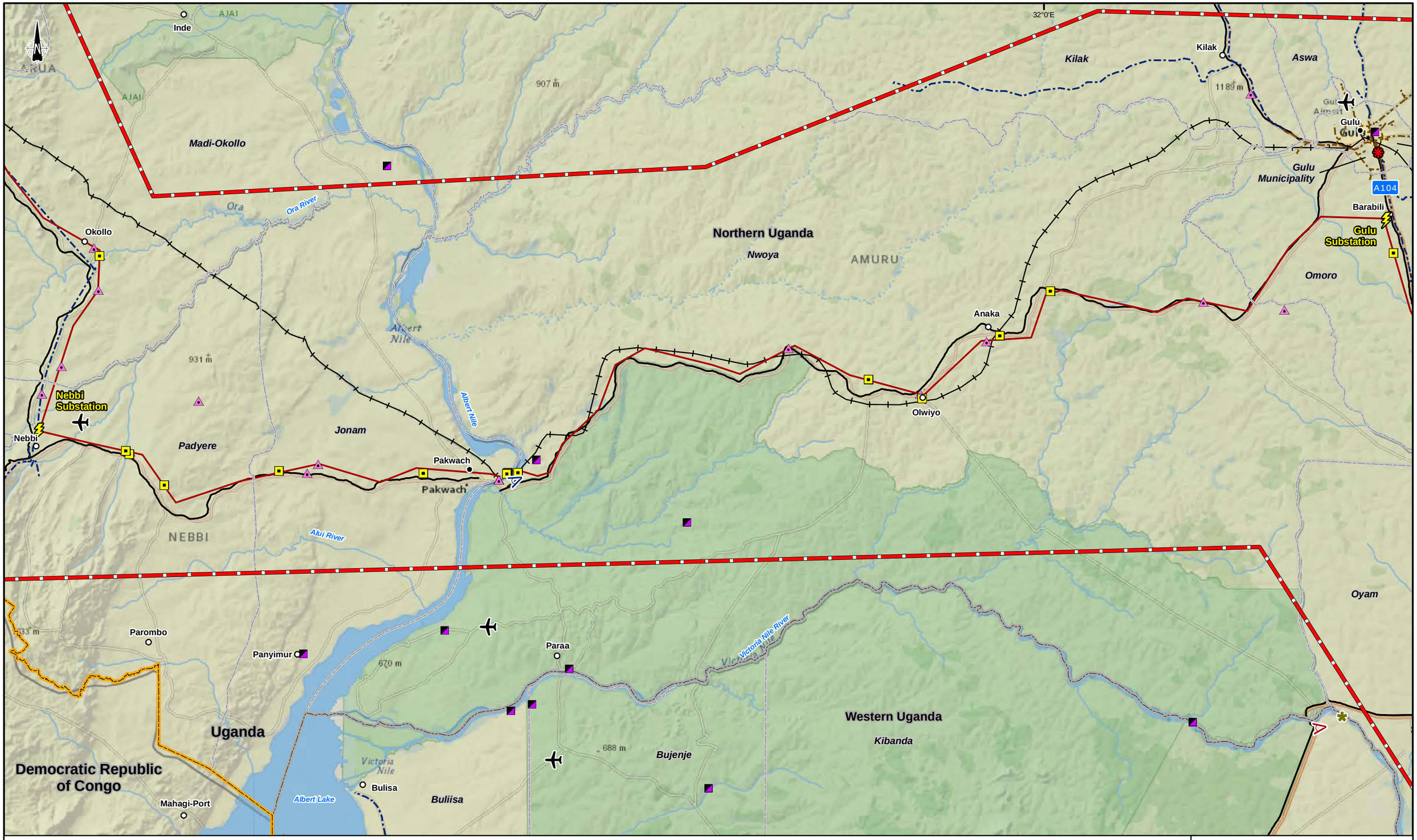
0 3,5 7 km
ARC 1960 - UTM 36N

Map 9a

January 2016

WSP

131_25275_00_ESM9a_015_HumanEnviro_160121.mxd



Infrastructures

- Airport
- Road
- Railroad

Sensitives View Points

- Murchison Falls National Park
- Nile Crossing

Sensitives Sites

- Physical Cultural Resources
- Touristic / Historical Site
- Other Sensitive Site

Electric Infrastructures

- MEMD Generation Site - Under Construction
- Existing Distribution Substation
- Electric Line Under Construction, 11 kV
- Electric Line Under Construction, 33 kV

Project Components

- Extended Study Area
- Project Line Route
- 132/33 kV Projected Substation

- International Border
- Region Boundary
- District Boundary
- City
- Village
- River
- Lake

Sources :

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- Projected Electric Line: SMEC, Feasibility Study for Lira-Gulu-Nebbi-Arua 132 kV Transmission Projects - Line Route Selection Report Final

Environmental and Social Impact Assessment for the Proposed Construction of Lira-Gulu-Nebbi-Arua 132 kV Transmission Line

Human Environment - Gulu-Nebbi

0 3,5 7 km

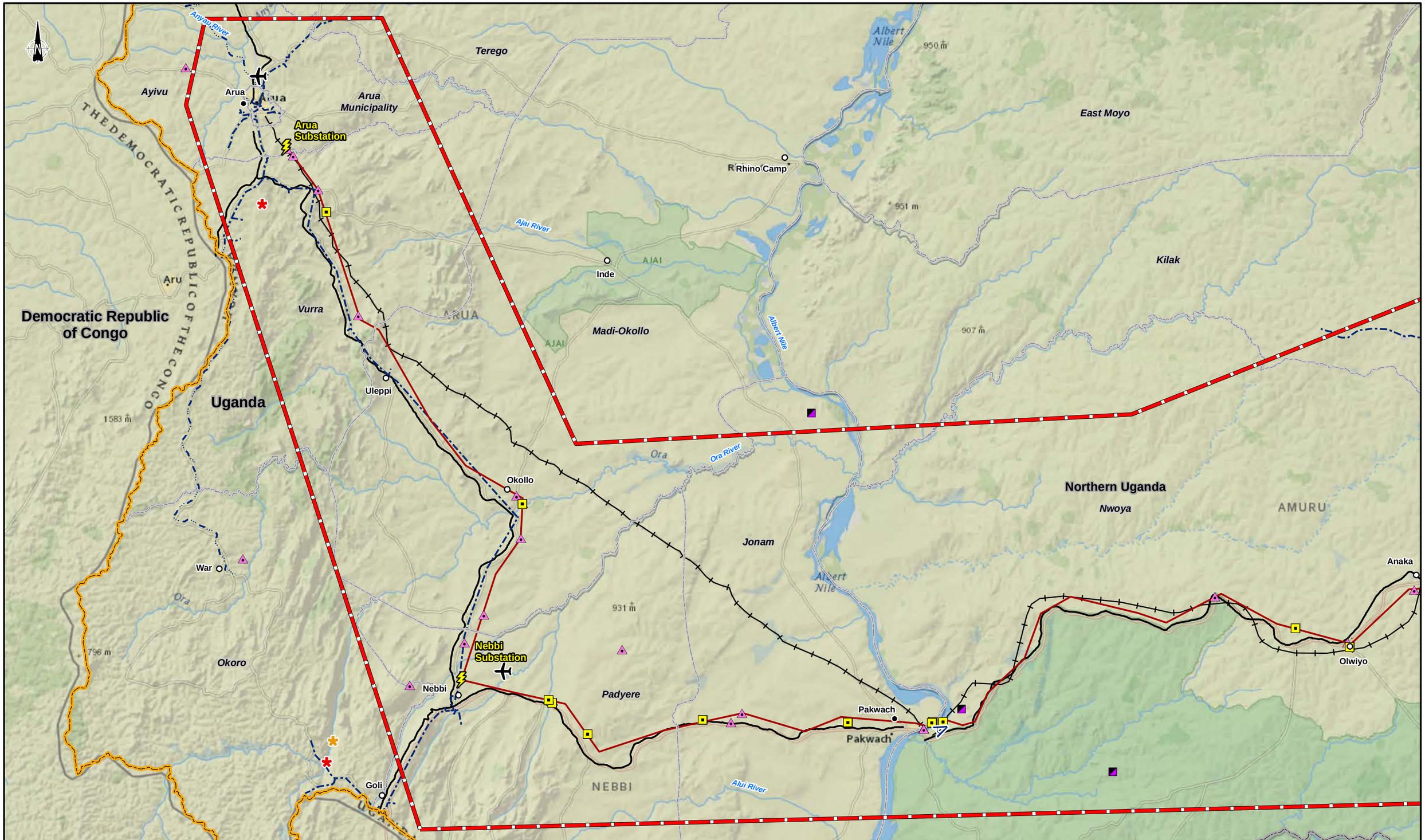
ARC 1960 - UTM 36N

Map 9b

January 2016

WSP

131_25275_00_ESM9b_016_HumanEnviro_160121.mxd



International Border
Region Boundary
District Boundary
City
Village
River
Lake

Infrastructures
Airport
Road
Railroad

Sensitives View Points
Nile Crossing

Sensitives Sites
Physical Cultural Resources
Touristic / Historical Site
Other Sensitive Site

Electric Infrastructures
Licensed MEMD Generation Site
Operational MEDM Generation Site
Electric Line Under Construction, 11 kV
Electric Line Under Construction, 33 kV

Project Components
Extended Study Area
Project Line Route
132/33 kV Projected Substation

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- Roads and Waterline: Digitalized from National Geographic World Map
- Projected Electric Line: SMEC, Feasibility Study for Lira-Gulu-Nebbi-Arua 132 kV Transmission Projects - Line Route Selection Report Final

Environmental and Social Impact Assessment for the Proposed Construction of Lira-Gulu-Nebbi-Arua 132 kV Transmission Line

Human Environment - Nebbi-Arua

0 3,5 7 km
ARC 1960 - UTM 36N

Map 9c

January 2016

WSP

131_25275_00_ESM9c_017_HumanEnviro_160121.mxd

6.4.1 LOCATION AND ADMINISTRATION

The proposed transmission line traverses through seven districts, namely Lira, Kole, Oyam, Gulu, Nwoya, Nebbi and Arua, five town councils, 25 sub counties, 60 parishes and 152 villages (Table 6-17).

Table 6-17 Administrative Boundaries through which the proposed line traverses

DISTRICT	DIVISIONS/TOWN COUNCIL	SUB-COUNTY	PARISH	VILLAGE
Lira	2	1	6	11
Kole		2	5	19
Oyam		2	6	19
Gulu		4	8	19
Nwoya	1	4	13	16
Nebbi	2	6	9	36
Arua		6	13	32
Total	5	25	60	152

The administrative structure operating in the project area consists of a Local Council (LC) system and civil servants. This structure is generally found in Uganda. The LC acts at various levels, i.e. village (LC I), parish (LC II), sub county (LC III) and district (LC IV). The county is not part of the local government hierarchy; nevertheless it is represented at the National level, in the Parliament. At the sub county level, the civil servants include parish chiefs and sub county chiefs. The sub county chief's office also includes technical workers such as sub-accountants, community development workers and agricultural/NAADS workers. The work of civil servants is complemented by village and parish development committees. The principal roles of political leaders are to oversee and monitor the implementation of government programs and projects at various levels. The main roles of civil servants are to implement government programs and projects and collect local government revenues. These two categories of leadership are currently operational in the extended project area. In addition, there are Members of Parliament (MPs) who represent the local constituencies at the national level. These political leaders can influence the implementation of development projects.

In addition to the aforementioned administrative structures, various non-government leadership structures can influence the implementation of development projects in their local constituencies. These include religious leaders, cultural leaders, opinion leaders, non-governmental organizations (NGOs) and community-based organizations (CBOs).

6.4.2 DISTRICTS

6.4.2.1 LIRA

Lira District is located in Lango sub-region in Northern Uganda and is bordered by the districts of Pader and Otuke in the North and North East, Alebtong in the East, Dokolo in the South and Kole in the West. It lies between Latitudes 1°21'N, 2°42"N and Longitudes 32°51"E, 34°15"E and covers an area of about 1326 km^2 of which 1286.22 km^2 is land area. The proposed transmission line crosses two divisions/town councils and a total of 11 villages.

6.4.2.2 KOLE

Kole District is located in the Northern part of Uganda between longitudes 32° East and 34° East and latitude 2° North and 3° North. The District is bordered by Oyam District in the North, Pader in the North-East, Lira in the East, and Apac Districts in the South. The District covers a total area of 2,847 Km^2 of which 9% is under open swamps and water while 15% is under forest with 2,970 Km^2 for human settlement and 2,524 Km^2 suitable for arable farming. The proposed transmission line crosses Ayer and Aboke sub counties and a total of 19 villages in these two sub counties.

6.4.2.3 OYAM

Oyam District has a total of 8 sub counties, 39 parishes, 810 villages and one town council comprising of two wards and 19 cells. The leadership structure of the district also consists of several levels; with LC V at district level, LC IV at county level, LC III at Sub County level, LC II at parish level and LC I at village level. The technical aspects are handled by different departments at the district and sub counties headed by professionals in their respective fields. The proposed transmission line traverses Oyam in the sub counties of Iceme and Ngai crossing 19 villages.

6.4.2.4 GULU

Gulu District is located in northern Uganda between longitude 30-32 degrees East; latitude 02-4 degrees North. It is bordered by Amuru and Nwoya district in the West and southwest respectively, Lamwo district in the Northeast, Pader district in the East, Lira district in the Southeast and Oyam district in the South

The total land area of Gulu District is 3,449.08 sq. km (1.44% of the Uganda land size). 96.9 sq. km (0.8%) is open waters.

Gulu District is composed of 16 Lower Local Governments (12 sub counties and 4 Divisions). Other administrative units include two counties and 1 Municipality. There are of 69 parishes (53 parishes in the rural sub counties and 16 wards in the divisions) and 342 villages. In Gulu district the proposed transmission line crosses a total of 4 sub counties and 19 villages.

6.4.2.5 NWOYA

Nwoya district is located between longitude 31-32 degrees East and latitude 2-3 degrees North. It is bordered by Amuru District in the North, Gulu District in the East, Buliisa District in the South West, Masindi and Kiryandongo Districts in the South, Oyam District in the South East, and Nebbi District in the West. The District Headquarters of Nwoyais at a road distance of 372 km from Kampala (the Country's capital city) via Gulu town.

Administratively, the district is made up of 5 lower local governments (4 sub-counties and 1 town council). Other administrative units include 1 county, under the supervision of an Assistant Chief Administrative Officer. There are 21 parishes and 4 wards, 49 villages and 16 sub-wards in Nwoya District. All the four sub counties that make up Nwoya district are traversed by the proposed transmission line crossing a total of 16 villages.

6.4.2.6 NEBBI

Nebbi District is located in the North-Western part of Uganda (West Nile). The district is divided into 15 LLGs, including 13 rural sub-counties, two town councils, and two Town Boards. The district has 81 parishes (including town wards), and 907 villages. The administration headquarters is located in Nebbi town council. The proposed transmission line runs through the sub counties of Pakwach, Panyango, Alwi, Kuchwiny and Nebbi. In addition, the two town councils of Nebbi and Pakwach are also affected by the proposed line. A total of 36 villages are affected by the line in Nebbi district.

6.4.2.7 ARUA

Arua District is located in the northwestern corner of Uganda. It has one international border with the Democratic Republic of Congo (DRC) in the West. It is bordered by Maracha and Yumbe districts to the North, Moyo to the Northeast, Adjumani and Amuru to the East (with the Albert Nile forming the border with the two districts) and Nebbi and Zombo Districst to the South. It is one of the districts forming the West Nile region, the others being Nebbi, Zombo, Yumbe, Moyo Maracha and Koboko. The district has four counties namely Ayivu, Madi-Okollo, Vurra and Terego and 26 sub counties. The proposed transmission line goes through six of these sub counties; namely Oluko, Ajia, Arivu, Ulepi, Okollo and Anyiribu sub counties. The district has one Municipal council with two wards namely Arua Hill and Oli River. A total of 32 villages are affected by the line in Arua district.

6.5 SOCIO-ECONOMIC COMPONENTS

The following sections portray the socio-economic situation of the seven districts crossed by the hydroelectric line and, more specifically, of the population living in the project area. The general data presented for the districts were retrieved from the report National Population and Housing Survey Census 2014, Provisional Results (UBOS, 2014). Data used to characterize the socio-economic situation of people living in the project area were collected during a household survey.

6.5.1 DEMOGRAPHICS TRENDS

Table 6-18 outlines some of the main demographic indicators for the seven districts crossed by the electrical transmission line in Northern Uganda. Arua is the most populated district with a total population of 785,189 people. Arua has the lowest average annual growth rate between 2002 and 2014 (2.83 %) of all seven districts. Nwoya District's population has been increasing the most during the same period with an average annual growth rate of 9.49 %. The sex ratio is defined as the number of males per 100 females in the population. The 2014 Census reveals that Arua has the lowest ratio while Nwoya has the highest. The urbanisation in Uganda is increasing steadily (UBOS, 2014), yet the population in the districts affected by the project still mainly lives in rural areas.

Table 6-18 Population Demographics per Distict

DISTRICT	TOTAL POPULATION	SEX RATIO	RESIDENCE		AVERAGE ANNUALGROWTH RATE 2002-2014
			Urban	Rural	
Arua	785 189	90.8	62 657	722 532	2.83
Gulu	443 733	94.5	152 276	291 457	3.3
Kole	241 878	94.4	8 833	233 045	3.14
Lira	410 516	92.2	99 059	311 457	2.88
Nebbi	385 220	91.9	57 335	327 885	3.08
Nwoya	128 094	96.5	13 489	114 605	9.49
Oyam	388 011	94.7	11 857	376 154	3.07

(Source: UBOS, 2014)

6.5.1.1 GENERAL DEMOGRAPHIC DATA PER DISTRICT

LIRA DISTRICT

The 2014 housing and population census indicated that the population of Lira District is at 410,516 (UBOS, 2014). 48.5% of the population is male and 51.5% is female. Eighty eight percent (88%) of the population reside in rural areas while the rest live in urban centres and the many upcoming growth centres. The population growth rate is estimated at 3.4% per annum. Based on the above figures, there could be an increase in the number of females in the reproductive age group (15-49 years) to over 92,072 by 2016. The villages crossed by the line in Lira District have a combined population of 8,553 people and a total of 2,622 households.

KOLE DISTRICT

As per 2014 Population and Housing Census (UBOS, 2014), the District total population stands at 241,878 people with a sex ratio of 94.4 % and an average life expectancy of 53 years for women and 47.7 years for men. Like the rest of the country, Kole has a very young population which increases the dependency burden upon the working population. The district fertility rate is at 7.07. The total population of the villages traversed by the line in Kole District is 13,479 and the total number of households is 4,008.

OYAM DISTRICT

The population of the district is 388,011 according to the 2014 Housing and Population Census with a growth rate of 3.6% per annum which is higher than the national average. The population of Oyam is predominantly rural with 95% percent living in rural areas. The district has high dependency population (below 15 and above 65 years of Age), which correspond to people who are not economically productive.

GULU DISTRICT

As per 2014 population and Housing Census, Gulu district has a total population of 443,733 of which 228,123 are females and are 215,610. Gulu Municipality has the largest population (152,276) followed by Omoro County (132,000) where the proposed transmission line will pass. Omoro County include the sub counties of Lakwana, Koro, Ongako and Bobi. The high population in Gulu municipality is attributed to the permanent settlement of IDP camps occupants, established during the 1986-2005 civil war.

NWOYA DISTRICT

Nwoya district population is 128,094 people according to the 2014 census. It consists of 65,195 females and 62,899 males. The population of Nwoya was unevenly distributed across the sub counties with the majority (97%) of the population living in rural areas. The population density differed in some of the sub-counties with Purongo sub county having the least density (4 sq. km) and Anaka the highest (29 sq. km). The presence of the National Game Park and game reserves and emigration to the then Masindi District (now Kiryandongo District) to escape rebel atrocities contributed to the low density. Children (those less than 18 years) represent 48 % of the population, those less than 15 years 44%, while the elderly (those 60+) represent 5 %. This age structure implies that a significant proportion of the population is dependent (dependency ratio is 108). The total population of the villages in the wayleave stands at 43,278 people with 7,434 households.

NEBBI DISTRICT

The population of Nebbi district is 385,220, composed of 184,507 males and 200,713 females. Children under 15 years correspond to 46.4% of the population and the elderly (over 65% years) constitute 3%. The district's dependency ratio is 59%. The district's population is distributed as 90.2% rural and 9.8 urban. Padyere constitutes 62% of the district's population and Jonam 38%. This distribution reflects the different agricultural potentials of the counties, which can also be seen from the population densities (persons per sq. km): highest in Padyere (>100) and Jonam (<100). The population growth rate of 2.69 is due to the combined effect of a high fertility rate and declining levels of mortality (especially maternal and infant mortality). The total population of the 63 villages in the project wayleave is 26,388 and the number of households is 5,457.

ARUA DISTRICT

Arua district has a population of 785,189 people of which 461,688 are females and 373,763 are males (UBOS, 2014). Almost half of the total population is younger than 15 years old. This results in a high dependency ratio. The district has a total of 151,851 households of which 35,537 are female headed. The average household size for Arua is 5.5 people. 52 villages are in the wayleave, including a total of 20,283 people and 4,287 households.

BREAKDOWN OF AFFECTED HOUSEHOLDS

Project-affected households have been compiled, and this list has been broken down by affected administrative levels among the various districts. Complete tables are provided in Appendix 6-2

6.5.1.2 HOUSEHOLD SURVEY RESULTS

A household socioeconomic survey was conducted in the study area in order to gain site-specific knowledge of socioeconomic characteristics along the Project line route. Results from this survey for demographic trends are summarized in table 6-19 below.

Table 6-19 Demographic Trends Along the Project Line Route

DEMOGRAPHIC TRENDS

District	Gender, Household head		Age distribution, household heads						Marital status, household head			
	M (%)	F (%)	18-25 (%)	26-35 (%)	36-45 (%)	46-55 (%)	56-64 (%)	65+ (%)	Married (%)	Single (%)	Widowed (%)	Others (%)
Lira	87	1	13	27	23	13	20	3	87	3	10	0
Kole	77	23	3	13	16	29	20	19	77	10	13	0
Oyam	82	18	0	12	12	30	15	30	70	18	9	3
Gulu	82	18	7	17	22	14	17	23	76	12	7	5
Nwoya	90	10	10	22	22	26	10	10	85	5	6	4
Nebbi	94	6	6	11	19	21	13	30	91	1	8	0
Arua	88	12	8	20	24	23	14	12	80	5	12	0
Average Project Area	**86**	**14**	**7**	**17**	**20**	**22**	**16**	**18**	**81**	**8**	**9**	**2**

6.5.2 SOCIO-ECONOMIC CHARACTERISTICS

6.5.2.1 LIRA DISTRICT

EDUCATION

According to the household survey, 36.7% of the respondents have attained at least secondary education with 26.7% having attained primary and another 26.7% have attained tertiary level. About 96% of all respondents in Lira District can read and write in the official language. Furthermore, survey findings show that all female household heads have reached primary level education at the least. Table 6-20 describes the different education levels attained by household heads by gender.

Table 6-20 Education Level of the Household Heads by Gender – Lira District

LEVEL OF EDUCATION	MALE		FEMALE		TOTAL	
	Nb	%	Nb	%	Nb	%
None	2	7.7	0	0	2	7
Primary	7	27	1	25	8	27
Secondary	9	35	2	50	11	37
Tertiary	7	27	1	25	8	27
University	1	3.3	0	0	1	3
Total	**26**	**100**	**4**	**100**	**30**	**100**

ECONOMIC ACTIVITY

The main economic activity in Lira district, as shown in Table 6-21, is agriculture with 81% of the population engaged in subsistence farming.

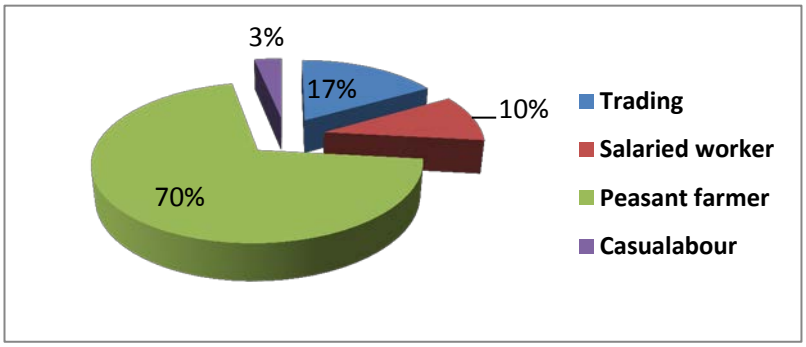
Table 6-21 Main Source of Household Livelihood in Lira district

NO.	LIVELIHOOD	PERCENTAGE
1	Subsistence Farming	81.0
2	Commercial Farming	1.5
3	Petty Trading	4.5
4	Formal Trading	2.0
5	Cottage Industry	1.5
6	Property Income	5.5
7	Employment Income	2.7
8	Family Support	1.0
9	Other	0.3

The traditional economic cash crop is cotton which in the past years has been declining. It has recently picked up mainly due to government's liberalization and privatization policy. Some non-traditional economic crops such as sunflower, rice, maize, sim-sim, cassava, groundnuts and beans among others are highly demanded. These crops not only play their traditional role as food crops, but are now also cash crops. Agriculture is mainly rain fed and is thus often affected by erratic weather patterns with sometimes too much rainfall and extended droughts.

The household survey revealed that 70% of the respondents along the Project route in Lira district are engaged in peasant farming followed by petty trading at 17%,salaried employment at 10% and casual laborer at 3 % as the main economic activities. Other activities that contribute slightly to income include; welding, saloon, carpentry and boda-boda riding, commercial farming, remittances, service provision such as salon and artisan skills. Figure 6-11 shows the main source of income. Land growing sesame and rice were observed in some sections of the project area. These crops have a high market price.

Figure 6-11 Main Source of Livelihood for Households in Lira District



INCOME AND EXPENDITURE

According to the household survey, 23.9% of the households in the project area are engaged in formal employment, e.g. as teachers, doctors, social workers, nurses, engineers, either working for the government or private institutions. Thus, people in this category earn salaries for a living.

During community meetings and stakeholder consultations, it was revealed that the majority of the youth are unemployed. The youth spend much of the time doing sports and gambling

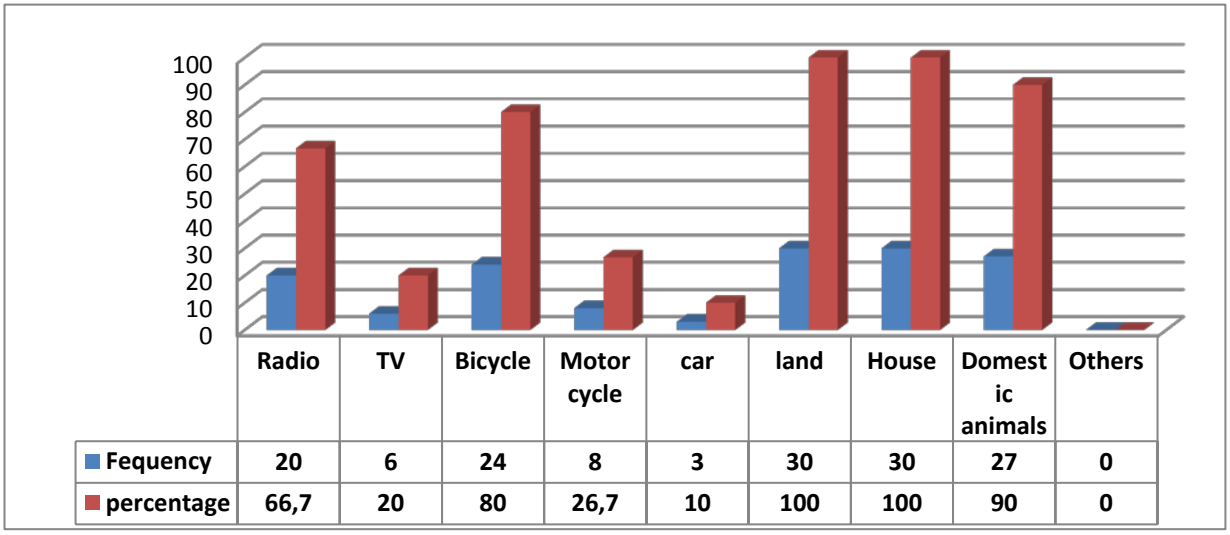
The household survey showed that 63% of household heads in the project area have no earnings, 10% earn less than UGX 200,000 per month, 16.7 % earn between UGX 200,00 and 600,000 monthly, while 6.7% earn between UGX 600,000 and I,000,000 per month . Only 3.3 % earned more than UGX I,000,000 per month .The main source of income is sales of agricultural commodities (crops and animals). Both crops produced and animals reared are sold in the local market and, on rare occasions, to Lira central market. Challenges encountered while marketing their produce included poor state of feeder roads, low market prices, high transport costs and sometimes lack of market especially during peak harvest seasons.

Cattle used to be an important source of wealth, however it is not anymore as cattle has been entirely eradicated due to cattle rustling and LRA war from 1987-2006. Currently, according to the household survey, 60% of the respondents own chicken, 50 % own cattle and 63.3 % own goats. As per survey, only one household has 9 heads of cattle with remaining 15 members sampled having between one and three cattle. Other animals were reported including sheep and pigs. Moreover, 6% of the sampled population were engaged in fishing, swamp fisheries, and nearly all the fish caught is sold.

ASSETS OWNED

Assets ownership is a key indicator of household's wellbeing and socio-economic status. Assets used to determine the livelihood levels of the people in the project area include: radio, land, television set, house, livestock, motorcycle and moto vehicle and are shown in Figure 6-12. Every household owns a land and a house. Ninety percent (90%) of the households own livestock, 80% own at least a bicycle, 66.7 % own a radio. Few households own a motorcycle or a car.

Figure 6-12 Assets owned by households in Lira district



	Radio	TV	Bicycle	Motor cycle	car	land	House	Domestic animals	Others
Fequency	20	6	24	8	3	30	30	27	0
percentage	66,7	20	80	26,7	10	100	100	90	0

POVERTY

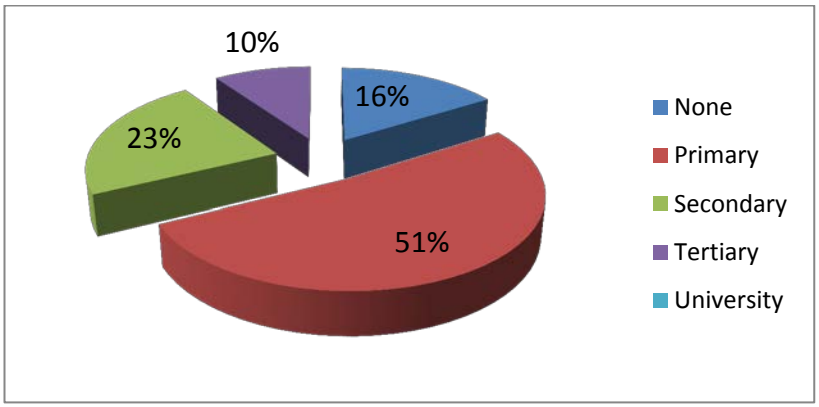
As per Lira DDP (2011/2012-2015/2016) poverty levels are high in Lira with 71% of the population living below the poverty line. This situation was worsened by the LRA war which displaced people into IDP camps from late 2002 to December 2006. The war led to increased poverty levels and decreased average household income from UGX 170,000 per annum in 2002 to UGX 110,000 per annum in 2008. The income earned is mainly spent on school fees, food, rent, medical bills, energy and transport.

6.5.2.2 KOLE DISTRICT

EDUCATION

In terms of education levels attained by household heads in the project area, the socio-economic survey findings indicate that 51% of the household heads did not exceed primary level, 16% did not attain any education, 23% went up to secondary level, 10% attained tertiary and vocational education and none attained university education as shown in figure 6-13 below.

Figure 6-13 Education levels of households



Furthermore, 54% of women have never attained any education levels as opposed to 4.2 % of males. Table 6-22 illustrates the different education levels attained by household heads by gender.

Table 6-22 Education levels attained by household heads by gender in Kole District

EDUCATION LEVEL	MALE	% MALE	FEMALE	% FEMALE	TOTAL
None	1	4.2	4	54.1	5
Primary	14	58.3	2	28.6	16
Secondary	7	29.2	0	0	7
Tertiary	2	8.3	1	14.3	3
University	0	0	0	0	0
Total	24	100	6	100	31

Introduction of Universal Primary Education (UPE) increased enrollment for both boys and girls although completion rates to primary seven remain low overall, and lower for girls. In 2009, 52% of boys and 31% of girls completed primary school. Fewer girls are still enrolled in secondary level. High cost of education affects both boys and girls. The major cause of drop out and absenteeism amongst girls are early pregnancy, several harassments, lack of sanitation facilities and helping with household chores. Many girls also lag behind boys in grade promotion and learning achievement. Their performances in national examination (e.g. PLE) are much lower than that of boys. Findings of the household survey indicate that 51% of respondents have completed primary level education, 22% secondary level while 16% have never attended school.

ECONOMIC ACTIVITY

Crop production is the main economic activity in Kole district, employing about 80% of the population (Table 6-23). Arable land is very fertile and represents 57.88% of the total land area. The main crops include sweet potatoes, sorghum, cassava, groundnuts, finger millet, maize, cowpeas, and beans. Cash crops grown in Kole include cotton, tobacco, legumes and non-traditional cash crops such as simsim, rice, sunflower, and soya beans.

Agricultural productivity is constrained by a limited supply and the high costs of agricultural input including improved and new seeds, limited knowledge of women and men farmers on improved agronomic practices. This is gradually improving due to different interventions by both the government and partners in development.

Table 6-23 Main economic activities in Kole district

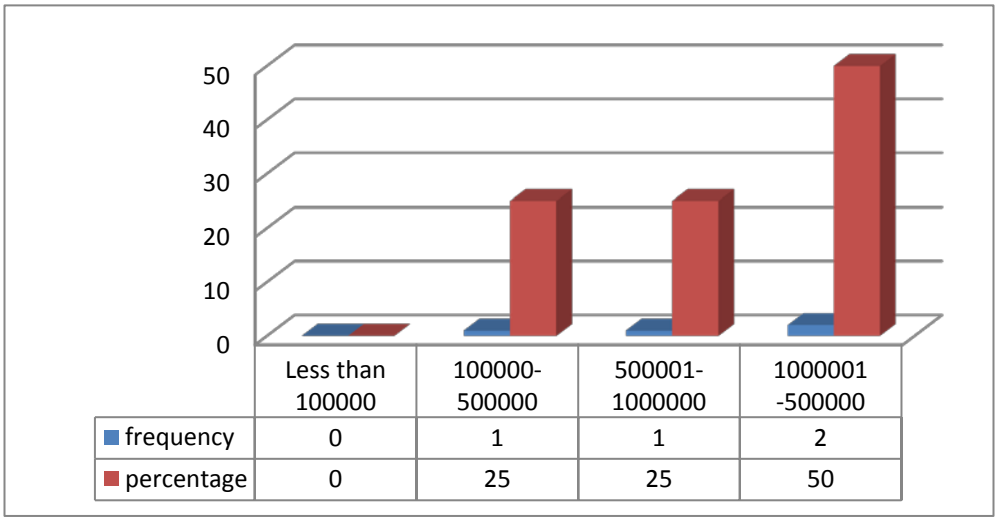
ECONOMIC ACTIVITY	PERCENT
Peasant farmer	80.6
Commercial farmer	6.5
Service provider e.g. salon, hotel	3.2
Boda-boda riding	3.2
Artisanal skills e.g. welding,	3.2
Other	3.2
Total	100.0

The main economic activity according to the survey is farming with subsistence farming accounting for 80.6% and commercial farming for 6.5%. In total, 90.1% of the population in Kole District relies on farming as a source of livelihood. The total income realised from farming per year ranges from UGX 200,000-7,500,000 at the household level. This is marketed at local markets and Lira central market. The main problems encountered include high transport costs, low prices offered and high cost of agricultural inputs. Other activities such as cottage industry, boda-boda riding and casual labour take up the remaining percentage.

Livestock could easily rank high on the list of asset and economic activities in the District. Ox ploughing was a vital part of crop production prior to the cattle rustling of 1986 to 1988. This led to an increase in population economic vulnerability. The re-stocking of the animals has recently improved the situation. At present there are about 100 dairy farmers in the entire District. The private sector in Kole District is constituted by very minor and small enterprises. Kole is thus among the Districts in Uganda with the least number of industries. Only a few grinding mills and rice hullers, garages, wood and metal workshops and the construction industry are present. The survey conducted revealed that the most common domestic animals owned in Kole District are chicken, goats, cows, sheep and pigs.

Other economic activities in the project area include trading/business whereby 13% of the households are engaged in it, 4.1% are causal laborers, 3% are service providers such as catering services, hair dressing and 3% are boda boda riders. 87% of the households include a member working for money, which is considered as an additional income to the household. Income raised by those other members is indicated in Figure 6-14 below.

Figure 6-14 Income by household members (other than household heads) in Kole District



Fifty percent (50%) indicated that the other working household members contribute between UGX 1M to 5M to the annual household income.

INCOME AND EXPENDITURE

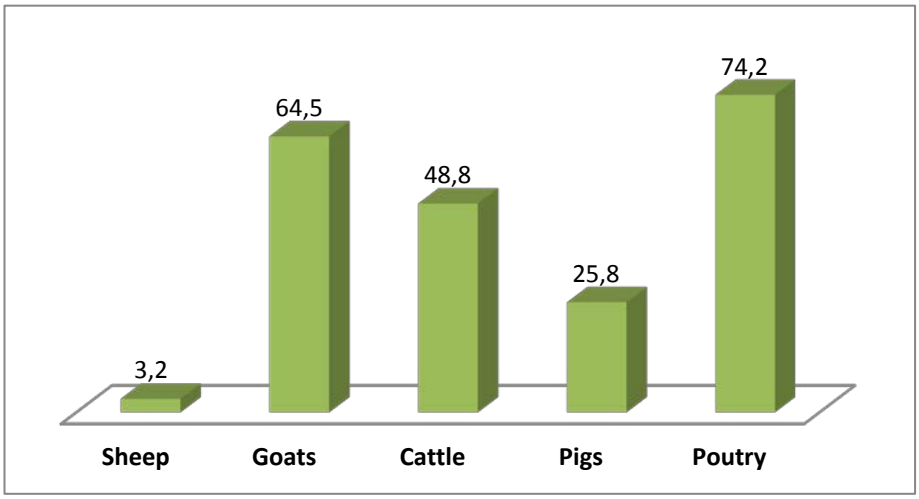
Crop production is the major economic activity in Kole, employing about 80% of the population. Arable land is very fertile and makes up 57.88% of the total land area. The main crops include; sweet potatoes, sorghum, cassava, groundnuts, finger millet, maize, cowpeas, and beans. Cash crops grown in Kole include cotton, tobacco, legumes and non-traditional cash crops such as simsim, rice, sunflower, and soya beans.

Agricultural productivity is constrained by a limited supply and the high costs of agricultural inputs including improved and new seeds, and limited knowledge of women and men farmers about improved agronomic practices.

Despite its shortcomings, agriculture continues to be the main economic activity and as per household survey, subsistence farming accounts for 81% and commercial farming 7 %. The total income realized from farming per year ranges from UGX 200,000-7,500,000 at household level. This is marketed locally at available markets and Lira central market within 1-3 km. The main problems encountered include high transport costs, low prices offered and high cost of agricultural inputs. Other activities include cottage industry, boda-boda riding and casual labour.

To date there are about 100 dairy farmers in the whole District. The household survey conducted revealed that the commonest domestic animals owned in Kole district is chicken, goats, cows, sheep and pigs as shown in Figure 6-15 below.

Figure 6-15 Types of livestock among households in the project area in Kole distrcit



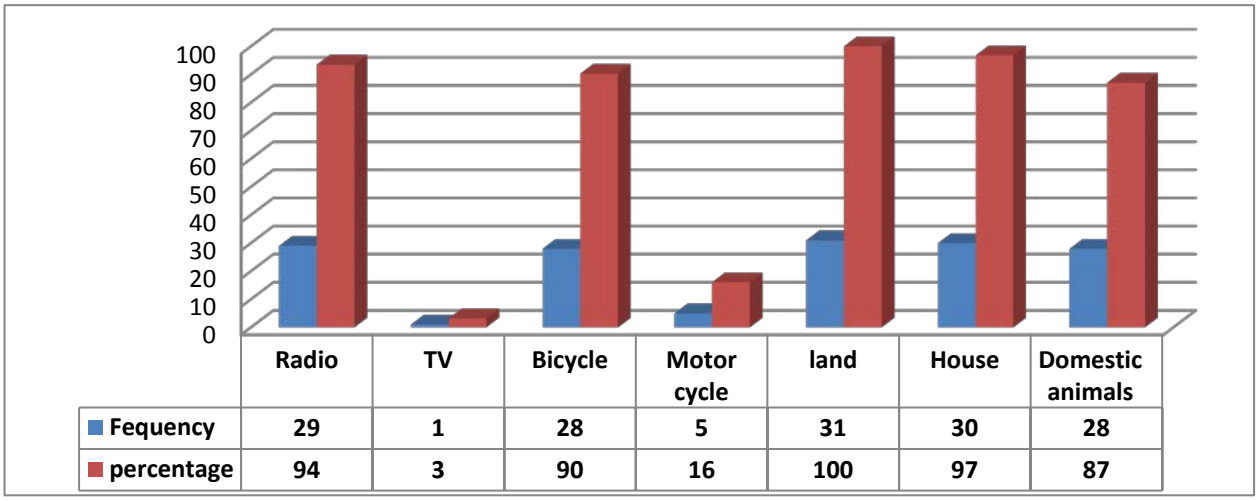
The household survey indicates that 35% of household heads in the project area earn up to one million Uganda Shillings per annum. 19% earn up to UGX 2,000,000 per annum, 12% earn above UGX 5,000,000 per annum, and 3 % only earn over UGX 10,000,000 per annum. Main expenditures include school fees, food, rent, medical bills, energy and transport.

It was further revealed that some members of the household get additional income from fishing. About 10 % fish and of that, 67% sell their catches. However fisheries have tremendously declined because wetlands, which are important breeding sites, are highly stressed and being converted to crop lands.

ASSETS OWNED

The major assets owned by households in the project area include radio, land, television set, house and livestock. Figure 6-16 shows some of the major assets owned by households in the project area.

Figure 6-16 Major assets owned by households in the project area in Kole district



	Radio	TV	Bicycle	Motor cycle	land	House	Domestic animals
Fequency	29	1	28	5	31	30	28
percentage	94	3	90	16	100	97	87

The project area is characterized with sparse population living in permanent and semi-permanent houses. Nearly all the households head interviewed owned the house in which they live in, except for one person who was living in the house as a care taker. These houses were constructed using different materials and therefore were different from each other with 32 % of household heads owning and living in temporary houses, 32% living in permanent houses and 23 % in semi-permanent houses.

POVERTY

Poverty situation in Kole District is empirically outlined in the findings of 2002 Uganda population and housing census but over the years some changes have been made following the introduction of programs such as NAADS, NUSAF, and PRDP.

In Kole district, 88% of households depend on subsistence farming for a livelihood against 68% national average, and this means little or no surplus for domestic income. The district has a household size of 4.8.

6.5.2.3 OYAM DISTRICT

EDUCATION

There is a steady increase in total enrolments in almost all primary schools in Oyam district. However, girls continued to be under-represented. According to the Population and Housing Census of 2002, it indicates that literacy rate (68%) is low. 61% of all respondents could read and write in the official while the remaining 39% said they could not. According to the survey conducted, it was established that 57.6% had completed primary level education, 27.3% secondary while 9% of the respondents had never attended school.

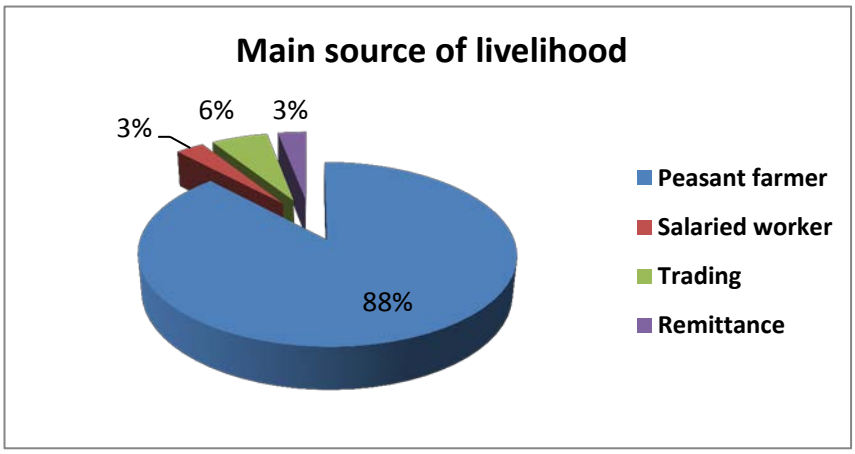
ECONOMIC ACTIVITY

Agriculture is the major economic activity in the district. About 90% of the population depends on agriculture and Agro-based activities. Both cash and food crops are grown and livestock such as cattle, goats, pigs, sheep and poultry reared. The largest proportion of the cultivated area is under traditional food crops mainly cassava, maize, potatoes, beans, millet, ground nuts, sorghum, pigeon peas and simsim. Fruits like pineapples, citrus, improved mangoes, passion fruits are also grown in the area. Horticultural crops like tomatoes, cabbages, onions, eggplants and bananas are also becoming popular among the people. Crops like cotton, tobacco, Soya beans and sunflower are purely grown for cash with rice production gaining economic importance in the area.

The survey established that 88% of the households sampled depend on agriculture as a main source of livelihood with trading, salaries, casual labour and boda-boda riding taking the remaining percentage as shown on the graph below. Livestock keeping is also a common practice with poultry being very popular

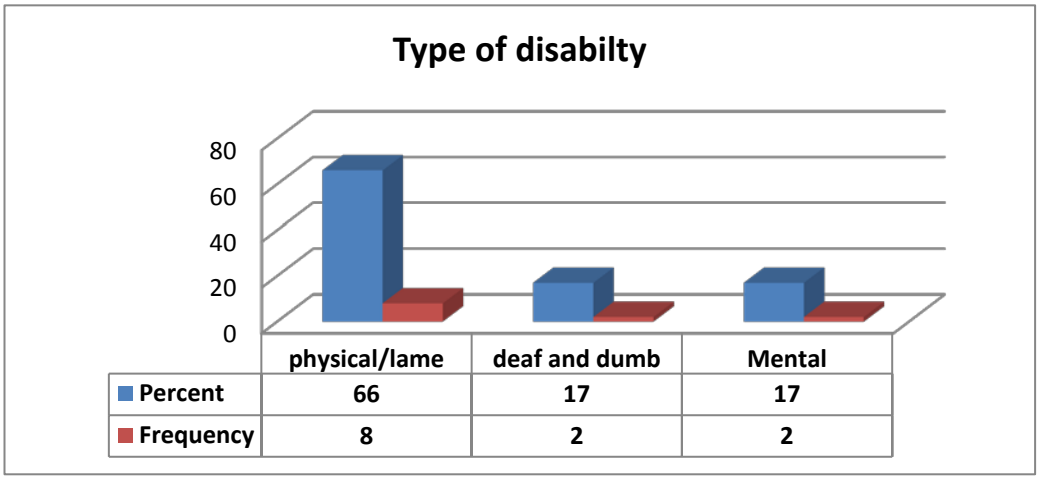
followed by goats, cattle sheep and pigs. The income realised from farm in a year varied from respondent to respondent but ranged from UGX 50,000 for the lowest earner to UGX 19,000,000. There was also income realised from sell of animals same households. Most of these items are sold at farm gate and some taken to the local market at Iceme and Ngai. The main challenge encountered as mentioned include; low prices, bad roads, delay in payment, poor/lack of transport and lack of storage facilities which makes them sell at low prices. Most income realised is spent on school fees, medical bill and food which were ranked in that order.

Figure 6-17 Main economic activities in Oyam District



According to the survey, food production in Oyam has been interrupted due to changing weather patterns that are characterised by very long drought and 42% of respondents said food production has gone down over the past year. This was also ranked as the biggest problem by most respondents.

Figure 6-18 Type of disability in Oyam District



6.5.2.4 GULU DISTRICT

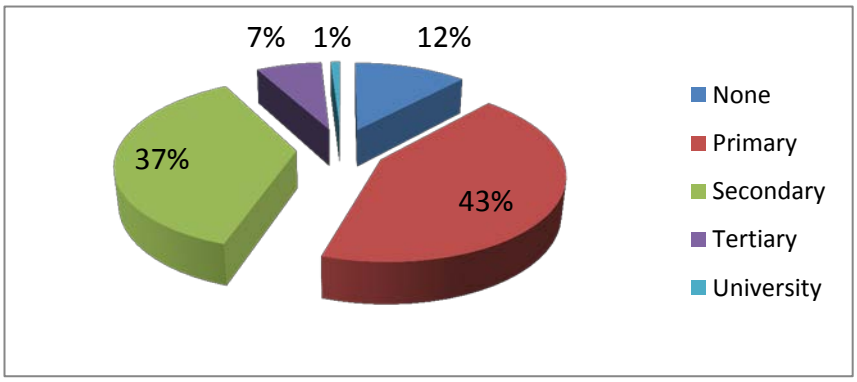
EDUCATION

As per 2002 19.3 % of the population of Gulu who are 10 years and above had no formal education with female forming 74.9 % and 23 % of school going age children. The district statistical report (UBOS 2013) indicated that the literacy level of Gulu district was 60.1%, far below the 85 % targeted by the National Development Plan (NDP) for 2013. In addition, 84.2% of the population aged 15 years and above had no post primary education, indicating that most of those who complete primary drop out of school.

Findings of the household survey indicate that 43% of respondents attained primary level, 37% secondary level, 12 % had never attended school, and 8 % attained tertiary level education while only

1% had attained university level as shown in Figure 6-19. In terms of education levels attained by household heads, the survey indicated that 12 % of the respondents have never gone to school, 43% had attained primary level of education, 37% have secondary level of education, 7% have tertiary level of education while only 1% has university level of education.

Figure 6-19 Level of education among the household heads



The survey findings also indicate that 59% of respondents are able to read and write in the official language. Further analysis of the socio-economic data, show that 26 % of the female household's heads had never attended any level of education, 12% attained primary school, 2% attended secondary school and none of the females reached tertiary and University level. Table 6-24 illustrates the different education levels attained by household heads by gender.

Table 6-24 Education Level of the Household Heads by Gender

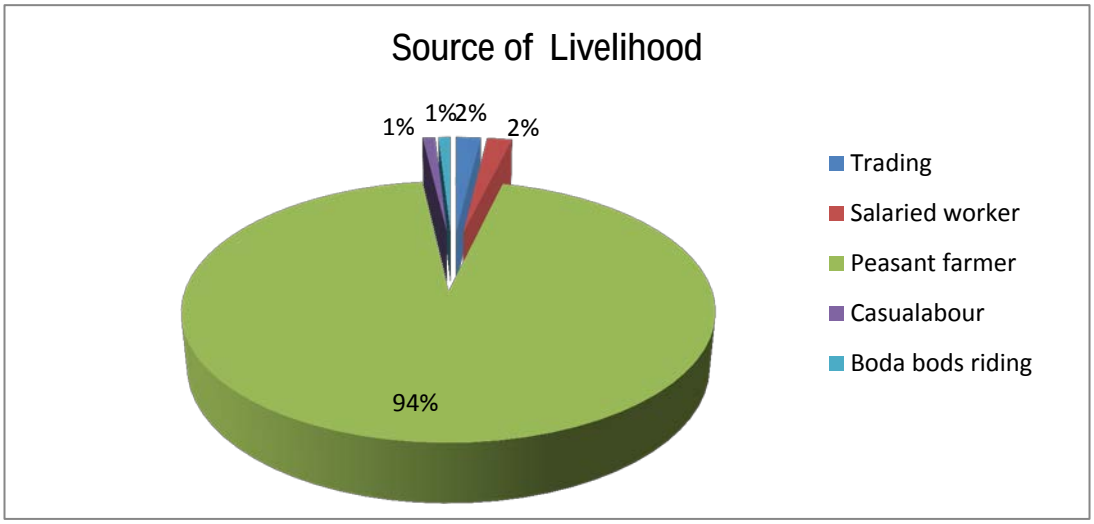
EDUCATION LEVEL	MALE		FEMALE		TOTAL, NB
	Nb	%	Nb	%	
None	8	9	5	26	13
Primary	34	39	12	63	46
Secondary	37	43	2	11	39
Tertiary	7	8	0	0	7
University	1	1	0	0	1
Total	87	100	19	100	**106**

The implication of the above results show higher illiteracy levels among women than men, hence may not be able to write and read. Women therefore have limited chances of contributing to decision making in their community affairs.

ECONOMIC ACTIVITY

The dominant economic activity carried out in the district is agriculture. Over 80% of the total district population still relies on subsistence agriculture to earn a living (UNFPA & UBOS 2013).The household survey conducted indicated that 92.5% of the respondents along the project routing depend on agriculture as their main source of income as shown in Figure 6-20.

Figure 6-20 Main source of household livelihoods in Gulu district

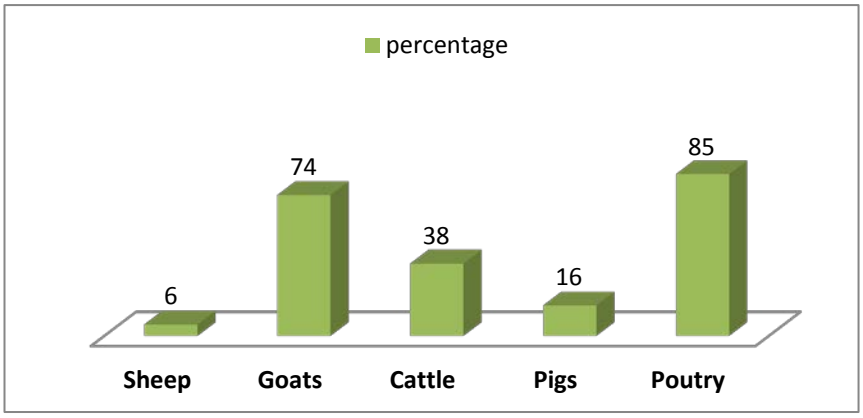


It was however, observed during the study that much of the land is not cultivated. As per district information, 87.4% of the total land area is available for farming, although less than 20% is actually cultivated (DDP, 2012).

Crops grown include rice, millet, sorghum, beans and simsim among others. Production of traditional cash crops which were cotton and tobacco has gone down due to lack of access to markets and the insurgency that was persistent within the region. Ox ploughs used to be common but are now almost nonexistent due to loss of oxen during the long insurgency. Formerly, the district used to be self-reliant in terms of food production but this has reduced due to post harvest losses, poor farming methods, unreliable weather conditions and poor storage among others.

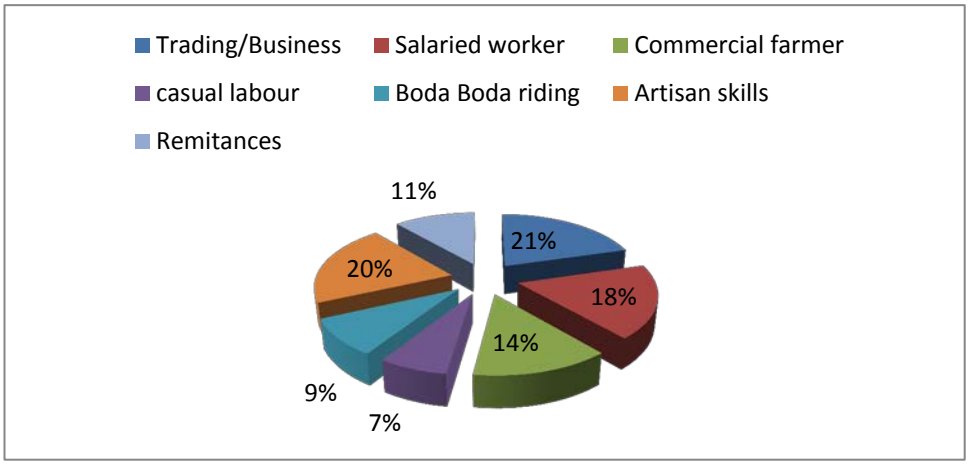
Besides farming, livestock keeping is also important in Gulu as established by the household survey. Poultry was the commonest with 85% of the households reporting that they own local chicken. This is followed by goats at 74% and cattle at 38% although these are owned in small numbers per household. Pigs are also steadily gaining importance with at least 16% of the respondents keeping these. As per household survey, fishing is minimally done with only 1% of the household involved. This is because district landlocked district and has no large natural water bodies except a few swamps where this activity is undertaken.

Figure 6-21 Livestock distribution per household in Gulu District



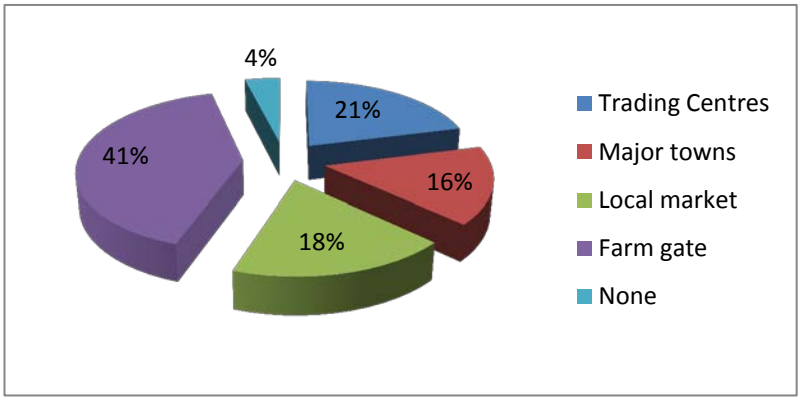
Other sources of livelihood as shown in Figure 6-22 include trading/business at 21%, cottage industry at 20%, employment income at 18%, commercial farming at 14%, remittances at 11%, boda boda riding at 9% and casual labour at 7%.

Figure 6-22 Sources of Livelihood in Gulu district



With regards to farm produce (both crops and animals), 41% of the households sell at the farm gate, 18% sell in local weekly markets (Awa, CukBobi, Along and Oryna) and 16 % sell in Gulu while 21% sell in trading centers such as Baragol, Bobi, Olula, Lakwana and Olyontu.

Figure 6-23 Markets for Agricultural produce in Gulu District



The distances to the markets range from 0 km to over 3 km with 40% travelling less than 500 m, 31% travel distance of 500-1 km, 18% travel 1-3 km and 11% travel above 3 km to sell their agricultural produce

The major constraints related to marketing as mentioned by households interviewed during the survey include: low prices, long distance to the markets, limited markets, and poor road network and high transport costs.

INCOME AND EXPENDITURE

As per Gulu Statistical Abstract 2013, the population below poverty line for Gulu district was at 58% compared to the national average at 24.5%. The average household income has declined from UGX. 170,000 per annum in 2002 to estimated UGX 110,000 per annum in 2008.

The household survey showed that (12%) of the household heads in the project area earn nothing, 61% earned less than UGX 1,000,000 , 9% earn UGX 1-2 million, 8% earn 2-4 million, UGX 4-6 Million , 2% earn 8-10. Only 2 % earned more than between UGX per year. The main source of income was from sales of agricultural commodities (crops and animals).

Regarding expenditure, items that were mainly spent on in order of priority included school fees (37.7%) medical bills (28.3%) and energy (15.1%).

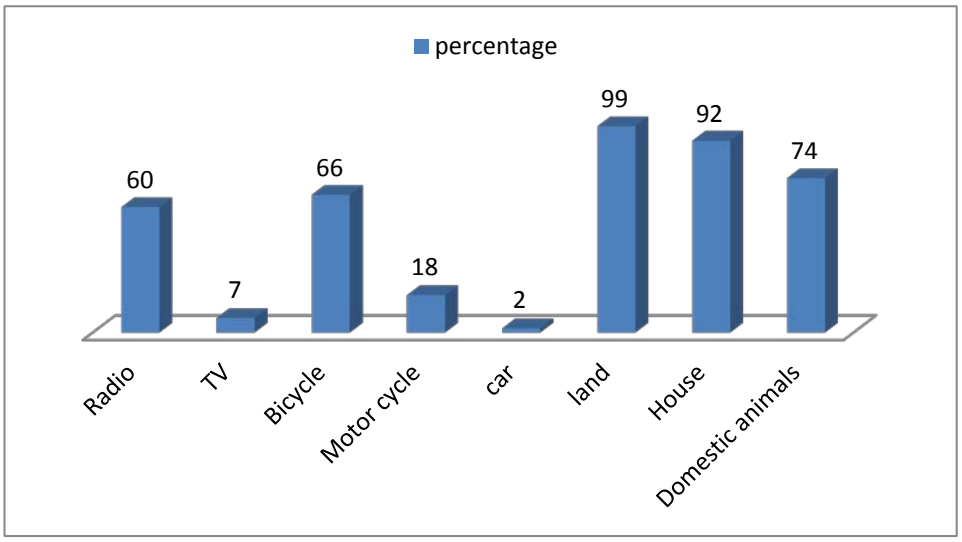
EMPLOYMENT

In the project area, 23.9% of the households are engaged in formal employment e.g. as teachers, doctors, social workers, nurses, engineers, etc., either working with government or private institutions meaning that such categories of people mentioned earn salaries for a living. During community meetings and stakeholder consultations, it was revealed that the majority of the youth are unemployed. The youth spend much of the time in sports betting and gambling.

ASSETS OWNED

Ownership of assets is a key indicator for a household's welfare. In particular, the types of assets owned are a proxy measure for their socio-economic welfare. The socioeconomic findings showed that for 99 % of the household own land, 92 % owned a house, 74% owned domestic animals, 66% owned a bicycle and 60% owned a radio. The most common type of transport owned by the project affected persons is the car, followed by a motorcycle.

Figure 6-24 Asset ownership in Gulu District

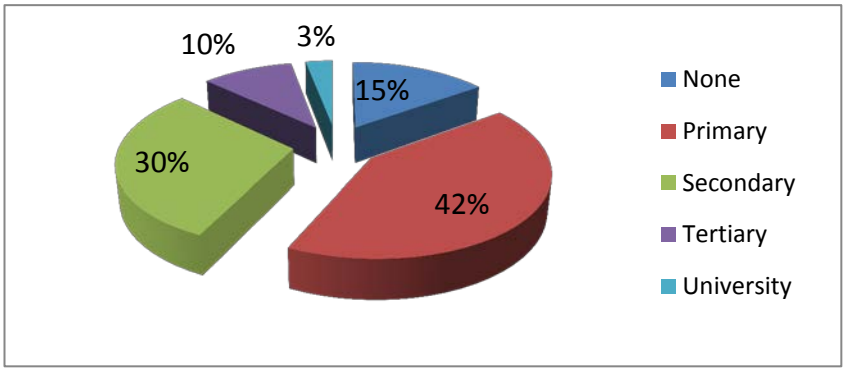


6.5.2.5 NWOYA DISTRICT

EDUCATION

Based on the findings of the household survey conducted, it was revealed that 42% of household heads had completed primary level, 30% secondary level, 10% had attained tertiary level while 3% had studied up to university level. On the other hand 15% of all respondents said they had not gone to school at all.

Figure 6-25 Level of education of household heads – Nwoya District



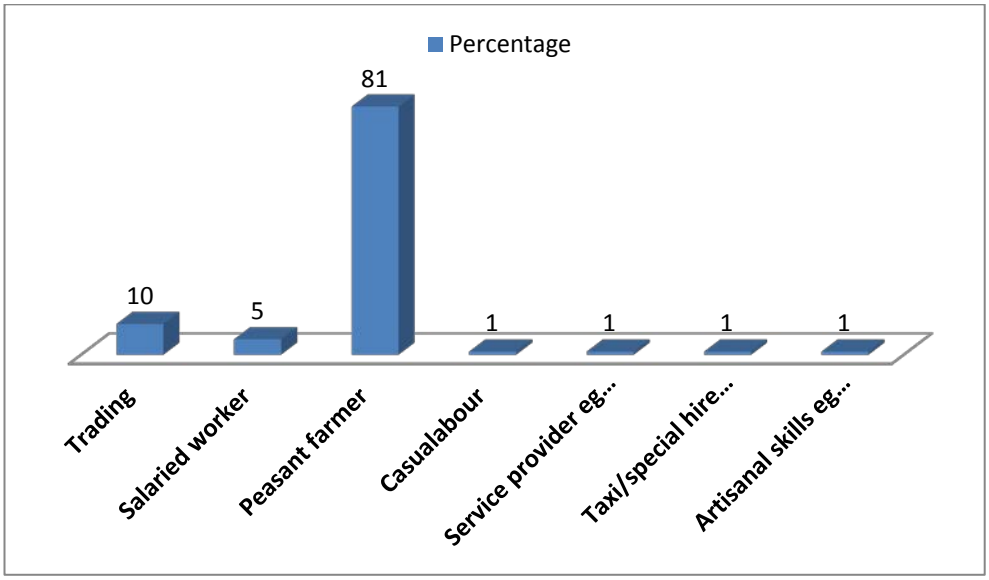
ECONOMIC ACTIVITY

Agriculture directly employs about 98% of the population in Nwoya District. Arable land is very fertile and makes up about 90% of the total land area although less than 10% of the land is utilized yearly. The limited utilization of land is partly due to the traditional and subsistent agriculture being practiced. The result has always been low household income and food insecurity. The traditional cash crops are cotton and tobacco, but due to decreasing prices and limited access to markets, their production has declined rapidly in the last 30 years. The major food crops are maize, finger millet, sorghum sweet potatoes, cassava, groundnuts, simsim, beans, peas and sunflowers and some of these are often sold to generate household income.

Livestock used to rank very high on the list of assets and economic activities in the district before the outbreak of insurgency in 1986, livestock was the financer of school fees, dowry, and security of the family welfare and source of protein. Ox-ploughing was further a more vital part of crop production for the population of Nwoya. However, at present there are only a few hundred dairy farmers in the district. The loss of cattle (oxen) in 1986 explains the widespread use of conventional manual ploughing instead of ox-ploughing. Manual ploughing is the reason for declined crop productivity and limited acreage under crops. Nwoya, being a new district, has no major industries to talk of and is thus among the districts in Uganda with the least number of industries save for a few cottage industries.

Based on the findings of the survey, 81% of the population in Nwoya district depends on agriculture as the main source of livelihood, with trading at 9.7% and salaried work standing at 5.8%, the rest are engaged in activities such as boda-boda ridding, artisan work and casual labour as shown in the figure below.

Figure 6-26 Main economic activity - Nwoya District



The total income from all economic activities ranges from 20,000-25,600,000 for the lowest and highest earner respectively. Their produce and livestock is marketed at different local markets depending on proximity to the market by the seller.

Livestock is another significant activity as recorded from the survey with goats and chicken being the most predominant domestic animals and about 16.7% own a few heads of cattle. Piggery is also an enterprise that is undertaken although very few households are involved according to the survey. Many factors were given by respondents as being hindrances to the marketing of their produce and these included; bad access roads, low prices, lack of post-harvest storage facilities, long distances to market places, lack of electricity which cattail agro-processing ventures among others.

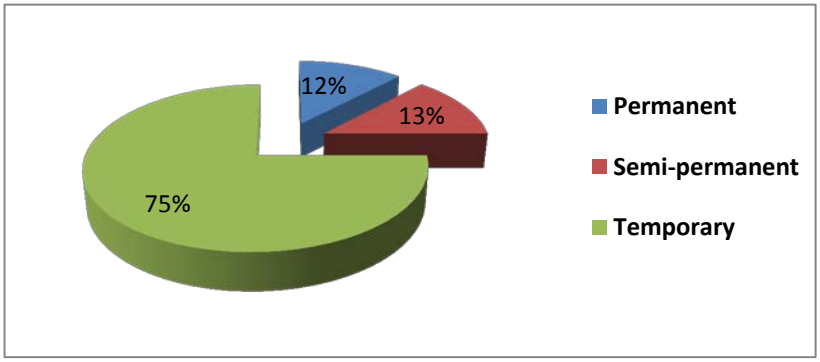
POVERTY

The potential and actual problems that are increasing poverty incidence include amongst others, the following: land wrangles – deadly incidences of land disputes; low level of literacy; tsetse flies infestation of areas abandoned for over two decades due to displacement into former IDP camps; loss of cultural values, and dependency syndrome that developed as a result of over stay in the former IDP camps.

The poverty situation is worse for vulnerable categories, namely the child-headed households, people with disabilities (PWD), widows/widowers, formerly abducted persons, people living with HIV/Aids (PLWHA) and the elderly. The plight of these special groups is immense. Other poverty pockets that need special attention are high tsetse fly infested areas in Alero and Koch-Goma sub-counties; vulnerability to destruction of lives and crops in the sub-counties of Koch-Goma, Anaka and Purongo by wild game, vulnerability of institutional houses in Purongo Sub-county to destruction by thunderstorm and hailstorm due to absence of natural trees (savannah grassland) in the vegetation.

Based on the survey conducted poverty levels are evidently high based on the nature of housing structures that are 74.5% temporary in nature, 13.6% being semi-permanent and only 11.8% are permanent as shown on the figure below.

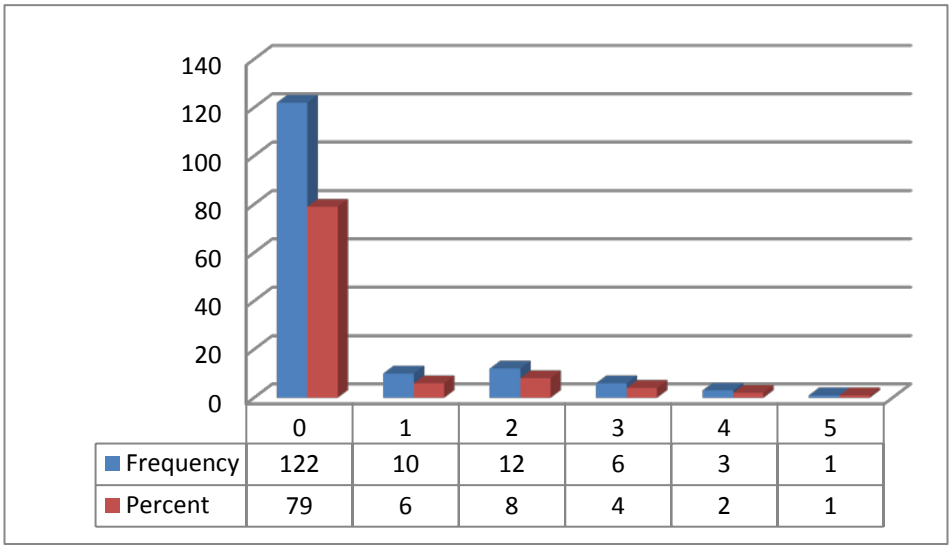
Figure 6-27 Nature of housing structures - Nwoya District



Picture 6-8 Type homestead in Nwoya district

Assets owned by households include land, houses, radio, bicycles and in some instances cellphones. During the survey it was also found out that it is only the household heads that fend for the homes hence poverty prevalence. Majority of the households (79%) do not have any other family member working apart from the house hold heads as indicated in Figure 6-28 below.

Figure 6-28 Other household members working - Nwoya District



6.5.2.6 NEBBI DISTRICT

EDUCATION

School completion rate is 56% for male and 51% for female and the average distance to the nearest school is 3 km for primary schools and 10 km for secondary school. This is the main constraint to school access, especially for girls who must fulfill extra gender-based roles on a daily basis.

The survey shows that primary schools are evenly distributed in Nebbi. The majority of the population live less than 3 km away from a primary school. Secondary schools are sparsely distributed and very often students have to travel longer distances to attend their class which affect enrollment after primary school.

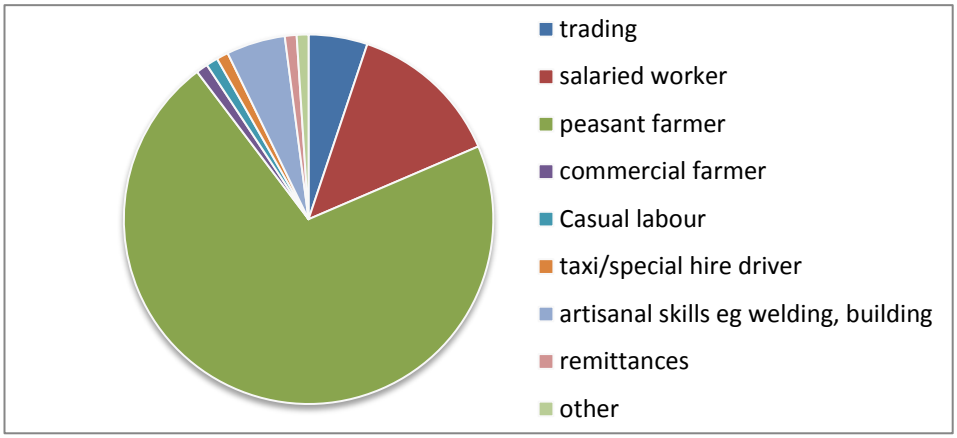
ECONOMIC ACTIVITY

Like many other rural areas of Uganda, the majority of the population in districts is engaged in subsistence farming. Most of what is produced is consumed at the household level and very little is marketed. The main crops grown are cotton, coffee, simsim, sorghum, millet, sweet potatoes, beans, cassava and maize. Rudimentary farming tools are used and family members are the sole source of all the labor needed. Mechanized agriculture is not common because farmers own small land and have limited capital to invest.

Livestock farming is an important activity especially where soils are less favorable to agriculture. Farmed animals include cattle, sheep, goats, poultry and pigs. Apiary is also emerging with over 3000 bee keepers producing over 10 tons of honey per year. In Jonam County where Pakwach town council is located fishing is common on Lake Albert and Nile River and accounts for 20% of household income. Common species of fish include; Lates Niloticus (Nile Perch) and Oreochromis Niloticus (Tilapia). Local rivers also provide fishing opportunities to communities far removed from Lake Albert and the Nile River. The local rivers and streams include River Nyagak and River Namrwodho.

Findings from the household survey show that farming is the sole source of income for 71% of the people interviewed. Other activities such as salaried work account for 13%, trading and artisan skills each for 5% and fishing 2%.

Figure 6-29 Main economic activity - Nebbi District



Income generated from all economic activities by the households sampled ranged from UGX 45,000 to 13,500,000. The main marketing area is each respondent's nearest local market and the farm gate. The main problems encountered are high transportation costs due to poor road condition, low prices offered by the buyers, lack of market and high market dues. Regarding household expenditure, most of household's earning is spent on food, school fees and medical bills. Low agriculture productivity, which has led to food shortage and lack of electricity, was identified as the most important problem faced by the majority of households interviewed.

Livestock keeping is also common. According to the survey, 66% of respondents own at least one goat. Chicken and cattle are also important with 49 and 22 percent of those interviewed rearing them. Fishing was also a common activity especially along river Nile. 33% of respondents fish, although fishing is not the major source of livelihood of the household.

POVERTY

According to Nebbi District Participatory Poverty Assessment (2002) in a sampled five Lower Local Governments of Parombo, Panyimur, Pakwach T.C and Nebbi T C, poverty was perceived differently based on geographical location, nature of economic activities and social status. However, poverty was generally summarised as "the inability to meet basic needs such as food, shelter, clothing, basic health care, basic education, lack of information and inadequate household items like paraffin, salt and soap".

Poverty in rural areas is already a vicious cycle. Poor people are marrying early, resulting into poor health as a result of maternal issues for both the parents and children. School attendance is in some cases are rare for school age going children and continuation beyond primary education is difficult especially for girls. The Urban Council community looks at poverty as lack of material needs and inability to engage in gainful activities, in most cases related to business (trade).

According to the survey, the majority of respondents did not have a family member engaged in a productive activity. This translates into high level of dependency given the fact that most of the families are actually extended. Additionally, the majority of respondents lived in temporary houses and only 26.8% of all sampled households lived in permanent house. Land, domestic animals and radio are commonly owned assets in Nebbi. 61% of households interviewed owned bicycles which is the most common means of transport.

6.5.2.7 ARUA DISTRICT

EDUCATION

The education level of the household head varies considerably with 37% having completed primary level, 25% secondary level, 16% tertiary, 8% university level while 14% of all respondents have never attended school. The literacy level stands at 60% for people above 10 years. There is a very high gender discrepancy between boys and girls of school going age who are actually in school. This is because some parents are reluctant to send girl children to school due to cultural beliefs that tend to

favor boys. The low literacy levels among women together with cultural ties have suppressed the role of women in the economic development of Arua.

In reference to the survey conducted, access to primary education by respondents is good because over 91% live in a distance of less than 3km from the nearest school. Secondary schools are relatively far and as such a hindrance to continuing with school after primary level completion.

ECONOMIC ACTIVITY

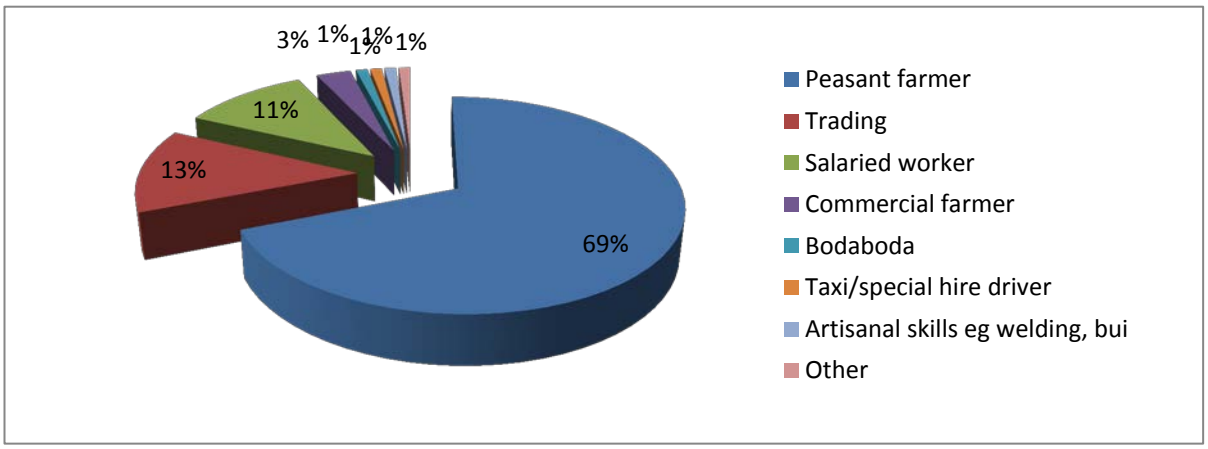
Agriculture is the back bone of the district's economy with over 95% of the household depending on subsistence farming as their principal source of livelihood while market oriented farming is negligible. The sector provides employment to over 80% of the active rural population.

The district has a high potential for a wide range of agricultural products including both crops and animals. The food crops grown include; beans; simsim, sweet potatoes, cassava, millet, maize, sorghum, groundnuts, rice and horticultural crops while the cash crops grown are tobacco, cotton and coffee. Like cash crops food crops are increasingly being grown for earning money.

According to the records available in the agriculture department, the estimated area available for cultivation in the district is about 5,227.09 Km^2 of which only 23% is currently under cultivation. The low agricultural productivity has seen more land required to maintain production levels, which has resulted in increased bush clearing and farming on marginal areas of the district.

Arua town is the most important center in West Nile. Being a boarder district, there has been steady growth in cross border trade both formal and informal, which dominates the district at 0.7% and 3.8% respectively.

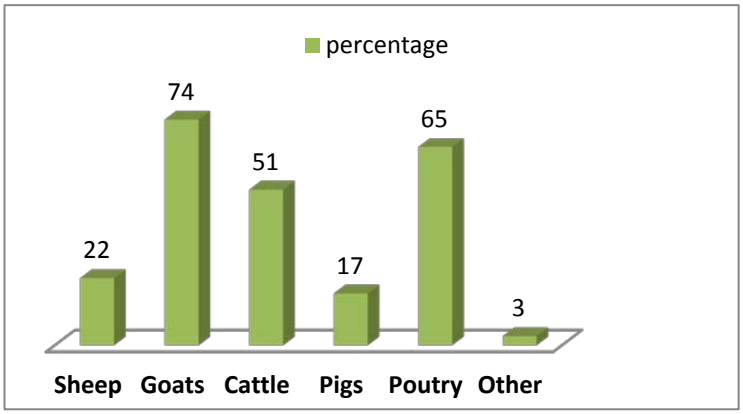
Figure 6-30 Main Economic Activity - Arua District



As presented above, based on the household survey conducted along the proposed line in Arua district, it was established that agriculture is the main economic activity engaging up to 68.6% of the respondents with trading and salaried work contributing 13.6% and 11.9% respectively. Other important activities are charcoal burning, boda-boda riding and artisan work and fishing. According to the findings the total received from all economic activities ranges between UGX 40,000 and 34,000,000 for the lowest and highest earning households respectively. The main marketing areas for the produce are the respective village markets with only a few of them taking their items to Arua town.

Livestock rearing is yet another important economic activity in Arua with goats, chicken and cattle being the most common animals kept. Other animals mentioned included pigs, ducks and rabbits as presented in Figure 6-31 below. Three percent of those interviewed also said they are partly engaged in fishing.

Figure 6-31 Domestic animals kept - Arua District



The main problem encountered during marketing of mainly agricultural produce as stated by the respondents is the poor road network which makes transportation very hard and costly. Also mentioned was the problem of low prices offered; sometimes there is no market for the produce, language barrier and high market dues levied on farmers/ traders. According to the survey most of the respondents live in a distance of less than 3km from the nearest marketing area and only 34% live above 3km from the nearest water source.

6.5.3 ETHNICITY, RELIGION AND CULTURAL BELIEFS

Ethnicity, religious affiliation and other demographic characteristics are key considerations in the processes of designing and implementing the transmission line project as customs and traditions vary from area to area. Therefore, when implementing such projects, consideration for culture should be a priority.

6.5.3.1 ETHNICITY AND RELIGION

Results of the field survey conducted along the prospective Project routing relating to ethnicity and religion are detailed in table 6-25 below.

Table 6-25 Ethnicity and Religion Distributions per Districts along the Project Line Route

ETHNICITY, RELIGION AND CULTURAL BELIEFS

District	Ethnicity								Religion			
	Langi	Acholi	Lugbara	Madi	Alur	Alur Jonam	Japadhola	Sudanese	Catholic	Protestant	Muslim	Others
Lira	100%	0%	0%	0%	0%	0%	0%	0%	37%	64%	0%	0
Kole	90%	10%	0%	0%	0%	0%	0%	0%	16%	84%	0%	0
Oyam	88%	12%	0%	0%	0%	0%	0%	0%	24%	64%	3%	9%
Gulu	78%	20%	1%	1%	0%	0%	0%	0%	52%	42%	3%	2%
Nwoya	1%	97%	0%	0%	2%	0%	0%	0%	60%	32%	2%	6%
Nebbi	0%	0%	0%	0%	78%	20%	2%	0%	50%	42%	2%	6%
Arua	1%	0%	41%	57%	0%	0%	0%	1%	44%	46%	8%	2%
Average, Project Area	**51%**	**20%**	**6%**	**8%**	**11%**	**3%**	**0%**	**0%**	**40%**	**53%**	**3%**	**5%**

6.5.3.2 CULTURAL BELIEFS

In the Acholi society, traditional religion was the source of the principles of governance. The Rwodi or chiefs, who headed the Acholi traditional government, were believed to have been chosen by the supernatural powers, and were enthroned and specifically anointed with fat preserved from the carcasses of lions in solemn religious ceremonies. After these ceremonies they were believed to have

been initiated into an esoteric relationship with the world of invisible deities and spirits of ancestors. They were thus held in high esteem, adored and respected by their people.

The most common and best-known ritual is “nyono tong gweno’ (‘stepping on the egg’), which essentially is intended to welcome home family members who have been away from the homestead for an extended period of time. It relates to the belief that away from home people could contract spirits which, if not cleansed, will adulterate and/or bring misfortune to the whole community.

In the Acholi context, cultural practices and traditions serve two main purposes: one is to cope with new circumstances, and the other, is to maintain cultural identity and continuity. The latter is the conservative side of tradition that resists innovation which might disintegrate the society (community).There are some common beliefs and behaviors that directly affect the well-being of community, e.g. widow inheritance rituals, health perception, gender perception, etc.

6.5.4 HEALTH

6.5.4.1 LIRA DISTRICT

DISEASES PREVALENCE

The Burden of Diseases in Lira District as per HMIS Database (December 2009), is due to preventable causes with malaria ranking top of the ten causes of morbidity in the district. Other causes of morbidity include anaemia, acute diarrhoea, respiratory infections and pneumonia among persons under 5 years old as well as Tuberculosis, HIV/AIDS, anaemia and injuries (trauma due to other causes) among persons five years and older. Table 6-26 shows the disease prevalence in the Lira District.

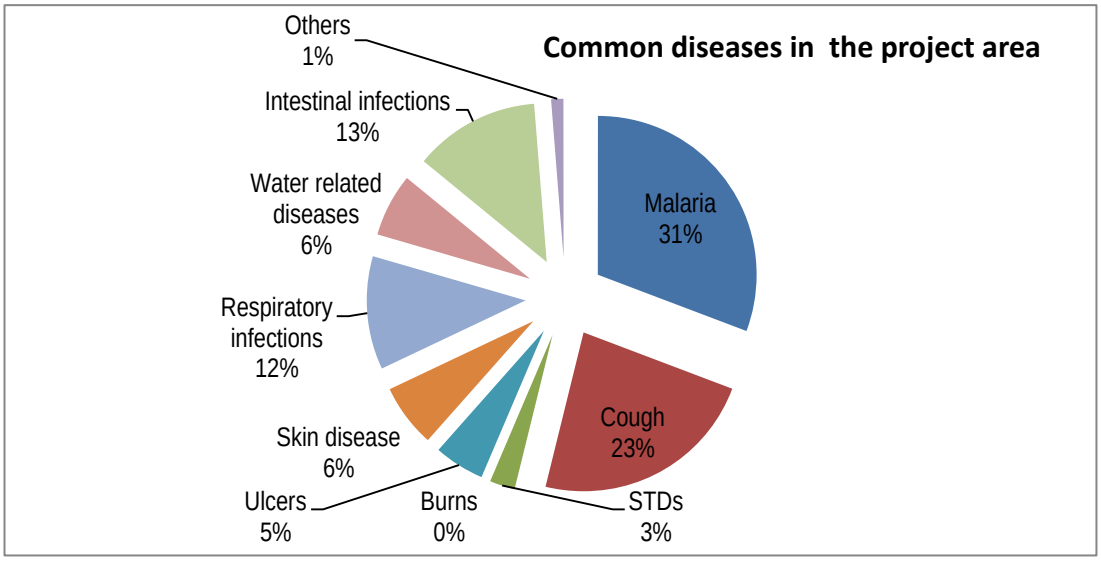
Table 6-26 Top five causes of morbidity in Lira District (DDP, 2011)

CAUSE OF MORBIDITY FOR CHILDREN UNDER 5 YEARS OF AGE		CAUSE OF MORBIDITY FOR PERSONS 5 YEARS AND OLDER	
Disease/ Condition	**%**	**Disease/ Condition**	**%**
Malaria	40.8	Malaria	22.6
Anaemia	14.4	Tuberculosis	6.6
Diarrhoea – Acute	9.1	AIDS	5.2
Respiratory infections (other)	7.3	Anaemia	4.2
Pneumonia	6.6	Injuries (trauma due to other causes)	3.9

Apart from the heavy burden of preventable diseases, Lira District is experiencing marked upsurge in the occurrence of non-communicable disease such as mental illnesses. However, there is scanty morbidity data on mental disorders.

According to the socioeconomic household survey, malaria was reported to be the most prevalent disease. This is followed by followed by cough at 23%, intestinal worms at 13% and respiratory infections at 12 % as indicated in Figure 6-32.

Figure 6-32 Common diseases in Lira District



HIV/AIDS

The HIV/AIDS prevalence of Lira District as per HMIS data (December 2010) is estimated at 8.3% which is higher than the national average (6.4%).The factors driving the HIV/AIDS epidemic in the District can be grouped into socio-economic and cultural. The high risk practices, reduction in the utilization of HIV prevention services, behavioral factors that have increased the probability of individuals having intercourse with an infected partner. Seventy three percent (73%) of households interviewed are aware of the HIV/AIDS pandemic with knowledge of somebody in their community living with or having been killed by HIV/AIDS.

FOOD SECURITY

Interventions by GOU in Return, Resettlement, Development Programme and Humanitarian Organisations in the food security sector have improved the food security situation in all parts of the District. The improved security situation in the District has encouraged return of people who were displaced into Rural and Urban IDP camps to their traditional land. This has resulted into increased accessibility to land for agricultural production; tools and planting materials have been made available to the community with reliable weather and continued improvement in security situation the farmers are capable of producing enough food and cash crops. Crops such as rice, sunflower, G/nut, simsim, Soya beans, mangoes and oranges will be promoted for cash income.

Based on the household survey findings, it was established that the food situation is fairly good because only 33% of the respondents said their families had gone hungry in the last year. The reasons for this were related to unpredictable weather patterns that affect agricultural output, lack of enough land for cultivation, lack of firewood among others.

6.5.4.2 KOLE DISTRICT

DISEASE PREVALENCE

The health system in Kole District is still overwhelmed by the consequences (morbidity and mortality) of low nutritional levels, unsafe drinking water, malaria, diarrhea and other preventable (immunizable) and curable diseases found in most tropical Africa. Infant mortality rate (IMR) in the District stands at 114/1,000 live births. The District rates in utilisation of family planning initiatives averages at 13% despite the high fertility rate (TFR=7.07). Doctor/population ratio is below national average and so does the Nurse/ Population ratio. All these factors have brought the Life expectancy at 48 years (revised DDP, 2015).

The District has high diseases burden, risk of diseases which include; malaria, diarrhoea, pneumonia, HIV/AIDS, TB and malnutrition. According to the findings of the household survey the main cause of

death in the area is Malaria having the highest percentage of 83 each followed by cough at 59 %. Other diseases included: STDs, Burns Ulcers, Skin disease Respiratory infections Water related diseases and Intestinal infections.

As per household survey, about 93% revealed that they have had a sick in their household in the last 6 months. Although HIV/AIDs was not mentioned as a major disease in the district , it was revealed that the community is aware of this diseases with 90% of the households interviewed indicating that they have heard about the disease.

HIV/AIDS

HIV/AIDS, sexually transmitted infections (STIs) and Tuberculosis together pose an increasing threat to people of the Kole District. The promoting factors of this situation include the cultural practices that hinder open discussions on sexuality, the parents' shyness and inadequate knowledge of current scientific facts on sexuality and HIV/AIDS, powerful negative influence on the youth by the electronic media. However most people in the project area are aware of the HIV/AIDs pandemic as revealed by 90% of the respondents who said they know of someone who has publically declared that they are HIV positive.

FOOD SECURITY

Only 16% of household survey respondents said that their families have gone hungry in the past year. Most respondents (68%) said food availability has improved in the past one year.

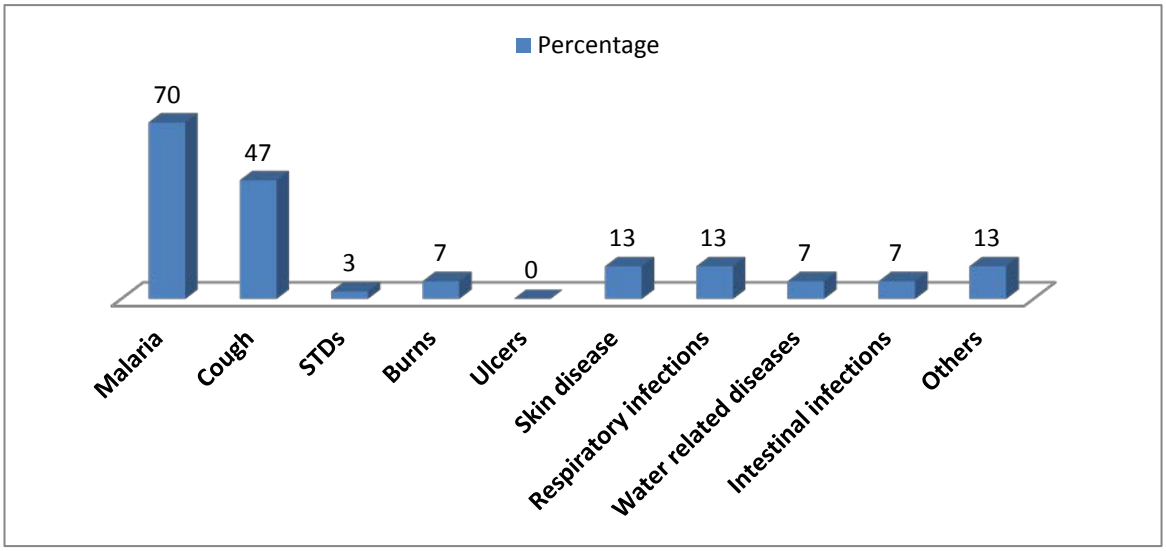
6.5.4.3 OYAM DISTRICT

DISEASE PREVALENCE

Like other localities in the country, the disease burden of Oyam consists of mainly preventable communicable diseases. The most prevalent diseases include: malaria, diarrhea, HIV/AIDS, maternal deaths, nutritional deficiency and respiratory tract infections ranking highest according to district statistics

It was noted that there are high incidences of disease in Oyam with 85% of all respondents said they had some form of illness in their household in the past 6 months. The most reported illness was malaria and cough as shown on the bar graph below.

Figure 6-33 Diseases most common among the respondents in Oyam



It was indicated by the respondents that most of these diseases were contained because 97% of respondents live in a distance of less than 3km from the nearest health facility. 55% of these are health center II while 42% are health center III and the 3% are clinics. The services offered have been ranked

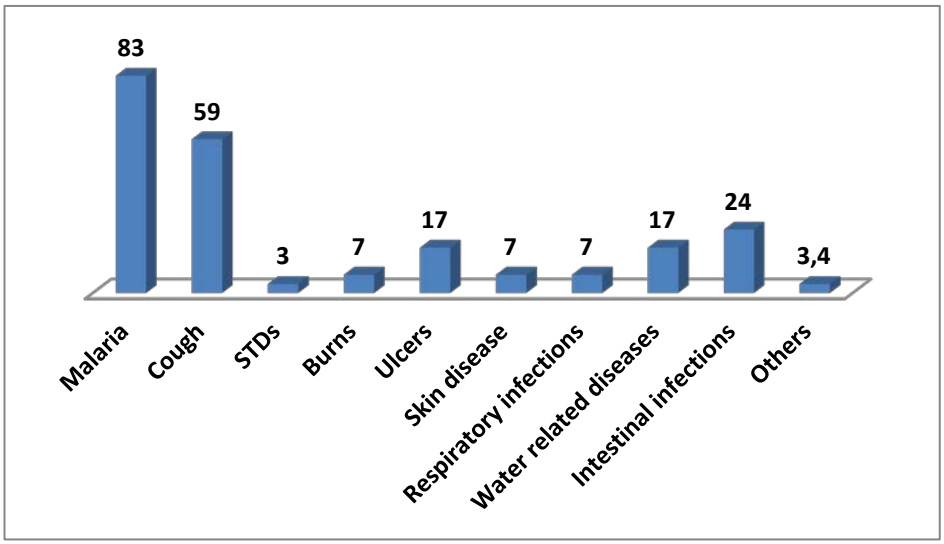
as average for reasons such as lack of enough medicine and other medical equipment. This is compounded by the fact that 82 % of all households sampled live in a distance greater than 6km the nearest referral unit which has significantly raised the proportion of income spent on health care.

6.5.4.4 GULU DISTRICT

DISEASE PREVALENCE

Seventy five percent (75 %) of the diseases that affect the population are preventable and associated with poor environmental sanitation and hygiene in the communities and at household level. The survey conducted indicated that 90 % of the respondents have had at least one person falling sick in the last 6 months before the study was conducted and that the common diseases affecting the people in the households included; malaria, cough, respiratory and water related diseases. Figure 6-34 presents the common diseases in the project area.

Figure 6-34 Diseases most common in the project area in Gulu District



Malaria poses the greatest disease burden/cause of illness in the district and accounts for 34% of all deaths in the district (UBOS 2013). According to the socioeconomic household survey, malaria was reported to be the most prevalent disease by 80% of the households followed by cough which affected 59% of the households. Other diseases that affected people in the area include; Ulcers, intestinal infections, respiratory infections, high blood pressure, diabetes, epilepsy, heart problem, mental illness, jiggers, tuberculosis.

HIV/AIDS

Related to HIV/AIDs none mentioned this directly but few individuals said STDS is among the diseases affecting the households. In Uganda, 7.3% of Ugandans aged 15-49 are HIV-positive. HIV prevalence is higher among women (8.3%) than among men (6.1%). Ugandans living in urban areas are more likely to be HIV-positive than those living in rural areas (8.7% versus 7.0%) (2011 Uganda AIDS Survey Indicator).

HIV/AIDS still remains a big development challenge in the district and its prevalence is estimated 12.8%, which is higher than the national average of 6.4% (HMIS 2010/2011). The higher prevalence can be attributed to the late 1980- 2005 where insurgency and civil war forced people to live in IDP camps created socio-economic environment that increased vulnerability of individuals to high-risk practices. The increased vulnerability increased high risk practices, reduced utilization of HIV prevention services and these increased the probability of individuals having sex with an infected partner.

Thus high HIV/AIDS prevalence rate poses challenges to health and wellbeing of the people in the District of Gulu through rising medical expenditures and care for the orphans and widows among

others. This epidemic has also hit the traditional labor intensive agricultural systems, contributing to household poverty. The household survey revealed that 95% of the respondents had heard about HIV and 81% of these said they knew of someone who had publically declared that they are HIV positive.

FOOD SECURITY

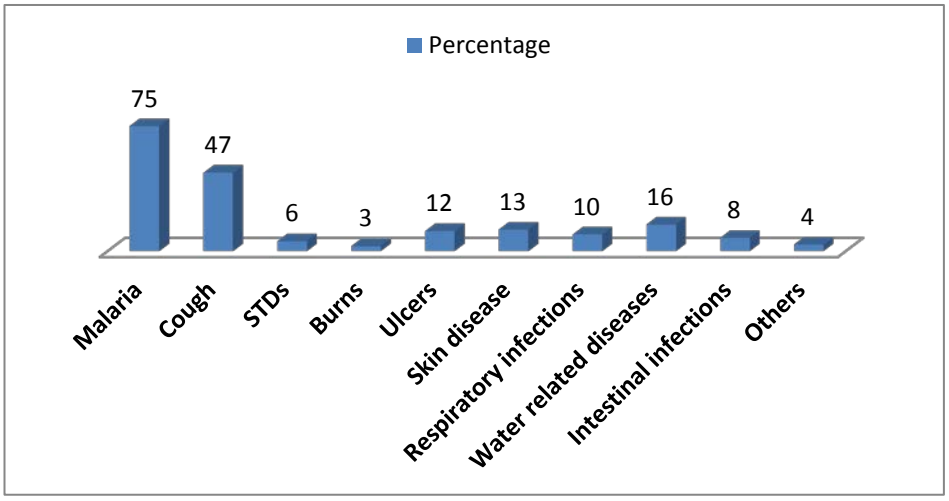
Based on the findings the food situation for Gulu is relatively good with only 29.2% of household recorded as having missed a meal in the past twelve months. They attributed this to reasons such as changing weather patterns leading to drought and sometimes too much rain, lack of money to purchase food and crops having been destroyed by wild animals. Despite this most respondents said that food production/availability had increased in the past 3 years has increased.

6.5.4.5 NWOYA DISTRICT

DISEASE PREVALENCE

According to the socioeconomic household survey, malaria and cough were reported to be the most prevalent disease at 75% and 47% respectively. This is followed water related diseases at 16% as indicated in figure 6-35 below.

Figure 6-35 Disease most common of household members in Nwoya District



HIV/AIDS

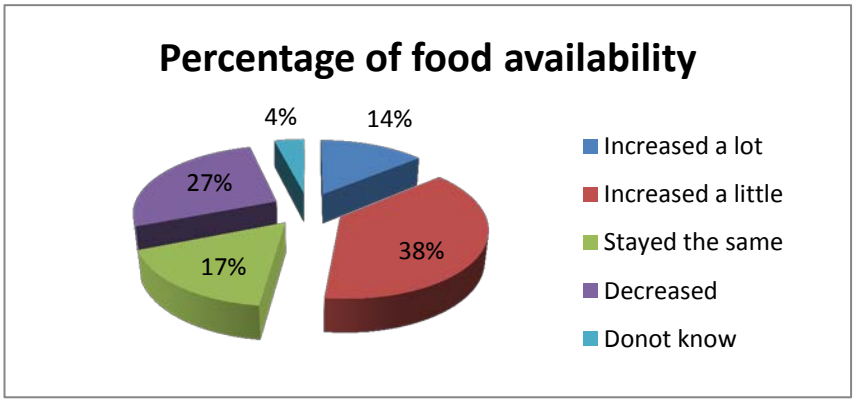
HIV/AIDS is still a big problem in the district. The prevalence rate declined from about 27% in 1993 to 11.9% in 2003 and down to 8.3% in 2010 (midterm review of Nwoya district development plan 2010-2015). There has been tremendous decline in the prevalence and the downward trend is the fruit of the continuous efforts by all stakeholders, especially in the area of HIV/AIDS education. The potential and actual problems that may increase the spread of HIV/AIDS are poverty, especially among the ladies; excessive consumption of alcohol leading to loss of control; negative cultural beliefs and practices such as widow inheritance and last funeral rites.

The survey revealed that 95% of the respondents had heard about HIV and up to 81% knew of a person who had publicly declared that they are HIV positive.

FOOD SECURITY

Based on the findings of the survey 30% of the population said their families had at least gone without a meal in the past 12 months. This was due to varying reasons including, destruction of crops by wild animals (particularly elephants), long dry spell, lack of enough land, lack of fire wood, sickness, and lack of money. Some (52%) however said food production has generally increased over the last 3 years as shown in figure 6-36 below.

Figure 6-36 Food availability in Nwoya District



6.5.4.6 NEBBI DISTRICT

Over eighty percent of the population of Nebbi district depends on subsistence farming, and poverty levels are very high. This explains the high morbidity burden in the district as poverty and disease are directly related in view of the fact that disease affects productivity, and poverty predisposes to disease due to lack of education and access to good housing, food and others. We have noted that areas with the highest levels of poverty also produce the highest burden of disease. This is made worse by the inability of the community to seek health services but there is hope that with government introducing various interventions to tackle poverty, this will translate into improved health in the community. The health personnel housed within facilities stands at 60% while the district immunisation statistics are at 99%.

The AIDS pandemic has affected different sections of the population causing loss of productive manpower, increase in numbers of orphans and dependents that translate into socio-economic stress. Prevalence of HIV/AIDS is 4.3%. Thus, the disease is a development challenge that undermines the attainment of the development goals of many sectors in the district. Whereas some voluntary counselling and testing (VCT) was being done at the hospitals and Goli Health Centers, five VCT sites were established with the help of AIDS Information Centre at Nebbi, Angal Hospitals and Pakwach HC IV. ARV services were opened in Nebbi Hospital in 2007 by Joint Clinical Research Centre (JCRC) with support from USAID, and expected be scaled up.

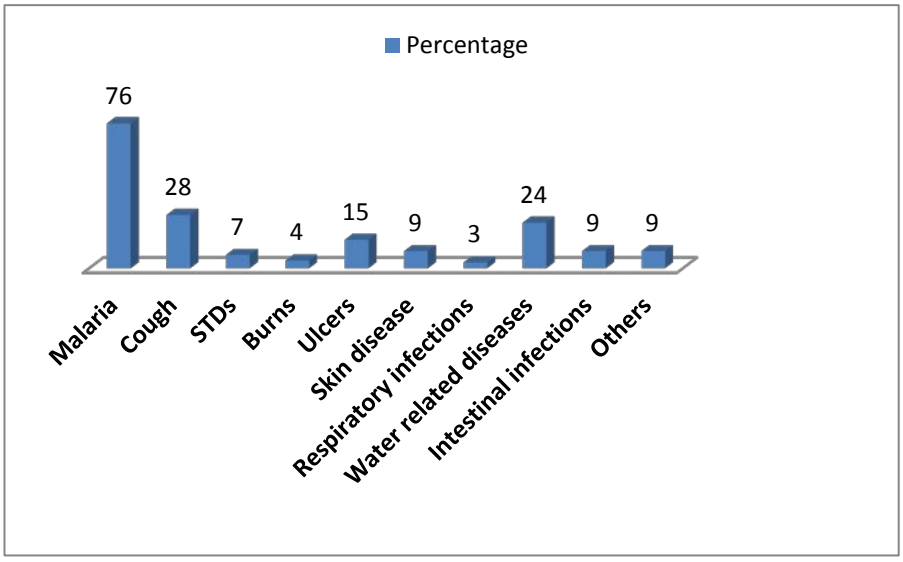
The household survey revealed that 93% of the respondents had heard about HIV and the majority new of someone who had publicly declared that they are HIV positive.

6.5.4.7 ARUA DISTRICT

DISEASE PREVALENCE

According to the survey, there is a relatively high disease incidence among the population of Arua district with 79% of all households reporting some form of illness in the past six months. The diseases suffered from were mainly malaria, cough and water borne infections as shown on the bar graph below.

Figure 6-37 Disease most common in last six months in Arua District



HIV/AIDS

HIV and AIDS continue to pose a big challenge to the development of West Nile region. Most people in West Nile today know HIV and AIDS as a life threatening sexually transmitted infection. Every household has at least lost a member, relative, or a friend to HIV and AIDS. In spite of awareness about the scourge there exist a big gap between knowledge and desired behavioral change. The respective Districts have tried to scale up efforts in providing HIV/AIDS services in most of its Health Centres.

Most of the health centres provide HIV/AIDS Counselling and Testing Services although Anti-Retroviral Services are provided in only Health Centre IV facilities which represent only a small coverage. Unlike the national trend West Nile's prevalence rates show a kind of down ward trends as per the data from the VCT sites. This is also consistent with the West Nile prevalence rate although the statistic is not representative enough.

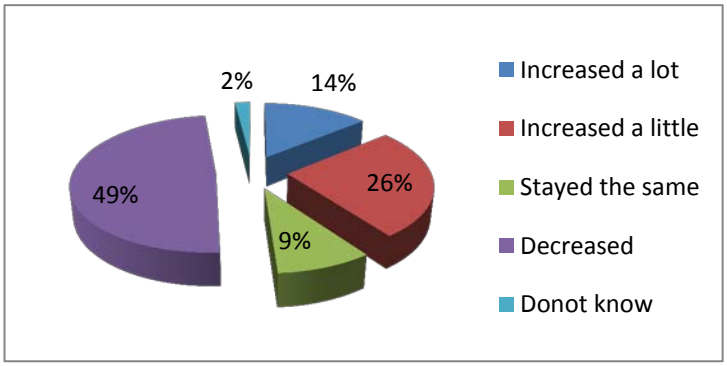
Over 90% of the population sampled said they had heard about HIV and they knew of a person who had publically declared that they are HIV positive. This means there is relative awareness about the disease in the proposed project area.

Another category of vulnerable people within the project area based on the findings of the survey are the orphans with 62% of respondents saying they had an orphan within their household. This increases on the dependency burden upon the household heads that are charged with the responsibility of fostering these orphans. The cause of death of the parents of these orphans ranged from HIV, malaria accidents and others under which fell many cause some of them unknown according to respondents. Causes of death have been presented on the graph below as told by the respondents.

FOOD SECURITY

The household survey revealed that 58% of households had experienced food shortage in the past 12 months. This was attributed to factors such as long drought spell that led to low yields and limited land acreage for rural dwellers and for those within town and trading centers the most common reason was lack of money to buy food. According to respondents, food availability in the district has gone down and this was stated by 49% of all respondents, with 26% saying it had increased a little, 14% said it has increased a lot while 9% said it had stayed the same and 2% did not know as shown below.

Figure 6-38 Status of food availability in Arua District



6.5.5 GENDER

Gender has been defined as the different roles of men and women, boys and girls as prescribed by society and how they affect the wellbeing of members of a given community. Gender mainstreaming relates to the integration of gender needs and gaps identified through gender analysis into development plans.

Gender imbalance is evidenced through the disparity and access to education, productive resources and benefits, development opportunities, decision-making and participation in development activities. In all the above aspect women are less privilege than their male counterparts. This imbalance is observed in the various economic, social, cultural and political activities in the district. For example for education the intake at lower classes is good for girls but they progressively drop out in higher classes. Studies have attributed this to shared sanitary facilities in schools, early marriages, and increased demand for domestic labour on the girl child.

- In the health sector gender imbalance are evidenced in decision making over reproductive health choices that is reflected in increased fertility level in the districts.
- Women as compared to their male counterparts in terms of participation and engagement indicate that much of their time is taken up in production of domestic goods and services for the welfare of their household members, yet they don't have control and ownership of the productive resources such as land, household assets, and proceeds from land.
- There are skewed employment opportunities for women compared to men. Relatively across the board, the literate and illiterate woman has less employment opportunities both in formal and informal enterprises.

This section addresses issues to do with differences between women and men, boys and girls within the same households, and within and between cultures that are socially and culturally constructed and change over time. These differences are reflected in roles, responsibilities, access to resources, constraints, opportunities, needs, perceptions, views, etc. held by both women and men, and their interdependence relationships.

Like other parts in Uganda and most African countries, there are specific cultural roles for men and women in the project area. Generally women are culturally assigned reproductive roles such as home keeping which are concerned with general household welfare and community work whereas men take on productive roles associated with monetary gains. There is poor participation of women in technology development and decision making, limited share benefits accruing from the sale of crop products and unequal division of labor in agricultural activities. Specificities in districts of the Project area are described below.

6.5.5.1 LIRA DISTRICT

As per housing and population census 2014, female population of Lira constitutes 51.5 % of the total District population. During the household survey , it was established that women roles are domestic related as they participate more in activities such harvesting, planting, water and firewood collection while men take charge of building houses paying school dues and footing medical bills among others.

There are marked gender disparities in access to education with literacy levels (standing at 79% and 59% for men and women respectively), formal sector employment, decision-making and access to property, including land and capital. The situation is further aggravated by the Lango Tribal Culture that accords low economic status to women rendering limited control over their reproductive rights. This was emphasized from the fact that 50% of all the men interviewed during households surveys said their wives do not own land but only use it for cultivation and about 46% said women are allowed to make decision on what happens on land.

6.5.5.2 KOLE DISTRICT

In Kole District generally, women neither own nor control land; they only have access to the land. However, decisions on what to produce and in what quantity remain the domain of men. Furthermore, women do not control proceeds of neither whatever is produced nor what they sell in the market. This is compounded by lack of a gender policy action plan at the District.

Based on the findings of the survey, women do not own land which is the commonest available resource for production. 78% of the male respondents said their wives do not own land and those who said they do based it on the fact that women access land for cultivation purposes but it was very clear that they cannot make any substantial decisions on matters related to land. It was also realised that women are more engaged in activities such as cultivation harvesting water and firewood collection which activities are very crucial for the family's wellbeing.

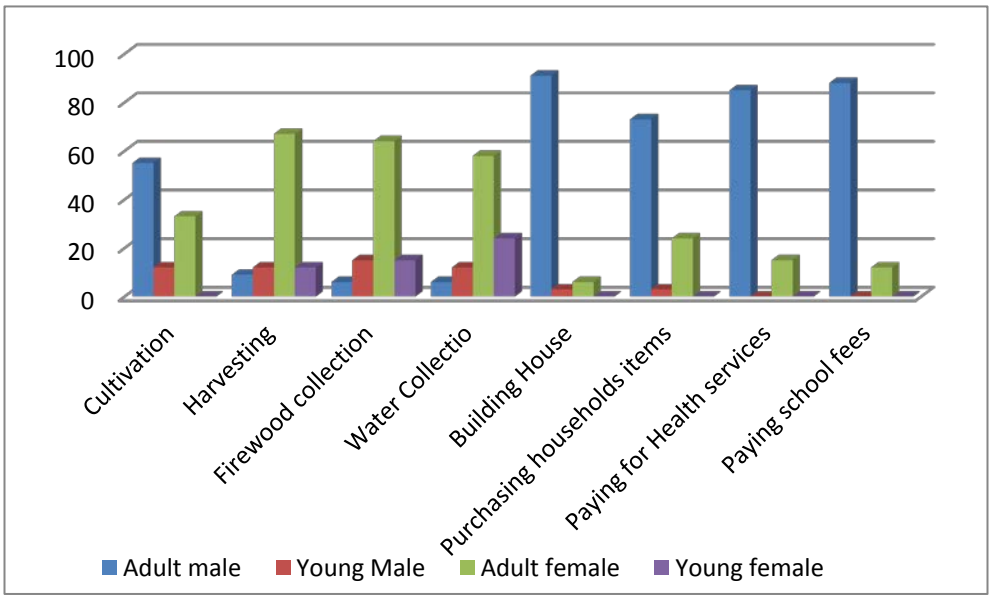
However the Land Act (1998) provides for female inheritance rights over land, and requirements for spousal consent in all matters relating to land from which the family derives subsistence but the customary practice favors male inheritance of land so that women's land right tend to be limited to access while men enjoy ownership rights. Women's minimal land ownership means they have limited decision making power over land use and women often lack awareness about their legal land rights.

6.5.5.3 OYAM DISTRICT

Traditional culture amongst the farming communities in Oyam with high illiteracy levels constraints women farmer's ability to access and utilize advantage services.

This gender imbalance was further stressed when it was established that women do not own land but they are allowed to make decisions such as where to plough what to plant but not change or transfer of ownership. Women participated more in activities like harvesting collecting water and firewood unlike the men who put up houses, pay school fees, purchase household items as well as pay medical bills as presented graphically below.

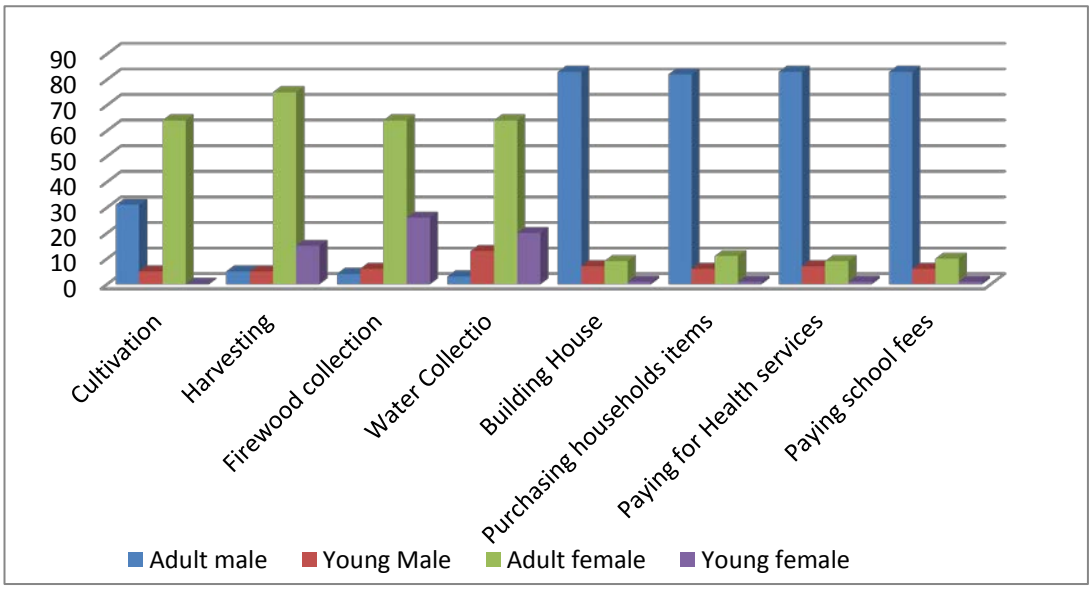
Figure 6-39 Main participant in selected activities in Oyam District



6.5.5.4 GULU DISTRICT

The findings of the survey affirmed that women in Gulu like most parts of the country are marginalised and not involved in decision making, ownership, and access to and control of productive resources, e.g. land and household assets, access to education, roles at household levels, employment, level of participation in development activities and rights to association. For example there are culturally not entitled to owning or inheriting land. Eighty two percent (82%) of all male respondents interviewed said their wives do not own land. Only 7% said they own land but 11% of the respondents did not address this question. Considering role, they seem to be clearly defined with women participating more in activities to do with day to day running of a home such as harvesting, water and firewood collection and cultivation as shown in Figure 6-40.

Figure 6-40 Main participants in selected activities – Gulu District



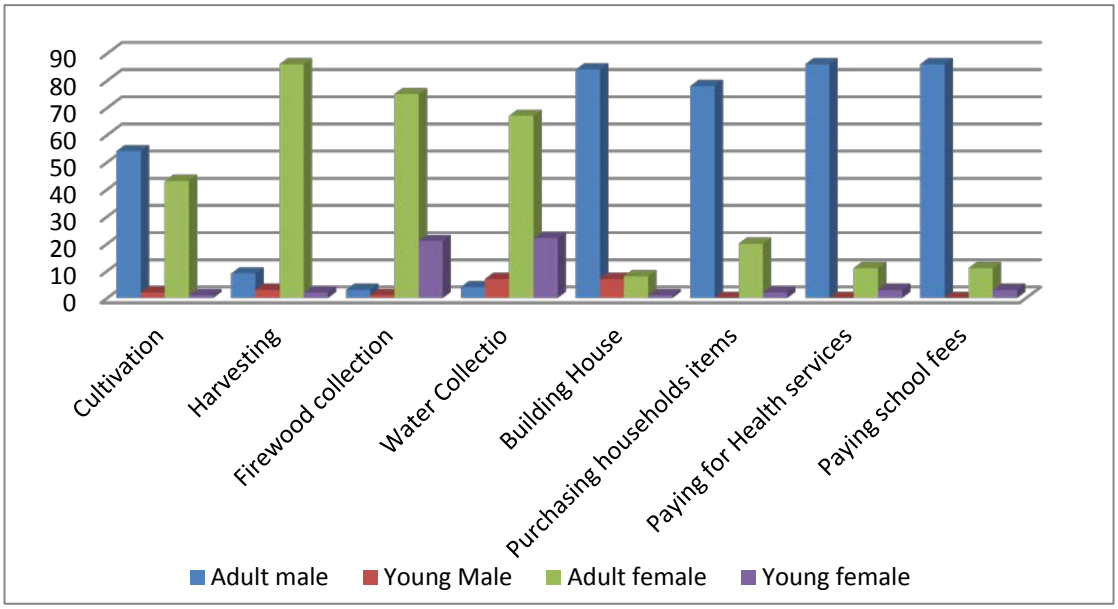
Although purchasing of household items and paying for school fees is largely done by men according to the survey, women stated that they are increasingly taking on responsibility which in the past was considered to be for men. This they said increases on their workload yet they do not direct control most resources required for production

Women are in a number of self-help groups to enable them to fight poverty and improve their welfare. Women expressed sentiments because men in their culture are the main decision makers, men will receive the compensation package on behalf of the family and may misuse it thereby rendering the family homeless. The major factors inhibiting women from playing an active role in society include socially constructed cultural roles, special cultural norms that limit women participation in some activities, inequality in the level of education, economic disparity, and ignorance about equal rights and religious beliefs.

6.5.5.5 NWOYA DISTRICT

The findings of the survey affirmed that women in Nwoya like most parts of the country are marginalised and are culturally not entitled to owning or inheriting land. 54% of all male respondents interviewed said their wives do not own land, 28% said they own land but 18% of the respondents did not address this question. Considering role, they seem to be clearly defined with women participating more in activities to do with day to day running of a home such as harvesting, water and firewood collection and cultivation as shown on the graph below.

Figure 6-41 Main participants in selected activities – Nwoya District



Although purchasing of household items and paying for school fees is largely done by men according to the survey, women stated that they are increasingly taking on responsibility which in the past was considered to be for men. This they said increases on their workload yet they do not direct control most resources required for production

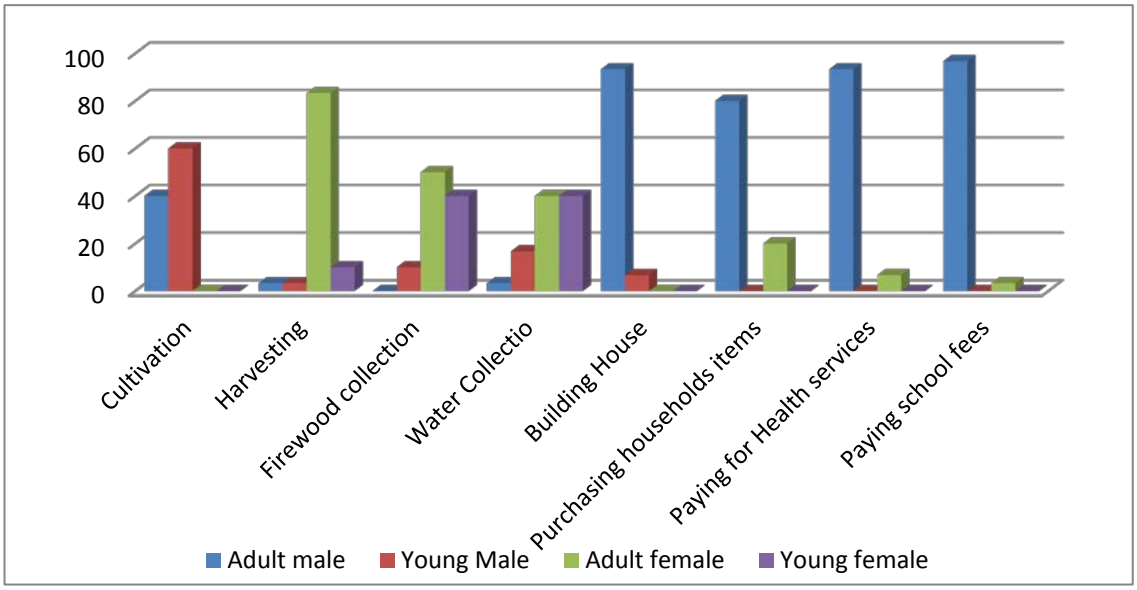
6.5.5.6 NEBBI DISTRICT

It is a fact that the distribution of development in the District is highly skewed in terms gender relations, on top of the overall poor development ranking in Uganda. The women constitute 52% of the district population, yet their access to productive resources is quite limited for instance very few of the women own land, which is the principle means to survival. They lack capital, access to financial services in the form of banking services. Lack of control over land and other productive activities makes women more vulnerable.

From the study it was established that women do not own land but only use it for productive purposes such as farming and livestock rearing and core decisions pertaining ownership are often made by men.

Women and girls are also more engaged in activities such as harvesting collecting water and firewood among others while men take on activities such as house building, paying school and medical bills and purchasing house hold items as presented by the graph below. During focus group discussions it was revealed that women are increasingly taking over responsibility that was formerly known to belong to men yet their status of limited access to productive resources is not changing.

Figure 6-42 Main participants in selected activities – Nebbi District



6.5.5.7 ARUA DISTRICT

In Arua district, 43.2% of men said their wives do not own land as shown by the pie chart below yet this is the most productive resource especially in rural areas.

And like other districts, gender roles seem to be clearly defined with women participating more in domestic roles such as harvesting, water and firewood collection, cultivation and purchasing of household items among others compared to their male counter parts.

6.5.6 LAND USE, LAND TENURE AND SETTLEMENT CHARACTERISTICS

The management and control of land is one factor that can minimize land degradation and enhance the productivity of land. Typical land holdings vary generally from half to about three acres per household on average and more than half of the farmers would like to cultivate more land. This situation varies significantly with farmers in the less populated areas having bigger plots than farmers in more populated areas.

The management and control of land in the country is regulated by the Land Act, 1998. This Act recognizes four tenure systems namely: Customary, Mailo, Freehold, and Leasehold.

Land in the districts traversed by the proposed transmission line is held under four tenure systems as described below:

- Customary land tenure; means a system of land tenure regulated by customary rules which are linked in their operation to a particular description or class of persons. Land acquisition under this system is usually through inheritance. Land is allocated by a father to his sons who in turn assign it to their wives to cultivate. According to the law, women can inherit property (and thus land), although in the patriarchate societies in the district, this is virtually never the case, so women tend to be excluded from having control over this basic resource.
- Leasehold land tenure; means the holding of land for a given period from a specified date of commencement, on such terms and conditions as may be agreed upon by the lessor and the lessee. This is common in urban centres like Arua.
- Freehold system: The freehold land tenure represents private ownership of land where both ownership and possession rights are clearly spelt out and can be transferred without restriction. This type of tenure is not widespread.

- Communal land tenure system; this system is gradually disappearing due to increase in population size. Communal land is used for grazing livestock and is common in less populated areas of the respective districts.
- Mailo land tenure system.

In terms of settlement, many factors influence settlement patterns, including ease of accessibility to socio-economic infrastructure. Settlements tend to be concentrated around existing infrastructure. Soil fertility has also had influence since much of the soil supports most of the crops grown in the study area. Physical features like hills, rivers, forests and swamps have also played significant roles in influencing the population settlement patterns.

The main patterns of settlement in the Project area include: dispersed rural homesteads and nucleated urban centers. The project area has a mixture of household structures. The quality of buildings differ both in rural and urban centers. The urban areas are dominated by permanent and semi-permanent structures in some instances. In rural areas, the dwelling units are dominated by semi-permanent and temporary structures made of mud with grass thatching.

Results of the preliminary field survey conducted along the prospective Project routing relating to land use, land tenure and settlement characteristics are provided in tables 6-27 and 6-28 below.

Table 6-27 Land Use, Land Tenure and Settlement Characteristics along the Project Line Route – Part I

LAND USE, LAND TENURE AND SETTLEMENT CHARACTERISTICS

District	Tenure System				Land Sizes per Household			
	Customary	Leasehold	Freehold	Communal	<1 acre	1-2 acres	2-5 acres	5+ acres
Lira	70%	7%	23%	0%	33%	33%	27%	7%
Kole	100%	0%	0%	0%	13%	16%	39%	32%
Oyam	91%	0%	9%	0%	15%	15%	54%	15%
Gulu	92%	0%	7%	1%	9%	9%	29%	54%
Nwoya	89%	3%	7%	1%	16%	13%	18%	53%
Nebbi	96%	1%	3%	0%	23%	23%	28%	26%
Arua	81%	3%	8%	8%	5%	12%	19%	64%
Average, Project Area	**88%**	**2%**	**8%**	**1%**	**16%**	**17%**	**30%**	**36%**

Table 6-28 Land Use, Land Tenure and Settlement Characteristics along the Project Line Route – Part II

LAND USE, LAND TENURE AND SETTLEMENT CHARACTERISTICS

District	Land Use							Type of Housing Structure		
	Building	Livestock Farming	Grazing Land	Crop Farming	Brick Making	Carpentry	Others	Permanent	Smi-permanent	Temporary
Lira	97%	73%	53%	97%	17%	0%	0%	53%	13%	33%
Kole	74%	55%	58%	90%	36%	3%	0%	32%	23%	45%
Oyam	97%	52%	49%	88%	18%	0%	0%	15%	24%	61%
Gulu	88%	60%	28%	88%	7%	0%	0%	14%	9%	76%
Nwoya	94%	47%	28%	84%	17%	0%	1%	12%	13%	75%
Nebbi	97%	51%	47%	95%	30%	0%	2%	27%	20%	54%
Arua	88%	68%	66%	79%	56%	0%	0%	38%	25%	37%
Average, Project Area	**91%**	**58%**	**47%**	**87%**	**26%**	**0%**		**21%**	**18%**	**61%**

6.5.7 CULTURAL HERITAGE AND ARCHEOLOGY

Consultations with district officials and communities revealed the existence of several cultural heritage sites and resources in the vicinity of the proposed electrical transmission line. The spiritual and cultural values of these elements were highlighted by local communities.

Several cultural physical resources were identified in the project area. Table 6-39 provide examples of various types of sites.

Table 6-29 Burial Sites

DESCRIPTION	PHOTO
BURIAL SITES	
At the proposed substation, in late Angello Diadoro home. Five burials in the compound under the custody of Olero Christine and Adiru Jenifer, the family is from Ayivu clan in Nyio village, Oluko Sub-county, Nyio Parish.	
Ogai Village, Alivu Parish, Ajia Sub-county. The home of Wadadu Wilson has 3 burials.	
The home of Andi Gift in Vuu village, Okollo parish, Okollo Subcounty has 5 burials. Out of these, 2 are clearly visible while the other 3 not clear. The owner knows their location.	
ARCHEOLOGICAL SITE	
Few scatters of roulette pottery along the road side. They could have been excavated during road construction.	

DESCRIPTION	PHOTO
Few sites of Later Stone Age (LSA) archaeology were recorded. The sites contain few scatters of roulette decorated pottery and microlithic materials made of clear quarts.	
RELIGIOUS SITES	
Kamguru Catholic Church in Kamguru Primary School	
LIVING HERITAGE SITES	
Pubungu Historical Site. The site is characterized by historical trees as identified by Rwot Jal Osiga and pottery. It is believed that the Luo ethnic group of people migrated from Bar el Gazel in Sudan and settled in Pubungo, present day Pakwach. They settled under trees near River Nile. These historical trees are still there up to now, five of which are so prominent. The cultural leaders of Alur together with their paramount chief, Rwot Jal Osiga who is based in Okuru-Zombe District always come under the trees to make some sacrifices in memory of what took place there.	
Labong separating from Gipiir Historical Site Legendary Separating point between Gipiir (currently Alur) and Labong (current Luo Tribe) in northern Uganda, South East Ugabda and Western Kenya . These two Luo brothers, separated, over the loss of the 'Ancestral Spear and the swallowing of the Royal Bead. 'This site is revered by the Alur Kingdom and often hold ceremonies to appease the ancestral spritis , This site is located on the banks of river Nile at near the Pakwach bridge.	

The following tables provide a summary of affected physical cultural ressources in the wayleave between Lira and AP-10 (SMEC 2011), between AP-10 and Gulu (M&E 2015) and between Gulu and Arua (WSP field work). You will find in Appendix 6-3, 6-4 and 6-5 the complete list of affected physical cultural resources on each section of the line.

Table 6-30 Summary of Affected Physical Cultural Ressources between Lira – AP10 (Source: SMEC 2015)

BURIAL SITES		
DISTRICT	**DESCRIPTION**	
Lira	8	Cemented graves
	37	Earth graves
	2	Church: St.James Kakoge C.O.U Church

Table 6-31 Summary of Affected Physical Cultural Ressources between AP-10 and Gulu (Source: M&E 2015)

BURIAL SITES		
DISTRICT	**DESCRIPTION**	
Lira	7	Cemented Graves
	21	Earth Graves
Kole	4	Cemented Graves
	119	Earth Graves
Oyam	6	Cemented Graves
	87	Earth Graves
Gulu	3	Cemented Graves
	46	Earth Graves
RELIGIOUS SITES		
Lira	1	Masjid Noor Mosque Burial Land
Oyam	1	Omoro P.A.G Church
Gulu	Ocen John Charles Ven.RevSt.Peters Church of Uganda, Bobi	

Table 6-32 Summary of Affected Physical Cultural Ressources between Gulu and Arua (Source: field inventories)

AMOUNT	**DESCRIPTION**
BURIAL SITES	
37	Cemented Graves
251	Earth Graves
RELIGIOUS SITES	
1	Omusobozi Church (Arua district)
SHRINES	
17	Shrines (buried underground)
ARCHEOLOGICAL SITES	
Nebbi	1 Scatters of microlithic materials in association with pottery (roulette) 1 Scatters of roulette decorated pottery in a simsim garden/cotton garden.
TREES	
200	Shea nut butter trees (*Butyrospermum paradoxum*) in the ROW
16	*Tamarindus indica* in the ROW
0	*Vitex doniana (Oyelo)* in the ROW

It should be noted that according to Alur Kingdom tradition, trees like Tamarindus indica (Ccwa), Tho, Vitex Doniana (Oyelo) and Butyrospermum paradoxum (Yaw) are not supposed to be cut or else a fine is paid to the kingdom. After investigations with the Secretary of Alur Kingdom and corroboration with other sources, it was found that the usual fine is to pay 1 bull to the chiefdom. However, such fines are not required in a context where those trees are cut in an organized resettlement context and properly compensated. "Organized resettlement context" refers to a formal resettlement and compensation operation supervised by State authorities. This operation should also include consultations with the Alur Kingdom in order to ensure agreement on proper replanting of sacred trees and/or amounts of compensations acceptable.

6.5.7.1 CHANCE FINDS PROCEDURE

A Chance Finds Protocol has been developed to identify and protect previously unrecorded cultural heritage sites, objects, or features from Project-related damage (Appendix 7-2). The Protocol applies to potential cultural heritage objects, features or sites identified as a result of vegetation and topsoil removal and other ground disturbing construction activities.

In the case of a Chance Find, Project activity will cease temporarily in the vicinity and the area shall be marked for avoidance. Construction supervisors, field personnel, and staff will be notified. The Project archaeologist will also be notified of the find if he or she is not already aware of it. If the find is significant, then government cultural heritage representatives will be notified as well, so that appropriate treatment strategies can be developed and approved. A step-by-step description of the Chance Finds Protocol is provided in Appendix 7-2.

6.5.8 EXISTING PROJECTS IN THE EXTENDED STUDY AREA

A number of existing projects have been identified in the extended study area. They are listed in the tables 6-33 and 6-34 below

Table 6-33 Infrastructure Projects

PROJECT	LOCATION
Lira - Agago Transmission line*	Lira through Kole, Oyam and Gulu districts
Karuma- Lira Transmission line *	Kole and Lira districts
Proposed 400 kV Transmission Line *	Currently unknown[1]
Gulu - Anaka Road	Gulu and Nwoya districts
Re-afforestation programmes	Lira district
Water for production facilities (Valley dam)	Andibo dam in Nebbi District

Table 6-34 Other Development Initiatives

PROJECT	LOCATION	KEY ACTIVITIES
Meridian Tobacco	Ajai Sub county, Arua	Tobacco Processing
Maraika Mineral water	Arua	Mineral water Packing
West Nile Distilleries	Arua	Gin processing
Proposed juice Procesing plant	Maluppe close to the air field	Friut Processing
Mutoni Grain Milling Facility	Near Wiyanaka	Grain milling
Civicon oil prospecting	Pacabu	oil prospecting
Proposed lime factory in Pakwach	Pakwach	Lime processing and packing
Pakwach Ginnery	Pakwach	Cotton ginning

[1] Note : detailed information regarding routing of other electricity transmission projects in the extended study area to be provided UETCL and added in the final ESIA report.

6.5.9 VULNERABLE GROUPS

In the **Gulu-Arua section**, a socio-economic survey was conducted by the WSP team between September and October 2015. Findings of the survey indicate that 15.27% (295) of PAPs are 65+ years of age (elderly). Of these 72 are female and 223 are male. 11.2% (217) are widowed. Of these 77.42% (168) are widows and 22.58% (49) widowers. 4.18% (81) are disabled. Of these 12 are female and 69 are male. 0.05% (1) is a minor (less than 18 years old). Furthermore, 3.25% of the PAPs indicated that they live with a person with chronic disease (e.g., STDs/HIV/AIDS etc.). Many of the vulnerable PAPs have double vulnerability. This list is presented in Appendix 6-6.

The number of vulnerable people in the **Lira-AP10 section** was calculated from data that was collected for the Karuma-Lira project (which includes the Lira-AP 10 section) given the unavailability of the detailed socioeconomic data collected for that section. For this Karuma-Lira project, SMEC conducted field observations, surveys, census, land valuations and socioeconomic surveys of PAPs between October 2010 and January 2011. Findings indicate that there are 28 vulnerable people for a total of 917 PAPs over the whole length of the Karuma-Lira project. The Lira-AP 10 section comprises 115 PAPs, thus the number of vulnerable people can be estimated at 4. The nature of their vulnerability is currently unknown. It is noteworthy that the Lira-AP 10 section is localized in an urbanized area. The list of vulnerable PAP is unavailable for this section. It is UETCL's responsibility to obtain detailed information on vulnerable PAPs in this section. Proper compensation and resettlement assistance measures will have to be implemented prior to land acquisition, in accordance with the ESMF and RPF chapters of the ESIA and RAP.

In the **AP10 – Gulu section**, M&E conducted a field surey. According to the data provided by M&E, 36% of the PAPs have at least a vulnerable person within their homesteads, most of them lining with physical disability. The list of PAP with double vulnerability for this section is also presented in Appendix 6-6. WSP consultants have not confirmed PAP vulnerability in the field. It will be UETCL's responsibility to obtain detailed information on vulnerable PAPs in this section. Proper compensation and resettlement assistance measures will have to be implemented prior to land acquisition, in accordance with the ESMF and RPF chapters of the ESIA and RAP.

6.5.10 CONFLICT IN NORTHERN UGANDA

6.5.10.1 DESCRIPTION OF CONFLICT IN NORTHERN UGANDA

The project area is located in northern Uganda where a war between the government of Uganda and the rebel group the Lord's Resistance Army (LRA) lasted two decades, from 1986 to 2005. This war left a devastating impact on the people living in Northern Uganda. It resulted in many dead and confined over 90% of the Acholi people in internally displaced people's camps. Instability in the region left the area lagging behind in development, and social indicators such as literacy level, nature of house structures and access to basic social services ranked very low during and shortly after the war. Access to infrastructures such as electricity transmission and distribution was not in the offing with few people living in large towns having access to this service and other services such as sanitation services and improved sources of water.

Conflict in northern Uganda led to the emergence of vulnerable groups within the region that differ from most parts of the country. Such groups include the formerly abducted children, people with disabilities due to landmines and torture, orphans whose parents were killed by rebels, female headed households and the elderly with meager social support.

The cultural history of northern Uganda is often defined by people's ability to forgive and to reconcile through traditional justice system - Mato Oput (reconciliation) that addresses intra-community problems. This system supports all forms of social peacebuilding and is particularly concerned with building an infrastructure of people who are committed to creating a new peace culture within the social fabric.

6.5.10.2 ASSESSMENT OF THE POST-CONFLICT SITUATION IN NORTHERN UGANDA

Since the Mid-2000 relative peace has been realized in the region and the Uganda government embarked on programs to iron out the economic imbalance that had been created between the North and the rest of the country that was peaceful. The Peace Recovery and Development Plan (PRDP) was

made as a comprehensive framework to guide development and social transformation in this part of the country. Development partners such as the World Bank, International Monetary Fund (IMF) and other donor countries have been extending assistance to programs targeting communities in the northern region of the country.

Programs such as Northern Uganda Social Action Fund (NUSAF) have been implemented. This program intends to enhance household income through extending support by providing capital to undertake income generation through identified enterprises at the household level. It targets the poorest of the poor in communities and has registered commendable success over the last ten years. Currently a framework is being prepared for the World Bank that will guide the third NUSAF implementation soon to be rolled out. Other programs include:

- Community Agriculture and Infrastructure Improvement Program (CAIIP) was launched with the aim of enhancing markets through improvement of access or community roads to facilitate the marketing of agricultural products.
- Agriculture Livelihood Recovery Program (ALREP); an initiative formulated by government to enhance developments in the region, particularly agricultural productivity through re-tooling, establishment of cattle crushes and market infrastructure among others.
- Community Driven Development (CDD) aimed at identifying enterprises such as poultry, piggery and goat rearing for boosting household income and facilitates their implementation through existing government structures.
- The quest for peace and reconciliation has been strongly supported by the Uganda government and NGOs such as War Child and Danish Refugee Council which have extended psychosocial support to war victims through peace and reconciliation programs.

With peace generally achieved in much of northern Uganda and support given, the region has adopted an approach of moving from being largely in an emergency state with high dependency on relief to increasingly taking on a path of becoming self-reliant. However, funding for the process of transition from relief to development is a necessity that requires proper coordination between the key players.

6.5.11 INFRASTRUCTURE

6.5.11.1 LIRA DISTRICT

EDUCATION INFRASTRUCTURE

There are 113 primary schools in the District (93 government aided, 9 private and 11 community schools). The majority of the government aided primary schools have at least 7 permanent classrooms. However, some of these classrooms are dilapidated and others incomplete.

There are four operational private Universities i.e. (All Saints University is now functional at former St Augustine and Uganda Martyrs' University has a campus at former Ngetta NTC), one proposed branch of Gulu University at UTC Lira (Faculty of Science and Technology) and Lira University to be established at Olaka Stock Farm. Bugema University is also in the Senior Quarters and Kampala International University has offices in Lira Town College offering distance programs.

Seventy percent (70%) of respondents live less than 3 km away from a school.

HEALTH INFRASTRUCTURE

Lira District has a total of 24 health units which include: one Referral Hospital, three level IV health centres, 11 level III health centres and nine level II health centres. In addition, there are several affiliate NGO/Private health centres as well as registered private clinics in the District. The majority of the households (59.2%) travel a radius of 5km to the nearest health unit (District Development Plan, 2011). Table 6-35 outlines the health units in Lira District.

Table 6-35 Health Units in Lira District (District Development Plan, 2011)

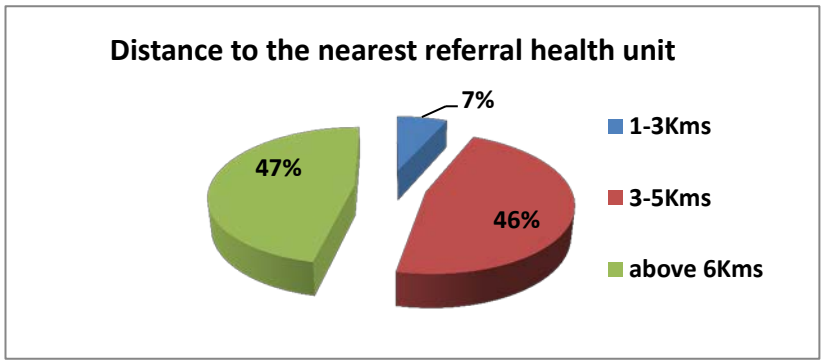
	RRH	HOSPITAL (HC III)		HEALTH CENTER IV		HEALTH CENTER III		HEALTH CENTER II		TOTAL GOV+PNFP	
	Gov	PNFP	Gov	PNFP	Gov	PNFP	Gov F	Gov NF	PNFP	**Func.**	**Non-Func**
Erute North	0	0	1	0	2	1	0	4	0	**4**	**4**
Erute South	0	0	1	0	3	2	4	0	1	**11**	**0**
Lira Municipality	1	1	0	1	2	1	3	0	0	**9**	**0**
TOTAL	**1**	**1**	**2**	**1**	**7**	**4**	**7**	**4**	**1**	**24**	**4**

Legend : RRH= Regional Referral Hospital , PNFP= Private-Not-for-Profit, NF= None Functional, F = Functional, HC = Health Center

As per DDP plan 2011, geographical access to health care is limited to about 31.4% of the population living within 5 km radius of health facility. However not all health facilities provide the full range of essential primary health care services. In addition only 36.8% of the population in sub-counties in Lira District has access to maternity services. Village communities are particularly affected because the health facilities are located at sub county headquarters (some villages are several kilometers from the sub county health centers

The household survey conducted on the other hand revealed that 86% of the sampled households live in a distance of less than 5km from the nearest health facility in this case a sub-county health center III. Like it is in other centres, the respondents said the services offered at these centres are poor to average because the facilities lack qualified health personnel and the medical supplies are often insufficient coupled with lack of electricity among others. The survey further revealed that 93% of the respondents travel for more than 3 km in order to have access to the nearest referral as shown in Figure 6-43.

Figure 6-43 Distance to the nearest referral hospital in Lira District

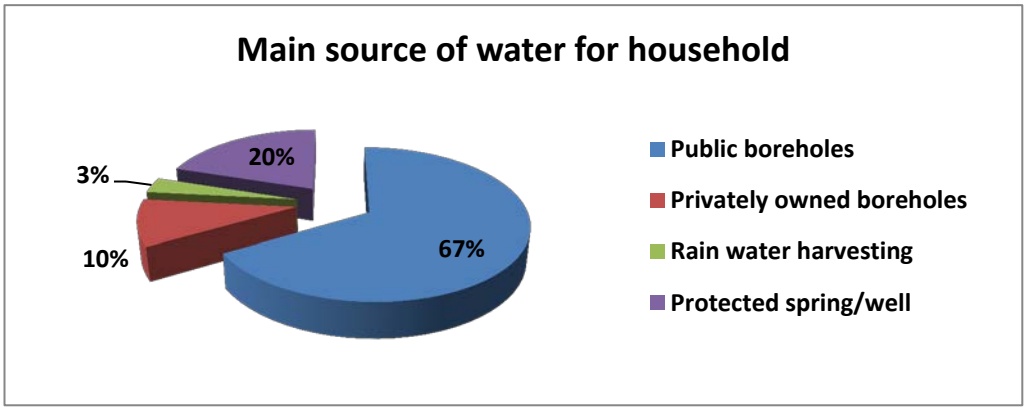


WATER AND SANITATION

According to Lira Five Year Development Plan (2010/11-2014/15), there are 2215 existing safe water sources out of which 971 are protected springs, 639 are boreholes and 605 are shallow wells which are installed with UII and UIII pumps. In addition there are 42 dams and 26 valley tanks (most in dilapidated state- silted up) with only 30 % of these fully utilized to provide water for livestock. The district water coverage is currently at 72 percent and the functionality rate of all the water sources stands at 77.4%. In the entire district, 32% of the households have access to protected well/springs, followed by 40% who access water from tap/piped water sources. About 19% of the households access their water from boreholes and 9% from open water sources. Some urban areas are served by extension of piped water supply system from National Water and Sewerage Corporation (NWSC).

The socio-economic survey results showed that 66% of the households in the project areas get their water from public boreholes, 20% of the households fetch water from the protected springs, 10% from private owned borehole and 3 % harvest rain water. Figure 6-44 shows the main sources of water in the Lira District.

Figure 6-44 Main source of water for household use in Lira District



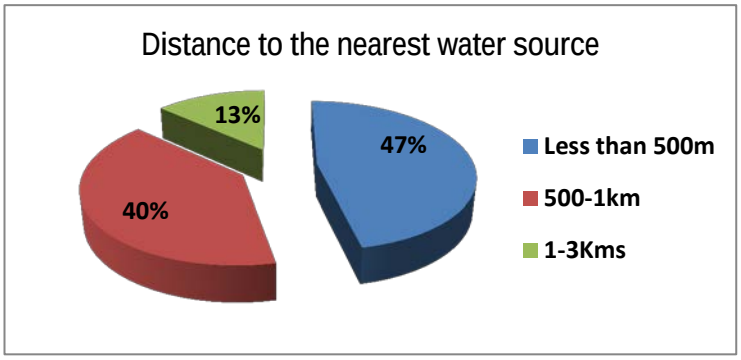
According to the findings of the household survey, it was established that and protected springs cater for most of the domestic and livestock water needs of the community accounting for 66% and 20% respectively.

Picture 6-9 Borehole in Teokole village in Lira District

Regarding sufficiency of water, 67% of the households acknowledged that water was sufficient throughout the year and 33 % of the households interviewed said that water is insufficient in dry seasons. However, they noted that the key challenges to water sufficiency are reduction in water flow during the dry season, maintenance costs whenever the borehole breaks down and congestion during the peak hours (evening).The quality of water is considered good in terms of taste, smell, colour and hardness respectively except for some sources where changes occur during the rainy season when the water becomes brown.

In terms of distance trekked to the water source, 47% travel less than 500 m to the water point, 47% travelled 500 m to 1 km to the water source and 13% travel 1 to 3 km. Figure 6-45 shows the distance to the nearest water source.

Figure 6-45 Distance to the nearest water source in Lira District



In some parts of the project area, water supply sources are, most often, within walking distance, as recommended by the government and as such the majority (50%) of households spend 30 to one hour to fetch water. Sixty four percent (64%) of households make 5 rounds in fetching water.

In terms of sanitation, all the respondents said they own sanitation facilities ranging from traditional latrines and shallow pits which accounted for 87%, with the remaining 13% falling under VIPs and flash toilets.

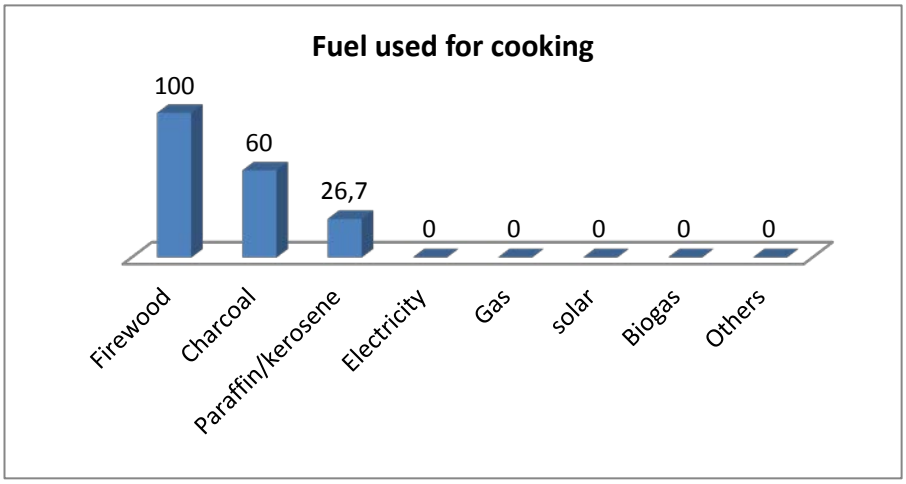
The majority (67%) have shallow pits for disposing off solid waste and there is no public waste disposal site. Thus waste collected is either burnt or disposed in an unscrupulous manner (scattering in the general environment).

ENERGY SOURCES

As per Lira DDP- 2011, more than 95% of the population of Lira District depends on biomass as their main source of energy used for cooking (firewood in rural areas and Charcoal in urban centres). Paraffin and electricity are predominant for lighting in urban and rural settings respectively. Use of biogas, solar, wind energy and other renewable energy forms are not yet well developed.

Along the project area, firewood is the main source of energy supply for cooking to households is indicated in Figure 6-46.

Figure 6-46 Main sources of energy used for cooking in Lira District



From the figure above, it was revealed from then household survey that all household use firewood and this is followed by use of charcoal and paraffin at 60% and 26.7 % respectively.

Kerosene, firewood, solar and grass are the sources of lighting in the project area with as per household survey conducted in the project area respondents in Lira said they use kerosene for lighting and the rest use firewood, torches, candles and grass for lighting.

TRANSPORT AND COMMUNICATION

Lira district has a well distributed feeder road networks linking up all the sub counties. There are tarmac roads namely Lira - Corner Kamdini (Kampala- Gulu Road) via Kole and Oyam districts, the Lira- Soroti Road via Dokolo and Kaberamaido districts. However, most of the feeder roads in the project area are the murram and are well maintained although in some cases they are slippery especially during the rainy season. Picture 6-10 shows the different types of roads.

Picture 6-10 Types of Road in the Project Area – Lira District

	
Odokumat-Apach Road (36 N 0484836, 0250514)	Lira Kamdini Road (36 N 0484838, 0250547

The Project crosses a road at one main location in the Lira District, at the following coordinates (484807 Eastings; 250815 Northings).

The main means of transportation in the project area include commuter taxis, trucks, special hire vehicles, and boda-boda (motorcycles, and bicycles).

The district project area has a railway running through from Soroti to Gulu. There is a proposal to improve this line by the governments of Uganda, Kenya and Rwanda. In addition, Lira district has an airfield about 0.6 km from Lira town and there are plans to build an airport in Anna Oki village, about 3km south of Lira Town.

In terms of communication, the district has 6 FM radio stations namely; Radio Rhino, Radio Lira, Radio North, Radio Unity, Voice of Lango and Radio Waa. They have greatly improved information dissemination and these will play a significant role in mobilization and sensitization during the RAP studies. The television booster station (UBC) at Odokomit has not been stable, much to the disappointment of television set owners and the general public. However, two private television stations namely TV Waa and NTV have been opened and have proved very useful to the communities. Majority of the District population read Rupiny, a Luo weekly that is supplemented by the New Vision and Monitor. The advancement in communication technology has seen Lira District partly connected to the internet, mobile telecommunication network, e-mail and satellite communication.

As per household survey, the main information dissemination media are through use of hand mobile phone (83%) place of worship (83%), neighboring household (80%), village meetings (77%), Radio (73 %) and reading newspapers (50%).

6.5.11.2 KOLE DISTRICT

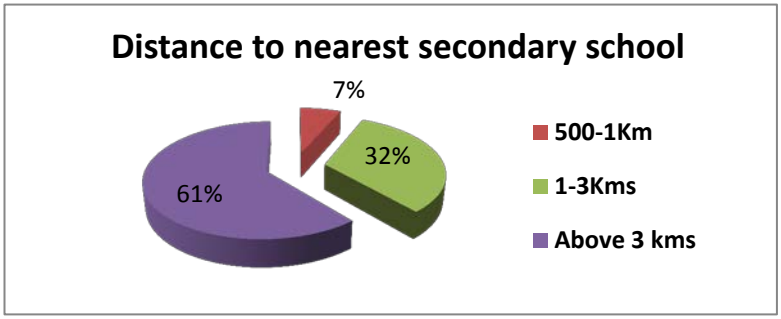
EDUCATION INFRASTRUCTURE

Primary education is provided through the 120 Government Aided Primary Schools and 12 Community Primary Schools. The number of Government aided Primary Schools in the District have not increased though enrolment in all the schools has increased which created demand for community Primary Schools to decongest some of the existing government aided primary schools. The Pupil Classroom ratio has improved from 1:113 to 1:93 over the period.

There are 13 Secondary Schools, i.e. 5 governments aided and 8 Private schools, but only 1 private school receives support from government through USE i.e. Fr. Aloysious Secondary School. Many of the schools are rural based. The introduction of Universal Secondary School (USE)/Universal Post Primary Education & Training (UPPET) in 2007 increased secondary school enrolment. Wigwa primary school in Aboke Sub County is handling special needs education. The scope of SNE covers all levels of education & training.

It was also deduced from the survey that accessibility to primary education is generally good but at secondary level it was difficult because over 60% live in a distance of over 5km from the nearest available secondary school as indicated in the figure 6-48 below.

Figure 6-47 Distance to the nearest Secondary Schools in Kole District



HEALTH INFRASTRUCTURE

The District health system comprises communities, Village Health Teams (VHTs) or health centres: HCs I, II, III and IV and general hospitals. Currently Kole HC IV is fully functional. However, the private and public health care systems are is characterized by inadequate supply of medicines, lack of equipment, a few health personnel and lack of health awareness creation and education programmes.

The survey revealed that 71% of the sampled population is in a distance of less than 5km from the nearest health facility. The respondents described the services offered as being average giving reasons such as lack of enough medicine and inadequate health personnel. This they said has led to general increase in the cost of health care to households with 74% of the household surveyed indicating this has increased a lot in the last three years.

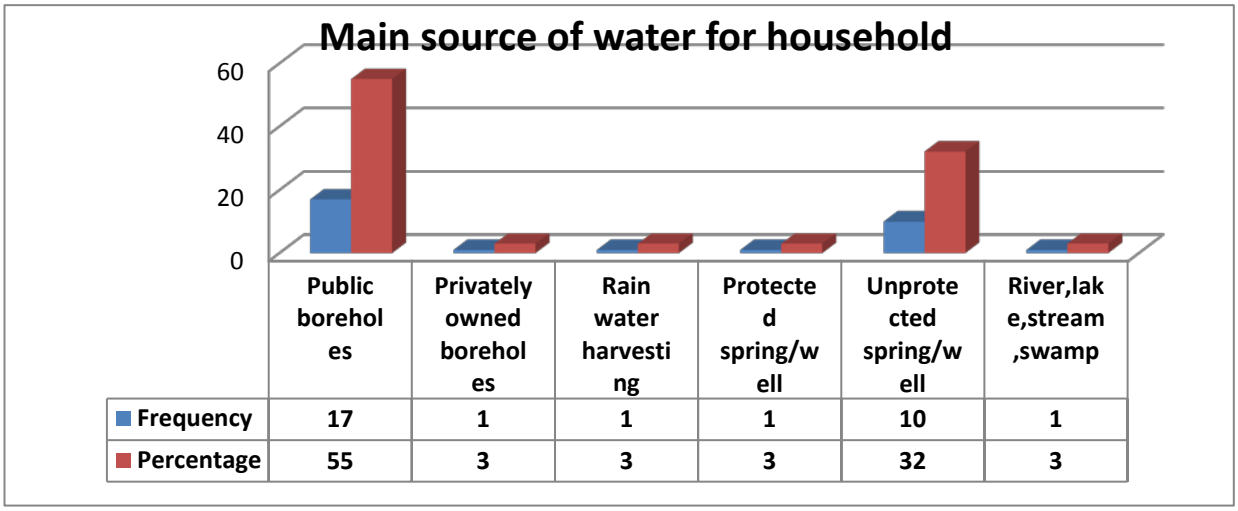
Only 48% of households in Kole live within five kilometres from a health facility (public or PNFP).utilization these is limited due to poor infrastructure, inadequate medicines and other health supplies, the shortage and low motivation of human resource. As per household survey, 94% of the households interviewed move for more than 6km to the referral hospital and in this case the nearest is Lira Regional Referral hospital.

WATER AND SANITATION

Kole District is well endowed with small rivers, springs and swamps as natural sources of water. As per DDP 2015, the district has 1188 existing safe water sources of which 676 are boreholes, 275 are shallow wells installed with UII and UIII pumps, 243 are protected springs; and 446 catchment rainwater tanks installed in Primary Schools and Health Centers. Kole District also benefited from Water for a Production (WFP) facility where one valley tanks namely Leye in Ayer Sub County was constructed. 64% of the households have access to safe water and consequently water related diseases put the population at stake.

According to the survey, it was discovered that 55% of households in Kole District get water from public bore holes, 32% from unprotected wells or springs and privately owned boreholes, rain water harvesting, protected springs, lakes and streams being represented by 3% each as shown in figure 6-48 below.

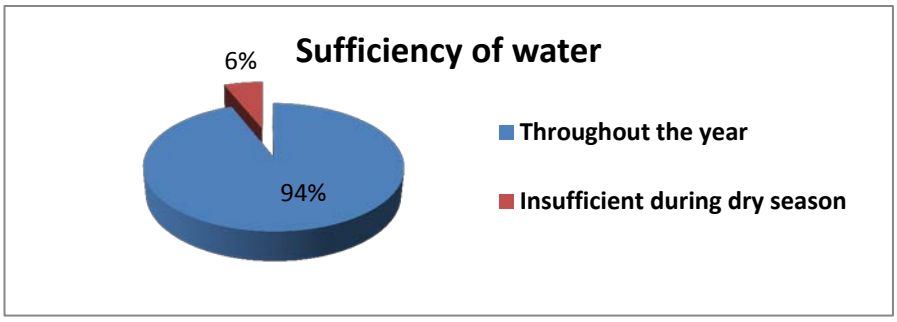
Figure 6-48 Main water sources for households in Kole District



	Public boreholes	Privately owned boreholes	Rain water harvesting	Protected spring/well	Unprotected spring/well	River,lake,stream,swamp
Frequency	17	1	1	1	10	1
Percentage	55	3	3	3	32	3

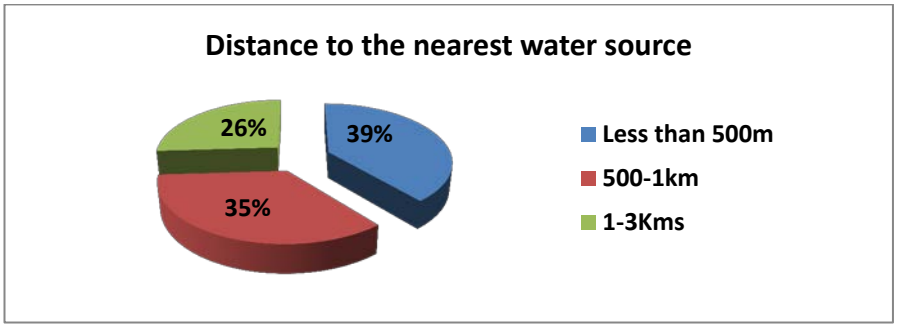
Regarding sufficiency of water, 94% of the households acknowledged that water was sufficient throughout the year and 6% of the households interviewed said that water is insufficient during dry seasons. However, they noted that the key challenges to water sufficiency the nature of the water sources are swampy, long distances to the water source and the topography of the area being too steep. The quality of water is considered good in terms of taste, smell, colour and hardness respectively except for some sources where changes occur during the rainy season when the water becomes brown. Figure 6-49 below shows water sufficiency in the area.

Figure 6-49 Sufficiency of water in Kole District



In terms of distance trekked to the water source, 39% travelled a distance of less than 500 m to the water point, 35% travelled 500m to 1km to the water source while, 26% travel 1 to 3km. Figure 6-50 shows the distances to the nearest water source.

Figure 6-50 Distance to the nearest water sources in Kole District



In some parts of the project area , water supply sources in most cases is within the walking distance as recommended by government and as such a majority of 52% of the households spend 30 minutes to one hour fetching water, and 59% of the households make 5 rounds in fetching water.

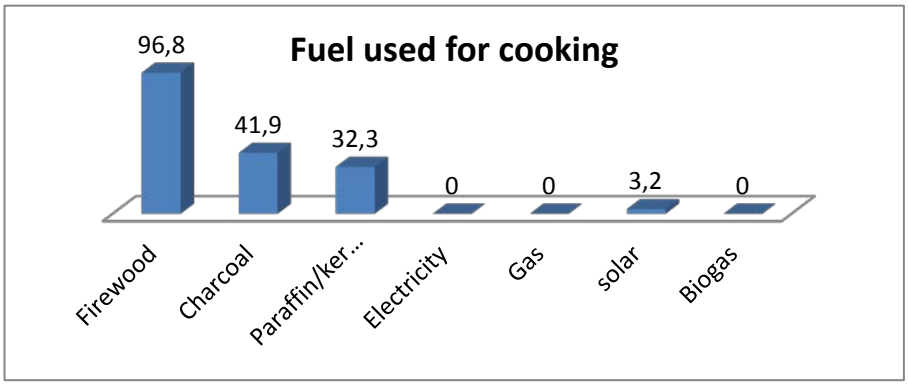
In terms of sanitation, all the respondents said they own sanitation facilities ranging from traditional latrines which accounted for 84%, with the remaining 13% falling under VIPs and 3% for flash toilets. Hand washing after latrine use is still a major problem in the community and more sensitization is still required. The whole District coverage for hand washing is as low as 27.9% of the total households. Latrine coverage is estimated at 70.4%.

The majority 74% have shallow pits for disposal of solid waste and there is no public waste disposal site in the community. Thus waste collected is either burnt or disposed in an unscrupulous manner (scattering in the general environment.

ENERGY SOURCES

99% of the households in Kole District use firewood and charcoal as a source of fuel for cooking and this has both short and long term effects on the environment. Electricity which drives industrialization and hence development is consumed by only 0.3 % of the households compared to 8% national average. The survey revealed that 97% of the respondents use firewood as the main source of energy for cooking which is occasionally supplemented by charcoal. Similarly 97% use kerosene for lighting with a few saying they sometimes use firewood and grass for lighting whenever paraffin is not available as shown in the figure below. Batteries and torches were also mentioned as sources of light to a few community members. Figure 6-51 below shows the energy sources used in the area.

Figure 6-51 Sources of energy used in the area in Kole



TRANSPORT AND COMMUNICATION

The main mode of transport to and within the District is road followed by water transport. The District has a total road length of 1,418.3 km classified in table 6-36 below.

Table 6-36 Road lengths per category in Kole District

CATEGORY OF ROADS	LENGTH OF ROAD (KM)
Classified Roads/Trunk Roads	250
District roads	315.7
Community access roads	852.6
Total	**1,418.3**

The District road condition has improved over the last two years through the support from PRDP, DLSP, RTI International and Road Fund. District Road condition assessments and National (Trunk) Road conditions are summarized in a tabular form below.

Table 6-37 Lengths of District roads in Kole District per sub county

SUB-COUNTY	DISTRICT FEEDER ROADS (KM)
Alito	**20**
Aboke	20
Ayer	34
Akalo	42
Bala	41.5

The Project has 5 road crossings in the Kole District; they are detailed in table below. (Table 6-38).

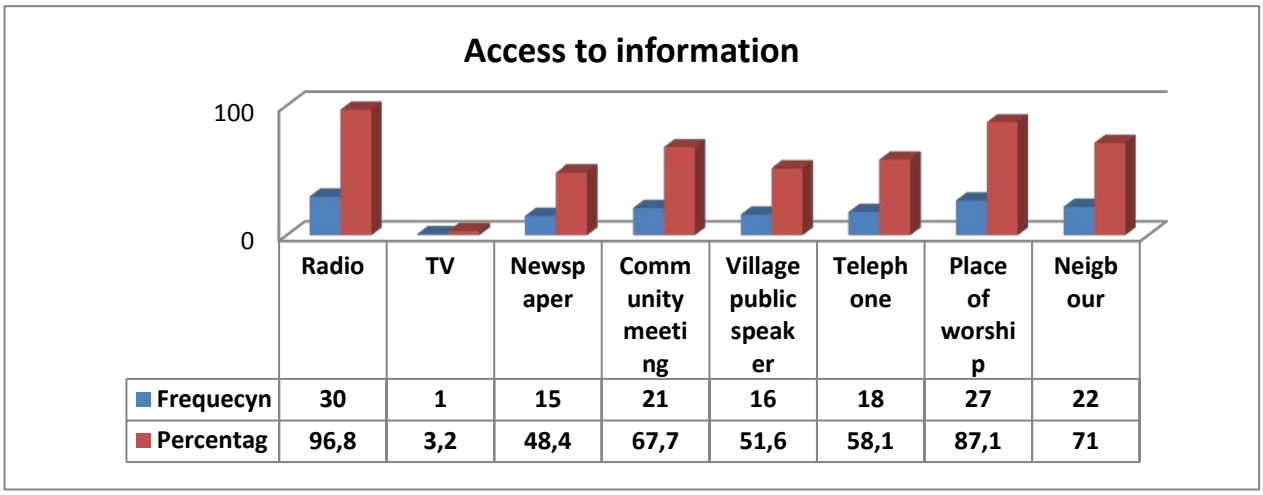
Table 6-38 Road crossings in the Kole District.

EASTINGS	NORTHINGS
466 399	256 496
467 748	255 363
468 918	254 381
470 722	254 272
464 976	257 691

The main means of transportation in the project area include commuter taxis, trucks, special hire vehicles, and boda-boda (motorcycles, and bicycles).

As per the household survey, the main information dissemination media are through radio (96.8%), place of worship (87.1%), neighboring households (71%), village meetings (67.7%), telephones (58.1%), village public speakers (51.6 %) and reading newspapers (48.4%). The most unpopular means of information dissemination was televisions at 3.2% mainly because of affordability and lack of power as the main cause. Figure 6-52 illustrates how information is accessed in the area.

Figure 6-52 Information Dissemination Media – Oyam District



6.5.11.3 OYAM DISTRICT

EDUCATION INFRASTRUCTURE

According to Report on Education Needs Assessment for Northern Uganda 2008, Oyam district include 103 Government Aided, 1 Community and 2 private Primary schools fairly distributed throughout the district with at least one school in every sub-county. In addition there are 9 Government aided, 1 private and 1 Community secondary school.

61% of those interviewed lived in a distance of 1-3 km of a primary school, 33% live between 500 m-1km, while those living below 500m and above 3km represented 3% Table 6-39 shows distances to the nearest primary school.

Table 6-39 Distance to Nearest Primary School – Oyam District

DISTANCE	FREQUENCY	PERCENT
less than 500ms	1	3.0
500-1Km	11	33.3
1-3Kms	20	60.6
above 3 km	1	3.0
Total	33	100.0

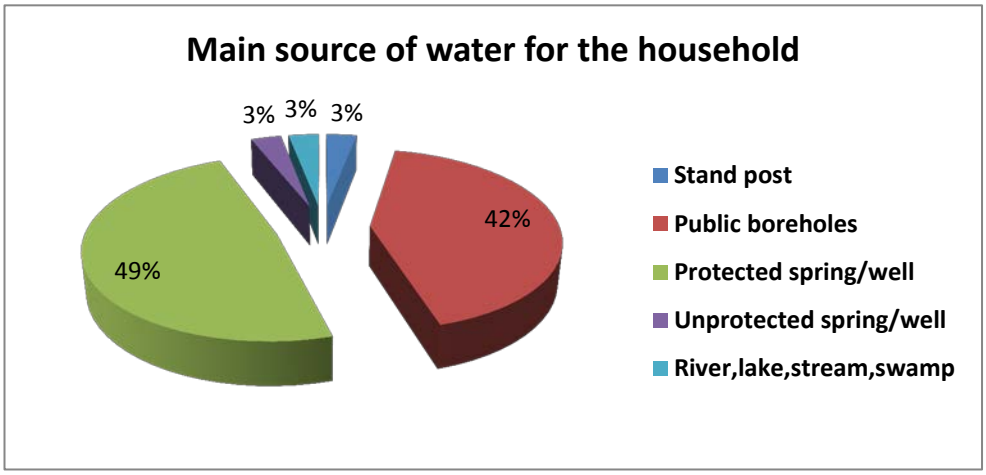
HEALTH INFRASTRUCTURE

The district has 24 functional health units of which 21 are government aided, and 3 are private. The various health units owned by the government are categorized as Health Centre IV which is units at County level; Health Centre III operates at Sub-County level and Health Centre II which operate at parish level. In addition to public hospitals and Health centers, there are also private clinics, drug shops and pharmacies scattered around the district though the numbers are not known.

WATER AND SANITATION

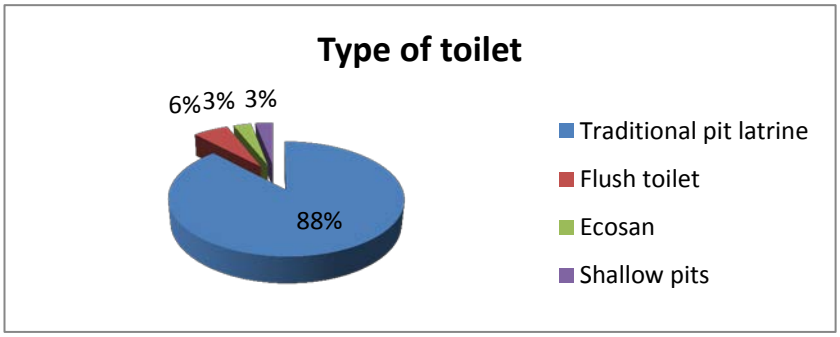
Based on the findings protected springs provide 49% while public boreholes cater for 42% of domestic water requirements. Stand posts, unprotected springs and streams and rivers all account for 3% each and this has been illustrated using the figure below.

Figure 6-53 Main water sources in Oyam District



The water sources are sufficient although some tend to dry up during long dry spells. 97% reside in a distance of less than 1 km from the water source and the water sources available provide good quality water based on parameters such as color, taste, smell and hardness. The main challenge associated with the available water sources is congestion at boreholes and springs especially during the dry season, maintenance costs of boreholes and steepness. All members had latrine ranging from traditional, VIPs, shallow pits and eco-san toilets as shown on the chart below. Most respondents have shallow pits in which they dispose of waste although some burn and scatter the waste.

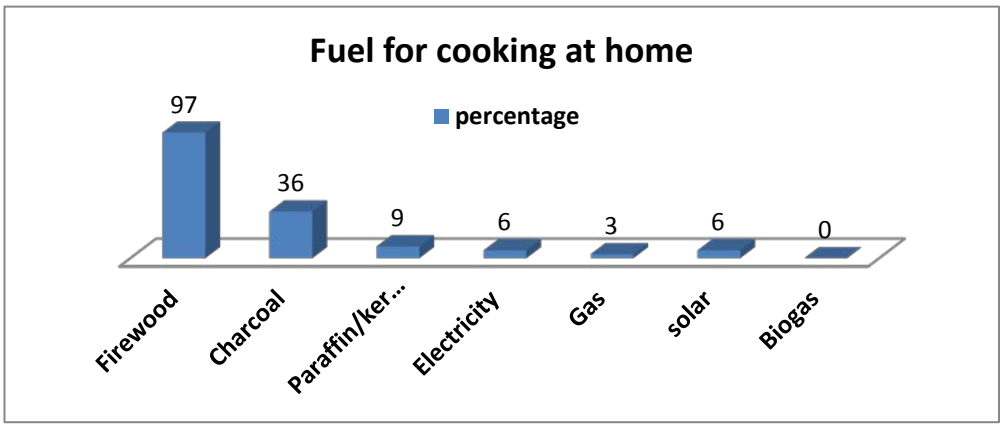
Figure 6-54 Type of sanitation facility in Oyam District



ENERGY SOURCES

According to the survey, firewood accounts for 97% of all cooking energy needs. This is supplemented by charcoal, at 36%, kerosene at 9% electricity and solar are used by 6% for each and gas is used for cooking by only 3% of the respondents as shown on the graph below.

Figure 6-55 Fuel for Cooking at Home in Oyam District



On the other hand, kerosene is used by 91% of the respondents as the main source of energy for lighting purposes although 18 and 12 percent of the respondents said they use wood and solar for lighting respectively. 6% of the respondents also sai they use other sources of energy for lighting. During the survey it was also brought out that the cost of energy has increased by 85% of the respondents with 6% saying the cost had reduced and 3% said it had stayed the same while the other 6% said they do not know.

TRANSPORT AND COMMUNICATION

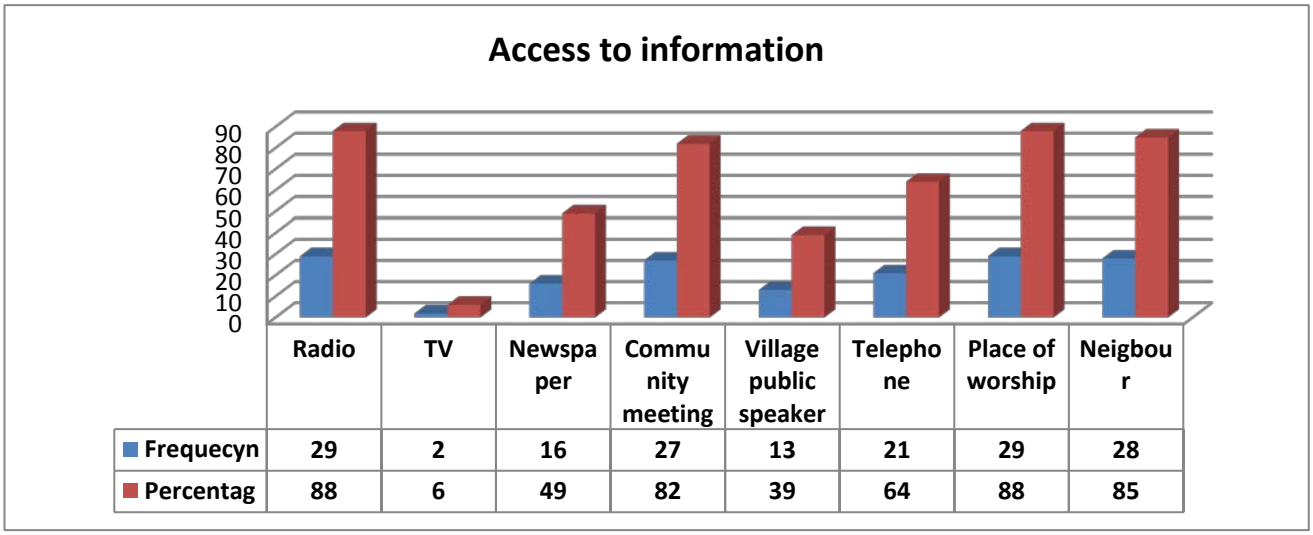
The mode of transport is mainly by Pickups, Dynas, Bicycles, Lorries and few mini-Buses. There is no distinction between public and goods transport. The trucks carry goods as well as passengers who either stand or sit on goods. Bicycles are major means of transport used for transporting agricultural produce from the gardens to the markets and also carrying water. Almost every family owns a bicycle which they use for transport.

The communication network in Oyam is fairly good, with all major communication companies having coverage especially within the town council. Internet usage is not common; internet is accessed by those who own internet modems. There is also one FM Radio station situated in Oyam town and other private postal organizations like yellow Pages which aid in letter delivery.

It was determined that most residents access information through radio, community meetings, places of worship and neighbours although other avenues such as cellphones, newspapers and TVs are used by some community members interviewed. This has been illustrated using the graph below.

There are no major road crossings in Oyam district.

Figure 6-56 Source of information in Oyam District



	Radio	TV	Newspaper	Community meeting	Village public speaker	Telephone	Place of worship	Neigbour
Frequecyn	29	2	16	27	13	21	29	28
Percentag	88	6	49	82	39	64	88	85

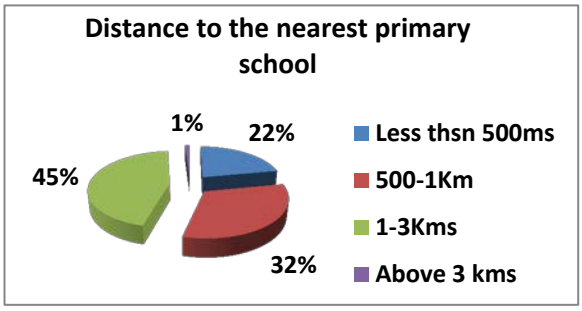
6.5.11.4 GULU DISTRICT

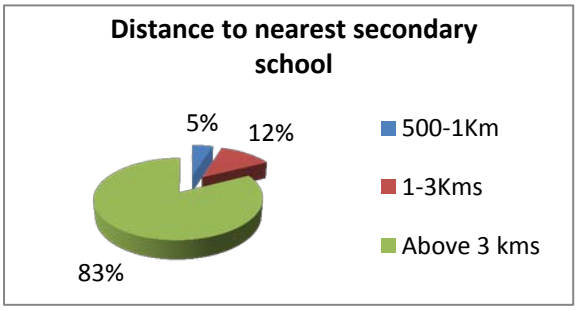
EDUCATION INFRASTRUCTURE

Education plays a vital role in promoting sustainable development through capacity building of the population in various skills. According to Gulu Development Plan 2011, the district has a total of 125 primary schools (112 governments and 13 private).There 19 secondary schools of which 13 are government and 6 are private schools. The district has 12 tertiary institutions (4 governments and 8 private.

The household survey indicated that 45% of the households have access to primary schools 1-3 km followed by 32% of the household saying they have access within 500 m - 1 km while 22% have access less than 500 Km only 1% of the households move for more than 3 km to the nearest primary school. In terms of access to secondary schools, 83% of the households travel for over 3kms to reach the nearest secondary,12 % travel for 1-3km, and 5% travel for 500 m - 1km.

Figure 6-57 Distance to the nearest school in Gulu District





HEALTH INFRASTRUCTURE

Access to health services still remains poor in Gulu District as a whole with over 37 % of the population travelling more than 5 km in search of health services (UBOS, 2013). The District Health System comprises of the District Health Office, 3 Health Sub Districts (HSD), 989 Village Health Team (VHT) and the Community at household level (UBOS, 2013). The health situation in Gulu District still falls below National Standard, largely due to the poor living conditions and the high poverty level. The district has about 73 health facilities (public, private not for profit and private for profit) of which 56 are government health facilities (50 local and 6 central governments managed) and about 17 health facilities are run by NGOs. There are three hospitals providing services to Gulu town and beyond and these include: St Mary's Lacor, Gulu Referral hospital and Gulu Independent Hospital.

In terms of access to health services, the majority of the population as per household survey live in a distance of 3km from the nearest health center and like most districts the services offered are considered to be average. The reasons given for rating the services offered as average include; presence of some health personnel and some medicine but they added that at some health centers health workers are not always around to attend to patients on time and this and the long distance to the nearest referral unit they said are responsible for increment in expenditure on health care issues over the year.

ENERGY SOURCES

There are different sources of energy and fuel used in the project area. Like most districts in Uganda, Gulu's main source of energy for cooking is firewood. According to the household survey, 95% of the respondents said this is used mainly for cooking. Charcoal and kerosene account for 13 and 4 percent respectively but these usually supplement fuel wood. Other sources of energy used by a few community members include; solar, electricity and biogas and gas. For lighting, 92% of people interviewed use paraffin, 17% use solar and 3% use electricity for lighting up their homes. Approximately 72% of the population said the cost of energy had increased over the last three years.

WATER AND SANITATION

Gulu District (rural and urban) has overall safe water coverage of 64.79% compared to the set MDG target of 77% by 2015. This means Gulu has to increase its coverage by 12.21% in the next 4 years to attain the MDG (DDP, 2012).

Sanitation and Hygiene situation had relatively improved in coverage and practice while people were confined in IDPs but this has drastically declined due to return and resettlement. Most of the people (98%) who lived in the former IDP camps have returned to their original homes (UBOS, 2013). This has affected both safe water and latrine coverage negatively. Scattered settlement pattern also has a huge impact on coverage.

Domestic safe water coverage is estimated at 56.2% of the population which is below the expected national coverage of 60%. This is still inadequate and results to a lot of struggle and congestion at water points. In rural areas some people still share water points with animals and this exposes them to diseases such as bilharzia. Some water points are also not reliable due to being seasonal in nature.

According to the household survey, it was noted that households get water from public boreholes which account for 88.7%, protected and unprotected springs at 4.7 and 3.8 percent respectively the rest being stand posts and privately owned boreholes as presented in the table below.

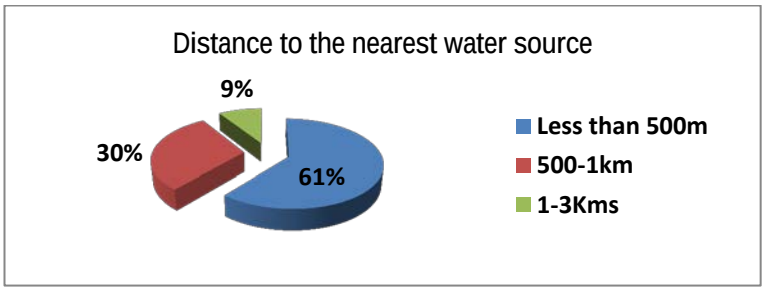
Table 6-40 Main Source of Water for Household Use in Gulu

WATER SOURCE	FREQUENCY	PERCENT
stand post	2	1.9
public boreholes	94	88.7
privately owned boreholes	1	0.9
protected spring/well	5	4.7
unprotected spring/well	4	3.8
Total	106	100.0

For a household to be better served by safe water source, the maximum walking distance to the nearest water source should be 1.5 km (UBOS, 2013).

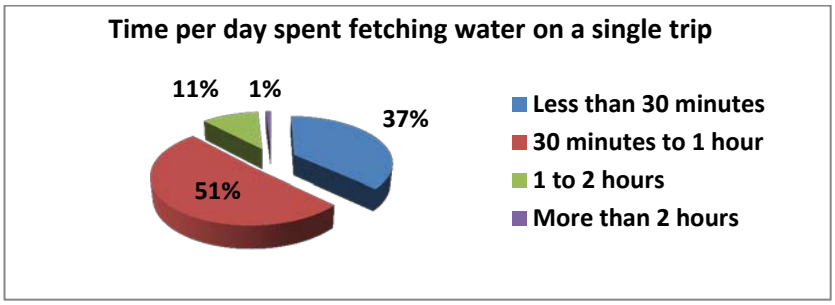
As per survey, it was revealed that 91 percent of the respondents live in a distance of less than a kilometer from the nearest water source while 9% of the people interviewed walked a distance of 1-3km to the water source as shown in figure below.

Figure 6-58 Distance to the nearest water source in Gulu District



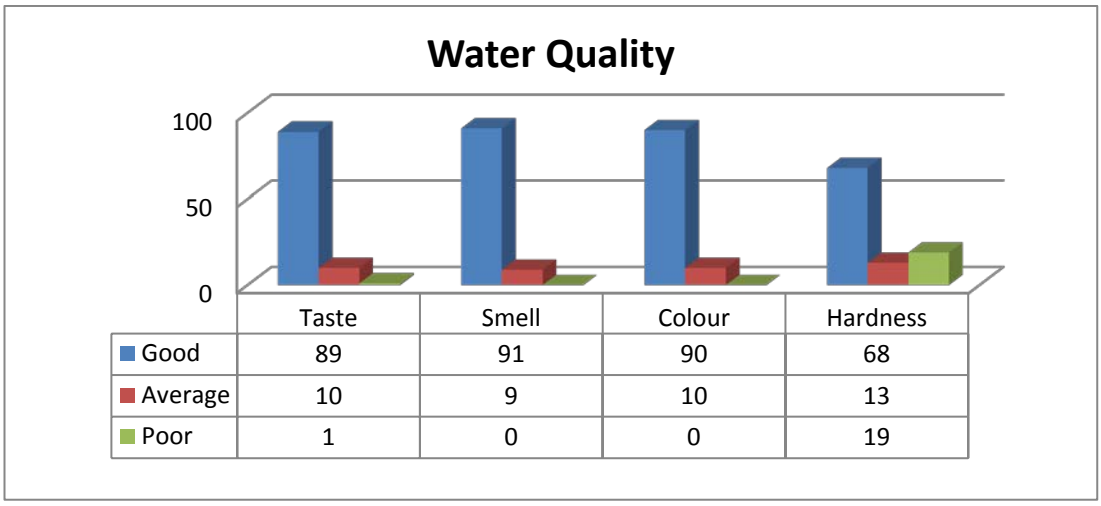
Further analysis indicated that 89.6% of the respondents said that the water sources were sufficient throughout the year. They however revealed that during the dry season there is congestion at boreholes and this often leads to long time people spend in fetching as indicated in Figure 6-59.

Figure 6-59 Time taken in fetching water in gulu District



The quality of water with regard to parameters such as, color, smell, hardness and taste was generally said to be good as shown in figure 6-60 below.

Figure 6-60 Quality of water in Gulu District



	Taste	Smell	Colour	Hardness
Good	89	91	90	68
Average	10	9	10	13
Poor	1	0	0	19

Regarding sanitation, 93% of the respondents said they have traditional pit latrines. Domestic waste management is mainly by use of shallow pits, burning and open dumping respectively.

TRANSPORT AND COMMUNICATION

Gulu District has a number of roads ranging from truck roads, feeder roads and community roads. These link the district to other districts and major trading centers within the district. Most roads are community roads whose funding for maintenance is very minimal.

The Project encounters major road crossings at a total of five locations (Table 6-41).

Table 6-41 Road crossings in the Gulu District, according to the transmission line route options

EASTINGS	NORTHINGS
428 215	284 218
415 541	415 541
412874	295 029
432 278	282 107
435 286	280 425

The district also has an air field which is under the management and control of civil aviation authority. It is located approximate 3km to the North-West of Gulu's town center.

The district has one post office and four sub offices and with the presence of the post bus postal services have improved. Gulu district also has several radio stations such as Mega FM, Choice FM, Radio Maria and radio 4 FM operating within town but with a fairly large coverage area. This makes transport within the district fairly good although outside main towns and trading centers Lorries and pickups are still used to transport both goods and people. Bicycles are also commonly used both within urban centers and the country side.

Regarding information dissemination, most public information is got through village meetings, places of worship and neighbours as found out from the survey. These channels were mentioned by over 70% of the people interviewed as being the major channels of information flow. Cellphones and radio also had a fair share of 55.7% and 40.6% respectively. Also television sets, newspapers and village public speakers had a share of less than 5.7%, 5.7% and 7.5% each respectively.

6.5.11.5 NWOYA DISTRICT

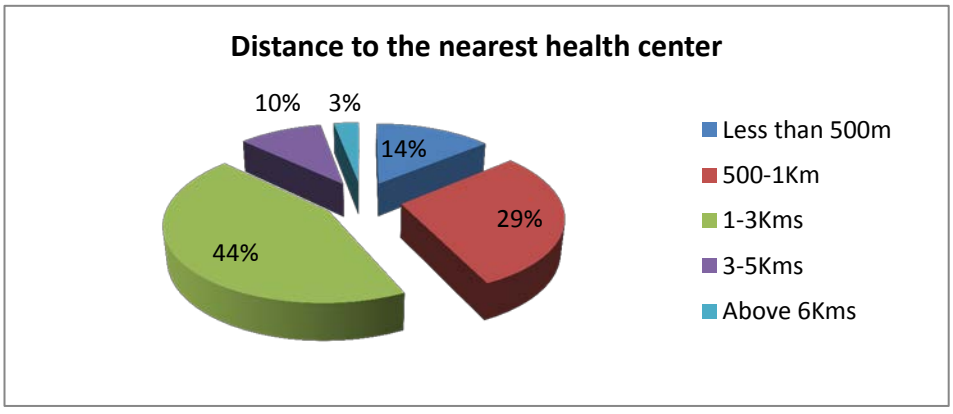
EDUCATION INFRASTRUCTURE

The study showed that 46% of all respondents live in a distance of 1-3km from the nearest primary school, 32% live between 500m-1km, 12% live less than 500m and only 10% of the respondents live over 3 km from the nearest primary school. As for secondary education only 56% of the respondents live within 3 km from the nearest secondary school while the remaining 44% live over 3km from the nearest secondary school. Findings also show that 62% of household heads can read and write in the official language but 38% cannot.

HEALTH INFRASTRUCTURE

Based on the survey conducted, it was established that a majority of 87%of respondents live in a distance of less than 3km, 10% within 3-5km and 3% living 6km away from the nearest health center as shown by details in the figure below.

Figure 6-61 Distance to the nearest health center – Nwoya District



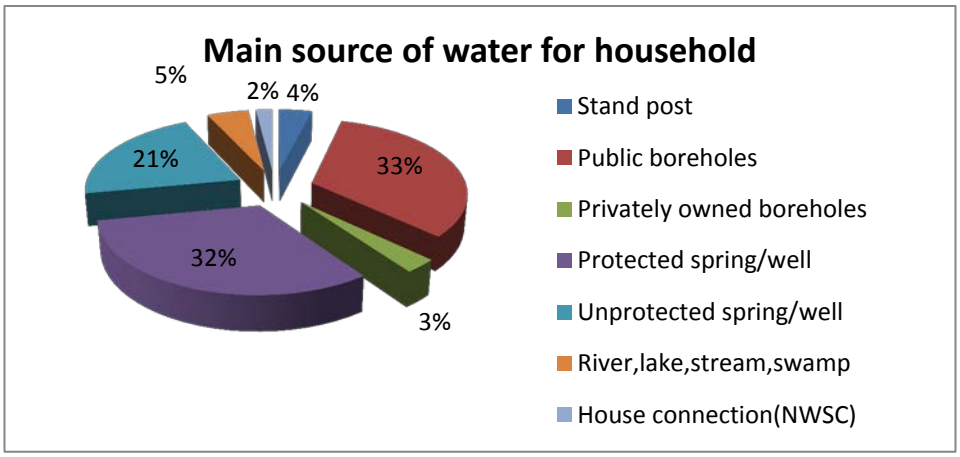
The health centers are at various levels with 46% being HCII, 37% are HCIII, 15% are at referral level while clinics and HC IV are at 1% each. Majority of the respondents think the health care system is slightly above average because of reasons such as; availability of a laboratory, enough health workers and medicine but absenteeism of health workers was cited as one of the problems facing proper and timely health service access. It should be noted that 64.7% of the population live in a distance of over 6km from the nearest referral hospital. This can be used to explain the claim by 80% of the respondents that the cost of health care has increased in the past 3 years.

WATER AND SANITATION

As a result of relative peace in the region, there is spontaneous return of persons to their ancestral homes and new settlements sites are being created. To date there are so many return villages some of which do not have any safe water and sanitation facilities. Even those that have, the sources have broken down beyond the capacity of the community to repair. The district has an average safe water coverage of 44% and latrine coverage of 27% with some of the new settlements having as low as 0 % of both facilities. Solid and liquid waste management in rural growth centres have remained very poor, while in new return settlements the situation is fair as a result of adequate spaces between the homes.

The survey conducted revealed that public boreholes and protected springs are the main water source in Nwoya district accounting for 65%. Other sources include unprotected springs at 21%, rivers streams and lakes at 5%, stand posts at 4%, privately owned boreholes and NWSC at 3% and 2% respectively. Figure 6-62 below shows the water sources in Nwoya district.

Figure 6-62 Water Sources in Nwoya District

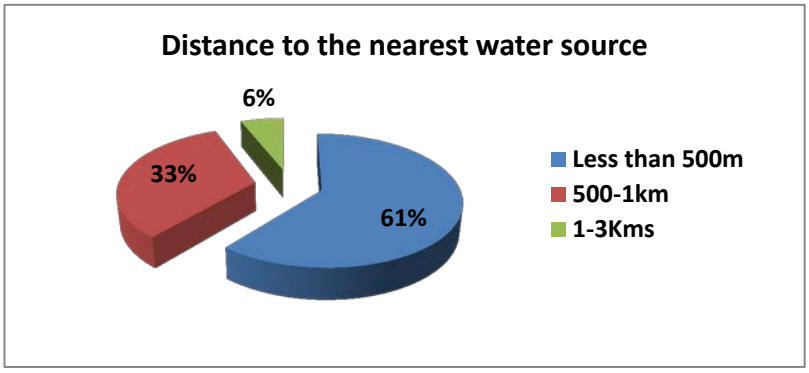


On average the water sources are sufficient because the water supply is sufficient all year round. The main problems identified were seasonal drying long queues and occasional break down of boreholes.

Picture 6-11 Borehole in Purungo, Nwoya district

In terms of distance trekked to the water source, 61% travelled a distance of less than 500m to the water point, 33% travel 500m to 1km to the water source while, 6% travel 1 to 3km. Figure 6-63 shows the distance to the nearest water source.

Figure 6-63 Distance to the nearest water source in Nwoya



In some parts of the project area, water sources in most cases are within the walking distances as recommended by government and as such 2% of the households spend less than 30 minutes fetching water while 80% of the households make 5 rounds fetching water.

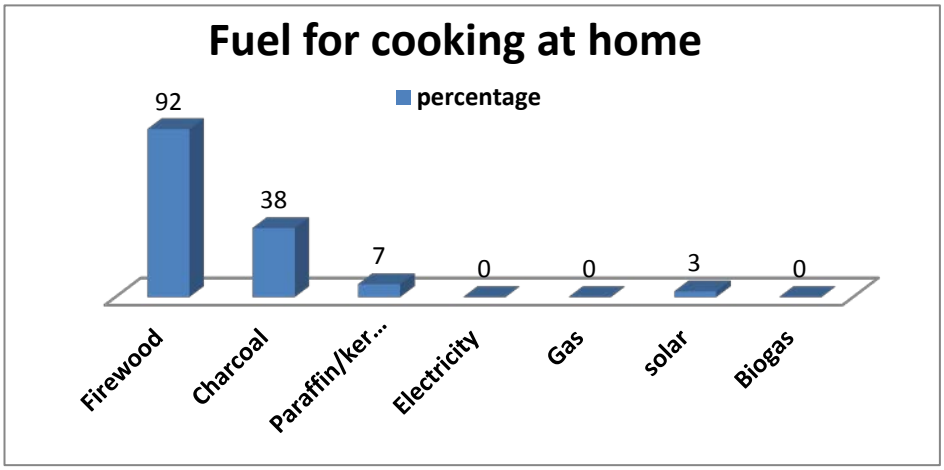
In terms of sanitation, all the respondents said they own sanitation facilities ranging from traditional latrines which accounted for 91%, with the remaining 9% falling under shallow pits, VIPs and flash toilets.

The majority (77%) have shallow pits for disposing off solid waste and only 8% of the households acknowledged the presence of public waste disposal site. Thus waste collected is either burnt or disposed in an unscrupulous manner (scattering in the general environment)

ENERGY SOURCES

Considering the outcome of the survey it was revealed that 92% of the population mainly uses firewood for cooking, 38% use charcoal as a source of energy for cooking and a few use kerosene and solar for cooking as shown in figure 6-64 below.

Figure 6-64 Fuel for cooking in Nwoya

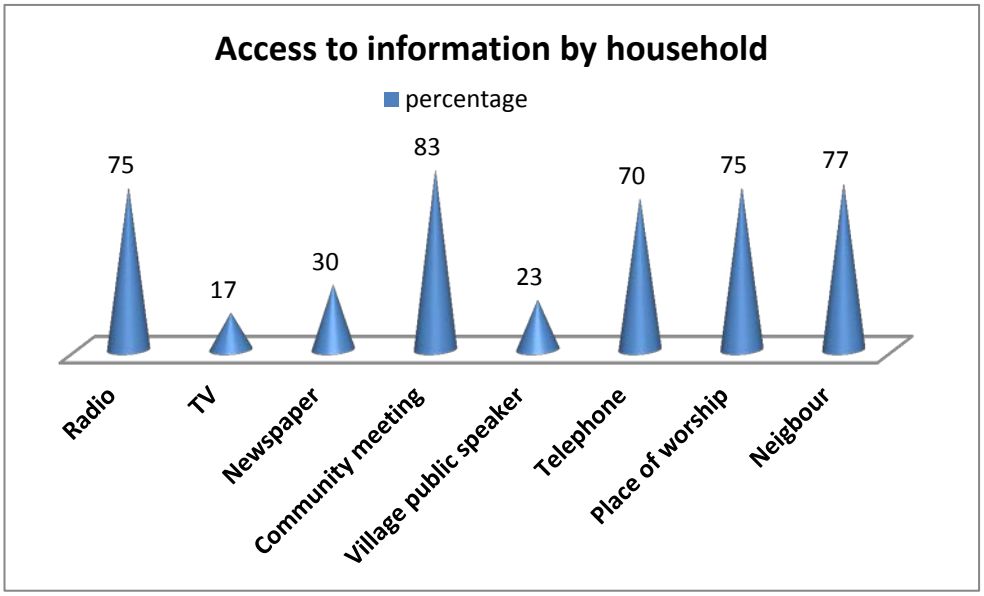


As for lighting 86% of the respondents said they use paraffin, 25% use solar and other forms such as firewood, gas and torches are also used. A majority of the population (68%) said the cost of energy has generally increased over the past 3years.

The media, especially radio which is widely accessible in the district, has a great influence on public opinion and attitudes. Although there is neither a radio station nor a TV station in the district, there are a number of private FM radio stations in the neighbouring districts of Gulu, Kiryandongo, Nebbi and Arua that broadcast mostly in the local languages. The above fact notwithstanding, there are reporters from both the print and electronic media who are based in the district to capture all the important events occurring in the district. The several telecommunications companies whose services are highly available in most parts of the district have also served to reduce the communication gap.

According to the survey it was revealed that the main mode of public information dissemination is by community meetings standing at 83%, neighbours at 77%, places of worship and radios both at 75% each, and telephones at 70%. Other forms of sending and receiving information about different aspects included the use of newspapers, village public speakers and televisions as shown in figure 6-65 below.

Figure 6-65 Information Dissemination Media in Nwoya



The total road network within the district is 732.6 km. Out of this, national road is 175 km, district road is 222.6 km and Community Access Roads is 335 km. When Nwoya District started in Fiscal Year 2010/11, already 108 km (14.7%) from Karuma via Olwiyo to Pakwach was bituminized. Additional 11 km from Olwiyo to Anaka Town Council was bituminized in FY 2012/13 with support of JICA. The proportion of paved roads (%) to the total national road network within the district therefore increased from 14.7% in 2010/11 to 16.2% in 2012/13. Picture 6-12 below shows part of the Olwiyo Pakwach road at Pajengo village in Purongo Sub County.

Picture 6-12 Part of the Olwiyo-Pakwach road at Pajengo village – Nwoya District

The various Project road crossings in the Nwoya district are shown in Table 6-42.

Table 6-42 Major Road Crossings in the Nwoya District

EASTINGS	NORTHINGS
363 376	285 693
362 756	285 369
346 873	284 563
346 861	284 557
344 143	279 422
343 647	278 960
343 579	278 897
343 550	278 870
341 882	277 317
340 804	276 312
340 240	275 385
339 061	273 127
392 197	291 067
402 781	290 474
409 057	289 412
399 843	289 332
375 929	281 151

6.5.11.6 NEBBI DISTRICT

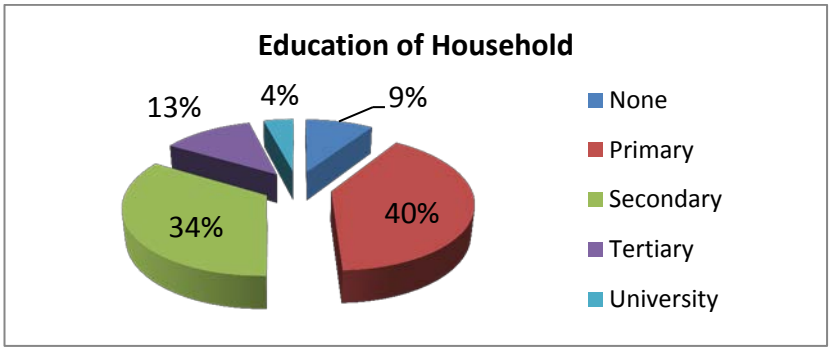
EDUCATION INFRASTRUCTURE

There is a total of 166 Primary Schools in Nebbi district, distributed at least one per parish throughout the district. The 166 Primary Schools include 153 Government Aided Primary Schools and 13 Non Formal Education Learning Centres (N.F.E).

Secondary Education is provided in 10 Government Aided Schools and 8 privately owned / community schools. The district has 3 prominent institutions one of which is Government aided and the rest privately owned. There is also one (1) Uganda College of Commerce (UCC) located in Pakwach Town Council, Jonam County. School completion rate is 56% for male and 51% for female and the average Distance to the nearest school is 3km for Primary and 10kms for secondary. Which is a main constraint especially to the girl child given the extra gender based roles they have to undertake on a daily basis.

The study revealed that primary schools are more evenly distributed in Nebbi with the majority of the population living in a distance of less than 3km. as for secondary schools, they are sparsely distributed and very often students have to move for longer distances and this affects enrollment after primary section. According to the survey most household heads completed at least primary level while 34% attained secondary level education and about 13 and 9 percent reaching tertiary and university levels respectively as represented by the figure below.

Figure 6-66 Education level of household head - Nebbi

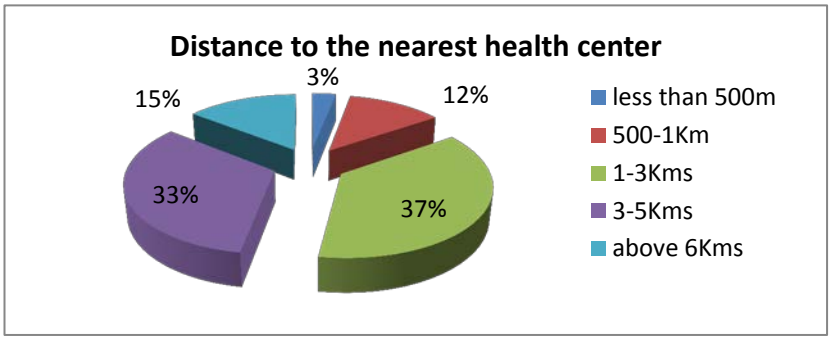


On the basis of gender it was established that there is a very high discrepancy between the level of education attained by males and females in Nebbi district. Most women had primary level education although it should also be noted that most of the respondents were male. It was further revealed that 70% of the respondents could read and write in the official language while 30% could not.

HEALTH INFRASTRUCTURE

The district has a total of 38 health facilities categorized as (17 HCII, 18 HCIII, 1 HCIV and 2 hospitals). Population per doctor ratio is 1:32,392 while that of patient to nurse is 1: 995. Survey findings show that 85.4% of the population sampled live in a distance of less than 5 km from the nearest health center but the distance to the nearest referral unit is more than 5 km. the services offered were generally classified as good based in issues like availability of drugs, medical equipment and qualified health workers. It should be noted though that the respondents said the cost of health services has increased over the past 3 years.

Figure 6-67 Distance to nearest health unit - Nebbi



The services offered were generally classified as good based on issues like availability of drugs, medical equipment and qualified health workers. 57% of the respondents live in a distance of over 6km from the nearest referral unit. It should be noted though that the respondents said the cost of health services has increased over the past 3 years.

WATER AND SANITATION

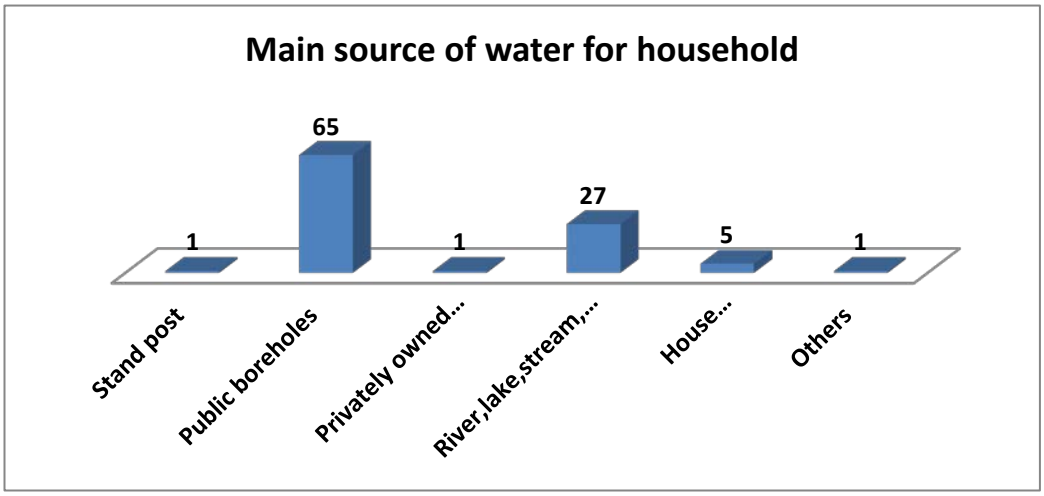
The overall District water coverage stands at 74% which is above the national coverage of 65% while rural and urban water coverage is at 76% and 64% respectively.` This water coverage is spread over the various Sub Counties with the highest in Nebbi T.C and Kucwiny (95%) and the lowest in Pakwach Town Council (25%) as at 30th June, 2010. Functionality of water facilities stood at 75% as at 30th June, 2010.

District statistics show that there is a total of 562 deep boreholes, 111 shallow wells, 182 protected springs, 2 surface water based piped water system, 1 ground water based piped water system, 83 rain water tanks, 6 valley dams, 5 valley tanks, 29 public stand pipes/kiosks/tap stands and 991 yard taps as at 30th June, 2010. From the above data, not all the villages have a water facility and hence majority of the water points are currently being shared by a number of villages ranging from 2 to 6 villages. This is

particularly true for boreholes and as a result a borehole which is expected to serve a population of 300 people is being used to serve a population ranging between 800 to 1,200 people.

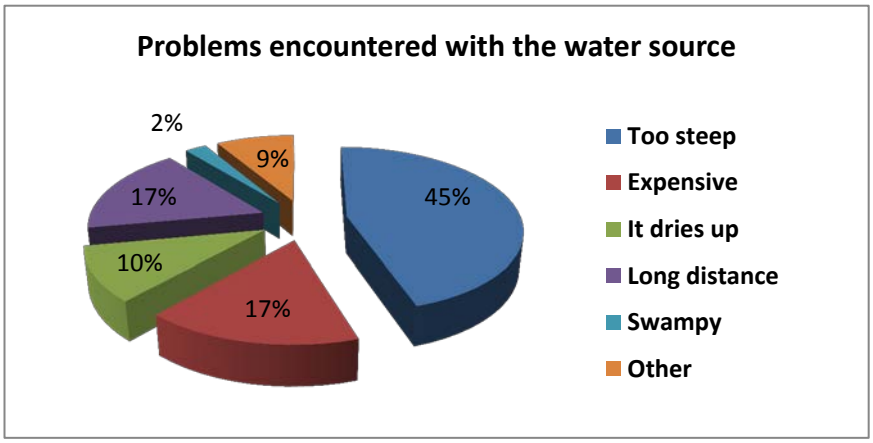
The most common source of water is public boreholes, and rivers/streams as represented on the graph below.The number of jerry cans fetched per day varied from household to household with 51% using between 1 and 5 jerry cans, 37% using between 6 and 10 and the remaining 12% using more than 10 jerry cans.

Figure 6-68 Main source of household water – Nebbi District



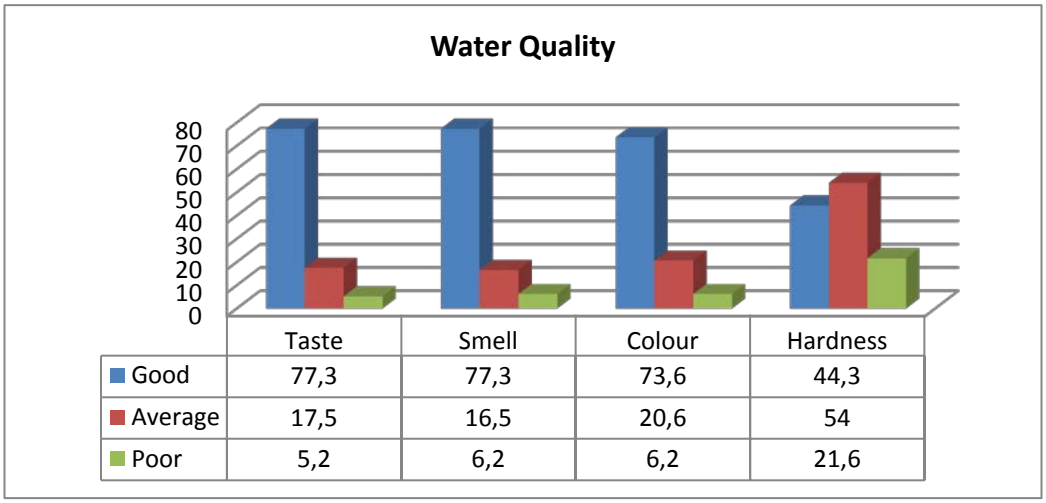
The main challenge encountered with the streams and rivers is that they tend to dry up or reduce in volume during the dry spell, steepness especially for people who draw their water from the Nile. There was also a problem with the long distance they have to trek with some staying as far as 8km from a reliable water source and long queues at the water points especially the boreholes. All the above factors increase on the time spent/lost collecting water as indicated in the pie chart below.

Figure 6-69 Main problem encountered at water source – Nebbi District



The quality of water was assessed using parameters such as taste, color, hardness and smell and it was generally deduced to be of good quality since all parameters scored above 50% as represented on the bar graph below.

Figure 6-70 Water Quality – Nebbi District



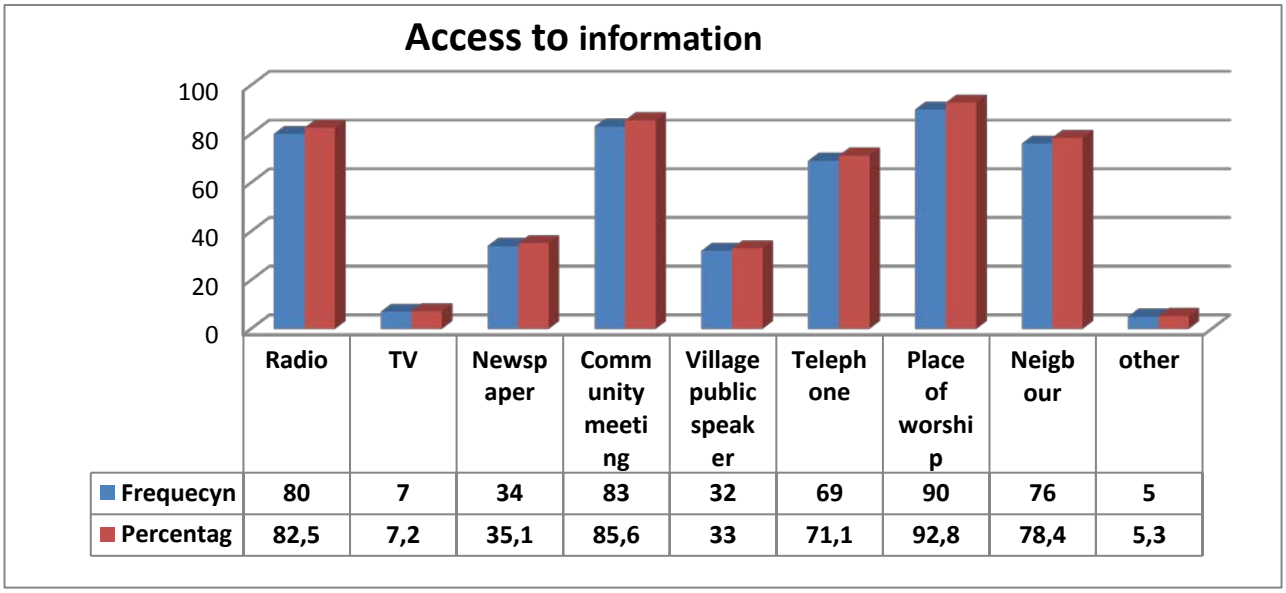
	Taste	Smell	Colour	Hardness
Good	77,3	77,3	73,6	44,3
Average	17,5	16,5	20,6	54
Poor	5,2	6,2	6,2	21,6

97% of those interviewed said they had human waste disposal facilities ranging from the traditional latrine, VIP and shallow pits. Shallow pits that are dug around home steads are commonly used for domestic waste disposal. Burning, scattering in gardens and open dumping is also used. For town councils it was established that there are public waste disposal sites.

TRANSPORT AND COMMUNICATION

Based on the findings, most people receive information through the radio, village meetings, from places of worship and neighbours. Other forms such as newspapers and cellphones are also widely used by those who have mobile phones. Detailed representation is shown by the graph below.

Figure 6-71 Modes of communication – Nebbi District



	Radio	TV	Newspaper	Community meeting	Village public speaker	Telephone	Place of worship	Neigbour	other
Frequecyn	80	7	34	83	32	69	90	76	5
Percentag	82,5	7,2	35,1	85,6	33	71,1	92,8	78,4	5,3

There is a total length of community access roads of only 410.2 km. This is a short network and limits the free movement of the people and goods, both from outside and within. To be able access enough food from outside, in case of need, it is important that more access roads be opened. Also maintenance and rehabilitation of the existing roads need to be done to make most households/villages accessible.

In Nebbi District, the Project crosses a road at a few locations (Table 6-43).

Table 6-43 Road crossings in Nebbi District

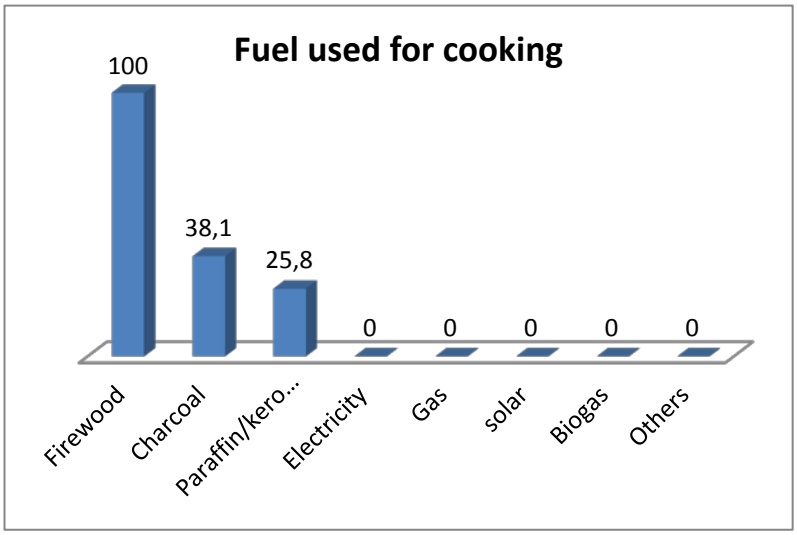
EASTINGS	NORTHINGS
311 046	272 937
323 333	272 434
322 236	272 241
308 445	272 368

The district also has an air field which is under the management and control of civil aviation authority. It is located approximate 5.8 km to the North-East of Nebbi's town center, and the landing strip is located approximately 2.5 km from the projected line route, in the direction of the landing strip's axis.

ENERGY SOURCES

Based on the household survey conducted it was established that all households use firewood as the main source of energy for cooking but in towns and trading centers this is often supplemented by charcoal and kerosene as shown by the bar graph below.

Figure 6-72 Main sources of energy – Nebbi District



On the other hand 93% use paraffin mainly for lighting although firewood, grass and torches are also often used. According to 91% respondents the cost of energy for both cooking and lighting has increased a lot over time.

6.5.11.7 ARUA DISTRICT

EDUCATION INFRASTRUCTURE

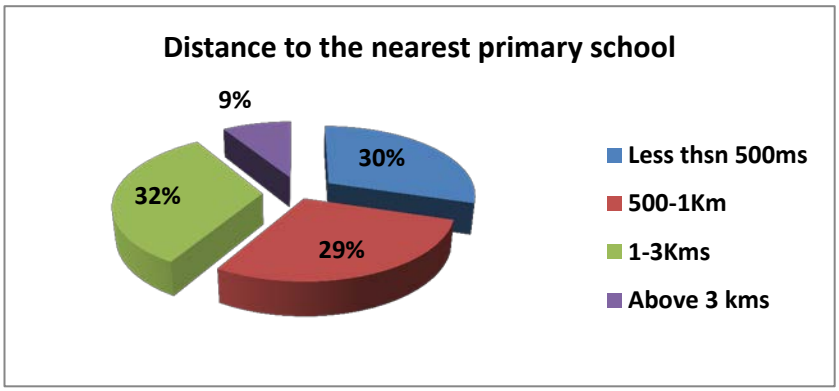
West Nile region is relatively covered well in terms of primary education. It was evident that the number of secondary, vocational and institutes was very low to cater for all primary level leavers. The discrepancy was is form of lack of institutions or their ill facilitation like lack of electricity, enough teachers and scholastic materials. The government policy is to have one senior secondary school per sub-county, which is government aided. However, this has not been achieved as most of the secondary schools are privately owned and mainly concentrated in the urban centres. The situation is slightly better due to the contribution of private secondary schools which has been made possible by providing enabling environment under public private partnership.

There is very high gender discrepancy between boys and girls of school going age who are actually in school. This is because some parents are reluctant to send girl children to school due to cultural beliefs

that tend to favor boys. The low literacy levels among women together with cultural ties have suppresses the role of women in the economic development of Arua.

In reference the survey conducted access to primary education by respondents is good because over 91% live in a distance of less than 3km from the nearest school as shown by the pie chart below.

Figure 6-73 Distance to nearest primary school – Arua District



The study revealed that 44% of the respondents live in a distance of less than 1km from the nearest secondary school, 23% live in a distance of 1-3km while 33% live above 3km away compared to only 9% for primary level. Secondary schools are relatively far and as such a hindrance to continuing with school after primary level completion. 81% of the respondents said they know how to read and write in the official language while 19% could not.

HEALTH INFRASTRUCTURE

Based on the findings 60% of the population live in a distance of less than 3km, 24% live 3-5km from the nearest health center while the remaining 16% live above 6km from the nearest health facility. It should be noted though that 72% of all respondents live in a distance of over 6km from the nearest referral health unit. 64% of the facilities are health center III, 22% are referral units, 12 % are health center II while 2% are at level IV. The services rendered at these centers have been categories as good because 57% said they are average, 20% said they are good while 5% of the respondent saying the services are very good. Only 18% of the respondents said the services offered at the respective health centers are poor because of bad handling of patients. Reasons cited for their responses included availability of enough medicine, having enough doctors and health centers having laboratory facilities among others. Over 70% of the respondents said the cost of health services has gone up in the recent past.

TRANSPORT AND COMMUNICATION

The Packwach-Nebbi-Arua road which is the main access route is in good condition save for some access routes for areas were the proposed transmission line is remote from the main road. Inadequate and poor physical infrastructure conditions constraint production in many sectors of the district's economies. The routine road maintenance has not been easy due to heavy rains experienced from August to November 2010. This has often resulted into floods destroying road surface and affecting social service delivery.

There is no major Project - road crossings in the Arua district.

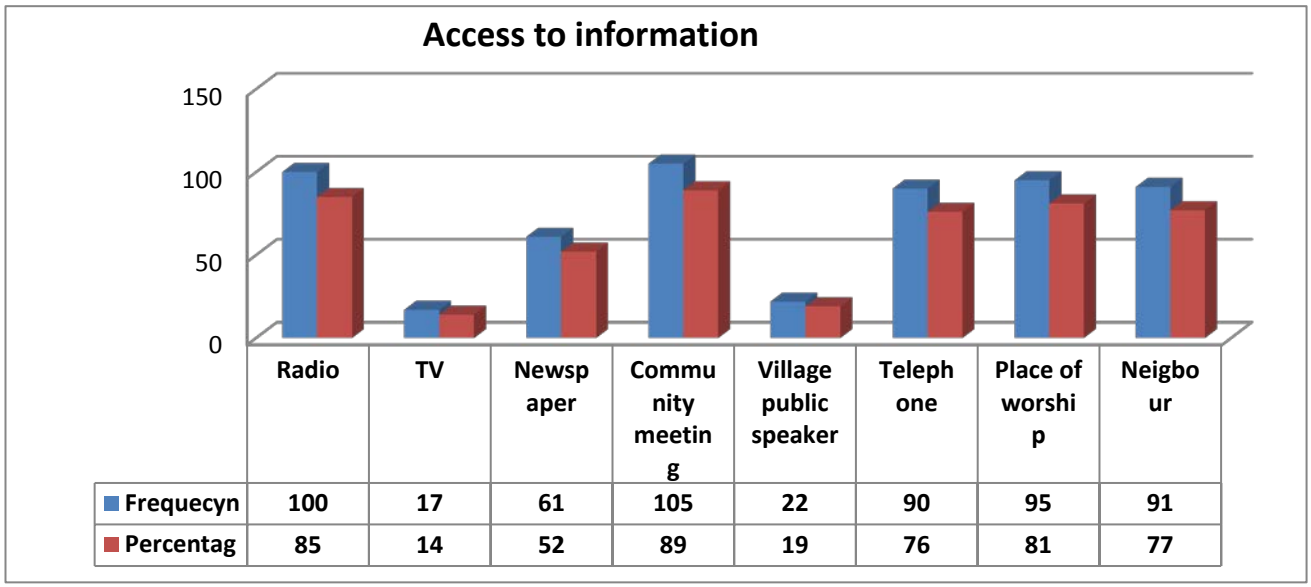
The district also has an air field which is under the management and control of civil aviation authority. It is located approximate 2km to the North-North-West of Arua's town center

Communication is by radio, telephones and a few people have television sets. All mobile service providers in the country have signals in the district although the network is often poor in remote areas.

Based on the survey, the most reliable and convenient ways of passing on information in Arua is by use of radio, community meetings, place of worship, neighbours and cell phones. Other forms of

communication include newspapers, TVs and public speakers although this target a smaller audience compared to the former. The findings have been illustrated by the figure below.

Figure 6-74 Media for Communication – Arua District



	Radio	TV	Newspaper	Community meeting	Village public speaker	Telephone	Place of worship	Neigbour
Frequecyn	100	17	61	105	22	90	95	91
Percentag	85	14	52	89	19	76	81	77

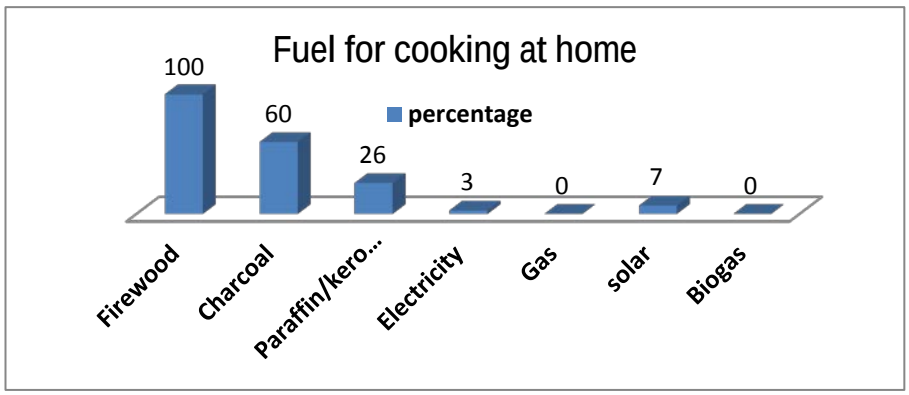
ENERGY SOURCES

Like other districts the main source of energy for cooking is firewood with 87.4% using it while 11% use charcoal and the remaining caters for paraffin electricity and biogas. Paraffin is the main source of energy for light at 95% while electricity is used by only 1% of the population. Arua district and the West Nile region in general is one of the regions with the lowest electricity consumption level as most parts of the districts lack electricity supply. Only Arua district is covered under the West Nile Rural Electrification Program at the moment and the current plan is to extend up to Yumbe district.

The use of electricity is further constrained by high power tariffs and inadequate transmission and distribution network. Moreover, the supply of electricity in West Nile also experiences disruption due to shortage in fuel supply; although this has improved in recent past. This inadequate and unreliable power supply in the district is a big disincentive to investors and hampers value addition to agricultural products. The limited electricity supply also affects the effective teaching and learning in secondary schools and hence poor performances.

Survey findings showed that all households sampled use firewood as the main source of energy for cooking but this is supplemented by charcoal and paraffin at 60 and 26%. Others sources of energy include electricity and solar as shown on the bar graph below.

Figure 6-75 Main source of energy – Arua District



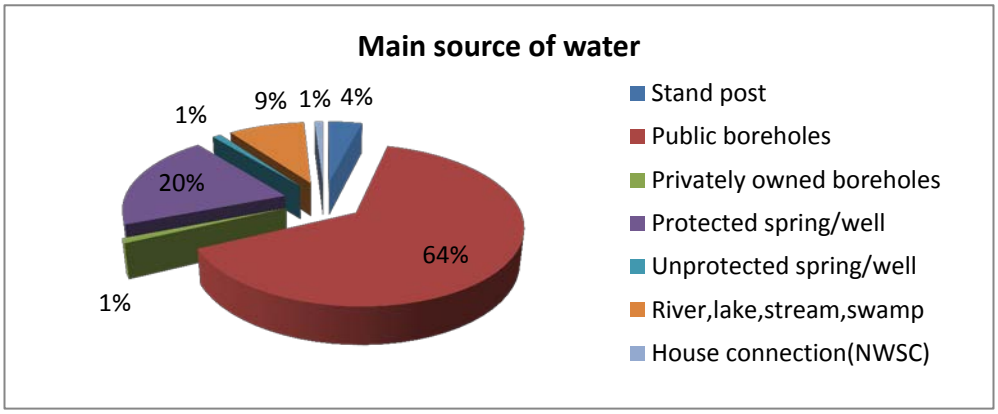
Kerosene is used for lighting by 95.8%, 27% use solar and about 9.3 said they use electricity. It should be noted though that since other forms of energy are not always reliable, kerosene is considered to be principle.

Based on the survey findings it was reported by 91% of respondents that the cost of energy has gone up in the recent past, only about 3% said the cost has said the same while the rest did not know.

WATER AND SANITATION

There are a number of water sources in the two districts including boreholes, protected springs, open well and piped water especially in urban centres. The safe water coverage of West Nile region is generally above 50% but below the national average of 63% due to drying up of water sources following climate change and decommissioning of some water sources that are non-functional for a long period of time. This leaves a very big percentage of the population in districts without access to clean and safe water. Only main trading centres and town councils have access to piped water.

Figure 6-76 Main source of water - Arua District



The chart above shows findings of the survey which indicate that, the main source of water for sampled respondents is public boreholes and protected springs providing 64.4% and 20 % of water needed respectively. Streams/rivers and stand posts cater for 8.5% and 4%. House connection, unprotected springs and privately owned water boreholes are the least used sources. Majority of respondents stay less than a kilometer from the water source and the quality of water collected was said be good based on parameters such as color, test, hardness and smell although streams tend to dry up during long dry spells. The other problems mentioned were the long queues that often lead to wastage of time and high maintenance costs for boreholes. On average time spent on a single trip is 30 minutes to 1hr and 75% of households use 1-5 jerry cans a day.

The sanitation coverage varies from district to district but fluctuations have been noted with changes in weather. It often improves during dry season and decreases during rainy season. The average household latrine coverage is lower than average school latrine coverage which stands at 88.5% with girls having a lower coverage of 67.2% compared to Boys with about 109.7%. With the low safe water coverage, cases of diseases and poor health are common among the communities which are a typical characteristic of the poor sanitation.

Of all the respondents, only one said he did not have a latrine. 89% of these facilities are traditional latrines, 5% have flush toilets, 4% with VIPs and the rest being shallow pits as shown in the table below.

Table 6-44 Type of sanitation facility - Arua District

TYPE OF SANITATION FACILITY	FREQUENCY	PERCENT
Traditional pit latrine	106	89.8
Flush toilet	6	5.1
VIP	5	4.2
Shallow pits	1	0.8
Total	118	100.0

Domestic waste was managed at household level except for those within Arua municipality. The main forms of disposing off included shallow pits which account for 55.9%, burning is used by 44.1%, 23.7% dump domestic waste openly while 13% scatter waste in gardens.

7 IMPACT ASSESSMENT

This section identifies and discusses both negative and positive environmental and social impacts likely to be associated with the proposed Lira-Gulu-Nebbi-Arua 132 kV transmission line project. Firstly, section 7.1 exposes the method used for impact identification and assessment. Then, section 7.2 discusses the assessment of potential impacts identified as well as of proposed mitigation or enhancement measures. Finally, section 7.3 gives an overview of the project's cumulative impacts.

It should be noted that in this chapter and in order to lighten reading, unless otherwise stated, the term ROW is used to describe the complete width of the project's right-of-way and wayleave.

7.1 METHOD FOR IMPACT IDENTIFICATION AND ASSESSMENT

The method used to identify and assess the project's impacts relies primarily on extensive knowledge of the project and its environment, as well as on experience in conducting environmental and social impact assessments for similar projects. Lessons learnt from previous experiences provide relevant information on the nature and intensity of impacts associated to this type of project, as well as on the real effectiveness of mitigation and compensation measures generally applied.

The method for impact identification and assessment is based particularly on the three following elements:

- The project description, which enables the identification of potential sources of impact based on the technical characteristics of the infrastructures to be built, as well as construction activities, methods and schedule. The project is described in detail in chapter 2.
- The description of the existing environment, which allows to understand the ecological and social context in which the project is implemented and to identify, if applicable, issues that should be considered. The environmental components are described in chapter 6.
- The issues and concerns raised by PAPs and other stakeholders, which allow identifying the main issues related to the project. Public issues and concerns are discussed in chapter 5.

7.1.1 KEY ELEMENTS FOR IMPACT ANALYSIS

7.1.1.1 SOURCES OF IMPACT

The sources of impact can be defined as all the activities linked to the project likely to have an impact on the environment. The sources of impact are grouped by project phase: construction, operation and decommissioning phases.

Table 7-1 below summarizes the LGNA project potential sources of impact at each project phase.

Table 7-1 Sources of Impact

Pre-construction phase	
Land acquisition	Procedures relating to agreements with landowners.
Resettlement	Resettlement process of the people affected by the project.
Displacement of Economic Activities	Resettlement process of economic activities affected by the project.
Construction Phase	
Site Preparation	Site preparation activities, including establishment of equipment storage yards and worker camps, vegetation clearing, removal of topsoil, excavation, earthworks and construction of access roads.
Exploitation of Borrow Pits	Use of borrow-pits as source of granular fill.
Construction Activities	Construction of the power transmission line and substations, including temporary facilities used during the work phase.
Waste and Hazardous Materials Management	Management and storage of waste, hazardous substances and other materials to be removed, including hydrocarbons.
Transportation and Circulation	Road transportation of materials, equipment and workers to and from the site, including fueling and maintenance of vehicles and machinery.
Purchase of Materials, Goods and Services	Purchases required for the construction of the power transmission line and substations.
Presence of Workers	Workers present along the ROW and substation sites
Work-sites Restoration	Restoration of work-sites.
Operation phase	
Presence and operation of Line, Substations and Access roads	Presence and operation of facilities.
Maintenance and Repair	Inspection, maintenance and repairs of conductors, towers and structures in substations.
ROW management	Activities related to the ROW maintenance.
Waste and Hazardous Materials Management	Handling operations and storage of hazardous waste and used during the operation, including oil used in transformers in substations.
Transportation and Circulation	Road transportation of materials and equipment, including vehicle fueling and maintenance.
Purchase of Materials, Goods and Services	Purchases required for the operation of the power transmission line
Presence of Workers	Employees operating substations and during maintenance along the line.

It should be noted that impacts resulting from the project's decommissioning phase were neither identified nor assessed in the present report. Indeed, it is anticipated that the power line and associated substations will be continuously maintained and operated for several decades. This very long useable life makes it very difficult and potentially counter-productive to predict, at this stage, the circumstances under which the project installations might ultimately be decommissioned. However, it is recommended to conduct full assessment of the decommissioning phase impacts when enough information on the decommissioning phase becomes available.

7.1.1.2 ENVIRONMENTAL AND SOCIAL COMPONENTS

Determining environmental and social components (ESC) consists in identifying, based on available data, all elements of the physical, biological and human environments that are likely to be affected by one or more sources of impact. The ESC identified for the LGNA transmission line project are listed in Table 7-2. The environmental assessment process will focus only on these components.

Table 7-2 Environmental and Social Components

	COMPONENT	DESCRIPTION
Physical Environment	Soils	Physico-chemical characteristics of surface deposits, including vulnerability to erosion.
	Water Resources	Physico-chemical characteristics of surface water, sediments and groundwater
	Air Quality	Physico-chemical characteristics of air
	Noise, Vibrations and Electromagnetic Fields (EMF)	Noise, vibrations and EMF levels
Biological Environment	Terrestrial habitats and associated flora	Terrestrial plant communities, including special-status species.
	Aquatic habitats and associated species	Riparian and aquatic plant communities and wetlands, with associated species, including special-status species.
	Terrestrial Fauna	All terrestrial and semi-aquatic animal species and their habitats, including special-status species.
	Avifauna (Birds)	All bird species and their habitats, including special-status species.
Human Environment	Land Use	Land uses: agricultural, mining, forestry, urban, etc.
	Built Environment	Impacts on buildings
	Transportation	Regional and local road network, railroads,
	Local and Regional Economy	Local and regional economic development, employment.
	Public Facilities, Utilities and Services	Electricity and telecommunication networks, public services (health, education), etc.
	Archaeological, Cultural and Historical Heritage	Religious, cultural or historical sites and structures.
	Safety and Public Health	Population well-being and health, including among others: • HIV/AIDS issues; • Identification of most vulnerable groups and institutions along the transmission corridor; • Collaboration with actors and partners.
	Gender Issues	Women living conditions, including among others: • Women's economic and employment opportunities as well as gender equity within communities; • Women's work conditions, adherence to labor laws and employment act including non-tolerance to sexual harassment and abuse; • Gender based child protection; • Stemming Gender based violence.
	Communities and Social Cohesion	• Traditional knowledge, social cohesion and vulnerable groups (the poor, youth, women, elderly and indigenous people), as well as post-conflict issues; • Complaints management; • Communication and community engagement as well as feedback.
	Landscape	Integrity of landscape features (landmarks, etc.)
	Workers' Health and Safety	Health and safety issues including labor issues and child protection.

7.1.1.3 ENVIRONMENTAL AND SOCIAL ISSUES RAISED IN STAKEHOLDER CONSULTATIONS

Consultations held with PAPs and relevant stakeholders raised the main environmental and social issues and concerns associated with the project. These issues are summarized in Table 7-3 and will be considered for impact assessment as they represent the most sensitive and the most valued components of stakeholders.

Table 7-3 Main Environmental and Social Issues

BIOLOGICAL ENVIRONMENT	
Ecosystems and Fauna	Presence of sensitive and fragile ecosystems, such as wetlands, watercourses, wildlife dispersal areas close to the Murchison falls national park, wooded savannah and forested areas;
HUMAN ENVIRONMENT	
Land Use	Permission from relevant authorities to initiate the project in areas with established installation such as aerodromes/airports, railway lines, road reserves and industrial parks.
Socio-economic and Land	Extent of land to be acquired for the project. Modalities of compensation for loss of property and/or land and /or livelihood, including valuation procedures as well as compensation criteria (need of documents proving land ownership). Resettlement plan Economic impact of the power transmission line (electrification, development of economic activities, etc.) Management of complaints Equity and support of the vulnerable groups
Archaeological, Cultural and Historical Heritage	Presence of cultural sites (i.e: Wang-Lei and Amor Ferry, in Pakwach Sub County), burial grounds and potential archaeological and paleontological artefacts.
Community and social cohesion	Implication of chiefs and elders during the RAP process Importance of cultural institutions for settling all complaints and potential conflicts Mobilization and sensitisation of communities
Gender and Special Groups	Involving women and other special groups in the project decision making process Considering vulnerable groups for the assessment of impacts Potential issues of child abuse including child marriage, child sexual abuse, school dropout
Public Health and Safety	Public health and safety issues, including risk of electric shock and other accidents Potential HIV/AIDS spread along the corridor

7.1.2 IDENTIFYING POTENTIAL IMPACTS

Potential impacts are identified using an “impact identification matrix” that links ESC and sources of impacts at each project phase, i.e. pre-construction, construction and operation (see Table 7-4). The importance of potential impacts identified by these means is then assessed in section 7.2.

Table 7-4 Impact Identification Matrix

		Physical Environment				Biological Environment				Human Environment									
		Soils	Water Resources	Noise, Vibrations and EMF	Air Quality	Terrestrial Habitats and associated Flora	Aquatic Habitats and associated Fauna	Terrestrial Fauna	Avifauna	Land Use	Built Environment	Employment and Economic Development	Infrastructures	Cultural and Archaeological Heritage	Gender Relations	Communities and Social Cohesion	Community Health and Security	Landscape	Workers' Health and Safety
Sources of Impacts	**Pre-Construction Phase**																		
	Land Acquisition									X	X				X	X			
	Resettlement										X				X	X			
	Displacement of Economic Activities															X			
	Construction Phase																		
	Site Preparation	X	X	X	X	X	X	X	X				X	X				X	X
	Exploitation of Borrow Pits					X								X				X	X
	Construction Activities	X	X	X	X	X	X	X	X			X	X	X	X		X	X	X
	Waste and Hazardous Materials Management	X	X			X	X										X		X
	Transportation and Circulation	X	X	X	X	X	X					X					X		X
	Purchase of Materials, Goods and Services																		
	Presence of Workers			X		X	X	X	X			X			X	X	X		X
	Work Sites Restoration					X													X
	Operation Phase																		
	Presence and operation of Line, Substations and Access Roads	X	X	X		X	X	X	X	X			X				X	X	
	Maintenance and Repair	X	X							X					X				X
	ROW Management					X	X	X	X						X				X
	Waste and Hazardous Materials Management					X	X	X	X										X
	Transportation and Circulation		X			X			X		X								X
	Purchase of Materials, Goods and Services																		
	Presence of Workers											X			X	X	X		X

7.1.3 IMPACT ASSESSMENT

7.1.3.1 IMPORTANCE OF IMPACTS

Impact assessment consists in determining the importance of potential impacts on physical, biological and human environments at each stage of the project. This assessment takes into account all measures integrated to the project's design, and focuses on impacts that remain after the application of general or specific mitigation measures (residual impacts).

Impacts are either positive or negative. A positive impact is considered to represent an improvement on the baseline conditions of the ESC affected by the project, while a negative impact is considered to contribute to its deterioration. The importance of each impact identified is evaluated according to the criteria defined below.

IMPACT INTENSITY

Impact intensity indicates the degree of disturbance observed on an environmental or social component affected by the project.

This analysis takes into account the characteristics of the ESC affected by the project, mainly its sensitivity and resilience to change, as well as its value (biological or socio-economic components only). The environmental value is determined using professional judgement and takes into account the role that the ESC plays in the ecosystem (biological components) or in the socio-economic context, as well as the value assigned to the ESC by stakeholders consulted. ESC that are subject to legal or regulatory protection or that play a critical role in their environment (ecosystem, socio-cultural and economic environments, etc.) are considered of great value. On the contrary, ESC that lack of interest and whose conservation and protection are of little concern to the public are considered of low value.

The intensity of an impact is measured using the following scale:

- **High**: where natural, cultural or social functions and processes are altered to the extent that it will temporarily or permanently cease; and valued, important, sensitive or vulnerable systems or communities are substantially affected.
- **Medium**: where the affected environment is altered but natural, cultural and social functions and processes continue although in a modified way; and valued, important, sensitive or vulnerable systems or communities are negatively affected
- **Low**: where the impact affects the environment in such a way that natural, cultural and social functions and processes are minimally affected.

IMPACT EXTENT

Impact extent refers to the extent of the area or the proportion of the population affected by the project. The extent of an impact is measured using the following scale:

- **Regional**: where the impact is felt within the entire study area (or a larger area than the study area) or by a large proportion of its population.
- **Local**: where the impact is felt by a portion of the study area or its population.
- **Limited:** where the impact is felt within a limited, confined area, or by a small proportion of the population within the study area.

IMPACT DURATION

Impact duration refers to the period of time during which changes in the environment are likely to occur. The duration of an impact is measured using the following scale:

- **Long**: when the effects are felt continuously for the lifetime of the transmission line or beyond.
- **Medium**: where the effects are felt continuously over a period of time shorter than the lifetime of the transmission line but longer than the construction period.
- **Short**: where the effects are felt sporadically over a short period of time.

7.1.3.2 MITIGATION, ENHANCEMENT AND COMPENSATION MEASURES

As discussed before, project optimal integration into the surrounding environment is fostered through the implementation of design criteria or optimizations aimed at environmental protection from the planning and design phases of the project.

Mitigation measures aim to reduce the project's remaining negative impacts, while enhancement measures aim to increase the project's benefits or positive impacts. On the other hand, compensation measures are applied to offset or compensate for some residual negative impacts which cannot be avoided or further reduced.

7.1.3.3 ASSESSING THE IMPORTANCE OF IMPACTS

The importance of an impact results from an overall judgement on the effect of a source of impact on an environmental or social component, after the application of mitigation or enhancement measures.

An impact is either positive or negative. However, only the importance of negative impacts is assessed in this study. The impact assessment is based on the three criteria discussed in section 7.1.3.1 above: intensity, extent and duration of the impact. The correlation between these criteria, as shown in Table 7-5, allows making an overall judgement on the importance of the impact at each phase of the project based on the following scale: minor, moderate or major importance.

The impact assessment matrix presented in Table 7-5 is meant to be symmetric since there are seven (7) possibilities for the impact to be of major importance, thirteen (13) possibilities for the impact to be of moderate importance and seven (7) possibilities for the impact to be of minor importance.

7.1.3.4 IMPACT PROBABILITY OF OCCURRENCE

The impact assessment also examines the probability of occurrence, i.e. the likelihood that an impact affects a component. The probability may be high, moderate, or low:

- High probability: the impact will certainly manifest itself.
- Moderate probability: the impact might occur, without any certainty.
- Low probability: it is unlikely that the impact occurs or it could occur only in the event of an accident.

Note that the analysis of the impact probability of occurrence is conducted separately from that of the importance, since they are two independent criteria that do not influence each other. Thus, this criterion is not included in the impact assessment matrix. To facilitate reading of the impact assessment, the analysis of these two criteria is nevertheless presented together, in the Detailed Impact Description and its final evaluation.

Table 7-5 Impact Assessment Matrix

IMPACT ASSESSMENT CRITERIA			IMPORTANCE
Intensity	**Extent**	**Duration**	
High	Regional	Long	Major
		Medium	Major
		Short	Major
	Local	Long	Major
		Medium	Major
		Short	Moderate
	Limited	Long	Major
		Medium	Moderate
		Short	Moderate
Medium	Regional	Long	Major
		Medium	Moderate
		Short	Moderate
	Local	Long	Moderate
		Medium	Moderate
		Short	Moderate
	Limited	Long	Moderate
		Medium	Moderate
		Short	Minor
Low	Regional	Long	Moderate
		Medium	Moderate
		Short	Minor
	Local	Long	Moderate
		Medium	Minor
		Short	Minor
	Limited	Long	Minor
		Medium	Minor
		Short	Minor

7.2 IMPACTS ASSOCIATED TO THE LGNA PROJECT

7.2.1 POSITIVE IMPACTS

7.2.1.1 EMPLOYMENT AND INCOME

Positive opportunities for PAPs and communities can be in the form of temporary employment and business opportunities during the construction phase, including revenues from the sale of food and other consumable goods to workers from other parts of the country and abroad.

It is expected that some jobs will be available during construction of the power transmission line for the local population, mainly as casual workers. However, these employment opportunities are expected to be temporary and benefit the community in the short term only. There will be a minimal positive impact on employment, since few local people are likely to be employed.

7.2.1.2 RURAL ELECTRIFICATION

One of the most important anticipated benefits to the population is increased electricity supply to communities and households. There is currently a lack of electricity in areas crossed by the project.

Many significant long-term indirect impacts could arise with the electrification of cities and villages and increased electricity availability, provided that the project is properly optimized and integrated to its environment. With the additional energy supply, community institutions and trading centers could improve services, increase economic activity and accelerate their development in their areas of expertise. Paragraphs below provide project integration avenues that could be considered in order to maximize positive impacts.

REDUCING DEFORESTATION

An additional potential co-benefit of rural electrification is the possibility to provide rural households the opportunity to use electricity for their energy needs as an alternative to firewood and charcoal. Firewood harvesting is responsible for much deforestation, and the project could help reduce the deforestation rate in the areas to be connected to the line and their surroundings.

AGRICULTURAL INFRASTRUCTURES

Improved availability and reliability of energy in the region, resulting in improved access to electricity for households and communities, can also improve storage and processing of agricultural products, thus increasing their market value and / or extend their preservation periods. Storage with refrigerators can preserve dairy products, fruits and vegetables that can be sold or consumed during the following days. Grain mills can be implemented in the villages of producers instead of bringing products to "mill towns", thereby reducing transportation costs. These improvements could result in higher values for agricultural products and better incomes for farmers in the long term.

POVERTY REDUCTION

Rural electrification is at the center of programs to reduce poverty and could support rural economic development through the provision of energy to power water pumps, grain mills, tourism, local industries, etc.

WELL-BEING OF WOMEN

Local electrification has the potential to significantly reduce women’s workloads through the usage of water pumps and electricity. It could save them some of the arduous daily responsibilities such as collecting water and firewood. Therefore, it could also have a significant impact on the environment, which is also threatened by deforestation and soil erosion.

DEVELOPMENT AND HEALTH

Electrification could support investments in education and strengthen capacity building efforts to overcome critical constraints in the implementation of development programs. Power supply to health facilities, cold storage for transport and storage of vaccines and other essential medicines could be significant improvements to health services in the project area.

7.2.1.3 POSITIVE IMPACT ENHANCEMENT MEASURES

- → UETCL shall contact REA to ensure joint coordination of electricity distribution activities as part of the Project;
- → Adopt human resources policies favouring local labour;
- → Adopt procurement policies promoting local products and services, when available;
- → Implement training programs to build local capacity;
- → Disclose information on newly created business opportunities.

7.2.2 NEGATIVE IMPACTS ON THE PHYSICAL ENVIRONMENT

7.2.2.1 SOILS

CONSTRUCTION PHASE

Potential impacts

- Soil erosion
- Soil compaction
- Soil contamination

Sources of impact

- Site preparation;
- Construction activities;
- Waste and hazardous materials management;
- Transportation and circulation.

Mitigation measures

The following mitigation measures aimed at controlling soil erosion, compaction and contamination should be applied to reduce impacts on soils:

- Contractor to develop and implement a construction worksite ESMP which will translate chapter 8's requirements into detailed actions to be carried out during construction works, including implementation of mitigation measures and environmental &social monitoring. Worksite ESMP to cover all elements under the contractor's control (i.e. construction works), and consider detailed specifications of activities to be conducted during construction and specific locations where they will be conducted.
- Restrict removal of vegetation to the minimum required.
- Mark areas to be cleared with proper visual signs (e.g.: flags) and indicate the limits of vegetation removal on construction plans.
- Avoid vegetation clearing on steep slopes.
- Restrict materials and manpower movements to existing roads/tracks to the extent possible.
- Operate machinery on land in a way that minimizes disturbance to the banks of watercourses.
- Avoid construction and maintenance activities during times when soils are saturated (rainy season);
- Implement erosion and sediment control plans.
- Install silt barriers (e.g., fencing) along wetland and woodland edges located within 30 m of construction areas to minimize potential sediment transport to natural habitats.
- Segregate and temporarily store excavated soils in order to use them as backfill when needed.
- Characterize, remove and dispose of contaminated soils at sites authorized by relevant authorities.
- Cover excavated materials with erosion control blankets.
- Identify and rehabilitate exposed soils immediately following construction activities.
- De-compact soils following construction, with appropriate equipment.
- Remove any construction debris generated at the sites immediately after completion of construction activities.
- Ensure that equipment and machinery are in good operating condition, clean (power washed), free of leaks, excess oil and grease.
- Establish equipment storage yards and maintenance areas on adapted surfaces (clear of vegetation, stripped of topsoil, leveled and compacted murram).

- Require all contractors and sub-contractors to develop and implement waste management plans that comply with relevant WB/IFC waste management guidelines (see appendix 7-1) in order to ensure that various types of waste to be produced during the construction phase (sanitary, non-hazardous and hazardous) are adequately recovered, stored and disposed of.
- Prepare and implement an Emergency Response Plan.
- Keep a Spill Containment Kit readily accessible onsite in the event of an accidental spill and ensure on-site staff is trained in spill response.
- Contain any spills onsite and clean up spills as soon as possible.
- Document and report all spills to the MoE.

Detailed Impact Description

Even prior to the construction phase, one of the Contractor's main obligations will be to translate the ESMP into a detailed Worksite ESMP. This Worksite ESMP will consider detailed specifications of construction activities (such as Workers' Camp/ Equipment Yard/Workshop, Borrow pits, presence of workers, etc.) and indicate how and when the ESMP's mitigation measures and monitoring requirements will be implemented.

The Worksite ESMP is not limited to impacts on soils and will cover all environmental and social components analysed herewith. This obligation will ensure that environmental and social impact mitigation will be fully adapted to detailed construction activities and equipment specifications which are currently unknown.

During the construction phase, construction of access roads, digging of foundations pits for the towers and removal of vegetation (for foundation purposes) are the main activities likely to affect soil structure and quality. Foundations will be dug up to variable depths, depending upon the tower type and soil characteristics. At the tower sites, all vegetation within the footprint of the tower base and for a distance still to be determined beyond the base in all directions will be cleared to ground level.

Excavation works and removal of vegetation, especially on steep slopes, would render soils unstable and more vulnerable to erosion. The line corridor is mostly covered by ferrallitic soils, including sand loams and sandy clay loams. These soils have fine texture with loose structures, which are easily eroded and leached. However, the topography in the study area is gently slopped with low to medium potential for soil erosion. As vegetation cover stabilises the soils and ensures better resistance to erosion, removal of vegetation will be restricted to a minimum in order to prevent soil erosion.

Construction of access roads and vehicle movement along the project area can lead to soil compaction in those areas where soils are clayey or highly saturated. In the project area, the following soil types are likely to be vulnerable to soil compaction: mineral hydromorphic soils and vertisols. These soils cover however only 1.9 % and 2.6 % of the extended study area, respectively. Application of specific mitigation measures such as de-compaction of soils following construction as well as avoiding construction activities during times when soils are saturated will help reduce adverse effects resulting from soil compaction in areas covered by these soil types.

In addition, soil contamination may also result from unsound waste management practices. A waste is any solid, liquid, or contained gaseous material that is being discarded by disposal, recycling, burning or incineration. Solid (non-hazardous) wastes generally include any garbage, refuse. Examples of such waste include domestic trash and garbage; inert construction / demolition materials; refuse, such as metal scrap and empty containers (except those previously used to contain hazardous materials which should, in principle, be managed as a hazardous waste). Hazardous waste shares the properties of a hazardous material (e.g. ignitability, corrosivity, reactivity, or toxicity), or other physical, chemical, or biological characteristics that may pose a potential risk to human health or the environment if improperly managed. Examples of waste types susceptible to be produced by the project include solid household and sanitary waste produced at worker camps and other work sites, used vehicle and machinery oils, etc. Contractors and sub-contractors will therefore be required to develop and implement waste management plans that comply with relevant WB/IFC waste management guidelines (see appendix 7-1) in order to ensure that various types of waste to be produced during the construction phase (sanitary, non-hazardous and hazardous) are adequately recovered, stored and disposed of.

Finally, soils can be contaminated during the construction phase by soil mixing during the excavation of foundation pits or by accidental oil/fuel spills from heavy machinery either at storage yards or work sites. With respect to soil mixing, excavated soils should be segregated and stockpiled in authorised sites during the construction phase in order to prevent soil mixing. In the case of accidental spills from heavy machinery, the proportion of soil contamination will depend on the magnitude of these accidental events. However, establishment of equipment storage yards and maintenance areas on adapted surfaces and implementation of an Emergency Response Plan will help managing accidental spills properly.

Impact assessment

The intensity of the impact is low since the potential for soil erosion in the study area is low and the application of general mitigation measures will reduce soil vulnerability to erosion or compaction, as well as soil contamination from soil mixing or accidental spills. The extent of the impact is local since soil erosion, compaction or contamination is likely to occur in a well-defined area within the ROW. The duration of the impact is medium since soil erosion, compaction and contamination could occur throughout the entire construction phase (duration still to be determined). The impact on soils during the construction phase is thus considered of minor importance. The probability of occurrence is medium after the application of mitigation measures.

IMPACT ON SOILS DURING THE CONSTRUCTION PHASE

Intensity : Low	Importance : **Minor**
Extent : Local	
Duration : Medium	
Probability of occurrence : Medium	

OPERATION PHASE

Potential impact

- Soil contamination

Sources of impact

- Presence and operation of lines, substations and access roads;
- Maintenance and repair.

Mitigation measures

The following mitigation measures should be applied:

- Ensure that equipment and machinery are in good operating condition, clean (power washed), free of leaks, excess oil, and grease.
- Ensure that all stationary equipment and machinery are installed above spill containment facilities of sufficient capacity.
- Keep a Spill Containment Kit readily accessible onsite in the event of an accidental spill and ensure on-site staff is trained in spill response.
- Contain any spills onsite and clean up spills as soon as possible.
- Document and report all spills to the MoE.

Detailed Impact Description

During the operation phase, oil spills could result from equipment breakdown at the substation sites and lead to soil contamination in proportion with the magnitude of these accidental events. As during the construction phase, the risk of soil contamination from accidental oil spills cannot be completely discarded. However, the application of general mitigation measures will help reducing this risk significantly.

Impact assessment

The intensity of the impact is low, since immediate response to accidental spills and decontamination would be possible. The extent of the impact is local since any spill or inappropriate management is likely to occur in a well-defined area within the ROW. Moreover, the duration of the impact is short, given that any accidental spill will be contained and cleaned-up immediately. The impact on soils during the operation phase is thus considered of minor importance. The probability of occurrence is low after the application of mitigation measures.

IMPACT ON SOILS DURING THE OPERATION PHASE

Intensity : Low	Importance : **Minor**
Extent : Local	
Duration : Short	
Probability of occurrence : Low	

7.2.2.2 WATER RESOURCES

CONSTRUCTION PHASE

Potential impact

- Modification to water quality
- Changes in hydrology
- Surface water contamination
- Groundwater contamination

Sources of impact

- Site preparation;
- Construction activities;
- Waste and hazardous materials management;
- Transportation and circulation.

Mitigation measures

General mitigation measures listed earlier in this chapter should be applied. Moreover, the following specific mitigation measures should also be applied:

- Limit activities in watercourses or wetlands to the extent possible.
- Adjust pylon siting to span wetland areas, or limit equipment access in wetlands, wherever possible.
- Ensure towers to be located outside the top-of-bank of all watercourses and permanent wetlands.
- Use existing roads and trails as much as possible to minimize road construction.
- All works in river and wetland areas are prohibited unless having obtained the required authorizations from the relevant authorities, for example Wetland Use Permits from NEMA. If necessary, the machinery must be cleaned in the areas designed for this purpose and suitable measures must be taken to restore the areas disturbed by the crossing of a river or wetland.
- Prohibit construction of permanent access roads in wetlands, along river banks or in areas covered by hydromorphic soils.
- Minimize construction of temporary access roads in wetlands, along river banks or in areas covered by hydromorphic soils. Perform all construction activities in wetlands during the dry season in order to minimize road construction requirements.
- Design access roads that are required for construction purposes in wetlands in collaboration with NEMA and wetland specialists in order to ensure wetlands' hydrodynamic conditions are not

modified by the access road. Install culverts on road watercourse crossings so that the free flow of water can be maintained at the same rate.

- Decommission all temporary access roads built in wetlands, as construction progresses along the Project routing and as soon a particular temporary access road becomes unnecessary. Perform this dismantlement during the dry season and dispose of materials outside wetland areas.
- Design road watercourse crossings with NEMA and wetland specialists in order to ensure hydrodynamic conditions are not modified by the access road. Install culverts on road watercourse crossings so that the free flow of water can be maintained at the same rate.
- Operate machinery on land in a way that minimizes disturbance to the banks of watercourses.
- Maintain vegetated buffers within and around wetlands and along both sides of watercourse crossings.
- Apply measures to reduce erosion and contain sediments or divert them so that they do not reach waterbodies.
- Do not refuel or service equipment within 100 m of any watercourse or surface water drainage installations.
- Pump out and dispose of any groundwater encountered during excavation, in order to protect groundwater resources from contamination in case of spills.
- No contaminated materials must be used for construction / installation of coffer dams.
- Prevent the discharge of solid waste in the water; should an incident occur, the waste will be recovered and disposed in compliance with local requirements.

Detailed Impact Description

The proposed transmission line route crosses the several watercourses, including the Albert Nile, as well as permanent and seasonal wetlands. Sources of impacts to watercourses and wetlands are removal of vegetation, construction of access roads, vehicle movement along the ROW and construction sites and excavation/piling for tower installations.

Vegetation removal in riparian areas can increase soil erosion in erosion prone areas, causing sediment to be deposited into the waterbodies, especially during rain events. Ultimately, this could lead to the deterioration of water quality as well as modification of aquatic habitats.

Construction of access roads as well as vehicle movement along the construction sites can result into changes in hydrology of wetlands. Small changes in wetland hydrology can significantly affect the chemical and physical properties of a wetland such as nutrient availability, degree of substrate anoxia, soil salinity, sediment properties, and pH (Mitsch and Gosselink, 1993). Depending on the degree of perturbation, wetlands can be temporarily or permanently impaired. Also, access road construction across watercourses or wetlands could modify the water flow dynamics, causing a reduction in the water flow velocity. The water stagnation in some areas could result into the conversion of a lotic system into a lentic system. This impact will be minimized by prohibiting permanent access roads in wetland areas, minimizing construction of access roads in such areas to what is strictly necessary for Project construction, and decommissioning of all construction access roads in wetland areas as soon as they have fulfilled their purpose.

Moreover, digging of foundations pits for the towers could cause groundwater contamination as any groundwater encountered during excavations can lead to potential contamination of the source. Thus, any groundwater encountered during excavation should be pumped out properly.

In addition, unsound waste management practices are susceptible to have an effect on water quality. Development and implementation of a waste management plan by the contractor and sub-contractors (see section 7.2.2.1 above for more details) will allow mitigating that risk.

Finally, the risk of accidental oil spills from heavy machinery is present during the construction phase and could result into both surface water and groundwater contamination. The contamination level resulting from accidental spills will depend on their magnitude. However, implementation of an Emergency Response Plan will help managing them properly.

Impact assessment

The intensity of the impact is medium since construction activities in watercourses and wetlands will be minimized and, where impossible avoid, mitigation measures will help reducing adverse effects on these components. The extent is local since any modification or disruption will be experienced on a specific area and will be controlled with the application of specific management measures. The duration is medium since contamination of water resources and changes in hydrology could occur throughout the entire construction phase. The impact on water resources during the construction phase is thus considered of moderate importance. The probability of occurrence is low after the application of mitigation measures.

IMPACT ON WATER RESOURCES DURING THE CONSTRUCTION PHASE

Intensity : Medium	Importance : **Moderate**
Extent : Local	
Duration : Medium	
Probability of occurrence : Low	

OPERATION PHASE

Potential impact

- Ground and surface water contamination

Sources of impact

- Presence of line, substations and access roads;
- Maintenance and repair;
- Transportation and circulation.

Mitigation measures

The following mitigation measures aimed at controlling accidental spills should be applied:

- Implement an Emergency Response Plan.
- Always perform regular maintenance in wetlands during the dry season. Favour use of floating devices and manual maintenance.
- Ensure that equipment and machinery are in good operating condition, clean (power washed), free of leaks, excess oil, and grease.
- Ensure that all stationary equipment and machinery are installed above spill containment facilities of sufficient capacity.
- Keep a Spill Containment Kit readily accessible onsite in the event of an accidental spill and ensure on-site staff is trained in spill response.
- Contain any spills onsite and clean up spills as soon as possible.
- Document and report all spills to the MoE.

Detailed Impact Description

During the operation phase, oil spills could result from equipment breakdown at the substation sites and lead to ground and surface water contamination in proportion with the magnitude of these accidental events.

Additionally, maintenance activities and machinery access in wetland areas are likely to cause water quality alterations due to the absence access roads in wetlands. These impacts will be mitigated by favouring manual maintenance and floating devices for accessing towers during regular maintenance.

Impact assessment

The intensity of the impact is low, since immediate response to accidental spills would be possible. The extent of the impact is local since any spill or inappropriate management is likely to occur in a well-defined area within the ROW. Moreover, the duration of the impact is short, given that any accidental spill will be contained and cleaned-up immediately. The impact on water resources during the operation phase is thus considered of minor importance. The probability of occurrence is low after the application of mitigation measures

IMPACT ON WATER RESOURCES DURING THE OPERATION PHASE

Intensity : Low	Importance : **Minor**
Extent : Local	
Duration : Short	
Probability of occurrence : Low	

7.2.2.3 AIR QUALITY

CONSTRUCTION PHASE

Potential Impact

- Temporary air quality deterioration

Sources of Impact

- Site preparation
- Construction activities
- Transportation and circulation

Mitigation measures

All measures aimed at controlling soil erosion should be applied. Moreover, the following specific measures should be applied:

- Maintain equipment and machinery in good running conditions and equipped with catalyzers.
- Use water for dust suppression on dust generating areas.
- Control speed of construction vehicles to minimize generation of dust on access roads.
- Restrict speed on loose surface roads to 25 km/h during dry or dusty conditions.
- Prohibit idling of vehicles on-site to reduce emissions.
- Cover loads of brittle material during transport.

Detailed Impact Description

During the construction phase, several construction activities will be conducted simultaneously at separate locations around the work sites (e.g.: excavations, off-road equipment operation, traffic along the ROW and on unpaved roads, etc.). These activities will generate dust and exhaust emissions, which will lead to temporary air quality deterioration and disturbances to neighboring populations.

Impact assessment

The intensity of the impact is low since the application of mitigation measures will help reducing significantly dust and exhaust emissions. The extent is local since dust and exhaust emissions are likely to be generated along the local road network and within the ROW and construction sites. The duration of the impact is medium since air quality deterioration is likely to be experienced throughout the entire construction phase. The impact on air quality during the construction phase is thus considered of minor importance. The probability of occurrence is high since dust and exhaust emissions are commonly associated to construction activities.

IMPACT ON AIR QUALITY DURING THE CONSTRUCTION PHASE	
Intensity : Low	Importance : **Minor**
Extent : Local	
Duration : Medium	
Probability of occurrence : High	

OPERATION PHASE

No adverse impacts on air quality are expected during the operation phase.

7.2.2.4 NOISE, VIBRATIONS AND ELECTROMAGNETIC FIELDS (EMF)

CONSTRUCTION PHASE

Potential Impact

- Increase in noise and vibration levels

Sources of Impact

- Site preparation
- Construction activities
- Transportation and circulation
- Presence of workers

Mitigation measures

The following mitigation measures should be applied:

- Locate access roads and lay down areas away from residences to the extent possible.
- Maintain equipment and machinery in good running conditions.
- Provide all internal combustion equipment with properly functioning silencers or mufflers.
- Restrict noise generating activities near residential or institutional sensitive receptors to the period between 6 a.m. and 10 p.m. which is defined as “daytime” in the Ugandan noise standards[1].
- Notify landowners along the routes about the construction schedule and activities.

Detailed Impact Description

Noise and vibration levels are likely to be increased at the construction phase during site preparation, pylon erection and construction of access roads. In some locations, work will be done in close proximity to residences, farms or businesses located along the ROW and near substations. Traffic, as well as the use of construction equipment and machinery, will lead to temporary noise emissions that may disturb neighbouring communities and local fauna. In particular, the GOT Afwoyo area is located directly to the North of the Murchison Falls National Park and is known to be used by the park’s large fauna. It will be crossed by the project over a distance of approximately 35 km.

Noise levels measurements that have been conducted revealed no significant noise stress in the project area. Moreover, noise resulting from the construction work will only be experienced during a limited time frame and can be significantly reduced with the implementation of general mitigation measures. These measures include maintaining machinery and equipment in good running conditions and restricting noise-generating activities to daytime hours.

Regarding fauna, the consultant considers that no additional noise reduction measures should be applied in the GOT Afwoyo area due to the dangers associated with large animals that are known to

[1] The National Environment (Noise Standards And Control) Regulations, 2003.

use this area (elephants, buffaloes, hippopotamuses, etc.). Noise from construction works would therefore contribute to workers' health and safety by keeping large, dangerous animals away during construction activities.

Impact assessment

With the adoption of appropriate mitigation measures, the intensity of the impact is low. The extent of the impact is local since noise and vibrations levels should be increased in the work sites and the surrounding areas. The duration of the impact is considered medium considering the limited time frame over which the construction phase should take place. The impact of noise and vibrations during the construction phase is thus considered of minor importance. The probability of occurrence is high because noise and vibrations are part of construction activities.

IMPACT OF NOISE, VIBRATIONS AND EMF DURING THE CONSTRUCTION PHASE

Intensity : Low	Importance : **Minor**
Extent : Local	
Duration : Medium	
Probability of occurrence : High	

OPERATION PHASE

Potential impact

→ Exposure to EMFs from the transmission line

Sources of impact

→ Presence and operation of line and substations

Mitigation Measures

→ Design and build the transmission line so as to ensure that EMF levels are well below accepted guidelines for occupational and human health exposure limits.

→ Keep residences and other permanent structures such as schools, shops or offices out of the wayleave to minimize exposure to EMFs.

Detailed Impact Description

During the operation phase, people living near the transmission line could be exposed to EMFs generated from the transmission line, which could potentially lead to effects on human health. Many studies have been conducted by scientists in order to determine whether or not exposure to EMF affects human health, but there is no consensus about real health effects from EMF exposure. However, ICNIRP Guidelines (ICNIRP, 2014) recommend EMFs levels not to exceed 1 Hz.

EMF levels measurements that have been conducted revealed that EMF levels in the study area are all below1 Hz. Thus, with the presence of the transmission, EMF levels are not expected to exceed exposure limits.

Impact Assessment

The intensity of the impact is low, since EMF levels should not exceed EMF exposure limits. The extent of the impact is local since EMF levels will be generated all along the transmission line. The duration of the project is long since exposure to EMF levels will occur for the lifetime of the transmission line. The impact of EMF during the operation phase is thus considered of moderate importance. However, with the application of mitigation measures, the impact could be considered of minor importance. The probability of occurrence is high since EMFs will be generated by the transmission line.

IMPACT OF NOISE, VIBRATIONS AND EMF DURING THE OPERATION PHASE	
Intensity : Low	Importance : **Moderate**
Extent : Local	
Duration : Long	
Probability of occurrence : High	

Note: The impact could be considered of minor importance after the application of mitigation measures.

7.2.3 NEGATIVE IMPACTS ON THE BIOLOGICAL ENVIRONMENT

7.2.3.1 TERRESTRIAL HABITATS AND ASSOCIATED FLORA

CONSTRUCTION PHASE

Potential Impact

- Permanent loss of 0.08 km² (8 ha) of forest habitats for the construction of the power line and substations.
- Impairment of flora communities
- Potential impacts on vulnerable species communities
- Increased pressure on natural resources
- Potential introduction of invasive alien species (IAS)

Sources of Impact

- Site preparation
- Exploitation of Borrow Pits
- Construction activities
- Waste and hazardous materials management
- Transportation and circulation
- Presence of workers
- Work-sites Restoration

Mitigation measures

Mitigation measures identified for reducing impacts on soils, water resources and ambient air quality will also help mitigating impacts on terrestrial habitats and associated flora. Moreover, the following specific mitigation measures should be applied:

- Undertake a selective cutting of the vegetation in the ROW, in order to maintain native low scrubby and herbaceous species that do not represent a risk for the power line.
- Perform tree cutting manually.
- Clearly mark the extent of vegetation cutting in the ROW with stakes at intervals of 50 m or less. Identify and mark the vegetation to be preserved along sections of the ROW.
- Undertake vegetation cutting with the supervision of a botanist in order to identify and relocate if possible species of conservation concern as well as to protect vegetation that does not represent a risk for the power line. Any species of conservation concern that need to be cut will be located and its habitat will be fully described. This information will be integrated in the planning of reforestation program.
- If possible, collect seeds from *Albizia ferruginea*, *Khaya anthotheca* and *Vitellaria paradoxa* mature specimens.

- Make chopped woody resources and residues available to local population in order to reduce additional pressures on natural resources.
- Remove as much roots of *Mimosa pilgra* when removing specimens from the RoW.
- Burn residues of invasive alien species to reduce the risk of propagation to other areas.
- Use existing roads and trails as much as possible to minimize road construction and associated habitat fragmentation.
- Optimize access road construction to reduce to a minimum the size of the disturbed area.
- Constantly stay inside the footprint of access road and works sites to reduce encroachment on natural habitats.
- Reduce the number of access roads to the ROW.
- Prohibit all storage of equipment, materials and hydrocarbons within the MFNP.
- Inspect and clean construction equipment properly after working in areas known to be infested with invasive alien species (IAS).
- Determine the best time for revegetation depending on the species to plant and the habitat to restore.
- Revegetate areas of bare and disturbed soils as soon as possible with native species. Validate with a botanical expert species chosen for restoration.
- Plant endangered species in preferential habitats.
- Establish a Compensation and Revegetation Plan for lost natural habitats during construction phase;
- Implement an IAS monitoring program following project construction in sensitive areas such as MFNP, forests reserves, and forest stands following construction and site re-vegetation.

Detailed Impact Description

During the construction phase, local vegetation will be cut for the construction of access roads, setting the ROW as well as for the exploitation of the borrow pits. Vegetation clearing will lead to a permanent loss of terrestrial habitats. However, a large proportion of these habitats are anthropized, reducing the loss and fragmentation of natural habitats. Moreover, the proposed line route mainly follows existing linear infrastructures, reducing the additional habitat fragmentation and loss. As the project is located mainly inside anthropic vegetation and wooded savannah and passes minimally through forested environment, a selective cutting is proposed. It will allow minimizing vegetation loss and reduce the risk of fire initiation. Only the tallest species representing a risk for the power line during the construction and operation will be cut. Nevertheless, the power line will generate a loss of 8 ha of forest and tree cuttings, mainly along the Arua – Pakwach portion.

Site preparation activities should not lead to *Albizia ferruginea, Khaya anthotheca* and *Vitellaria paradoxa* losses, as those species are considered Vulnerable according to IUCN red list. As a botanist will be part of the site preparation team, specimens will be protected if possible. However, if the cut is needed, GPS coordinates of each specimen and the description of their habitat will be noted, and seeds will be collected if possible. Each loss of specimens will need to be compensated and the success of their plantation will be followed, in order to ensure no net loss of specimens.

The proposed line route passes through four forest reserves, covering an approximate ROW surface of 15.6 ha. The Laura Central Forest is the most affected forest reserve with 7.8 ha that will need to be prepared for the power line implementation. On the other side, the Opaka Central Forest hosts a tree plantation, reducing the potential impact on natural habitats.

Extended vegetation clearings for the ROW, access roads and work areas could result in an increased likelihood of invasive species' establishment along the power line route, as these species often occur in disturbed environments. *Mimosa pilgra* has been surveyed during surveys. Disturbance caused by construction can then encourage aggressive growth of this IAS especially inside wetland habitats. Habitat providing food and cover for local wildlife may be altered or lost if these IAS out-compete existing native plants, resulting in a loss of plant and animal diversity.

The transport activities and works could lead to an increase in particulate matter in the air, with a risk of deposition on leaves and plant reproductive organs. These deposits could impair the photosynthesis and reproduction processes, with associated impacts on recruitment.

Impact assessment

With the adoption of appropriate mitigation measures, the intensity of the impact is medium. The extent of the impact on terrestrial habitats and flora is local since the presence of natural habitats inside the ROW is restricted because of human encroachment. The duration of the impact is considered long as the vegetation will be cut and will need to be maintain at a given height and will consequently always be secondary. The impact on terrestrial habitats and associated flora is thus considered of medium importance. The probability of occurrence is high because the ROW needs to be prepared prior to construction works.

IMPACT ON TERRESTRIAL HABITATS AND ASSOCIATED FLORA DURING THE CONSTRUCTION PHASE

Intensity : Medium	Importance : **Moderate**
Extent : Local	
Duration : Long	
Probability of occurrence : High	

OPERATION PHASE

Potential Impact

- Impairments of natural habitats and associated flora communities;
- Potential introduction of invasive alien species (IAS)

Sources of Impact

- Presence and operation of line, substations and access roads
- ROW management
- Waste and Hazardous Materials Management
- Transportation and circulation

Mitigation measures

Mitigation measures identified for reducing impacts on soils, water resources and ambient air quality will also help mitigating impacts on terrestrial habitats and associated flora. Moreover, the following specific mitigation measures should be applied:

- Undertake selective cutting of the vegetation in order to keep low scrubby and herbaceous species that do not represent a risk for the power line (species that cannot grow more than 4m in height).
- Clearly mark the extent of vegetation cutting in the ROW. Identify and mark the vegetation to be preserved along sections of the ROW.
- Undertake vegetation cutting with the supervision of a botanist in order to identify and relocate if possible species of conservation concern as well as protected vegetation that does not represent a risk for the power line.
- Constantly stay inside the footprint of access road and works sites to reduce encroachment on natural habitats.
- Avoid using chemical products for maintenance of the ROW. Implement an invasive species control program in order to prevent the establishment and propagation of invasive species, such as *Mimosa Pilgra;*
- Dispose of organic material removed from the ROW properly.

Detailed Impact Description

During the operation phase, maintenance of the ROW requires regular clearing of vegetation in order to reduce short-circuit risks caused by electric arcing. This means no vegetation will be allowed to grow above 4 m within the ROW, which will result in continuous alteration of natural habitats. The most affected forms of flora will surely be woody species, comprising trees and shrubs, as they can grow taller. The periodic disturbance will maintain ROW habitats in earlier vegetation development stages, leading to the presence of more common species and rarity of specialized species. Presence of the access road in previously inaccessible areas could lead to an increase in natural resources exploitation and a reduction of species communities with a higher use value.

Moreover, periodic ROW maintenance activities can also lead to IAS proliferation, especially if these activities include moving and clearing of vegetation. Once introduced, IAS will likely spread and impact adjacent areas with habitats that correspond to their ecological requirements.

Impact assessment

With the adoption of appropriate mitigation measures, the intensity of the impact is low as most of the significant effect will happen during construction works. The extent of the impact on terrestrial habitats and flora is local since the presence of natural habitats inside the ROW is restricted because of human encroachment. The duration of the impact is considered long as the impact will be effective during all the operation phase because of the need for ROW maintenance. The impact on terrestrial habitats and associated flora is thus considered of moderate importance. The probability of occurrence is medium as the maintenance works will just be undertaken in the case there is regeneration of ligneous vegetation inside the ROW.

IMPACT ON TERRESTRIAL VEGETATION DURING THE OPERATION PHASE

Intensity : Low	Importance : **Moderate**
Extent : Local	
Duration : Long	
Probability of occurrence : Medium	

7.2.3.2 AQUATIC HABITATS AND ASSOCIATED FAUNA

CONSTRUCTION PHASE

Potential Impact

- Permanent loss of seasonal and permanent wetlands (respectively 0.55 km^2 and 0.15 km^2) and riparian areas for construction of the power transmission line and substations.
- Impairment of hydrological dynamics leading to wetland disturbances and alteration.
- Effects on wetland specialist species and species of conservation interest.
- Increased pressure on natural resources, especially in areas where new access is created.
- Potential introduction of invasive alien species (IAS).

Sources of Impact

- Site preparation
- Construction activities
- Transportation and circulation
- Waste and hazardous materials management
- Presence of workers

Mitigation measures

Mitigation measures identified for reducing impacts on soils, water resources and ambient air quality, as well as those relating to the protection of terrestrial habitats and associated flora, will also help mitigating impacts on aquatic habitats and associated fauna. Moreover, the following specific mitigation measures should be applied:

- Adjust pylon siting to span wetland areas, or limit equipment access in wetlands, wherever possible.
- Use existing roads and trails as much as possible to minimize road construction and associated habitat fragmentation.
- Prohibit construction of permanent access roads in wetlands, along river banks or in areas covered by hydromorphic soils.
- Minimize construction of temporary access roads in wetlands, along river banks or in areas covered by hydromorphic soils. Perform all construction activities in wetlands during the dry season in order to minimize road construction requirements.
- Design access roads that are required for construction purposes in wetlands in collaboration with NEMA and wetland specialists in order to ensure wetlands' hydrodynamic conditions are not modified by the access road. Install culverts on road watercourse crossings so that the free flow of water can be maintained at the same rate.
- Decommission all temporary access roads built in wetlands, as construction progresses along the Project routing and as soon a particular temporary access road becomes unnecessary. Perform this dismantlement during the dry season and dispose of materials outside wetland areas.
- Undertake a selective cutting of the vegetation in order to keep low scrubby and herbaceous species that does not represent a risk for the power line.
- Avoid equipment and vehicle movements in rivers, floodplains and wetland areas. If unavoidable, reduce access and access roads to a minimum length in wetlands and floodplains.
- Conduct activities during the dry season to minimize disturbance of sensitive shorelines and wetland areas.
- While working inside wetlands, restrict all equipment movements to access roads.
- Avoid material piling inside wetland areas.
- Avoid vegetation cutting along stream shores.
- Avoid aquatic vegetation cutting.
- Implement a biodiversity protection awareness program for workers. Prohibit workers from owning firearms and other hunting gear, and raise awareness about the prohibition to engage in any kind of poaching.
- Set and implement strict rules for in-water works.
- Maintain a 50-m wide riparian buffer zone along rivers and wetlands. Restore as soon as possible any disturbed areas in the riparian buffer zone.
- Do not throw debris in aquatic habitats and remove any debris introduced accidentally into the aquatic environment as soon as possible.
- Always maintain hydrologic connectivity between upstream and downstream in the work areas.
- Always ensure free flow of water and sufficient water supply in order to maintain a viable fish habitat downstream from the work areas.
- Install diversion structures (canals, dikes, coffers) that neither obstruct fish movements nor diminish habitat width to less than 2/3 of the current water bodies, including rivers, wetlands, etc.
- Fish imprisoned in the drained zone must be captured and released out of the confined area.
- After termination of construction works, restore natural bed conditions (minor bed, natural obstacles, etc.).
- Backfill all diversion canals once construction is over.
- Properly manage waste and hazardous materials.

- Clean construction equipment properly after working in areas known to be infested with IAS.
- Implement an IAS monitoring program following project construction in sensitive areas such as wetlands and shorelines, following construction and site re-vegetation.
- Strictly respect sound waste management practices.

Detailed Impact Description

During the construction phase, construction of access roads, vegetation clearing in the ROW and construction of towers will lead to impacts on wetland and riparian areas. The construction of access roads can change the quantity or direction of water flow, causing permanent damage to hydrological conditions sustaining wetland dynamics and habitats. If flowing water is stopped by structures, a lentic habitat could replace the existing lotic ones. Flora communities would consequently switch and be replaced by adapted vegetation. Construction of access roads will necessitate the implementation of water crossings which have the potential to cause modification to water dynamics and consequently deterioration, destruction or disturbance of wetlands and watercourse, comprising habitats for fish and other aquatic organisms. Moreover, they have the potential to become obstacles for aquatic fauna movements, leading to restricted access to specific habitats for a variety of species. This impact will be minimized by minimizing construction of access roads in such areas to what is strictly necessary for Project construction. Installation of culverts sized according to water flows and applying preventive management measures on the remaining access road can limit this loss of habitat further by avoiding the barrier effect that these works can have on aquatic habitats and associated fauna.

Construction activities could result in an increase in suspended solids leading to the siltation of spawning and feeding sites for aquatic and semi-aquatic species. Increases in organic material inside the aquatic environment could also result in a higher DOB and a reduction of dissolved oxygen for aquatic wildlife. Water could also be contaminated through accidental spills of reactants, chemical products, hydrocarbons, and wastewater resulting from poor environmental management. Contamination in lentic environment with shallow water will exacerbate the impacts as the contaminants could be locally concentrated. Environmental contamination could affect the aquatic and semi-aquatic fauna, among which amphibians and fish which are sensitive to the presence of contaminants in their habitats. This contamination has the potential to affect the entire food chain and to bio accumulate.

Two endangered species are likely to be present inside the study area. One of these two species, (*Marcusenius victoriae*), is notably found in shallow inshore waters inside the Victoria Nile watershed on both soft and rocky bottoms, in or near marginal plants and is consequently prone to be impacted during construction works. Aquatic vegetation should be minimally removed to conserve ecologically important habitats for the species as well as the entire fish community.

Moreover, vehicles and construction equipment can introduce IAS, particularly *Mimosa pigra* that evolves well in wetlands. IAS species may compete with native vegetation, destroying valuable wildlife habitat, adding to direct habitat loss.

Impact assessment

With the adoption of appropriate mitigation measures, the intensity of the impact is medium. The extent of the impact on aquatic habitats and associated fauna is local since the aquatic habitats are punctual along the proposed power line and the impact could be restricted to permanent wetlands and watercourses if the construction works schedule is well planned. The duration of the impact is considered long, in particular if an access road needs to be built inside a permanent wetland or across a watercourse. The impact on aquatic habitats and associated fauna is thus considered of moderate importance. The probability of occurrence is high even if the intensity will be correlated to the works schedule and the adaption of good practices for in-water works and project design.

IMPACT ON AQUATIC HABITATS AND ASSOCIATED FAUNA DURING THE CONSTRUCTION PHASE

Intensity : Medium	Importance : **Moderate**
Extent : Local	
Duration : Long	
Probability of occurrence : High	

OPERATION PHASE

Potential Impact

- Impairment of hydrological dynamic leading to wetland disturbances and alteration;
- Effects on wetland specialist species and species of conservation interest;
- Increased pressure on natural resources, especially in areas where new access have been created;
- Potential introduction of invasive alien species (IAS)

Sources of impact

- Presence of power line, substation and access road
- ROW management
- Waste and Hazardous Materials Management

Mitigation measures

Mitigation measures identified for reducing impacts on soils, water resources and ambient air quality, as well as those relating to the protection of terrestrial habitats and associated flora (protection of vegetation cover and species diversity), will also help mitigating impacts on aquatic habitats and associated fauna. Moreover, the following specific mitigation measures should be applied:

- Always perform regular maintenance in wetlands during the dry season. Favour use of floating devices and manual maintenance.
- Undertake selective cutting of the vegetation in order to maintain low scrubby and herbaceous species that do not represent a risk for the power line (species that cannot grow more than 4m in height, including papyrus).
- Avoid destabilization of shores and sediments or other pollutants rejection in watercourses during road and wayleave maintenance;
- Only excavate the lower third of ditches during drainage ditch maintenance in order to maintain ditch slope stability;
- Forbid use of chemical pesticides to control vegetation in the ROW;
- Undertake monitoring of natural resources exploitation and implement a sensitization program in order to educate and increase local communities' awareness on natural resources protection.

Detailed Impact Description

Possible changes in the hydrologic conditions that could be related to the presence of access roads and pylons inside a wetland could lead to modification of ecological parameters and associated disturbances of the aquatic and semi-aquatic fauna. Maintenance of access roads and related ditches is essential in order to prevent the water crossings from becoming insurmountable obstacles for the aquatic fauna and for soil erosion to encroach spawning grounds or other critical ecological habitat.

Presence of an access road inside wetlands could lead to an increase of natural resources exploitation in areas that were previously inaccessible. It could have an impact on species with higher use value for local communities, locally reducing the number of specimens and the long-term recruitment. Therefore and as mentioned above, no permanent access roads shall be built in wetlands. Moreover, regular maintenance activities will be performed manually, using floating devices.

During the operation phase, the movement of people and vehicles along the ROW and access roads for ROW maintenance and for repair of transmission line can lead to the introduction of invasive alien species (IAS). Seeds and other propagating parts of IAS can be carried out into a wetland inadvertently by equipment. IAS introduced can then grow rapidly.

Impact assessment

With the adoption of appropriate mitigation measures, the intensity of the impact is low as most of the impact will occur during construction phase. The extent of the impact on aquatic habitats and associated fauna is local since the aquatic habitats are punctual along the proposed power line and the impact could be restricted to permanent wetlands and watercourses. The duration of the impact is considered long, in particular if an access road need is built. The impact on aquatic habitats and associated fauna is thus considered of moderate importance. The probability of occurrence is medium as it is related to a good maintenance of ditches and access road.

IMPACT ON AQUATIC HABITATS AND ASSOCIATED FAUNA DURING THE OPERATION PHASE	
Intensity : Low	Importance : **Moderate**
Extent : Local	
Duration : Long	
Probability of occurrence : Medium	

7.2.3.3 TERRESTRIAL FAUNA

CONSTRUCTION PHASE

Potential Impact

- Modification and alteration of terrestrial fauna habitats, with associated changes in fauna communities;
- Local reduction of fauna density for species of higher use value

Sources of Impact

- Site preparation;
- Construction activities;
- Presence of workers.

Mitigation measures

Mitigation measures identified for reducing impacts on soils, water resources ambient air quality and noise levels, as well as those relating to the protection of terrestrial habitats and associated flora (protection of vegetation cover and species diversity), will also help mitigating impacts on terrestrial habitats and associated fauna. Moreover, the following specific mitigation measures should be applied:

- Implement a biodiversity protection awareness program with workers including the following elements:
- Prohibit workers from owning firearms and other hunting gear;
- Raise awareness about the prohibition to engage in any kind of poaching, existing laws and penalties;
- Raise awareness about animal behavior and handling, especially when working in the Got Afwoyo area.
- Inform the environmental supervisor when dangerous or endangered fauna species are observed in or close to project sites.
- Strictly respect sound waste management practices.
- Strengthen UWA ranger posts located near Got Afwoyo area in order to monitor animal movements and poaching activities.

Detailed Impact Description

Heavy duty machinery movements and increase in traffic during construction could lead to mortality of small mammals, reptiles and amphibians.

During the construction phase, site preparation for access road and power line construction will lead to a loss of habitats for some terrestrial fauna species. Removal of vegetation all along the power line can also increase habitat fragmentation in the study area. An important proportion of the project area has already been converted to agriculture and settlements and can be considered as already disturbed by human activities. The mitigation measures proposed for the protection of vegetation cover will contribute to minimize habitat losses. Construction activities could favor the spread of invasive species which can reduce the suitability of the habitats for some native fauna species. Proper cleaning of equipment and monitoring should be implemented to reduce the risks of spread.

Construction activities can also cause increased noise which may disturb species present in the area. These impacts are temporary and terrestrial fauna species are likely to migrate to similar but quieter habitats in the vicinity of construction areas. Dust can impact foraging success of resident bats, especially at night when they are active. Impacts can be reduced by using dust control measures. Waste generation has the potential to cause a local increase of pest fauna if waste is not managed properly.

The line routing crosses the Got Afwoyo area located North of the Murchison Falls National Park, which is an active wildlife dispersion area where several species disperse to graze, including elephants and hippopotamuses. One endangered mammal species is present in the project area and especially in the Got Afwoyo area. The hippopotamus is known to use terrestrial habitats close to wetlands or aquatic habitats at night, for grazing. Vegetation clearing should be minimized, especially in known hippopotamus grazing areas, to limit impacts on the species. Because of the unpredictable nature of its behavior, workers should be careful with the presence of the hippopotamus, even more close to the Albert Nile where they are quite abundant. In addition, an awareness program should be implemented for biodiversity protection with workers including a prohibition to own firearms and other hunting equipment, sensitization about prohibition to engage in poaching and sensitization about animal behavior and handling. Finally, a partnership to strengthen UWA ranger posts near the Got Afwoyo area will allow better monitoring of animal movements and poaching activities.

Impact assessment

With the adoption of appropriate mitigation measures, the intensity of the impact is medium considering the presence of some endangered species as the hippopotamus. The extent of the impact on terrestrial fauna is local as most of their habitat has already been modified by human presence. The duration of the impact is considered long, as the habitat will be modified on a long term. The impact on terrestrial fauna is thus considered of moderate importance. The probability of occurrence is high because the ROW need to be prepared prior to construction works and will then generated habitat loss and fragmentation.

IMPACT ON TERRESTRIAL FAUNA DURING THE CONSTRUCTION PHASE

Intensity : Medium	Importance : **Moderate**
Extent : Local	
Duration : Long	
Probability of occurrence : High	

OPERATION PHASE

Potential Impact

- → Risks of bat collisions
- → Modification and alteration of terrestrial fauna habitats, with associated modifications in fauna communities;

Sources of Impact

- Presence of lines, substations and access road
- ROW management
- Waste and Hazardous Materials Management

Mitigation measures

Mitigation measures identified for reducing impacts on soils, water resources ambient air quality and noise levels, as well as those relating to the protection of terrestrial habitats and associated flora (protection of vegetation cover and species diversity), will also help mitigating impacts on aquatic habitats and associated fauna. Moreover, the following specific mitigation measures should be applied:

- Implement a bat mortality monitoring program, including data monitoring of bat mortality (in partnership with local communities).
- Develop specific mitigation measures for species that are involved in mortality.

Detailed Impact Description

During the operational phase, vegetation clearing and maintenance on the ROW will lead to a loss of habitats for some terrestrial fauna species and the presence of flora species of earlier stages of development. It could lead to a local adaptation of wildlife communities with higher representation of common species. Vegetation clearing will be minimized to limit habitat destruction. Vegetation maintenance activities could favor the spread of invasive species which can reduce the suitability of the habitats for some fauna species. Proper cleaning of equipment and monitoring should be implemented to reduce the risks of spread and associated impacts on wildlife.

Power lines are susceptible to impact bat population during operational phase because there is a risk of collision and electrocution with flying mammals. Electrocution is only possible when bats get in contact with two live wires at the same time. Considering the powerline is designed with single conductors, the electrocution risk is considered nil. There is still a risk of collision but it involves only frugivorous species. A monitoring program should be implemented in order to follow up the number of mortality and species involved. Species specific mitigation measures should be proposed on the basis of monitoring results.

Impact assessment

With the adoption of appropriate mitigation measures, the intensity of the impact is medium. Even if most of the significant effect on wildlife habitat will happen during construction works, risks of mortality for bats and habitats modifications can happen during all the operation phase. The duration is then considered as long. The extent of the impact on terrestrial fauna is local since the presence of natural habitats inside the ROW is limited and a lot of common species are found because of human presence. The impact on terrestrial fauna is thus considered of moderate importance. The probability of occurrence is medium considering the potential impacts on bat communities.

IMPACT ON TERRESTRIAL FAUNA DURING THE OPERATION PHASE

Intensity : Low	Importance : **Minor**
Extent : Local	
Duration : Long	
Probability of occurrence : Medium	

7.2.3.4 AVIFAUNA

CONSTRUCTION PHASE

Potential Impact

- Modification and alteration to bird habitats;
- Disturbances and modification of bird communities.

Sources of impact

- Site preparation;
- Construction activities;
- Presence of workers.

Mitigation measures

Mitigation measures aimed at reducing impacts on soils, water resources, ambient air quality and ambient noise levels, as well as relating to the protection of terrestrial habitats and associated flora (protection of vegetation cover and species diversity) will also help mitigating impacts on aquatic habitats and associated fauna. Moreover, the following specific mitigation measures should be applied:

- Complete tree and/or brush cutting prior to or after the core nesting season;
- Undertake a pre-construction survey, covering migration season and seasonal specificities in order to validate areas of higher risk for bird communities. Develop adapted mitigation measures. The survey should comprise :
- Assessment of birds breeding along the proposed route, and within an appropriate buffer zone including the construction site itself;
- Vantage point surveys throughout the year with intense monitoring during peak migration periods;
- Species specific assessments for species with conservation interest as well as water birds and breeding bird species for collision risks and/or electrocutions;
- Winter ornithological surveys;
- Identification of any additional specific mitigation measures required to reduce impacts on avifauna;
- Compensate any loss of breeding/nesting sites by the creation of suitable habitat elsewhere, notably from enhancement of degraded habitats;
- Implement compensation measures prior to construction work.

Detailed Impact Description

Construction activities will lead to habitat losses, modification and fragmentation for some terrestrial and water birds. Vegetation clearing will however be minimized as much as possible to limit habitat destruction. The habitat loss could impair highly ecologically important habitats for birds, as breeding or nesting sites. Prior to construction works, bird' surveys should be undertaken covering migration season and seasonal specificities, in order to validate areas of higher risk for bird communities. Specific mitigation measures should then be proposed, notably for species of conservation interest and water birds, and to protect habitat of higher ecological importance for birds, or to develop relevant mitigation measures that should be adopted prior to construction works. In total, eighteen species of water birds are present or potentially present inside the study area. A very high priority should also be given to protecting critical sites that hold a large proportion of their population. Such critical sites are particularly important for migratory waterfowl because the loss or degradation of the site may have a very large impact on the population as a whole. Indeed, some species use relatively few sites as migratory staging posts and wintering areas (AEWA, 2008).

Construction activities will also lead to increased noise which may disturb the bird species present in the area. However, as for the terrestrial fauna, the avifauna is likely to migrate to similar but quieter

habitats located in the vicinity of construction areas. This phenomenon could cause a short term increase in habitat competition as the bird communities may concentrate in these adjacent habitats.

Impact assessment

With the adoption of appropriate mitigation measures, the intensity of the impact on avifauna is considered medium. The extent of the impact on terrestrial fauna is local as most of their habitat has already been modified by human presence and few ecologically important areas are still present inside the ROW. The duration of the impact is considered long, as the habitat will be modified on a long term. The impact on avifauna is thus considered of moderate importance. The probability of occurrence is high because the ROW need to be prepared prior to construction works and will then generated habitat loss and fragmentation.

IMPACT ON AVIFAUNA DURING THE CONSTRUCTION PHASE

Intensity : Medium	Importance : **Moderate**
Extent : Local	
Duration : Long	
Probability of occurrence : High	

OPERATION PHASE

Potential Impact

- Bird electrocutions and collisions;
- Modification and alteration of birds habitats, with associated modifications in fauna communities;

Sources of impact

- Presence of lines, substations and access road
- ROW management
- Waste and Hazardous Materials Management
- Transportation and circulation

Mitigation measures

The following mitigation measures should be applied:

- Place “bird diverters” at appropriate intervals on the top (ground) wire to make the lines more visible to birds if the collision potential is high, in particular inside or close to ecologically sensitive areas (Wetlands, staging areas, birds’ migration corridors and large rivers, close to Important Bird Area.
- Implement a bird mortality monitoring program, including data monitoring of bird mortality (in partnership with local communities) and review of mitigation measures efficiency.
- Develop specific mitigation measures for species that are involved in bird mortality;

Bird Diverter Installation Considerations

Priority locations along the project line routes have been identified for installation of bird diverters. Those locations consider presence of large wetland areas, large waterbodies as well as internationally recognized Important Bird Areas. The following criteria were followed for identification of segments where bird diverters should be installed:

- **Wetland crossings**: installation above important wetlands and areas surrounding them, in order to minimize risks of collisions during sloping flight trajectories (downward or upward) of birds entering or exiting wetlands;
- **Nile Crossing**: installation above the Nile River and 800 metres on each side;

- **Important bird areas**: installation on the whole project segment neighbouring Murchison Falls National Park;
- **Planned Andibo dam**: approximately 800 metres to each side of the proposed reservoir;
- **Municipality perimeters**: installation in and near Lira municipality perimeter considering that it is common to find Marabou Stork birds (*Leptoptilos crumenifer*) scavenging municipal waste.

Figure 7-1 below provides an illustration of segments where bird diverters are to be installed along the project line route. Table 7-6 below provides a detailed description of each of those segments.

It should also be noted that bird diverters should also be installed in any additional line segment identified in the bird survey study described above.

Figure 7-1 Overview of Segments for installation of bird diverters

Table 7-6 Detailed description of segments for installation of bird diverters

SEGMENT	BEGINNING	END	APPROX. LENGTH (KM)
1	Lira substation	PK 36,7	37,1
2	PK 41,2	PK 43	1,8
3	PK 47,5	PK 55,2	7,7
4	PK 61,2	PK 76	14,8
5	PK 94,4	PK 100	5,6
6	PK 158	East Anchor Tower	39
NC1	East Anchor Tower	West Anchor Tower	1,6
NC2	East Anchor Tower	West Anchor Tower	1,5
NC3	East Anchor Tower	West Anchor Tower	1,6
7	West Anchor Tower	AP50	2,3
Andibo	PK 206	PK 210	4
		Total	**112,9**

Detailed Impact Description

The presence of the power line is likely to affect bird communities during the operational phase, especially when located in open air space habitats as grasslands and wetland. The presence of the power line can affect birds mainly through:

- Collision with power lines or towers leading to death or injury. Greater collision risk is associated with the thin ground wire which is located above the thicker high voltage wire (BirdLife, nd).
- Electrocution: Due to contact with live components;
- Displacement/Barriers: Along migration routes or to suitable habitats/feeding grounds.

The environmental characteristics and location of the power line can greatly influence collision probabilities. Collision rates between birds and the proposed power line could be highly variable both temporally and spatially. There are many factors that can contribute to specie's vulnerability to collisions with power lines, such as flocking behavior, rapid flight, high wing loading, nocturnal migrants, and species with poor vision (cranes and waterfowl). Aquatic birds, including shorebirds, waterfowl, cranes, and herons, are known as the most common victims of power transmission lines (Rioux et al. 2013). Collision risks are higher for species with small binocular fields of vision and large blind areas. Thus visual field topographies, which have evolved primarily to meet visual challenges associated with foraging, may render certain bird species particularly vulnerable to collisions that extend into the otherwise open airspace above their preferred habitats. The concentration of water birds inside wetlands could increase the impacts on their populations.

On the other hand, electrocution rates could be high for species nesting on power lines, such as storks. As well as putting them at risk of electrocution, this could escalate the probability of collision by increasing the amount of time spent flying close to power lines (Martin and Shaw, 2010).

Proposed mitigation measures should help reducing the risk of collision and electrocution. However, the success of mitigation measures could be highly variable from species to species. A proper bird mortality monitoring program should then be developed and implemented in order to identify areas and species that are more impacted. Collisions are thought to be more common during migratory movements (Morkill and Anderson 1991), which suggests that a better understanding of impacts during migration as well as other critical periods is needed. On the basis of monitoring program, specific mitigation measures should be proposed. Collision mitigation may need to vary substantially for different collision prone species, taking species specific behaviours, habitat and foraging preferences into account, since an effective all-purpose marking device is probably not realistic if some birds do not see the obstacle at all (Martin and Shaw, 2010).

Impact assessment

Even with the adoption of appropriate mitigation measures, the construction of a power line inside flyways or close to critical ecological habitat has the potential to generate impacts of high intensity. The extent of the impact on terrestrial avifauna is local as it could probably happen on given portion of the line according to the presence of some important habitat for birds. The duration of the impact is considered long as it is likely to occur during all the operation phase. The impact on avifauna is thus considered of major importance. The probability of occurrence is high.

IMPACT ON AVIFAUNA DURING THE OPERATION PHASE

Intensity : High	Importance : **Major**
Extent : Local	
Duration : Long	
Probability of occurrence : High	

7.2.4 NEGATIVE IMPACTS ON THE HUMAN ENVIRONMENT

7.2.4.1 LAND USE

PRE-CONSTRUCTION AND CONSTRUCTION PHASE

Potential Impact

- Restriction to land uses within the line's right-of-way
- Loss of arable, grazing and pastoral lands
- Disruption of farming activities by construction works

Sources of impact

- Land acquisition (approximately 9.44 km^2 including TL and substation footprints)
- Construction activities

Mitigation measures

- Development by UETCL of a structured Communication and Stakeholder / Community Engagement Plan covering all elements described in Appendix 7-2. Start implementing that plan before initiation of resettlement activities and continuation throughout the pre-construction and construction phase.
- Provide compensation measures and resettlement assistance to affected households and landowners

Detailed Impact Description

Agricultural activities and livestock are likely to be affected during the work due to the loss of arable lands, restrictions imposed on the movement of livestock, potential breakage to fences and drainage channels. Adequate compensation and/or reestablishment measures (de-compaction of land, reconstruction of fences, etc.) will be proposed to affected landowners.

Crops in the wayleave area will be destroyed or delayed during the construction period. It is however difficult to assess the precise impact on the annual harvest since the exact period and duration of construction in each locality are not known at this stage. All these aspects will be detailed in the RAP. In addition, crops that may be removed from land to be temporarily used for construction purposes (camp, access road) will also have to be compensated.

Land use directly adjacent to substations, especially near urban areas, will be modified with time, since these lands are subject to new residential development. Overtime, these residential developments can generate conflict between inhabitants and equipment operators: complaints about noise, risks of electrocution, etc.

The power transmission line traverses mostly small-scale agricultural land, as well as some land that might be used for pasture. Therefore, the clearance of the line's ROW will have a significant impact on local farmers. The line's route will also affect the urban suburbs of Lira over approximately 1 km, where urban resettlement will be required. Lira is the only urban area that is affected by the line route.

It should also be noted that impacts listed above, although occurring mostly in the pre-construction phase, usually continue either unfinished or as a result of re-alignments during the construction phase. They shall be managed and mitigated according to the same mitigation measures during both the pre-construction and the construction phase.

Impact assessment

The intensity of the impact on land use is medium since compensation and resettlement assistance will be provided to affected household and the ROW could be used for various purposes. The extent of the impact on land use is local since land use will mainly be altered along the proposed power line and new access roads. The duration of the impact is considered long since land use will be altered during the period of the construction and beyond. The impact on land use during the pre-construction and construction phase is thus considered of moderate importance. The probability of occurrence is high since land used will certainly be altered in the ROW.

IMPACT ON LAND USE DURING THE PRE-CONSTRUCTION AND CONSTRUCTION PHASE

Intensity : Medium	Importance : **Moderate**
Extent : Limited	
Duration : Long	
Probability of occurrence : High	

OPERATION PHASE

Potential impact

- Land use restriction in the ROW and wayleave
- Punctual infringement of crops by machinery for maintenance purposes

Source of Impact

- Presence and operation of line, substations and access roads
- Maintenance and repair

Mitigation Measures

- Allow grazing in the ROW and other agricultural activities wayleave, provided that plantations do not exceed 4 m in height. If UETCL permits it, the ROW in urban area can be used for a number of purposes that will increase quality of life in neighborhoods crossed by the wayleave, e.g. gardening, playground, walking path.
- Plan for maintenance activities to be conducted outside of the growing and grazing seasons.

Detailed Impact Description

During the operation phase, impacts on land use consist of land use restriction in the ROW and infringement of crops by machinery during ROW maintenance. Effects on land use should not be significant since grazing will be allowed within the ROW, provided that plantations do not exceed 4 m in height. Moreover, infringement of crops by machinery during ROW maintenance will be prevented by conducting maintenance activities outside the growing and grazing seasons.

Impact assessment

The intensity of the impact is considered low since no land use changes are to be expected in the ROW following project inauguration. The extent of the impact on land use is limited since it will be felt by a small portion of the population within the project area. The duration of the impact is considered long since land use will be altered over the lifetime of the transmission line. The impact on land use during the operation phase is thus considered of minor importance. The probability of occurrence of the impact is high because land use will certainly be restricted within the ROW.

IMPACT ON LAND USE DURING THE OPERATION PHASE

Intensity : Low	Importance : Minor
Extent : Limited	
Duration : Long	
Probability of occurrence : Medium	

7.2.4.2 BUILT ENVIRONMENT

PRE-CONSTRUCTION AND CONSTRUCTION PHASE

Potential impact

→ Houses and other buildings located within the ROW will need to be relocated.

Sources of impact

→ Land acquisition (approximately 9.44 km^2 including TL and substation footprints)

→ Resettlement

Mitigation measures

→ Provide compensation measures and resettlement assistance to affected households and landowners

Detailed Impact Description

A number of houses, secondary structures and community buildings that are located within the ROW will be demolished or moved.

In the highly settled areas, like Lira, some of affected households will not have the opportunity to reconstruct their house within their existing property. This resettlement operation will be very sensitive due to high density in the area (see the RAP for details).

With proper resettlement procedures, appropriate and cost effective compensation measures, the impact of the project on these households will be minimized but still potentially significant. Sufficient time and care to assist communities and households is crucial to minimize the impact on these resettlements. It should however be noted that the definitive number of households likely to be displaced will be established during the final property and asset inventories.

In general, however, the power transmission line avoids villages, where the concentration of buildings is marked.

Impact assessment

The intensity of the impact is high since the built environment within the ROW will be completely relocated. The extent of the impact is local since it will be felt only in the ROW and its immediate surroundings. The duration of the impact is considered long since houses and buildings will be relocated for the lifetime of the transmission line. The impact is thus considered of major importance. The probability of occurrence of the impact is high because a portion of the built environment and habitations within the project area will certainly be displaced due to construction activities.

IMPACT ON BUILT ENVIRONMENT AND HABITATIONS DURING THE PRE-CONSTRUCTION AND CONSTRUCTION PHASE

Intensity : High	Importance : **Major**
Extent : Local	
Duration : Long	
Probability of occurrence : High	

OPERATION PHASE

No negative impacts on houses and secondary structures are expected during the operation phase since these structures will have been displaced during the pre-construction phase.

7.2.4.3 EMPLOYMENT AND ECONOMIC DEVELOPMENT

PRE-CONSTRUCTION AND CONSTRUCTION PHASE

Potential impact

- Temporary loss in crops
- Temporary perturbation of tourism and recreation activities
- Inflation risk
- Increase in pressure on resources

Sources of impact

- Construction Activities
- Transportation and circulation
- Presence of workers

Mitigation measures

- Provide compensation measures for the loss of crops, if any.
- Provide compensation measures to affected tourism and recreation activities, if any.
- Hire local workers in priority, especially for unspecialized jobs.
- Adopt procurement policies promoting local products and services, when available with price limits in order to reduce risk of high inflation.
- Ensure that regular business dealers and especially food vendors are registered for identity and avoidance of unfair treatment by contractors and workers, such as denial of payment entitlements.

Detailed Impact Description

There are no strong adverse impacts on the local and regional economy at the pre-construction and construction stage. Some speculation could happen before the beginning of construction which could act as an upward pressure on commodities prices.

During the construction phase, the upward pressures on commodities prices in areas where construction will happen (because of increased demand by workers or by contractors) could temporarily cause some slight market distortions. It is however expected that the local markets react properly by, for instance, increasing local supplies of key merchandises. The increased supply should in turn drive prices down to their former level. Furthermore, contractors could announce that local commodity and services will not be purchased over a certain price in order to reduce the risk of high inflation.

The dissemination of reliable information is essential to maintaining a swift and efficient market for the goods and services required by contractors and workers. Therefore, it will be primordial that local and

regional populations be informed well in advance of the onset and duration of construction work to allow them to adjust their supplies accordingly and avoid bottlenecks resulting in steep price increases.

As for agricultural activities, adequate compensation measures should offset the temporary loss in crops. However, the compensation package should ideally be ramped up as to imitate the normal revenue stream of farmers (i.e. more than one instalment), if judged convenient by both authorities and communities. Experience has shown that dividing a compensation package into several instalments tends to reduce inequalities in households and preserve more efficiently social organization. RAP will explain in more details these compensations measures and mechanisms.

Other economic activities, such as tourism, may be affected during the construction period. In fact, the noise produced by construction activities and equipment as well as the related trucking may reduce aesthetic values for tourism and recreation activities. However, adequate compensation measures should help reducing impacts on tourism and recreation activities during the construction period. Impacts on local economies can also be offset by hiring local workers in priority, especially for unspecialized jobs.

Impact assessment

With the adoption of appropriate mitigation measures, the intensity of the impact is medium as tourism /recreation activities and inflation could be impacted by construction activities and the increase in economic activity during the construction phase. The extent of the impact is local since, if the impact occurs, it will be felt mostly around construction sites. The duration of the impact is considered medium because the negative effects on tourism/recreation and inflation could be felt over a period of time shorter than the lifetime of the transmission line but longer than the construction period. The impact is thus considered of moderate importance. The probability of occurrence of the impact is medium because tourism perturbations and inflation may occur.

IMPACT ON EMPLOYMENT AND ECONOMIC DEVELOPMENT DURING THE PRE-CONSTRUCTION AND CONSTRUCTION PHASE

Intensity : Medium	Importance : **Moderate**
Extent : Local	
Duration : Medium	
Probability of occurrence : Medium	

OPERATION PHASE

No adverse impacts on employment and economic development are expected during the operation phase.

7.2.4.4 INFRASTRUCTURES

PRE-CONSTRUCTION AND CONSTRUCTION PHASE

Potential impact

- → Need for relocation of existing infrastructure
- → Increased traffic and disturbance of traffic flow
- → Damage to existing infrastructures

Sources of impact

- → Site preparation
- → Construction activities
- → Transportation and circulation

Mitigation measures

- Conduct an inventory of infrastructure that will be disturbed during construction.
- Plan construction activities in collaboration with local authorities to minimize damages to existing infrastructures
- Rehabilitate damaged public infrastructures after construction
- Restrict travel to and from the construction sites during low traffic periods

Detailed Impact Description

As far as infrastructures are concerned, roads, electricity and telecommunications infrastructures were surveyed. Uganda Civil Aviation Authority has given clearance to the selected line route (see Appendix 2-2). On main roads, the presence of construction vehicles and equipment may lead to increased traffic and affect traffic flow, as well as constitute a risk of damage. Also, several existing secondary roads will be used as access roads to the way leave, and new access roads will be constructed. However, they will have to be rehabilitated after the construction phase, as some of the machinery could have damaged them, or dismantled. Proper signaling will also be key in indicating the presence of machinery traffic. An increase in road traffic as well as a temporary blockage of points could lead to difficulties with regards to access of some communities to water.

Construction work should not create any impacts on the operation of nearby existing telecommunication antennas, except for perhaps temporarily limiting their access.

Impact assessment

The intensity of the impact is low since the application of mitigation measures will attenuate the impact of the construction activities on infrastructures within the project area. The extent of the impact is local since the impact on infrastructures, if any, will be felt mainly by the population living in proximity with the line and access roads. The duration of the impact is considered medium since the negative effect on infrastructure will be felt continuously throughout the construction phase. The impact on infrastructure is thus considered of minor importance. The probability of occurrence of the impact is low because the project construction is not likely to damage or cause the relocation of existing infrastructures.

IMPACT ON INFRASTRUCTURES DURING THE PRE-CONSTRUCTION AND CONSTRUCTION PHASE

Intensity : Low	Importance : **Minor**
Extent : Local	
Duration : Medium	
Probability of occurrence : Low	

OPERATION PHASE

Potential impact

- Radio and television signal interruption

Source of impact

- Presence of line, substations and access roads

Mitigation measures

No specific mitigation measures are proposed.

Detailed Impact Description

Transmission lines do not usually interfere with normal television and radio reception. In some cases, interference can occur very close to the wayleave due to weak broadcast signals or poor receiving equipment. No other significant impact on infrastructures is expected to occur during the operation phase.

Impact Assessment

The intensity of the impact is low as infrastructures, namely radio and television signal, within the project area will be minimally affected by operation activities. The extent of the impact is local since the impact will be felt mainly by the population living very close to the wayleave. The duration of the impact is considered short since the negative effect on radio and television signal could be felt sporadically over a short period of time. The impact is thus considered of minor importance. The probability of occurrence of the impact is low because the transmission line will unlikely cause the interruption of radio and/or television signals.

IMPACT ON INFRASTRUCTURES DURING THE OPERATION PHASE	
Intensity : Low	Importance : **Minor**
Extent : Local	
Duration : Short	
Probability of occurrence :Low	

7.2.4.5 CULTURAL AND ARCHEOLOGICAL HERITAGE

PRE-CONSTRUCTION AND CONSTRUCTION PHASE

Potential impact

- Destruction or disturbance of archaeological sites or artifacts
- Destruction or disturbance of burial grounds or sacred sites

Sources of impact

- Site Preparation
- Exploitation of borrow Pits
- Construction activities

Mitigation measures

- Provide financial and logistical assistance for the relocation of known burial grounds, sacred sites, or any other cultural sites of importance to communities
- Implement provisions of the attached Summary Cultural Resources Management Plan (appendix 7-3), including chance finds procedures
- Update chance finds procedure prior to construction in order to include contact information of relevant persons in case of a chance find.
- Oversight of excavation works by an archeologist

Detailed Impact Description

Consultations with district officials and communities revealed the existence of several cultural heritage sites and resources in the vicinity of the proposed electrical transmission line. The spiritual and cultural values of these elements were highlighted by local communities. Many burial sites and two archeological sites were found to be located within the project wayleave. The archeological sites include scatters of roulette decorated pottery and scatters of microlithic materials in association with pottery (roulette).

The project Chance finds procedure should be updated prior to construction in order to include contact information of relevant contact persons in case of a chance find. During construction activities, hither to unknown archaeological sites or artifacts can be discovered and partially destructed by the machinery. An archaeologist should accompany the construction team, especially during excavation work. Should any archaeological or historic remnants be encountered, construction work should immediately stop along that section, and the National museum authorities and District authorities should be informed.

Important cultural sites, such as the Pubungu Historical Site and the Labong separating from Gipiir Historical Site, need to be protected during construction activities. Significant cultural features include the presence of burial grounds for which people have strong attachments. During the construction, special attention should be placed on the verification of cultural artifacts.

Impact assessment

Considering the adoption of mitigation measures listed above, the intensity the impact is considered medium because construction activities could partially disrupt cultural heritage sites. The extent is considered limited because the risk of disturbance is confined to a limited space, that of the facilities with an impact on the ground during the construction. The impact duration is estimated long, if integrity is lost or an archaeological site or artifact destroyed. Indeed, the nature of such loss or destruction could be permanent and irreversible. The importance of the impact on archeology and heritage is considered moderate. The probability of the occurrence of this impact is medium since it is possible that cultural and/or archaeological sites will be accidentally damaged along the project line route.

IMPACT ON CULTURAL AND ARCHAEOLOGICAL HERITAGE DURING THE PRE-CONSTRUCTION AND CONSTRUCTION PHASE

Intensity : Medium	Importance : **Moderate**
Extent : Limited	
Duration : Long	
Probability of occurrence : Medium	

OPERATION PHASE

No adverse impacts on cultural and archaeological heritage are expected during the operation phase.

7.2.4.6 GENDER RELATIONS

PRE-CONSTRUCTION AND CONSTRUCTION PHASE

Potential impact

- Risk of increased incidence of STD and HIV/AIDS
- Risk of sexual abuse by workers and especially child abuse
- Women being sidetracked from the compensation and decision making processes
- Disturbance of women subsistence activities
- Marginalization of women during employment process

Sources of impact

- Presence of workers
- Land acquisition
- Resettlement
- Construction activities

Mitigation measures

- Compliance to Employment Act 2006, Section 7 on sexual harassment and violence;
- Favour the employment of local workers to reduce the risk of sexual harassment and violence caused by foreigners;
- Locate worker camps at a minimum distance of 1km from towns and villages in order to limit worker – community interactions;
- Implement and follow-up on grievance redress mechanism described in Appendix 7-4;

- Development by UETCL of a strict LGNA project management plan on Gender, STD and HIV/AIDS, Sexual abuse, Child labour and other relevant social issue, covering all elements described in Appendix 7-5;
- Preparation and implementation by the Lead Contractor of a strict Employee Code of Conduct complying with UETCL's management plan and including among others a strict prohibition of sexual abuse and sexual intercourse with partners younger than 18 years-old (underage sex). It is the Lead Contractor's responsibility to take necessary measures so that its employees and subcontractors' employees do not commit acts of sexual abuse and/or underage sex;
- Sensitize all contractors, workers and communities on the STD and HIV/AIDS program, including explanations on risks posed by STDs, sanctions, etc. as well as on grievance mechanism in place;
- Institute a non-fraternization policy at the workers' camps as a measure to control against prostitution and misconduct;
- Immediately report any suspected case of sexual abuse or underage sex to the supervising engineer and UETCL. Management of such case should be based around the following principles:
  - Immediate suspension of employment for accused worker;
  - Trigger grievance redress mechanism processes if not done already (see Appendix 7-4) and invite an impartial observer such as a representative from the Ministry of Gender, to follow the process;
- If accusations are found to be justified, the Lead Contractor shall:
  - Immediately cease employment of the accused worker and report criminal offences to appropriate authorities for prosecution;
  - Compensate the affected person and community according to an agreement to be negotiated using the grievance redress mechanism. These compensations may **not** take a monetary form, and shall be validated as fair by the impartial observer mentioned above as well as the World Bank ESDP Project's social specialist.
- If accusations are found not to be justified, the Lead Contractor shall reinstate the worker in its regular tasks with compensation for lost income during suspension.
- The first sexual abuse and/or underage sex complaint or event treated in front of a grievance committee (which may involve one or more workers) where accusations of sexual abuse and/or underage sex are found to be justified shall entice the following consequences for the Lead Contractor, in addition to those listed above:
  - Warning from UETCL about consequences of any additional cases;
  - Obligation to submit a remedial plan to be approved by UETCL and World Bank ESDP Project's Task Team Leader(TTL) and Social specialist.
- The second instance where a sexual abuse and/or underage sex complaint treated in front of a grievance committee finds accusations to be justified shall trigger immediate suspension of all construction works. The World Bank Inspection Panel shall be called in to conduct an inquiry and provide guidance on way forward.
- Encourage the recruitment of female workers, with equal payment for male and female workers, for equivalent jobs;
- Provide opportunities to women in income generating activities during construction, e.g. provision of catering services, selling local products, etc., with price limits in order not to cause inflation;
- Proper consideration of gender issues in decision making process and the attribution – and distribution – of compensation packages

Detailed Impact Description

The influx of foreign workers in local communities may cause significant health and safety impacts on local communities. First and foremost, interactions between workers and female community members increase the risk of communicable diseases transmission such as HIV/Aids and other STDs.

To prevent this impact by minimizing worker interactions with local women, worker camps should never be sited less than 1km away from towns and villages. The contractor in charge of works should also undertake a prevention program for STDs and HIV/AIDS among its workers and the local communities.

Close interactions between workers and communities may also result in cases where some workers commit sexual abuse or have sexual intercourse with underage community members. Such serious offence should be strictly forbidden and, in case of violation, determined action should be taken. The procedure to be applied in such an event is described above and revolves around immediate suspension of involved workers, collaboration with communities through the grievance resolution mechanism to determine whether accusations are justified, dismissal of workers at fault and reporting to public authorities if accusations are indeed justified, as well as compensation of victims and communities through non-monetary mechanisms to be determined in common agreement.

It should be noted that ultimate responsibility for community women and children's safety from sexual abuse lies with the Lead Contractor. The first sexual abuse / underage sex event (where accusations are found justified) shall result in a warning and an obligation for the Lead Contractor to prepare a remedial plan that will need to be approved by UETCL and the WB ESDP project's TTL and Social specialist. Any further event of sexual abuse / underage sex shall result in immediate suspension of all construction works and calling in the World Bank Inspection Panel to inquire and provide guidance on way forward.

During the pre-construction phase, attention should be paid to the treatment of women in the surveying of propriety/land titles and their registration. It is primordial that the project insures that women are not sidetracked from the process. This will be particularly important for the attribution of compensation packages for agricultural losses. During the construction phase, impacts of the project on gender are mostly related to employment opportunities and land use by women.

Within the project area, traditional cultural norms play an important role in women and girls' education, gainful employment and other social benefits. With little education, women have had little access to formal employment. Hence, they represent a negligible proportion of persons currently employed in professional, technical and administrative occupations, which the proposed project will – to some extent – provide. Should this pattern continue with the onset of the project, it will inevitably lead to an increase in men/women inequality through heavy employment of men as opposed to women. At the very least, such impact should be kept to a minimum by actively making sure that women with proper qualifications (technical works or administrative work, generally) are hired for various jobs (surveying, signaling, etc.). There should also not be any gender inequalities in terms of wages for equivalent jobs.

Also, land lost and subsequent loss of crops (annual and perennial) due to the project could affect women more than men. In fact, women are usually in charge of subsistence activities and struggle to provide for the household when crops are limited. Proper consideration of this dynamic in the attribution and distribution of compensation packages is recommended. To reduce this inequality, women should be provided with adequate information at all phases of the compensation process. Moreover, a scaling formula of payments should be used to reduce misuse by husband or relatives.

Impact assessment

Even with the adoption of adequate mitigation measures, the intensity the impact is considered high because project could negatively impact women within the project area. The extent is considered local as only a portion of women within the project area will be affected. The impact duration is estimated medium as the negative impacts will be felt over a shorter period than the lifetime of the project, but longer than the construction phase. The importance of the impact on gender relations is considered major. The probability of the occurrence of this impact is medium because there is a slight probability that women will not be impacted by the project.

IMPACT ON GENDER RELATIONS DURING THE PRE-CONSTRUCTION AND CONSTRUCTION PHASE

Intensity : High	Importance : **Major**
Extent : Local	
Duration : Medium	
Probability of occurrence :Medium	

OPERATION PHASE

Potential impact

→ Effects on women due to crop loss

Sources of impact

→ Maintenance and Repair
→ ROW Management

Mitigation measures

→ Encourage the recruitment of female workers

Detailed Impact Description

Although the impacts on gender are likely to be mostly felt during the construction phase, they are also likely be felt, to a lesser degree, during maintenance activities. Loss of crops (annual and perennial) due to maintenance activities may affect women more than men. In fact, women are usually in charge of subsistence activities and struggle to provide for the household when crops are limited. Proper consideration of this dynamic in the attribution and distribution of compensation packages is recommended. Prompt and proper compensation need to be provided for any crop loss due to maintenance activities.

Impact assessment

The intensity the impact is considered low because women will be minimally affected by the project during the operation phase. The extent is considered local as only a portion of women within the project area will be affected. The impact duration is estimated short as the negative impacts will be felt sporadically over the lifetime of the project. The importance of the impact on gender relations and equality is considered minor. The probability of the occurrence of this impact is low because it is unlikely that women will be impacted by the project during the operation phase.

IMPACT ON GENDER RELATIONS DURING THE OPERATION PHASE

Intensity : Low	Importance : **Minor**
Extent : Local	
Duration : Short	
Probability of occurrence :Low	

7.2.4.7 COMMUNITIES AND SOCIAL COHESION

PRE-CONSTRUCTION AND CONSTRUCTION PHASE

Potential impact

→ Land use and compensation disputes, reviving old quarrels (land resource and power conflict)
→ Tensions with workers from outside
→ Increased marginalization of vulnerable groups
→ Disruption of educational programs where the construction passes schools
→ Inadequate communication with communities and stakeholders

Sources of impact

→ Land acquisition
→ Resettlement

- Displacement of economic activities
- Presence of workers

Mitigation measures

- Involve traditional leaders in the resettlement process
- Development by UETCL of a structured Communication and Stakeholder / Community Engagement Plan covering all elements described in Appendix 7-2. Start of its implementing that plan before initiation of resettlement activities and continuation throughout the pre-construction and construction phase.
- The Contractor will prepare a Community Engagement Plan with the following components:
  - Identification of Project Stakeholders using the present ESIA, the Project RAP, information from RAP implementation as well as any other relevant information;
  - Analysis of stakeholder engagement to date;
  - Identification of methods of communication and information disclosure;
  - Action plan for stakeholder information and engagement during project construction;
  - Roles and responsibilities.
- Relocate temporarily students to other schools and prepare a relocation plan
- Favour the employment of local labour
- Prioritize vulnerable individuals and households in terms of access to the different social measures and programs;
- Support the most vulnerable households and individuals in organizing their transport to the relocation sites and the construction of their new homes
- Consideration for employment for the most vulnerable in the community including disabled, as may be appropriate
- As part of the RAP's monitoring program, identify the most vulnerable households and individuals and ensure close monitoring of their health and integration into host communities
- Implement the Grievance Redress Mechanism (see Appendix 7-4) during RAP implementation as well as during the whole pre-construction and construction phase.

Detailed Impact Description

The country's Northern region is known to be in a post-conflict situation that requires consideration. Land use disputes have also been reported and documented in some communities in the vicinity of the line route. Thus, steps leading to final arrangements prior to the construction could stress some communities, reviving old quarrels. Moreover, the distribution of compensations among claimants (e.g. landlord, tenants, family members) can create tensions inside an outside the impacted households.

Recommended solutions to both conflict-related and "regular" land conflicts during resettlement converge towards proper communication of compensation rules and procedures to all interested parties and implementation of mechanisms involving all parties to the conflict as well as local representatives in discussions aiming towards mediation and peaceful conflict resolution. Therefore, the grievance redress mechanism (see Appendix 7-4) to be implemented during and after RAP implementation, as well as during the whole construction phase will enable to address conflicts that may arise.

Furthermore, outsiders going to remote location for the preparation of works may disturb some communities and disrupt their traditional habits and schedules.

The construction phase will mainly impact communities and social cohesion due to:

- The presence of workers, sometimes from outside of the region, in the different sections of the line during the construction. The exact number of workers is difficult to quantify since the contractor will determine its needs for labor according to his work program;

- The population exposure to different systems of values that may be conflicting with their own, due to the presence of different stakeholders (project managers, contractors, subcontractors, employees and / or consultants);
- A corresponding steep increase in monetary flux in traditional villages or areas;
- Increased activities near remote communities.

The aforementioned factors could potentially lead to tensions, conflicts with local and traditional authorities, as well as draw cleavages between different groups.

Impacts on livelihoods of vulnerable groups (such as the elderly people, the disabled, the landless and women-headed households), may be more severe, since these groups usually have less resources and experience difficulty in using available services due to their condition.

Impact assessment

With the adoption of adequate mitigation measures, the intensity the impact is considered low because the impact on communities and social cohesion will be minimal. The extent of the impact is considered local as only a portion of the population in affected communities will be affected. The impact duration is medium as it will be felt continuously during, and perhaps beyond, the construction phase. The importance of the impact on communities and social cohesion is thus considered minor. The probability of the occurrence of this impact is high because land and compensation disputes, tensions between the local population and foreign workers and the increase in marginalisation of vulnerable groups will most likely occur during pre-construction and construction phases.

IMPACT ON COMMUNITIES AND SOCIAL COHESION DURING THE PRE-CONSTRUCTION AND CONSTRUCTION PHASE

Intensity : Low	Importance : **Minor**
Extent : Local	
Duration : Medium	
Probability of occurrence : High	

OPERATION PHASE

Potential impact

- Tensions between locals and workers from outside
- Land use disputes, reviving old quarrels (land resource and power conflict)

Sources of impact

- Presence of workers from outside

Mitigation measures

- Communicate with communities effectively and involve their leaders
- Restrict project land use during the operation phase to the line's right-of-way to avoid project developer conflict with local communities.

Detailed Impact Description

Although the impacts on communities and social cohesion are likely to be mostly felt during the construction phase, they could also be felt, to a lesser degree, during the operation phase due to the presence of workers for maintenance activities.

Impact assessment

With the adoption of adequate mitigation measures, the intensity of the impact is considered low because the size of the workforce to be employed during project operation will be very limited. The extent of the impact is considered local as only a portion of the population in affected communities will

be affected. The impact duration is short as it will be felt sporadically over the maintenance phase. The importance of the impact on communities and social cohesion is thus considered minor. The probability of the occurrence of this impact is low because tensions between the local population and maintenance workers are not very likely occur during the operation phase.

IMPACT ON COMMUNITIES AND SOCIAL COHESION DURING THE OPERATION PHASE

Intensity : Low	Importance : **Minor**
Extent : Local	
Duration : Short	
Probability of occurrence : Low	

7.2.4.8 COMMUNITY HEALTH AND SECURITY

PRE-CONSTRUCTION AND CONSTRUCTION PHASE

Potential impact

- Risk of increased incidence of STDs and HIV/AIDS
- Risk of sexual abuse by workers and especially child abuse
- Risk of abuses by contractors hiring underage workers (child labour)
- Increased pressure on community health services
- Accidents and physical injuries involving workers or local residents
- Risk of accidents due to project related traffic
- Increased stress related to nuisances (noise, dust, air pollution)

Sources of impact

- Presence of workers
- Construction activities
- Waste and Hazardous Materials Management
- Transportation and circulation

Mitigation measures

- Locate worker camps at a minimum distance of 1km from towns and villages in order to limit worker – community interactions;
- Implement and follow-up on grievance redress mechanism described in Appendix 7-4;
- Development by UETCL of a strict LGNA project management plan on Gender, STD and HIV/AIDS, Sexual abuse, Child labour and other relevant social issues covering all elements described in Appendix 7-5;
- Mainstream child protection and compliance to/awareness of Child rights laws in the continuous stakeholder engagement to be conducted in compliance to UETCL's communication and stakeholder engagement plan to be developed according to Appendix 7-2, and including workers, leaders and communities.
- Preparation and implementation by the Lead Contractor of a strict Employee Code of Conduct complying with UETCL's policies and including among others a strict prohibition of sexual abuse and sexual intercourse with partners younger than 18 years-old (underage sex). It is the Lead Contractor's responsibility to take necessary measures so that its employees and subcontractors' employees do not commit acts of sexual abuse and/or underage sex;
- Sensitize all contractors, workers and communities on the STD and HIV/AIDS program, including explanations on risks posed by STDs, sanctions, etc. as well as on grievance mechanism in place;

- Institute a non-fraternization policy at the workers' camps as a measure to control against prostitution and misconduct;
- Immediately report any suspected case of sexual abuse or underage sex to the supervising engineer and UETCL. Management of such case should be based around the following principles:
  - Immediate suspension of employment for accused worker;
  - Trigger grievance redress mechanism processes if not done already (see Appendix 7-4) and invite an impartial observer such as a representative from the Ministry of Gender, to follow the process;
- If accusations are found to be justified, the Lead Contractor shall:
  - Immediately cease employment of the accused worker and report criminal offences to appropriate authorities for prosecution;
  - Compensate the affected person and community according to an agreement to be negotiated using the grievance redress mechanism. These compensations may **not** take a monetary form, and shall be validated as fair by the impartial observer mentioned above as well as the World Bank ESDP Project's social specialist.
- If accusations are found not to be justified, the Lead Contractor shall reinstate the worker in its regular tasks with compensation for lost income during suspension.
- The first sexual abuse and/or underage sex complaint or event treated in front of a grievance committee (which may involve one or more workers) where accusations of sexual abuse and/or underage sex are found to be justified shall entice the following consequences for the Lead Contractor, in addition to those listed above:
  - Warning from UETCL about consequences of any additional cases;
  - Obligation to submit a remedial plan to be approved by UETCL and World Bank ESDP Project's Task Team Leader and Social specialist.
- The second instance where a sexual abuse and/or underage sex complaint treated in front of a grievance committee finds accusations to be justified shall trigger immediate suspension of all construction works. The World Bank Inspection Panel shall be called in to conduct an inquiry and provide guidance on way forward.
- Strictly prohibit child labour, as per required by Uganda Labour Law. It is the Lead Contractor's responsibility to take necessary measures so that its employees and subcontractors' **employees are all aged 18 years-old or more**. All child labour cases should be immediately reported to UETCL by the supervising engineer;
- The first child labour case discovered (which may involve one or more child-labourers) shall entice the following consequences for the Lead Contractor:
  - Warning from UETCL about consequences of any additional cases;
  - Obligation to submit a remedial plan to be approved by UETCL and World Bank ESDP Project's Task Team Leader and Social specialist.
- Any additional case(s) of child labour shall trigger immediate suspension of all construction works. The World Bank Inspection Panel shall be called in to conduct an inquiry and provide guidance on way forward.
- Education programs on community risks for workers and drivers
- Secure equipment and demarcate any excavation work areas
- Sign and fence construction areas where necessary
- Locate access roads and lay down areas away from residences to the extent possible
- Reduce nuisances especially near settled areas with adequate noise, dust and air pollution reduction measures
- Educational programmes in schools and communities on hazards and safe behaviours near high voltage transmission lines
- Create an emergency response plan to respond to accidental spills or environmental emergencies

- Confine construction period to normal working hours
- Adopt a MOU between UETCL and district local governments defining the terms under which the company will support the improvement of health care services during the project's construction phase

Detailed Impact Description

The influx of foreign workers in local communities may cause significant health and safety impacts on local communities. First and foremost, interactions between workers and communities increase the risk of communicable diseases transmission such as HIV/Aids. To prevent this impact by minimizing worker interactions with local communities, worker camps should never be sited less than 1km away from towns and villages. The contractor in charge of works should also undertake a prevention program for STDs and HIV/AIDS among its workers and the local communities. Close interactions between workers and communities may also result in cases where some workers commit acts of sexual abuse and/or have sexual intercourse with underage community members. Such serious offence should be strictly forbidden and, in case of violation, determined should be automatic. The procedure to be followed in such situations provided in the mitigation actions listed above, and is described in details in section 7.2.4.6 above.

Child labour is another risk during construction work that should be avoided at all costs. First and foremost, it is prohibited by the Children's Act, Chapter 59 of the Laws of Uganda. This prohibition is justified by the fact that Child labour contributes to worsening pending issues of (i) high level school dropout rates, and (ii) early child marriages. Therefore, child labour shall be strictly prohibited and any case thereof should be reported to UETCL by the supervising engineer. For purposes of the present ESMP, child labour is described as having workers aged less than 18 years-old.

Ultimate responsibility for preventing child labour lies with the Lead Contractor. The first child labour case that is discovered shall result in a warning and an obligation for the Lead Contractor to prepare a remedial plan that will need to be approved by UETCL and the WB ESDP project's TTL and Social specialist. Any additional cases shall result in immediate suspension of all construction works and calling in the World Bank Inspection Panel to inquire and provide guidance on way forward.

During project construction, the population of the project area may increase temporarily, increasing the pressure on local health systems.

Accidents are likely to happen during construction works. In fact, construction sites pose potential hazards to both workers and nearby communities because they may raise curiosity, especially among children.

In order to prevent any accidents, the contractor will secure equipment and demarcate any excavations when construction is not in progress, such as with temporary fences. Non-authorized persons will also be kept away from any construction sites. In addition, warnings signs could be posted for public safety. Finally, educational programs in schools and communities could be implemented to educate people on hazards and safe practices when playing and working close to a high voltage transmission line.

Increased traffic in the villages could be a source of accidents. The contractor will have to develop appropriate strategies to manage transportation of supplies. The contractor will have to ensure its compliance with all applicable laws and regulation, such as maximum load restriction and speed limits. These measures will minimise the risk of accidents due to project related traffic. Given the rapid road system expansion and the changes in the number and type of vehicles used by residents of the project area, it is recommended to conduct a baseline study as close as possible to the commencement date of the project to get an accurate reading of the situation.

With regards to overall quality of life, nuisances (noise, dust, air pollution and accident risks) will create stress especially in usually calm rural areas. Proper mitigation measures and confinement of construction activities during normal working hours will reduce these inconveniences to local population.

Additionally, some communities may be nervous due to the presence of foreign workers and the uncertainty related to the electrification of their community, however positive it may be.

Finally, this project may create an “induced development” effect, i.e. an influx of population in the area that can increase the pressure on public services. This risk is low due to the «moving nature» of the construction site.

Impact assessment

Even with the adoption of adequate mitigation measures, the intensity the impact on community health and security is considered high. The extent of the impact is considered local as only a portion of the population will be affected within the project area. The impact duration is medium as it will be felt continuously during and beyond the pre-construction and construction phases but not throughout the lifetime of the project. The importance of the impact on community health and security is thus considered major. The probability of the occurrence of this impact is high because some of the potential impacts listed above will certainly manifest themselves.

IMPACT ON COMMUNITIES HEALTH AND SECURITY DURING THE PRE-CONSTRUCTION AND CONSTRUCTION PHASE

Intensity : High	Importance : **Major**
Extent : Local	
Duration : Medium	
Probability of occurrence : High	

OPERATION PHASE

Potential impact

- Risk of electrocution caused by equipment breakdowns, illegal connections, steel thefts and all other forms of unsafe contacts
- Health concerns over exposure to electromagnetic fields

Sources of impact

- Presence of line, substations and access roads

Mitigation measures

- Proper communication with and awareness of local populations
- Educate local populations on safe behaviour around high voltage power lines and on Electromagnetic Field (EMF) risk
- Warning signs and anti-climbing devices installed near substations and pylons
- Usage of safety locks and bolts in order to minimize steel theft risks;
- Ensure the development of local and regional emergency plans in case of infrastructure breakdowns, especially near roads or residential areas
- Monitor and control illegal connections

Detailed Impact Description

The presence of electric power lines constitute potential risks and safety for the population living nearby, where people sometimes try to make illegal connections. Steel thefts on pylons can also pose significant safety risks in the event of tower collapses.

However, towers are to be designed according to the best practices and applicable norms and standards. The land use restrictions within the wayleave will prevent contacts with the energized conductors and minimize risks to public safety in the event of tower collapses. Risks associated with steel theft are also limited by the fact that the project is located near public roads along all its route. This will guarantee reliable and safe operation of the power transmission line while ensuring safety for the communities neighbouring the power transmission line.

Health concerns over exposure to electro-magnetic field (EMF) are often raised when a new transmission line is proposed.

Based on a recent in-depth review of extensive scientific literature (World Health Organisation's International EMF Project), the WHO has concluded that "despite extensive research, to date there is no evidence to conclude that exposure to low level electromagnetic fields is harmful to human health " (WHO 2007, WHO 2002).

Impact assessment

With the adoption of adequate mitigation measures, the intensity the impact on community health and security during the operation phase is considered low. The extent of the impact is considered limited as the impact with regards to risk of electrocution is mainly limited to substations and health concerns over exposure to EMF relate to areas close to the line and substations. The impact duration is long as it will be felt continuously for the lifetime of the transmission line. The importance of the impact on community health and security during the operation phase is thus considered minor. The probability of the occurrence of this impact is medium because potential impacts listed above might occur without any certainty.

IMPACT ON COMMUNITY AND HEALTH SECURITY DURING THE OPERATION PHASE

Intensity : Low	Importance : **Minor**
Extent : Limited	
Duration : Long	
Probability of occurrence : Medium	

7.2.4.9 LANDSCAPE

PRE-CONSTRUCTION AND CONSTRUCTION PHASE

Potential impact

- Temporary degradation of landscape at work sites
- Potential degradation of highly sensitive scenic areas and tourism attractions

Sources of impact

- Site preparation
- Construction activities
- Exploitation of borrow pits

Mitigation measures

- Obtain authorizations prior to harvesting the trees, clearly delineate areas to be deforested and vegetation to be cut and minimize vegetation clearing around work areas
- Maximise use of existing access roads
- Restore all temporary construction areas, such as borrow pits and camp sites
- Provide compensation measures to affected tourism and recreation activities, if any.

Detailed Impact Description

Aesthetic impacts during the construction phase will be limited to the work areas. Deforestation of the ROW will change landscape. Moreover, to minimize the impacts of construction activities on the landscape, existing access roads will be used as much as possible. Finally, all temporary works areas will be restored upon completion.

Impact assessment

With the adoption of adequate mitigation measures, the intensity the impact on the landscape during pre-construction and construction phases is considered low. The extent of the impact is local as the impact will only be felt in a portion of the project area. In urban setting, the project will affect the integrity of the landscape to a lesser extent as it will integrate well near existing infrastructures. The impact duration is medium as it will be felt continuously over a period of time shorter than the lifetime of the transmission line but longer than the construction phase. The importance of the impact on the landscape during the pre-construction and construction phases is thus considered minor. The probability of the occurrence of this impact is high because the landscape will certainly be disrupted at the work sites and potentially at scenic areas.

IMPACT ON LANDSCAPE DURING THE PRE-CONSTRUCTION AND CONSTRUCTION PHASE

Intensity : Low	Importance : **Minor**
Extent : Local	
Duration : Medium	
Probability of occurrence : High	

OPERATION PHASE

Potential impact

- Permanent alteration to the landscape
- Potential degradation of highly sensitive scenic areas and tourism attractions

Sources of impact

- Presence of lines, substations and access roads

Mitigation measures

- Use existing access roads optimally so as to reduce the need for new deforestation
- Allow tree and shrub species whose height is limited to 4 m to grow within the ROW
- Minimize the number of access roads to and in the ROW. When possible, proceed to early closing of access roads near sensitive scenic areas
- Create visual barriers to reduce line visibility

Detailed Impact Description

The overall aesthetic effect of a transmission line is likely to be negative to most people, especially where proposed lines would cross natural landscapes. The tall steel structures may seem out of proportion and not compatible with agricultural landscapes, vast plains or luxuriant hills.

Research and experience shows that reaction to aesthetic of transmission lines vary. Some residents do not notice them or find them objectionable from an aesthetic perspective. To some, the power transmission lines or other utilities may be viewed as part of the infrastructure necessary to sustain everyday lives and activities and are therefore acceptable. To others, new transmission lines may be viewed in a positive way as they are associated with economic development. During the community and household consultations, the aesthetic impact of the project was seldom mentioned, which indicates that it is not a major concern for the impacted populations.

However, in some areas of the Murchison Fall Park the infrastructure will be clearly visible from the Nile and nearby lodges. This intrusion will be noticeable by visitors and could affect the overall evaluation of the quality of the landscape. To reduce this impact , visual barriers (trees, shrubs) should be installed, where possible, to reduce the visibility of the line from touristic areas (i.e. belvedere, lodge) and along roads used by tourists.

Finally, during maintenance activities, existing access roads will be used as much as possible to avoid new landscape disturbance.

Substations will generally have a more subtle impact on the landscape as they will blend better with the urban or peri-urban areas in which they will be installed.

Impact assessment

With the adoption of adequate mitigation measures, the intensity of the impact on the landscape during the operation phase is considered low. The extent of the impact is local as the impact will only be felt in a portion of the project area. In urban setting, the project will affect the integrity of the landscape to a lesser extent as it will integrate well near existing infrastructures. The impact duration is long as it will be felt continuously for the lifetime of the transmission line. The importance of the impact on the landscape during the operation phase is thus considered moderate. The probability of the occurrence of this impact is high because the landscape will certainly be disrupted at the work sites and potentially at scenic areas.

IMPACT ON LANDSCAPE DURING THE OPERATION PHASE

Intensity : Low	Importance : **Moderate**
Extent : Local	
Duration : Long	
Probability of occurrence : High	

7.2.4.10 WORKERS' HEALTH & SAFETY

PRE-CONSTRUCTION AND CONSTRUCTION PHASE

Potential risks

- Absence of adherence to labour standards and well-being of construction workers;
- Work related injury or health effects.

Sources of impact

- Construction activities
- Waste and hazardous materials management
- Transportation and circulation
- Presence of workers.

Mitigation measures

- Establish equipment storage yards and maintenance areas on adapted surfaces (clear of vegetation, stripped of topsoil, leveled and compacted murram);
- Cut grass and brush near ground level outside the equipment storage yards / worker camps perimeter to maintain a fire break;
- Develop a Health and Safety Policy, including personal safety, site conduct, security, site safety zoning and emergency procedures;
- Comply with the Uganda Occupational Safety and Health Act 2007 to ensure the health and safety of workers, organizations and the surrounding.
- Require all contractors to adopt and comply with policies and procedures that comply with national legislation and address all aspects of labour standards relevant to the project as specified by WB/IFC health & safety guidelines for electric power transmission projects (see appendix 7-6). Sub-contractors will be contractually required to comply with labour and health and safety legislation. Specific provisions must be included for:
  - Provision of sanitation at camps, substations and tower erection points;
  - Provision of separate accommodation and sanitation facilities in worker camps in order to satisfy both gender needs;

- Declaration of accidents through an accident reporting mechanism (see Accident Report Template, Appendix 7-7)
- Monitor H&S issues using the UETCL / ESDP Weighted HSE Checklist (see Appendix 7-8)
- Handling domestic and specialized waste, as well as dangerous goods;
- Procedures in case of injuries and accidents;
- Use of personal protective equipment (e.g.: helmets, fall protection equipment);
- Work near live electrical components;
- Work in heat conditions.

→ Implement a long-term training programme throughout the construction phase to ensure adequate training and qualification of all staff employed for the LGNA project. Specific training must be provided for:

- Working around live power lines;
- Working at heights.

→ Provide specific worker sensitization about animal behavior and handling before conducting works in areas known to be used by dangerous animals such as the GOT Afwoyo area, to the North of Murchison Falls National Park;

→ Provide medical facilities throughout the construction phase for the use of workers where required;

→ Ensure reasonable working hours, wages and other benefits;

→ Provide suitable and safe accommodation and sanitation facilities, including available drinking water and improved latrines;

→ Provide and ensure the use of personal protective equipment (PPE);

→ Establish a 'grievance mechanism' for workers and local residents.

Detailed Impact Description

The project construction works will likely require hiring a large labour force, which lead to several issues in the absence of proper worker welfare. Access to medical facilities is crucial with respect to accidents and illness either in the workplace or outside. Other working conditions such as reasonable working hours, wages and other benefits are considered to be good working practices and should be employed at all times. In addition, a large number of labourers may be housed temporarily near the work sites. It must be ensured that the labour and working conditions are of an acceptable standard. Housing must be adequately designed with adequate lighting, adequate services (air conditioning, telephone, plumbing, etc.), adequate sanitary and safety facilities such as sufficient fire exits and fire suppression system (fire detectors, fire alarms, fire extinguishers, fire suppressants); a fire break must be maintained outside the perimeter. Issues such as retrenchment policies must be clearly defined prior to work beginning.

Moreover, activities planned during the construction phase could be a source of accidents. The main common causes of accidents in construction are:

→ Falls from working at height;

→ Crush injuries in excavation work;

→ Slips and trips;

→ Being struck by falling objects;

→ Moving heavy loads;

→ Bad working positions, often in confined spaces;

→ Drowning;

→ Encounters with dangerous fauna;

→ Electrocution.

All workers could be exposed to accidents at the worksite. However, implementation of suitable health & safety procedures should help preventing or reducing the probability of accidents to occur. Also, the application of all aforementioned mitigation measures should help preventing or reducing the risk of accidents on-site.

Impact assessment

The intensity of the impact on workers would be low, provided that proper management measures are applied as to ensure workers' health & safety as well as proper worker welfare. The extent of the impact is limited since only workers would be affected. The impact duration is considered to be medium given that it will last over the entire construction phase. The importance of the impact on workers' health & safety during the construction phase is thus considered minor. The probability of the occurrence of this impact is medium.

IMPACT ON WORKERS' HEALTH & SAFETY DURING THE CONSTRUCTION PHASE

Intensity : Low	Importance : **Minor**
Extent : Limited	
Duration : Medium	
Probability of occurrence : Medium	

7.3 CUMULATIVE IMPACTS

This section will be completed when information on ongoing or planned similar projects in the study area will be submitted by UETCL.

8 ENVIRONMENTAL & SOCIAL MANAGEMENT PLAN

8.1 CONTEXT

This chapter presents the project's Environmental and Social Management Plan (ESMP). The ESMP aims at defining and structuring the measures to be implemented in order to mitigate or optimize the project's potential impacts identified in Chapter 7. For each measure, responsibilities and costs are presented.

On a larger scale, the ESMP establishes responsibilities for the implementation and oversight of the proposed environmental and social management measures. Responsibilities are to be shared among several stakeholders, including relevant ministerial authorities, contractors, new coordinating units (the Project implementation unit (PIU) and consultation committees created for the purpose of the project.

The ESMP also provides guidelines for a comprehensive monitoring plan which shall ensure, on an ongoing basis, the adequate implementation of the proposed environmental and social management measures. Such Monitoring Plan will be based on a set of performance indicators and a clear formulation of expected results to be achieved or maintained. Thus, the Plan will facilitate ongoing adjustments to initial mitigation/optimization measures, within an adaptive management approach.

Finally, the ESMP provides orientations on training and capacity building requirements for its successful implementation.

8.2 ENVIRONMENTAL AND SOCIAL MANAGEMENT MEASURES

8.2.1 PRE-CONSTRUCTION / CONSTRUCTION PHASE

E&S measures proposed to mitigate negative impacts or optimize the positive ones during the preconstruction/construction phase are presented in Table 8-1 below.

Table 8-1 Environmental and Social Management Measures for the Project Preconstruction/Construction Phase

SOURCE OF IMPACT	IMPACTED VESC	POTENTIAL IMPACTS	PROJECT COMPONENT		MITIGATION MEASURES	IMPLEMENTATION TIMING	RESPONSIBILITIES	BUDGET (USD)	SPECIFIC MONITORING MEASURES / PARAMETERS / INDICATORS WHERE RELEVANT
			LINE	SUBSTATIONS					
Rural Electrification		Improved electricity access in the project area	X	X	Contact REA to ensure joint coordination of electricity distribution activities as part of the Project	Pre-Construction	PIU	TBD (Operating budget)	Communications with REA initiated 6 months prior to beginning of construction
Land Acquisition and Displacement of Economic Activities	Land Use; Built Environment; Livelihood Activities; Community Health and Security Communities and Social Cohesion	Land acquisitions and land use restrictions, resettlement	X	X	Implement Resettlement Action Plan	Pre-Construction	PIU	See RAP for details	See RAP for details
		Land use and compensation disputes, reviving old quarrels (land resources and power conflict)	X	X	Involve traditional leaders in the resettlement process	Pre-Construction	PIU	See RAP for details	See RAP for details
			X	X	Development of a structured Communication and Stakeholder / Community Engagement Plan covering all elements described in Appendix 7-2	Throughout the pre-construction and construction phases	PIU	Development: 20 000 $ Implementation: 40 000 $	Start of implementation before initiation of resettlement activities and continuation throughout the pre-construction and construction phase
			X	X	Ensure that conflicting parties over land are handled in such a way that the conflict is appropriately solved through the Grievance Redress Mechanism.	Throughout the pre-construction and construction phases	PIU	See RAP for details	See RAP for details
		Increased marginalization of vulnerable groups	X	X	Prioritize vulnerable individuals and households in terms of access to the different social measures and programs;	Pre-Construction	UETCL	See RAP for details	See RAP for details
			X	X	Support the most vulnerable households and individuals in organizing their transport to the relocation sites and the construction of their new homes	Throughout the pre-construction and construction phases	UETCL	See RAP for details	See RAP for details
			X	X	Consideration for employment for the most vulnerable in the community including disabled, as may be appropriate	Throughout the pre-construction and construction phases	Implementation: contractor. Monitoring: supervising engineer.	n/a (Included in Construction contract)	Target: vulnerable people hired where appropriate
			X	X	As part of the RAP's monitoring program, identify the most vulnerable households and individuals and ensure close monitoring of their health and integration into host communities	Prior to and throughout the operation phase	UETCL	See RAP for details	See RAP for details
	Archaeological and Cultural Heritage	Destruction or disturbance of archaeological sites or artifacts	X	X	Provide financial and logistical assistance for the relocation of known burial grounds, sacred sites, or any other cultural sites of importance to communities	Pre-Construction	PIU	See RAP for details	See RAP for details
					Implement provisions of the attached Summary Cultural Resources Management Plan, including chance find procedures and hiring of archaeologist (appendix 7-3)	Throughout the construction phase	PIU	TBD (Operating budget)	Archaeologist hired prior to construction phase CRMP applied
	Gender	Disturbance of women subsistence activities Marginalization of women during employment process	X	X	Encourage the recruitment of female workers, with equal payment for male and female workers, for equivalent jobs	Throughout the construction phase	Implementation: Contractor Monitoring: Supervising Engineer	Included in Construction contract	Number of female workers recruited No wage inequalities
			X	X	Provide opportunities to women in income generating activities during construction, e.g. provision of catering services, selling local products, etc., with price limits in order not to cause inflation	Throughout the construction phase	Implementation: Contractor Monitoring: Supervising Engineer	Included in Construction contract	Local procurement focused on income generating activities for women
	Communities and Social Cohesion	Disruption of educational programs where the construction passes schools	X	X	Relocate temporarily students to other schools and prepare a relocation plan	Pre-Construction	PIU	Included in Construction contract	Number of students relocated
Resettlement	Livelihood Activities	Increased marginalization of vulnerable groups	X	X	Implement Resettlement Action Plan	Pre-Construction and Construction phases	PIU	See RAP for details	See RAP for details

SOURCE OF IMPACT	IMPACTED VESC	POTENTIAL IMPACTS	PROJECT COMPONENT		MITIGATION MEASURES	IMPLEMENTATION TIMING	RESPONSIBILITIES	BUDGET (USD)	SPECIFIC MONITORING MEASURES / PARAMETERS / INDICATORS WHERE RELEVANT
			LINE	SUBSTATIONS					
	Gender	Women being sidetracked from the compensation and decision making process	X	X	Implement Resettlement Action Plan	Pre-Construction and Construction phases			
Site Preparation: Establishment of Equipment Storage Yards and Worker Camps	Soils; Surface Water and Sediments; Terrestrial Habitats and Associated Flora; Aquatic Habitats; Aquatic and Semi-Aquatic Fauna; Terrestrial Fauna;	Soil contamination Surface water contamination Ground water contamination	X	X	Contractor to develop and implement a construction worksite ESMP which will translate the present chapter 8's requirements into detailed actions to be carried out during construction works, including implementation of mitigation measures and environmental &social monitoring. Worksite ESMP to cover all elements under the contractor's control (i.e. construction works), and consider detailed specifications of activities to be conducted during construction and specific locations where they will be conducted.	Prior to Construction phase	Development: Contractor Approval: Supervising Engineer / PIU	Included in Construction contract	No construction works undertaken before approval of Final Worksite ESMP Worksite ESMP covers all construction-related impacts and mitigation measures listed in the present table.
			X	X	Establish worker camps, equipment storage yards and maintenance areas on adapted surfaces (clear of vegetation, stripped of topsoil, leveled and compacted murram);	Pre-Construction and Construction phases	Implementation: Contractor Monitoring: Supervising Engineer	Included in Construction contract	Worker camps, storage yards and maintenance areas established as required
			X	X	Develop and implement a waste management plan that strictly respect sound waste management practices and WB/IFC waste management guidelines (see appendix 7-1).	Pre-Construction and Construction phases	Implementation: Contractor Monitoring: Supervising Engineer	Included in Construction contract	Waste management plan applied consistently throughout the construction phase
Site Preparation: Vegetation Clearing	Soils; Terrestrial Habitats and Associated Flora; Terrestrial Fauna;	Permanent loss of 8 ha of forest habitats for the construction of the power line and substations. Soil erosion Impairments of flora communities Potential impacts on Vulnerable species communities Increased pressure on natural resources Potential impacts on Vulnerable species communities	x	x	Establish a Compensation and Revegetation Plan for lost natural habitats during construction phase. Validate with a botanical expert: - species chosen for restoration; - best time for revegetation depending on species to plant and habitat to restore; - preferential habitats for endangered species.	Beginning of construction phase	Implementation: Contractor Monitoring: Supervising Engineer	Included in Construction contract	Validated compensation and revegetation plan ready at beginning of construction phase
			x	x	Clearly mark the extent of vegetation cutting in the ROW with stakes at intervals of 50 m or less. Identify and mark the vegetation to be preserved along sections of the ROW.	Throughout the construction phase	Implementation: Contractor Monitoring: Supervising Engineer	Included in Construction contract	No vegetation removal outside limits of vegetation clearing identified in construction plans
			x	x	Undertake ROW vegetation cutting with the supervision of a botanist in order to identify and relocate if possible species of conservation concern as well as protect vegetation that does not represent a risk for the powerline. Any species of conservation concern that need to be cut will be located and its habitat will be fully described. This information will be integrated in the planning of reforestation program. If possible, collect seeds from Albizia ferruginea, Khaya anthotheca and Vitellaria paradoxa mature specimens.	Throughout the construction phase	Implementation: Contractor Monitoring: Supervising Engineer	Included in Construction contract	Botanist hired for ROW and wayleave clearance; Species of conservation concern identified and protected where possible; Reforestation program for compensation of cut individuals of species of conservation concern, prepared and implemented
			x	x	Make chopped woody resources and residues available to local population in order to reduce additional pressures on natural resources.	Throughout the construction phase	Implementation: Contractor Monitoring: Supervising Engineer	Included in Construction contract	Chopped woody resources managed as required
		Potential introduction of invasive alien species (IAS)	x	x	- Remove as much roots of Mimosa pilgra when removing specimens from the RoW. - Burn residues of invasive alien species to reduce the risk of propagation to other areas.	Throughout the construction phase	Implementation: Contractor Monitoring: Supervising Engineer	Included in Construction contract	IAS specimens managed as required

SOURCE OF IMPACT	IMPACTED VESC	POTENTIAL IMPACTS	PROJECT COMPONENT		MITIGATION MEASURES	IMPLEMENTATION TIMING	RESPONSIBILITIES	BUDGET (USD)	SPECIFIC MONITORING MEASURES / PARAMETERS / INDICATORS WHERE RELEVANT
			LINE	SUBSTATIONS					
	Avifauna	Disturbances and modification of birds communities; Bird electrocutions and collisions; Modification and alteration to bird habitats.	x		Undertake a pre-construction survey, covering migration season and seasonal specificities in order to validate areas of higher risk for bird communities. Develop adapted mitigation measures. The survey should comprise : - Assessment of birds breeding along the proposed route, and within an appropriate buffer zone including the construction site itself; - Vantage point surveys throughout the year with intense monitoring during peak migration periods; - Species specific assessments for species with conservation interest as well as water birds and breeding bird species for collision risks and/or electrocutions; - Winter ornithological surveys; - Identification of any additional specific mitigation measures required to reduce impacts on avifauna.	Prior to construction phase	PIU	150 000 $	Survey completed prior to construction phase
			x	x	Compensate any loss of breeding/nesting sites by the creation of suitable habitat elsewhere, notably from enhancement of degraded habitats	Prior to construction phase and after	PIU	75 000 $	Breeding/nesting sites identified in bird survey and impacted by line are compensated.
			x		Place “bird diverters” at appropriate intervals on the top (ground) wire to make the lines more visible to birds if the collision potential is high, in particular inside or close to ecologically sensitive areas (wetlands, staging areas, birds’ migration corridors and large rivers, close to Important Bird Area). Bird diverters should be installed in priority areas identified in section 7.2.3.4 above.	Throughout the construction phase	PIU	150 000 $	All line sections located inside or close to ecologically sensitive areas for birds (wetlands, staging areas, birds’ migration corridors and large rivers, Important Bird Area) are equipped with bird diverters.
			x	x	Complete tree and/or brush cutting prior to or after the core nesting season	Throughout the construction phase	Implementation: Contractor Monitoring: Supervising Engineer	Included in Construction contract	No cuttings during core nesting season
	Terrestrial Habitats and Associated Flora; Aquatic Habitats; Aquatic and Semi-Aquatic Fauna	Permanent loss of seasonal and permanent wetlands (respectively 0.55 and 0.15 km2) and riparian areas for the construction of the power transmission line and substations. Effects on wetland specialist species and species of conservation interest;	x		Adjust pylon siting to span wetlands areas, or limit equipment access in wetlands, wherever possible.	Prior to construction and throughout the construction phase	Implementation: Contractor Monitoring: Supervising Engineer	Included in Construction contract	Pylon siting in wetland areas minimized
			x	x	Perform vegetation clearing according to following guidelines: - Undertake a selective cutting of the vegetation in order to keep low scrubby and herbaceous species that does not represent a risk for the powerline; - Avoid vegetation cutting along stream shores; - Minimize vegetation cutting on steep slopes; - Avoid aquatic vegetation cutting; - Perform all vegetation clearing work manually; - Backfill all diversion canals once construction is over.	Throughout the construction phase	Implementation: Contractor Monitoring: Supervising Engineer	Included in Construction contract	Vegetation clearing performed as required Low scrubby and herbaceous vegetation maintained Performance indicator: status of ground cover in construction areas
Site Preparation: Construction of Access Roads	Soils; Surface Water and Sediments; Terrestrial Habitats and Associated Flora; Aquatic Habitats; Aquatic and Semi-Aquatic Fauna; Terrestrial Fauna;	Soil compaction; Soil erosion; Increased pressure on natural resources; Changes in hydrology; Wetlands disturbances and alterations.	x	x	Use existing roads and trails as much as possible to minimize road construction and associated habitat fragmentation.	Throughout the construction phase	Implementation: Contractor Monitoring: Supervising Engineer	Included in Construction contract	Use of existing roads maximized
			x	x	Prohibit construction of permanent access roads along river banks, in wetlands or in areas covered by hydromorphic soils.	Throughout the construction phase	Implementation: Contractor Monitoring: Supervising Engineer	Included in Construction contract	No permanent access roads in identified sensitive areas.
			x	x	Minimize construction of temporary access roads along river banks, in wetlands or in areas covered by hydromorphic soils. Perform all construction	Throughout the construction phase	Implementation: Contractor	Included in Construction contract	Temporary access roads in identified sensitive areas minimized.

SOURCE OF IMPACT	IMPACTED VESC	POTENTIAL IMPACTS	PROJECT COMPONENT		MITIGATION MEASURES	IMPLEMENTATION TIMING	RESPONSIBILITIES	BUDGET (USD)	SPECIFIC MONITORING MEASURES / PARAMETERS / INDICATORS WHERE RELEVANT
			LINE	SUBSTATIONS					
					activities in wetlands during the dry season in order to minimize road construction requirements;		Monitoring: Supervising Engineer		Construction activities in wetlands performed only during the dry season
			x	x	All works in river and wetland areas are prohibited unless having obtained required authorizations from relevant authorities. Machinery must be cleaned and disturbed areas must be restored.	Throughout the construction phase	Implementation: Contractor Monitoring: Supervising Engineer	Included in Construction contract	Required authorizations obtained from authorities Any disturbed areas restored after works
			x	x	Design unavoidable access roads in wetlands and watercourse crossings with NEMA and wetland specialists in order to ensure wetlands' hydrodynamic conditions are not modified by the access road. Install culverts on road watercourse crossings so that the free flow of water can be maintained at the same rate.	Throughout the construction phase	Implementation: Contractor Monitoring: Supervising Engineer	Included in Construction contract	Drainage capacity of installed culverts equal or higher than confirmed rainy season flow rate at each watercourse crossing
			x	x	Decommission all temporary access roads built in wetlands for construction purposes, as construction progresses along the Project routing and as soon a particular temporary access road becomes unnecessary. Perform this dismantlement during the dry season and dispose of materials outside wetland areas	Throughout the construction phase	Implementation: Contractor Monitoring: Supervising Engineer	Included in Construction contract	No access roads left in wetland areas after construction work is finished in a given area.
			x	x	Maintain vegetated buffer zones within and around wetlands and along both sides of watercourse crossings. Restore as soon as possible any disturbed areas in the riparian buffer zone.	Throughout the construction phase	Implementation: Contractor Monitoring: Supervising Engineer	Included in Construction contract	Minimized vegetation clearings in wetlands and in a 50m buffer zone at watercourse crossings Disturbed riparian areas restored after conclusion of works
	Noise and Vibrations	Increase in noise and vibration levels	x	x	Locate access roads and lay down areas away from residences to the extent possible	Throughout the construction phase	Implementation: Contractor Monitoring: Supervising Engineer	Included in Construction contract	Daily inspection by the Contractor of access roads for excessive noise. Contractor / Supervising Engineer to maintain records of complaints on noise and vibration levels, and follow-up corrective measures
Site Preparation: Removal of Topsoil, Excavation, Earthworks; Construction Activities; Exploitation of Borrow Pits	Air Quality; Noise and Vibrations; Community Health and Safety	Temporary air quality deterioration; Increase in noise and vibration levels; Increased stress related to nuisances (noise, dust, air pollution)	x	x	Maintain equipment and machinery in good running conditions, including brakes, mufflers and silencers, catalyzers.	Throughout the construction phase	Implementation: Contractor Monitoring: Supervising Engineer	Included in Construction contract	Daily inspection by the Contractor of all equipment and machinery used during construction.
			x	x	Use water for dust suppression on dust generating areas.	Throughout the construction phase	Implementation: Contractor Monitoring: Supervising Engineer	Included in Construction contract	Daily inspection by the Contractor of construction areas for excessive nuisance dust and air pollutants. Contractor / Supervising Engineer to maintain records of complaints on air quality, and follow-up corrective measures
			x	x	Prohibit idling of vehicles on-site to reduce emissions	Throughout the construction phase	Implementation: Contractor Monitoring: Supervising Engineer	Included in Construction contract	Daily inspection by the Contractor of construction areas for excessive nuisance dust and air pollutants. Contractor / Supervising Engineer to maintain records of complaints on air quality, and follow-up corrective measures
			x	x	Restrict noise generating activities near residential or institutional sensitive receptors to the period between 6 a.m. and 10 p.m. which is defined as "daytime" in the Ugandan noise standards	Throughout the construction phase	Implementation: Contractor Monitoring: Supervising Engineer	Included in Construction contract	Daily inspection by the Contractor of access roads for excessive noise. Contractor / Supervising Engineer to maintain records of complaints on noise and vibration levels, and follow-up corrective measures
			x	x	Notify landowners along the line route about the construction schedule and activities	Throughout the construction phase	Implementation: Contractor Monitoring: Supervising Engineer	Included in Construction contract	Communicate to all landowners along the line route about the construction schedule and activities planned prior to the beginning of construction work

SOURCE OF IMPACT	IMPACTED VESC	POTENTIAL IMPACTS	PROJECT COMPONENT		MITIGATION MEASURES	IMPLEMENTATION TIMING	RESPONSIBILITIES	BUDGET (USD)	SPECIFIC MONITORING MEASURES / PARAMETERS / INDICATORS WHERE RELEVANT
			LINE	SUBSTATIONS					
	Surface Water and Sediments Aquatic Habitats Aquatic and Semi-Aquatic Fauna	Modification to water quality; Changes in hydrology; Surface water contamination; Impairment of hydrological dynamic leading to wetland disturbances and alteration.	x		Ensure towers to be located outside the top-of-bank of all watercourses and permanent wetlands	Throughout the construction phase	Implementation: Contractor Monitoring: Supervising Engineer	Included in Construction contract	No pylons inside top-of-bank of watercourses and permanent wetlands.
			x	x	Avoid equipment and vehicle movements in rivers, floodplains and wetland areas. If unavoidable, reduce access to a minimum length in wetlands and floodplains.	Throughout the construction phase	Implementation: Contractor Monitoring: Supervising Engineer	Included in Construction contract	Minimized work near watercourses or wetlands
			x	x	River and wetland crossings are prohibited unless having obtained required authorizations from relevant authorities. Machinery must be cleaned and disturbed areas must be restored.	Throughout the construction phase	Implementation: Contractor Monitoring: Supervising Engineer	Included in Construction contract	Required authorizations obtained from authorities Any disturbed areas restored after works
			x	x	Set and implement strict rules for in-water works.	Throughout the construction phase	Implementation: Contractor Monitoring: Supervising Engineer	Included in Construction contract	In-water works rules approved by Supervising Engineer prior to initiation of Construction phase.
			x	x	Conduct activities during the dry season to minimize disturbance of sensitive shoreline and wetland areas.	Throughout the construction phase	Implementation: Contractor Monitoring: Supervising Engineer	Included in Construction contract	Activities in the wet season minimized
			x	x	Avoid material piling inside wetland areas	Throughout the construction phase	Implementation: Contractor Monitoring: Supervising Engineer	Included in Construction contract	No material piling in watercourses and wetland areas
	Soils; Surface Water and Sediments; Aquatic Habitats; Terrestrial Habitats and Associated Flora	Soil erosion; Soil compaction; Increased pressure on natural resources	x	x	Restrict materials and manpower movements to existing roads/tracks to the extent possible.	Throughout the construction phase	Implementation: Contractor Monitoring: Supervising Engineer	Included in Construction contract	Equipment and vehicle movements outside the line route and access roads' ROW restricted to a minimum
		Soil Erosion; Modification to water quality Surface water contamination	x	x	Operate machinery on land in a way that minimizes disturbance to the banks of watercourses	Throughout the construction phase	Implementation: Contractor Monitoring: Supervising Engineer	Included in Construction contract	No machinery operations inside top-of-bank of watercourses Performance indicator: state of river banks
		Surface water contamination; Increased pressure on natural resources	x	x	Do not refuel or service equipment within 100 m of any watercourse or surface water drainage installations	Throughout the construction phase	Implementation: Contractor Monitoring: Supervising Engineer	Included in Construction contract	Refueling stations located away from watercourses and surface water drainage
					No contaminated materials must be used for construction / installation of coffer dams.	Throughout the construction phase	Implementation: Contractor Monitoring: Supervising Engineer	Included in Construction contract	No contaminated materials used in coffer dams
					Fish imprisoned in the coffer dams or other drained zone must be captured and released out of the confined area	Throughout the construction phase	Implementation: Contractor Monitoring: Supervising Engineer	Included in Construction contract	Catch and release of fish immediately after drainage of area
		Potential introduction of invasive alien species (IAS)	x	x	While working inside wetlands, restrict all equipment movements to access roads	Throughout the construction phase	Implementation: Contractor Monitoring: Supervising Engineer	Included in Construction contract	No equipment and vehicle movements outside access roads when working in wetlands
	Groundwater	Groundwater contamination	x	x	Pump out and dispose of any groundwater encountered during excavation in order to protect groundwater resources from contamination in case of spills	Throughout the construction phase	Implementation: Contractor Monitoring: Supervising Engineer	Included in Construction contract	Groundwater seepage pumped out during excavations
	Soils	Soil erosion;	X	x	Prepare and implement erosion and sediment control plans	Throughout the construction phase	Implementation: Contractor	Included in Construction contract	Approval of erosion and sediment control plan by supervising engineer prior to initiation of construction activities

SOURCE OF IMPACT	IMPACTED VESC	POTENTIAL IMPACTS	PROJECT COMPONENT		MITIGATION MEASURES	IMPLEMENTATION TIMING	RESPONSIBILITIES	BUDGET (USD)	SPECIFIC MONITORING MEASURES / PARAMETERS / INDICATORS WHERE RELEVANT
			LINE	SUBSTATIONS					
	Surface water and sediments	Soil compaction;					Monitoring: Supervising Engineer		
			X	x	Install silt barriers (e.g., fencing) along wetland and woodland edges located within 30 m of construction areas to minimize potential sediment transport to natural habitats.	Throughout the construction phase	Implementation: Contractor Monitoring: Supervising Engineer	Included in Construction contract	Required silt barriers installed
			X	x	Cover excavated materials with erosion control blankets	Throughout the construction phase	Implementation: Contractor Monitoring: Supervising Engineer	Included in Construction contract	Excavated materials appropriately covered
			X	x	Identify and rehabilitate exposed soils immediately following construction activities	Construction phase decommissioning	Implementation: Contractor Monitoring: Supervising Engineer	Included in Construction contract	Exposed soils rehabilitated as soon as possible following construction activities
			X	x	Avoid construction activities during times when soils are saturated (rainy season)	Throughout the construction phase	Implementation: Contractor Monitoring: Supervising Engineer	Included in Construction contract	No construction activities during rainy season Inspections in order to ensure that authorized work periods are respected and that wetlands and watercourses are not affected.
			X	x	De-compact soils following construction with appropriate equipment	Construction phase decommissioning	Implementation: Contractor Monitoring: Supervising Engineer	Included in Construction contract	Following construction, assessment of soil compaction in and around the ROW by the Supervising Engineer and de-compaction if necessary.
			X	x	Prepare and implement an Emergency Response Plan	Throughout the construction phase	Implementation: Contractor Monitoring: Supervising Engineer	Included in Construction contract	Approval of Emergency Response Plan by supervising engineer prior to initiation of Construction activities
			X	x	Keep a Spill Containment Kit readily accessible onsite in the event of an accidental spill and ensure on-site staff is trained in spill response	Throughout the construction phase	Implementation: Contractor Monitoring: Supervising Engineer	Included in Construction contract	Proper spill kits in sufficient numbers along work sites Site staff properly trained in spill response
			X	x	Contain any spills onsite and clean up spills as soon as possible	Throughout the construction phase	Implementation: Contractor Monitoring: Supervising Engineer	Included in Construction contract	Site staff properly trained in spill response No contaminated sites left behind after construction works
			X	x	Document and report all spills to the MoE	Throughout the construction phase	Implementation: Contractor Monitoring: Supervising Engineer	Included in Construction contract	All spills documented and reported to the MoE
		Soil contamination	X	x	In the case of an unforeseen discovery of soil with sign of contamination, stop excavation works and warn Promoter	Throughout the construction phase	Implementation: Contractor Monitoring: Supervising Engineer	Included in Construction contract	Contaminated soils properly managed
			X	x	Characterize, remove and dispose of contaminated soils at sites authorized by relevant authorities	Construction phase decommissioning	Implementation: Contractor Monitoring: Supervising Engineer	Included in Construction contract	Contaminated soils properly managed
			X	x	Ensure that equipment and machinery are in good operating condition, clean (power washed), free of leaks, excess oil, and grease	Throughout the construction phase	Implementation: Contractor Monitoring: Supervising Engineer	Included in Construction contract	Equipment and machinery properly maintained
			X	x	Segregate and temporarily store excavated soils in order to used them as backfill when needed	Throughout the construction phase	Implementation: Contractor	Included in Construction contract	Excavated soils properly stored

SOURCE OF IMPACT	IMPACTED VESC	POTENTIAL IMPACTS	PROJECT COMPONENT		MITIGATION MEASURES	IMPLEMENTATION TIMING	RESPONSIBILITIES	BUDGET (USD)	SPECIFIC MONITORING MEASURES / PARAMETERS / INDICATORS WHERE RELEVANT
			LINE	SUBSTATIONS					
							Monitoring: Supervising Engineer		
				x	Ensure that all stationary equipment and machinery are installed above permanent spill containment facilities of sufficient capacity.	Design stage	UETCL	Included in Construction contract	All stationary equipments containing oil or other pollutants are installed above containment facilities of sufficient capacity (110% of maximum possible spill)
			X	x	Remove any construction debris generated at the sites immediately after completion of construction activities.	Construction phase decommissioning	Implementation: Contractor Monitoring: Supervising Engineer	Included in Construction contract	Construction debris properly managed
	Aquatic Habitats; Aquatic and Semi-Aquatic Fauna.	Changes in hydrology; Wetland disturbances and alteration.	X		Always maintain hydrologic connectivity between upstream and downstream in the work areas.	Throughout the construction phase	Implementation: Contractor Monitoring: Supervising Engineer	Included in Construction contract	Hydrologic connectivity maintained in all work sites impacting watercourses
			X		Always ensure free flow of water and sufficient water supply in order to maintain a viable fish habitat downstream from the work areas;	Throughout the construction phase	Implementation: Contractor Monitoring: Supervising Engineer	Included in Construction contract	Free flow of water maintained in all work sites impacting watercourses
			x		Install diversion structures (canals, dikes, coffers) that neither obstruct fish movements nor diminish habitat width to less than 2/3 of the current water bodies, including rivers, wetlands, etc.	Throughout the construction phase	Implementation: Contractor Monitoring: Supervising Engineer	Included in Construction contract	Diversion structures designed as required
			X		Fish imprisoned in the drained zone must be captured and released out of the confined area	Throughout the construction phase	Implementation: Contractor Monitoring: Supervising Engineer	Included in Construction contract	Catch and release of fish immediately after drainage of area
		Increased pressure on natural resources, especially in areas where new access is created	x		After termination of construction works, restore natural river bed conditions (minor bed, natural obstacles, etc.);	Construction phase decommissioning	Implementation: Contractor Monitoring: Supervising Engineer	Included in Construction contract	Natural river bed conditions restored as required
	Terrestrial Habitats and Associated Flora; Landscape	Potential introduction of invasive alien species (IAS)	x	x	Inspect and clean construction equipment properly after working in areas known to be infested with invasive alien species (IAS).	Throughout the construction phase	Implementation: Contractor Monitoring: Supervising Engineer	Included in Construction contract	Construction equipment cleaned as required
			x	x	Survey sensitive areas such as wetlands and shorelines for invasive species following construction and site re-vegetation.	Throughout the construction phase	Implementation: Contractor Monitoring: Supervising Engineer	Included in Construction contract	No IAS found after site revegetation
		Impairments of flora communities Potential impacts on Vulnerable species communities Temporary degradation of landscape at work sites	x	x	Revegetate areas of bare and disturbed soils as soon as possible with native species.	Construction phase decommissioning	Implementation: Contractor Monitoring: Supervising Engineer	Included in Construction contract	Bare and disturbed areas revegetated as required
	Employment and Economic Development	Temporary perturbation of tourism and recreation activities	X	X	Provide compensation measures to affected tourism and recreation activities, if any	Prior and throughout the construction phase	PIU	PIU Operating budget	During construction UETCL to report on status of tourism and/or recreation facilities and/or activities
	Livelihood Activities	Disruption of farming activities by construction works	X	X	Provide compensations to affected households and landowners	Throughout the construction phase	PIU	As part of the RAP (see RAP for details)	See RAP for details
	Community health and safety	Accidents and physical injuries involving local residents	X	X	Secure equipment and demarcate any excavation works areas	Throughout the construction phase	Implementation: Contractor	Included in Construction contract	Equipment and excavation work areas properly secured

SOURCE OF IMPACT	IMPACTED VESC	POTENTIAL IMPACTS	PROJECT COMPONENT		MITIGATION MEASURES	IMPLEMENTATION TIMING	RESPONSIBILITIES	BUDGET (USD)	SPECIFIC MONITORING MEASURES / PARAMETERS / INDICATORS WHERE RELEVANT
			LINE	SUBSTATIONS					
							Monitoring: Supervising Engineer		
			X	X	Sign and fence construction areas where necessary	Throughout the construction phase	Implementation: Contractor Monitoring: Supervising Engineer	Included in Construction contract	Construction areas properly secured
		Exposure to EMFs from the transmission line	X		Design and build the transmission line as to ensure that EMF levels are well below accepted guidelines for occupational and human health exposure limits.	Design stage	UETCL	n/a	EMF levels will be measured by UETCL at the same sites as those for the baseline study during initial full load operation. EMF levels are not expected to change with time, so further monitoring is not planned.
	Gender Relations	Marginalization of women during employment process	X	X	Encourage the recruitment of female workers, with equal payment for male and female workers, for equivalent jobs	Prior and throughout the construction phase	Implementation: Contractor Monitoring: Supervising Engineer	Included in Construction contract	Percentage of women employees No wage inequalities
			X	X	Provide opportunities to women in income generating activities during construction, e.g. provision of catering services, selling local products, etc., with price limits in order not to cause inflation	Throughout the construction phase	Implementation: Contractor Monitoring: Supervising Engineer	Included in Construction contract	Local procurement focused on income generating activities for women
	Archaeological and Cultural Heritage	Destruction or disturbance of archaeological sites or artifacts	X	X	Implement provisions of the attached Summary Cultural Resources Management Plan, including chance find procedures and hiring of archaeologist (appendix 7-3)	Throughout the construction phase	PIU	PIU Operating budget	Archaeologist hired prior to construction phase CRMP applied
			X	X	Oversight of excavation works by an archeologist	Throughout the construction phase	PIU	60 000$	
	Landscape	Temporary degradation of landscape at work sites	X	X	Obtain authorization prior to harvesting the trees, clearly delineate areas to be deforested and vegetation to be cut and minimize vegetation clearing around work areas	Throughout the construction phase	Implementation: Contractor Monitoring: Supervising Engineer	Included in Construction contract	No vegetation removal outside limits of vegetation clearing identified in construction plans
			X	X	Restore all temporary work areas, such as borrow pits and worker camp sites	Construction phase decommissioning	Implementation: Contractor Monitoring: Supervising Engineer	Included in Construction contract	Temporary work areas properly restored.
Transportation and Circulation	Air Quality; Noise and Vibrations; Community Health and Security	Risk of accidents due to project related traffic; Temporary Air Quality deterioration; Increase in Noise and Vibrations Level	x	x	Maintain equipment and machinery in good running conditions, including brakes, mufflers and silencers, catalyzers.	Throughout the construction phase	Implementation: Contractor Monitoring: Supervising Engineer	Included in Construction contract	Daily inspection by the Contractor of all equipment and machinery used during construction.
			X	X	Locate temporary access roads and lay down areas away from residences to the extent possible.	Throughout the construction phase	Implementation: Contractor Monitoring: Supervising Engineer	Included in Construction contract	Temporary roads' routings chosen as required.
			x	x	Restrict transport and circulation activities on public roads to the period between 6 a.m. and 6 p.m.	Throughout the construction phase	Implementation: Contractor Monitoring: Supervising Engineer	Included in Construction contract	Daily inspection by the Contractor of access roads for excessive noise. Contractor / Supervising Engineer to maintain records of complaints on noise and vibration levels, and follow-up corrective measures
			x	x	Notify landowners along the main public transportation routes about the construction schedule and activities	Throughout the construction phase	Implementation: Contractor Monitoring: Supervising Engineer	Included in Construction contract	Communicate to all landwoners along the main public transportation routes about the construction schedule and activities planned prior to the beginning of construction work
			x	x	Control speed of transport vehicles	Throughout the construction phase	Implementation: Contractor Monitoring: Supervising Engineer	Included in Construction contract	Daily inspection by the Contractor of construction areas for excessive nuisance dust and air pollutants. Contractor / Supervising Engineer to maintain records of complaints on air quality, and follow-up corrective measures

SOURCE OF IMPACT	IMPACTED VESC	POTENTIAL IMPACTS	PROJECT COMPONENT		MITIGATION MEASURES	IMPLEMENTATION TIMING	RESPONSIBILITIES	BUDGET (USD)	SPECIFIC MONITORING MEASURES / PARAMETERS / INDICATORS WHERE RELEVANT
			LINE	SUBSTATIONS					
	Air Quality	Temporary air quality deterioration	x	x	Use water for dust suppression on dust generating areas.	Throughout the construction phase	Implementation: Contractor Monitoring: Supervising Engineer	Included in Construction contract	Daily inspection by the Contractor of construction areas for excessive nuisance dust and air pollutants. UETCL/the Contractor to maintain records of complaints on air quality, and follow-up corrective measures
			x	x	Restrict speed on loose surface roads to 25 km/h during dry or dusty conditions	Throughout the construction phase	Implementation: Contractor Monitoring: Supervising Engineer	Included in Construction contract	Daily inspection by the Contractor of construction areas for excessive nuisance dust and air pollutants. Contractor / Supervising Engineer to maintain records of complaints on air quality, and follow-up corrective measures
			x	x	Prohibit idling of vehicles on-site to reduce emissions	Throughout the construction phase	Implementation: Contractor Monitoring: Supervising Engineer	Included in Construction contract	Daily inspection by the Contractor of construction areas for excessive nuisance dust and air pollutants. Contractor / Supervising Engineer to maintain records of complaints on air quality, and follow-up corrective measures
			x	x	Cover loads of brittle material during transport	Throughout the construction phase	Implementation: Contractor Monitoring: Supervising Engineer	Included in Construction contract	Daily inspection by the Contractor of construction areas for excessive nuisance dust and air pollutants. Contractor / Supervising Engineer to maintain records of complaints on air quality, and follow-up corrective measures
	Noise and Vibrations	Increase in noise and vibration levels	x	x	Provide all internal combustion equipment with properly functioning silencers or mufflers	Throughout the construction phase	Implementation: Contractor Monitoring: Supervising Engineer	Included in Construction contract	Daily inspection by the Contractor of all equipment and machinery used during construction.
	Soils; Surface Water and Sediments; Aquatic Habitats; Terrestrial Habitats and Associated Flora	Soil erosion; Soil compaction Increased pressure on natural resources	x	x	Restrict materials and manpower movements to existing roads/tracks to the extent possible.	Throughout the construction phase	Implementation: Contractor Monitoring: Supervising Engineer	Included in Construction contract	Movements outside the line route and access roads' ROW restricted to a minimum Construction of temporary access roads restricted to a minimum
		Soil Erosion; Modification to water quality Surface water contamination	x	x	Operate machinery on land in a way that minimizes disturbance to the banks of watercourses	Throughout the construction phase	Implementation: Contractor Monitoring: Supervising Engineer	Included in Construction contract	No machinery operations inside top-of-bank of watercourses Performance indicator: state of river banks
					River crossings are prohibited unless having obtained required authorizations from relevant authorities. Machinery must be cleaned and disturbed areas must be restored.	Throughout the construction phase	Implementation: Contractor Monitoring: Supervising Engineer	Included in Construction contract	Required authorizations obtained from authorities Any disturbed areas restored after works
		Surface water contamination	x	x	Do not refuel or service equipment within 100 m of any watercourse or surface water drainage installations	Throughout the construction phase	Implementation: Contractor Monitoring: Supervising Engineer	Included in Construction contract	Refueling stations located away from watercourses and surface water drainage
		Potential introduction of invasive alien species (IAS)	x	x	While working inside wetlands, restrict all equipment movements to access roads	Throughout the construction phase	Implementation: Contractor Monitoring: Supervising Engineer	Included in Construction contract	No equipment and vehicle movements outside access roads when working in wetlands
	Infrastructures and Public Services	Increased traffic and disturbance of traffic flow	X	X	Travel to and from the construction sites should be done during low traffic periods	Throughout the construction phase	Implementation: Contractor Monitoring: Supervising Engineer	Included in Construction contract	No transportation activities at peak traffic times

SOURCE OF IMPACT	IMPACTED VESC	POTENTIAL IMPACTS	PROJECT COMPONENT		MITIGATION MEASURES	IMPLEMENTATION TIMING	RESPONSIBILITIES	BUDGET (USD)	SPECIFIC MONITORING MEASURES / PARAMETERS / INDICATORS WHERE RELEVANT
			LINE	SUBSTATIONS					
		Damage to existing infrastructures	X	X	Plan construction activities in collaboration with local authorities to minimize damage to existing infrastructures	Prior to and throughout the construction phase	Implementation: Contractor Monitoring: Supervising Engineer	Included in Construction contract	Construction activities planned with local authorities
			X	X	Rehabilitate damaged public infrastructures after the construction	Construction phase decommissioning	Implementation: Contractor Monitoring: Supervising Engineer	Included in Construction contract	Damaged infrastructures rehabilitated after construction
Waste and Hazardous Materials Management	Terrestrial Habitats and Associated Flora; Aquatic Habitats	Increased pressure on natural resources, especially in areas where new access is created	x	x	Develop and implement a waste management plan that strictly respect sound waste management practices and WB/IFC waste management guidelines (see appendix 7-1).	Throughout the construction phase	Implementation: Contractor Monitoring: Supervising Engineer	Included in Construction contract	Construction waste management plan approved by Supervising engineer prior to beginning of construction phase Waste management plan applied consistently throughout the construction phase
			x	x	Do not throw debris in aquatic habitats and remove any debris introduced accidentally into the aquatic environment as soon as possible.	Throughout the construction phase	Implementation: Contractor Monitoring: Supervising Engineer	Included in Construction contract	All waste or debris in aquatic habitats removed.
		Impairment of flora communities	x		Prohibit all storage of equipment, materials and hydrocarbons within the MFNP.	Throughout the construction phase	Implementation: Contractor Monitoring: Supervising Engineer	Included in Construction contract	No hazardous products storage in MFNP
Presence of Workers	Terrestrial Habitats and Associated Flora; Terrestrial Fauna	Increased pressure on natural resources, especially in areas where new access is created	x	x	Implement a biodiversity protection awareness program with workers. Prohibit workers from owning firearms and other hunting gear, raise awareness about the prohibition to engage in any kind of poaching, and raise awareness about animal behavior and handling, especially when working in the Got Afwoyo area.	Throughout the construction phase	Implementation: Contractor Monitoring: Supervising Engineer	Included in Construction contract	Biodiversity Protection Awareness Program developed and approved by Supervising Engineer prior to beginning of construction activities. Workers engaged in poaching activities sanctioned. No bush meat consumed in worker camp.
		Modification and alteration of terrestrial fauna habitats, with associated changes in fauna communities; Local reduction of fauna density for species of higher use value	x	x	Inform the Contractor's E&S specialist when endangered fauna species are observed in or close to project sites.	Throughout the construction phase	Implementation: Contractor Monitoring: Supervising Engineer	Included in Construction contract	Contractor's E&S specialists aware of endangered fauna sightings
			X	X	Strengthen UWA ranger posts located near Got Afwoyo area in order to monitor animal movements and poaching activities	Prior to and throughout the construction phase	Implementation: Contractor Monitoring: Supervising Engineer	Included in Construction contract	Agreement with UWA concluded prior to initiation of works
	Employment and Economic Development	Inflation risk	X	X	Adopt procurement policies promoting local products and services, when available, with price limits in order to reduce risk of high inflation	Prior to the construction phase	Development: PIU	TBD (Operating budget)	Procurement policies developed and included in Contractor contract
			X	X	Ensure that regular business dealers and especially food vendors are registered for identity and avoidance of unfair treatment by contractors and workers, such as denial of payment entitlements	Throughout the pre-construction and construction phase	Implementation: Contractor Monitoring: Supervising Engineer	Included in Construction contract	Existence of an up-to-date register of local goods and services providers
	Gender Relations Community Health and Security	Tensions with workers from outside	X	X	Prepare a Community Engagement Plan	Prior to and throughout the construction phase	Contractor and UECTL	TBD (Operating budget)	Communications with affected communities maintained throughout the construction phase
		Risk of increased incidence of STD and HIV/AIDS	X	X	Development of a strict management plan on Gender, STD and HIV/AIDS, Sexual abuse, Child labour and other relevant social issues covering all elements described in Appendix 7-5	Prior to the construction phase	UETCL	Development : 20 000 $ Implementation : 40 000$	Management Plan officially adopted prior to initiation of construction
		Risk of sexual abuse and child abuse by workers	X	X	Locate worker camps at a minimum distance of 1km from towns and villages	Throughout the construction phase	Implementation: Contractor Monitoring: Supervising Engineer	Included in Construction contract	Distance between worker camps and other human settlements always kept at 1km or more, as the crow flies

SOURCE OF IMPACT	IMPACTED VESC	POTENTIAL IMPACTS	PROJECT COMPONENT		MITIGATION MEASURES	IMPLEMENTATION TIMING	RESPONSIBILITIES	BUDGET (USD)	SPECIFIC MONITORING MEASURES / PARAMETERS / INDICATORS WHERE RELEVANT
			LINE	SUBSTATIONS					
			X	X	Implement and follow-up on grievance redress mechanism	Throughout the construction phase	Implementation: Contractor Monitoring: Supervising Engineer	75 000 $	Grievance mechanism functional throughout the construction phase
			X	X	Prepare and implement an Employee Code of Conduct complying with UETCL's policies including a **strict prohibition of sexual abuse and sexual intercourse with partners younger than 18 years-old** (underage sex).	Prior to and throughout the construction phase	Implementation: Contractor Monitoring: Supervising Engineer	Included in Construction contract	HIV/AIDS prevention program developed and approved by Supervising Engineer prior to beginning of construction activities
			X	X	Sensitize all contractors, workers and communities on the STD and HIV/AIDS program, including explanations on risks posed by STDs, sanctions, etc. as well as on grievance mechanism in place	Prior to and throughout the construction phase	Implementation: Contractor Monitoring: Supervising Engineer	Included in Construction contract	• All workers sensitized on HIV/AIDS and other STDs at beginning of employment • All subcontractors and workers sensitized on prohibition of sexual abuse, underage sex and consequences of infraction at beginning of employment • All communities sensitized on HIV/AIDS, other STDs as well as on the grievance mechanism prior to beginning of any construction works in their vicinity
			X	X	Institute a non-fraternization policy at the workers' camps as a measure to control against prostitution and misconduct	Throughout the construction phase	Implementation: Contractor Monitoring: Supervising Engineer	Included in Construction contract	Policy adopted prior to beginning of construction phase.
			X	X	Immediately report any suspected case of sexual abuse or underage sex to the supervising engineer and UETCL. Management those cases according to principles listed in ESIA sections 7.2.4.6 and 7.2.4.8	Throughout the construction phase	Implementation: Contractor Monitoring: UETCL, Ministry of Gender, World Bank	Included in Construction contract	• Any accused worker(s) suspended immediately; • Grievance redress mechanism triggered within 24 hours if not done already; • Presence of impartial observer requested from Ministry of Gender within 24 hours; • If accusations justified, accused workers dismissed • If accusation justified, individual victim(s) and affected community compensated in non-monetary form as per agreed during grievance redress • Remedial plan for sexual abuse and underage sex submitted by lead contractor • Construction works suspended and WB Inspection panel called in if more cases arise.
			X	X	Compliance with Uganda Employment Act, 2006, Section 7 on Sexual harassment and violence	Throughout the construction phase	Implementation: Contractor Monitoring: UETCL, Ministry of Gender, World Bank	Included in Construction contract	• Any report of infringement to the Employment Act
			X	X	Favour the employment of local workers to reduce the risk of sexual harassment and violence caused by foreigners;	Throughout the construction phase	Implementation: Contractor Monitoring: UETCL, Ministry of Gender, World Bank	Included in Construction contract	• Percentage of foreign workers
	Infrastructures and Public Services	Increased pressure on community health services	X	X	Adopt a MOU between UETCL and district local governments defining the terms under which the company will support the improvement of health care services during the project's construction phase.	Prior to and throughout the construction phase	PIU	PIU Operating budget	MOU developed and signed prio to beginning of construction activities
Workers' Health & Safety	Community Health and Safety	Risk of abuses by contractors hiring underage workers (child labour)	X	X	Strictly prohibit child labour. It is the Lead Contractor's responsibility to take necessary measures so that its employees and	Prior to and throughout the construction phase	Implementation: Contractor	Included in Construction contract	All workers and employees, at any given time, are aged 18 years-old or more

SOURCE OF IMPACT	IMPACTED VESC	POTENTIAL IMPACTS	PROJECT COMPONENT		MITIGATION MEASURES	IMPLEMENTATION TIMING	RESPONSIBILITIES	BUDGET (USD)	SPECIFIC MONITORING MEASURES / PARAMETERS / INDICATORS WHERE RELEVANT
			LINE	SUBSTATIONS					
					subcontractors' **employees are all aged 18 years-old or more**.		Monitoring: Supervising Engineer		
			X	X	Mainstream child protection and compliance to/awareness of Child rights laws in the continuous stakeholder engagement to be conducted in compliance to UETCL's communication and stakeholder engagement plan to be developed according to Appendix 7-2, and including workers, leaders and communities.	Prior to and throughout the construction phase	Implementation: Contractor and UETCL	Included in Communication plan implementation budget	Successful implementation
			X	X	Immediately report any case of child labour to the supervising engineer and UETCL. Management those cases according to principles listed in ESIA section 7.2.4.8	Prior to and throughout the construction phase	Implementation: Contractor Monitoring: Supervising Engineer	Included in Construction contract	• Remedial plan for child labour submitted by lead contractor • Construction works suspended and WB Inspection panel called in if more cases arise.
	Absence of adherence to labour standards and well-being of construction workers Work related injury or health effects		x	x	Require the Contractor to adopt policies and procedures that comply with national legislation and address all aspects of labour standards relevant to the project as specified by IFC policies. Sub-contractors willbe contractually required to comply with labour and health and safety legislation	Throughout the construction phase	Implementation: Contractor Monitoring: Supervising Engineer	Included in Construction contract	The Contractor to keep accurate employment records. Ongoing monitoring by supervising engineer of Contractor's H&S performance. Investigation and corrective action for reported incidence of abusive labour conditions.
			x	x	Comply with the Uganda Safety and Health Act 2007 to ensure the health and safety of workers, organizations and surrounding.	Throughout the construction phase	Implementation: Contractor Monitoring: Supervising Engineer	Included in Construction contract	Any report of infringement to the Employment Act
			x	x	• Establish equipment storage yards and maintenance areas on adapted surfaces (clear of vegetation, stripped of topsoil, leveled and compacted murram); • Cut grass and brush near ground level outside the equipment storage yards / worker camps perimeter to maintain a perimeter for fire break; Develop a Health and Safety Policy, including personal safety, site conduct, security, site safety zoning and emergency procedures; Require all contractors and sub-contractors to comply with relevant WB/IFC health and safety requirements (see appendix 7-6), including specific provisions for: • Introduction, and use of, poisonous or other chemicals injurious to health; • Provision of sanitation at camps, substations and tower erection points; • Provision of separate accommodation and sanitation facilities in worker camps in order to satisfy both gender needs; • Declaration of accidents through an accident reporting mechanism (see Accident Report Template, Appendix 7-7) • Monitoring of H&S issues using the UETCL / ESDP Weighted HSE Checklist (see Appendix 7-8) • Provide suitable and safe accommodation and sanitation facilities, including available drinking water and improved latrines • Provide medical facilities for the use of workers where required;	Throughout the construction phase	Implementation: Contractor Monitoring: Supervising Engineer	Included in Construction contract	The Contractor to keep accurate employment records. Ongoing monitoring by supervising engineer of Contractor's H&S performance. Investigation and corrective action for reported incidence of abusive labour conditions.

SOURCE OF IMPACT	IMPACTED VESC	POTENTIAL IMPACTS	PROJECT COMPONENT		MITIGATION MEASURES	IMPLEMENTATION TIMING	RESPONSIBILITIES	BUDGET (USD)	SPECIFIC MONITORING MEASURES / PARAMETERS / INDICATORS WHERE RELEVANT
			LINE	SUBSTATIONS					
					• Handling of domestic and specialised waste as well as dangerous goods ; • Training; • Provision of potable water; • Working environment committee; • Fire suppression system; • Use of personal protective equipment such as helmets and other safety equipment; • Personal injuries and accidents; • Damage to material, equipment and buildings; • Poison treatment, chemical and fire injuries; • Safety audit; • Work done by hired personnel or firms; • Work done near live electric components; • Work done at heights; • Work done in areaswhere there are dangerous animals (near MFNP); • Operating cranes; • Working with heat in confined places; • Corrective action; • Protective action; and, • Utilisation of fall arrestors and anti-climbing devices to prevent public injury.				

The Construction Phase Decommissioning Strategy Framework is included in Appendix 8-1.

8.2.2 OPERATION PHASE

E&S measures proposed to mitigate negative impacts or optimize the positive ones during the operation phase are presented in Table 8-2 below.

Table 8-2 Environmental and Social Management Measures for the Project Operation Phase

VALUED E&S COMPONENT	POTENTIAL IMPACTS	PROJECT COMPONENT		MITIGATION MEASURES	IMPLEMENTATION TIMING	RESPONSIBILITIES	BUDGET (USD)	SPECIFIC MONITORING MEASURES / PARAMETERS / INDICATORS WHERE RELEVANT
		LINE	SUBSTATIONS					
Soils, Water Resources	Soil contamination, Surface water and groundwater contamination	x	x	Prepare and implement an Emergency Response Plan	Project lifetime	UETCL	20 000 $	Implement an Emergency Response Plan (ERP) prior to the operation of the power line as soon as possible and monitor for the application this plan throughout the operation phase
	Soil contamination Surface water and groundwater contamination	x	x	Keep Spill Containment Kits readily accessible onsite in the event of an accidental spill and ensure on-site staff is trained in spill response	Project lifetime	UETCL	10 000 $	Monitoring by UETCL of the application of the ERP
	Soil contamination Surface water and groundwater contamination	x	x	Contain any spills onsite and clean up spills as soon as possible	Project lifetime	UETCL	n/a (UETCL operating budget)	Monitoring by UETCL of the application of the ERP
	Soil contamination Surface water and groundwater contamination	x	x	Document and report all spills to the MoE	Project lifetime	UETCL	n/a (UETCL operating budget)	Monitoring by UETCL of the application of the ERP
EMF Levels	Effects of EMF levels generated by the transmission line project on public health	x		Keep residences and other permanent structures such as schools, shops or offices out of the wayleave to minimize exposure to EMFs.	Project lifetime	UETCL	n/a (UETCL operating budget)	ROW and wayleave maintained free of permanent structures
Terrestrial habitats and associated flora	Impairments of natural habitats and associated flora communities	x		Maintain all work inside the footprint of access road and works sites to reduce encroachment on natural habitats.	Troughout the operation phase	UETCL	n/a (UETCL operating budget)	All maintenance activities performed inside ROW/wayleave
		x		Clearly mark the extent of vegetation control in the ROW. Identify and mark the vegetation to be preserved along sections of the ROW.	Troughout the operation phase	UETCL	n/a (UETCL operating budget)	Extent of vegetation areas to be cleared clearly demarcated
		x		Undertake selective control of the vegetation in order to keep low scrubby and herbaceous species that do not represent a risk for the powerline (species that cannot grow more than 4m in height)	Troughout the operation phase	UETCL	n/a (UETCL operating budget)	scrubby and herbaceous cover maintained all along the wayleave
		x		Dispose of organic material removed from the ROW properly	Troughout the operation phase	UETCL	n/a (UETCL operating budget)	Local communities allowed to use material for their own energy use
		x		Avoid using chemical products for maintenance of the ROW.	Troughout the operation phase	UETCL	n/a (UETCL operating budget)	no chemical products used in maintenance of ROW and wayleave
	Potential introduction of invasive alien species (IAS)	x		Implement an IAS monitoring program following project construction and site re-vegetation in sensitive areas, such as MFNP, forests reserves, and forest stands. Consider conduction along with ROW maintenance.	Troughout the operation phase	UETCL	10 000 $	IAS monitoring program ready at the beginning of operational phase. Monitoring conducted at least every 5 years
	Potential introduction of invasive alien species (IAS)	x		Implement an IAS control program in order to prevent the establishment and propagation of invasive species such as Mimosa Pilgra	Troughout the operation phase	UETCL	50 000 $	IAS control program ready at beginning of operational phase. IAS control executed along with ROW maintenance activities.
Aquatic habitats and associated flora	Impairments of natural habitats and associated flora communities	x		Undertake selective cutting of the vegetation in order to maintain low scrubby and herbaceous species that do not represent a risk for the power line (species that cannot grow more than 4m in height, including papyrus).	Troughout the operation phase	UETCL	n/a (UETCL operating budget)	Low-lying wetland vegetation cover (ex. papyrus) maintained all along ROW and wayleave
		x		Forbid use of chemical pesticides to control vegetation in the ROW	Troughout the operation phase	UETCL	n/a (UETCL operating budget)	no chemical products used in maintenance of ROW and wayleave
	Increased pressure on natural resources, especially in areas where new access have been created	x		Undertake monitoring of natural resources exploitation and implement a sensitization program in order to educate and increase local communities awareness on natural resources protection.	Troughout the operation phase	UETCL	25 000 $	Undertake monitoring of natural resources exploitation along the powerline

VALUED E&S COMPONENT	POTENTIAL IMPACTS	PROJECT COMPONENT		MITIGATION MEASURES	IMPLEMENTATION TIMING	RESPONSIBILITIES	BUDGET (USD)	SPECIFIC MONITORING MEASURES / PARAMETERS / INDICATORS WHERE RELEVANT
		LINE	SUBSTATIONS					
	Impairment of hydrological dynamic leading to wetland disturbances and alteration	x		Avoid destabilization of shores and sediments or other pollutants rejection in watercourses during road and wayleave maintenance;	Troughout the operation phase	UETCL	n/a (UETCL operating budget)	
	Effects on wetland specialist species and species of conservation interest	x		Only excavate the lower third of ditches during drainage ditch maintenance in order to maintain ditch slope stability;	Troughout the operation phase	UETCL	n/a (UETCL operating budget)	Ditch maintenance conducted as required.
	Potential introduction of invasive alien species (IAS)	x		Implement an IAS monitoring program following project construction in sensitive areas such as wetlands and shorelines, following construction and site re-vegetation. Consider conduction along with ROW maintenance.	Troughout the operation phase	UETCL	10 000 $	IAS monitoring program ready at the beginning of operational phase. Monitoring conducted at least every 5 years
Avifauna, Terrestrial fauna	Bat electrocution and collisions Bird electrocutions and collisions	x		Implement a bird and bat mortality monitoring program, including: - data monitoring of bird and bat mortality (in partnership with local communities); - rewiew of mitigation measures efficiency.	Troughout the operation phase 2 times/year in first 5 years of operation. Once every 5 years later on.	UETCL	100 000 $	Bird and Bat mortality monitoring program ready at the beginning of operational phase. Data to be included: monitoring of bird and bat mortality (in partnership with local communities)/ Number of dead specimens (species involved) related to period and location
		x		Develop specific mitigation measures for species that are involved in bird mortality.	Troughout the operation phase	UETCL	15 000 $	Mitigation measures developed and implemented if required. Mitigation measures Implementation budget to be developed if MM are required.
Land Use	Land use restriction in the ROW	X	X	Allow grazing in the ROW and other agricultural activities wayleave, provided that plantations do not exceed 4 m in height. If UETCL permits it, the ROW in urban area can be used for a number of purposes that will increase quality of life in neighborhoods crossed by the wayleave, e.g. gardening, playgrounds, walking paths.	Troughout the operation phase	UETCL	n/a (UETCL operating budget)	Line-safe land uses by public allowed in ROW and wayleave where infrastructures allow it.
	Land use disputes (land resource and power conflict)	X	X	Restrict project land use to the line's right-of-way to avoid project developer conflict with local communities	Construction Phase	UETCL	n/a (UETCL operating budget)	Line-safe land uses by public allowed in ROW and wayleave where infrastructures allow it.
	Punctual infringement of crops by machinery for maintenance purposes	X		Plan for maintenance activities to be conducted outside of the growing and grazing seasons.	Troughout the operation phase	UETCL	n/a (UETCL operating budget)	Minimized ROW / wayleave maintenance activities in growing and grazing seasons.
Employment and Economic Development	Job creation	X	X	Apply human resources policies favouring local labour	Prior to the operation phase	UETCL	n/a (UETCL operating budget)	Target 90% of local labour for unskilled tasks
			X	Implement training programs to build local capacity	Prior to and throughout the operation phase	UETCL	n/a (UETCL operating budget)	Target 25% of local labour for skilled tasks
	Economic opportunities for local and regional suppliers and businesses	X	X	Disclose information on newly created business opportunities	Prior to the operation phase	UETCL	n/a (UETCL operating budget)	Information published from beginning of operation phase.
Gender relations	Effect on women due to crop loss		X	Encourage the recruitment of female workers	Throughout the operation phase	UETCL	n/a (UETCL operating budget)	Gender employee policy adopted at beginning of operations phase. Target 30% of female workers
Communities and social cohesion	Tensions with workers from outside	X	X	Prepare a Community Engagement Plan	Prior to and throughout the operation phase	UETCL	20 000$	Implementation of the Plan
	Land use and compensation disputes,	X	X	Involve traditional leaders in the resettlement process	Prior to and throughout the operation phase	UETCL	n/a (UETCL operating budget	Regular communication with community leaders

VALUED E&S COMPONENT	POTENTIAL IMPACTS	PROJECT COMPONENT		MITIGATION MEASURES	IMPLEMENTATION TIMING	RESPONSIBILITIES	BUDGET (USD)	SPECIFIC MONITORING MEASURES / PARAMETERS / INDICATORS WHERE RELEVANT
		LINE	SUBSTATIONS					
	reviving old quarrels (land resource and power conflict)							
	Increased marginalization of vulnerable groups	X	X	Prioritize vulnerable individuals and households in terms of access to the different social measures and programs;	Prior to and throughout the operation phase	UETCL	n/a (UETCL operating budget	Target, All vulnerable individuals or households have access to special social measures and programs
		X	X	Consideration for employment for the most vulnerable in the community including disabled, as may be appropriate	Prior to and throughout the operation phase	UETCL	n/a (UETCL operating budget	Target: vulnerable people hired where appropriate
		X	X	As part of the RAP's monitoring program, identify the most vulnerable households and individuals and ensure close monitoring of their health and integration into host communities	Prior to and throughout the operation phase	UETCL	n/a (RAP budget)	Target: All vulnerable households and individuals are identified and their health and integration are closely monitored.
Community health and security	Community unease	X	X	Continued implementation of UETCL's Communication and Stakeholder Engagement Plan, as well as the Gender, STD / HIV/Aids, Sexual Abuse, Child Labour and Other issues Management Plan	Prior to and throughout the operation phase	UETCL	80 000 $	Plans implemented
	Risk of electrocution caused by equipment breakdowns, illegal connections and all other forms of unsafe contacts	X	X	Educate local populations to safe behaviour in the presence of high voltage power lines	Prior to and throughout the operation phase	UETCL	100 000 $	Target: no electrocutions over the line's lifecycle
		X	X	Proper communication with and awareness of local populations	Prior to and throughout the operation phase	UETCL	n/a (UETCL operating budget)	Target: no electrocutions over the line's lifecycle
		X	X	Warning signs and anti-climbing devices installed near substations and pylons	Throughout the operation phase	UETCL	n/a (project costs)	Signs installed from onset of operation phase
		X	X	Ensure the development of local and regional emergency plans in case of infrastructure breakdowns, especially near roads or residential areas	Prior to and throughout the operation phase	UETCL	20 000 $	Emergency plans adopted from onset of operation phase
		X	X	Monitor and control illegal connections	Throughout the operation phase	UETCL	n/a (UETCL operating budget)	Target: 0 illegal connections
	Health concerns over exposure to electric and magnetic fields	X	X	Educate the local population on Electromagnetic Field (EMF) risk	Prior to and throughout the operation phase	UETCL	n/a (UETCL operating budget)	Information published from beginning of operation phase.
Landscape	Permanent alteration to the landscape	X	X	Minimize the number of permanent access roads to and in the ROW. When possible, proceed to early closing of access roads nearby sensitive scenic areas	Prior to and throughout the operation phase	UETCL	n/a (UETCL operating budget)	Access roads kept to a minimum
		X	X	Allow tree and shrub species whose height is limited to 4m to grow within the ROW	Throughout the operation phase	UETCL	n/a (UETCL operating budget)	Low-lying vegetation cover (ex. herbaceous or shrubby vegetation, papyrus, etc.) maintained all along line route
		X	X	Create visual barriers to reduce line visibility	Prior to and throughout the operation phase	UETCL	n/a (UETCL operating budget)	Visibility of project minimized in sensitive areas.

8.2.3 COMMUNITY ENGAGEMENT PLAN

As per mentioned in sections 7.2.4.1 above, UETCL has committed to develop and implement a Communication and Community Engagement plan at the implementation phase, in order to facilitate smooth project implementation. An outline of such a plan is provided in Appendix 7-2, for guidance.

8.2.4 GRIEVANCE REDRESS MECHANISM

Grievances may arise from members of communities who suffer predicted or unpredicted impacts caused by project implementation. Grievance redress mechanisms are thus established to resolve disputes as part of the project's implementation.

A grievance resolution process has been developed (Appendix 7-3) in order to resolve issues quickly so as to expedite smooth conflict resolution without resorting to expensive and time-consuming legal processes.

Grievance redress mechanisms are proposed in order to provide an effective avenue for expressing concerns and achieving remedies for communities, promote a mutually constructive relationship between the project and the community or PAPs as well as prevent and address community concerns. It is based on resolution on grievances on a community basis, and aims to ensure that seeking redress in front of courts of law is a last-resort option.

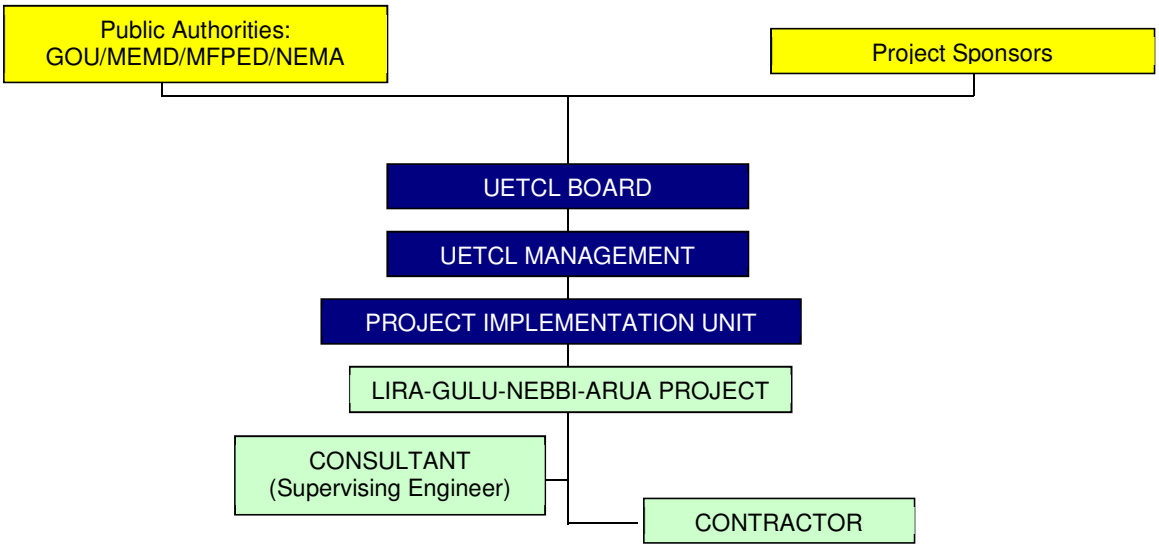
8.3 INSTITUTIONAL ARRANGEMENTS FOR PROJECT IMPLEMENTATION

8.3.1 PRE-CONSTRUCTION / CONSTRUCTION PHASE

Responsibilities for ESMP implementation and monitoring are shared between multiple stakeholders including UETCL, relevant public authorities and project contractor(s).

Figure 8-1 illustrates the mechanics of the proposed institutional arrangement for the project preconstruction / construction phases. The following sections also describe each stakeholder's roles and responsibilities during the construction period. This arrangement is meant to conform with UETCL's management organigram (see appendix 8-2).

Figure 8-1 Institutional Arrangements for ESMP Implementation, Construction Phase



8.3.1.1 GOVERNMENT OF UGANDA AND PROJECT SPONSORS

The Government of Uganda oversees the project's high level planning, financing and implementation via the Ministry of Energy and Minerals Development and the Ministry of Finance, Planning and Economic Development. Independent oversight of ESMP implementation and respect of applicable laws and regulations shall be done by NEMA, in collaboration with other agencies (including MoGLSD, LGs, etc.) and CSOs.

Financial partners for their part also contribute to the project's high level planning before financing its construction. Their environmental and social safeguards provide guidance regarding project design and implementation mechanics, in order to minimize and properly manage its environmental and social impacts.

8.3.1.2 PROJECT OWNER: UETCL BOARD AND MANAGEMENT

As the project owner, UETCL will have direct responsibility for proper project and ESMP implementation. Under the structure illustrated above, the roles attributed to its Board and management team would be the following:

- Be the interface between UETCL and financial partners regarding environmental and social issues;
- Ensure that applicable financial partner safeguard policies are implemented and respected, by analyzing E&S monitoring reports received from the PIU E&S specialist and other partners, and identifying gaps against financial partners' safeguard policies;
- Take ultimate technical decisions about environmental and social problems raised or observed by other project stakeholders, if need be
- Guide and support the top management/technical management for everything that relates to the project's environmental management;
- Ensure that the environmental and social management process is working well and that no significantly negative and irreversible impact are produced by the project;
- Centralize all information and documentation regarding the project's E&S management.

8.3.1.3 PROJECT IMPLEMENTATION UNIT

UETCL will create a Project Implementation Unit (PIU) within UETCL, consisting of technical and environmental/social staff.

Technical staff would be composed of technical experts able to ensure compliance with construction standards included in the project plans and specifications, bidding documents and contracts. This team would be composed of national engineers and experts, supervised by UETCL's Principal Projects Engineer.

Environmental and social staff would be composed of experts from the fields of environment, ecology, agronomy and sociology, etc., and ensure proper implementation of the environmental and social management measures contained in the ESMP, but also the RAP. These experts could come from UETCL's professional staff. PIU's environmental staff would act under the authority of UETCL's Principal Environment Officer. Given the importance of social issues, the PIU is required have qualified Social scientist to attend to all social issues including RAP implementation. They will lead the social dialogue, risk assessment and guide the implementation of the social issues including land acquisition, compensation and resettlement.

PIU's environmental and social team would be responsible for monitoring of ESMP implementation during the project pre-construction and construction phases. As such, its main responsibilities would be as follows:

- Pre-construction phase:
  - Coordinate E&S aspects of project procurement, *inter alia* inclusion of E&S aspects (ESMP & RAP, as well as the World Bank's *General Environmental Management Conditions for Construction Contracts*) in contractor(s) and supervising engineer tender documents and

contracts. The General Environmental Management Conditions for Construction Contracts can be found as Appendix 8-4;

- Coordination of population resettlement & compensation, as well as implementation of other RAP measures;
- Conduction of additional consultations prior to the project's implementation, with representatives from the Ministry of Gender, Labour and Social Development's to involve Community Development Officers in project supervision and monitoring during implementation. Also, consultations with National Forestry Authority's representatives should be held to discuss their involvement in the implementation of planned restoration of forest reserves under the project.
- Strengthen inter-agency collaboration including UETCL and:
  - Affected/benefiting Local Government Departments including: Education, Community Development, Gender, Probation, Labor and Health;
  - Lower LCs;
  - CSOs operating in the area;
  - MoLG, MoGLSD, Law enforcement agencies at the LG, etc.

→ Construction phase:

- Supervise proper implementation of ESMP & RAP when relevant during construction.

In order to achieve the objectives above, it is recommended that PIU environmental staff conducts field inspections on a monthly basis in order to monitor proper implementation of relevant E&S measures by the contractor, and proper monitoring by the supervising engineer.

In the case of an incident that could potentially cause serious damage to the environment or equipment, PIU environmental staff will be authorized to stop work or to give instructions to the head contractor to ensure that impacts are minimized or eliminated.

8.3.1.4 CONSULTANT (SUPERVISING ENGINEER)

The supervising engineer's general role is to represent UETCL in order to monitor proper project implementation. As such, the supervising engineer would monitor proper implementation of the project's technical, environmental and social aspects. Generally, its role would include verification/approval of technical execution studies/drawings, as well as supervision and monitoring of the project construction works.

The supervising engineer would appoint qualified environmental and social specialists. Given the importance of social issues, the supervising engineer's social scientist will attend to all social issues including RAP implementation. They will lead the social dialogue, risk assessment and guide the implementation of the social issues including land acquisition, compensation and resettlement.

The supervising engineer's E&S specialists would be responsible for the following main tasks:

→ Prior to initiation of construction:

- Verification/approval of lead contractor's candidates as environmental specialists', based on their qualifications;
- Verification/approval of the detailed ESMP and RAP implementation plan during the project construction phase, for elements under the Contractor's control (Project Worksite ESMP) to be prepared by the lead contractor's environmental specialists;
- Verification/approval of training provided to the lead contractor and subcontractors' staff;
- Review of Contractors' Method Statements to ensure that environment and social risks are assessed and mitigations put in place before any activity commences;

→ During construction:

- Review of Contractors' Method Statements to ensure that environment and social risks are assessed and mitigations put in place before any activity commences;

- Monitor adequate implementation of the Worksite ESMP by the lead contractor and sub-contractors, with systematic controls;
- Control the quality and quantity of E&S reports produced by the lead contractor;
- Monitor ongoing project environmental and social impacts;
- Oversee communications done by the contractor against the worksite's ESMP, control the way the contractor manages the complaints issued by the public.
- Handle/keep record of complaints under its competence;
- Produce by-weekly E&S monitoring reports for the PIU. Report contents:
  - Analysis of contractor's environmental management reports;
  - Results of the surveillance of complaints and critical incidents/accidents handled by the contractor;
  - Complaints handled directly;
  - Level of implementation of the project's ESMP / worksite's ESMP and observed deviations;
  - Identification of unanticipated impacts (not identified in the ESMP);
  - Results of the controls done regarding the communications and awareness activities done/planned by the contractor.
- Oversee complaints issued by the contractor;
- When necessary, take decisions concerning the implementation of the Worksite ESMP.

The supervising engineer's assignment should come to an end at the end of the project pre-construction / construction phase.

8.3.1.5 LEAD CONTRACTOR

The lead contractor shall appoint qualified environmental and social specialists and submit their CVs to the supervising engineer who will assess sufficiency of their qualifications for ESMP implementation. After approval of their qualifications, contractor environmental and social specialists will be responsible for daily implementation and management of all relevant E&S measures provided in the ESMP and RAP, during the whole construction phase.

Given the importance of social issues, the lead contractor's social scientist will attend to all social issues including RAP implementation. They will lead the social dialogue, risk assessment and guide the implementation of the social issues including land acquisition, compensation and resettlement.

The lead contractor's E&S specialists would be responsible for the following main tasks:

→ Prior to initiation of construction:

- Preparation of detailed ESMP and RAP implementation plan for the project construction phase, for elements under the Contractor's control (Project Worksite ESMP);
- Preparation of all plans and policies required by the ESMP;
- Training of relevant contractor and subcontractor staff on Worksite ESMP in order to ensure integration in general planning of works;

→ During construction:

- Measurement of environmental and social parameters listed in section 8.4 below on work sites. Those measurements are to be done before, during and after conduction of works at a given site in order to assess efficiency of mitigation measures;
- Ensure permanent field E&S surveillance of construction works conducted by contractor / subcontractors;
- Environmental management of the worksites and monitoring of works, particularly of the respect of the Worksite ESMP by foremen and workers;

- Produce weekly E&S reports to the supervising engineer detailing state of ESMP implementation;
- Declare accident/incidents/events that may affect the quality of the environment and/or the human environment;
- Answer and take necessary actions regarding complaints by affected population (when the complaint is related to the contractor).

It should be noted that the lead contractor is to be held accountable for all H&S infractions, E&S infractions, and ESMP infringements caused by its sub-contractors.

The Lead Contractor should also appoint health & safety staff who would be responsible for application of health and safety obligations and reporting on H&S issues. All applicable national health & safety regulations, as well as UETCL standards, will have to be respected. In the absence of specific rules, it is suggested to use, where appropriate, the WHO or World Bank standards.

The Lead Contractor must hold all necessary licenses and permits before the work begins. It will befall on them to provide UETCL and PIU with all the required legal documents, among which the signed agreements with owners, authorisations for borrow pits, authorisations for temporary storage sites, etc.

The Lead Contractor's contract should come to a close at the end of the project pre-construction / construction phase.

8.3.1.6 SUMMARY OF TASKS TO BE ACCOMPLISHED IN THE PRECONSTRUCTION AND CONSTRUCTION PHASES

A summary of tasks to be accomplished by the main project actors in the Preconstruction and Construction phases is provided in Appendix 8-3.

8.3.2 OPERATION PHASE

As project owner and operator, UETCL should be the only body directly concerned with ESMP implementation at project operation phase.

Its current internal structures will therefore be responsible for following through and implementing all mitigation and monitoring measures provided in the ESMP for that phase.

8.4 E&S SURVEILLANCE AND MONITORING

8.4.1 E&S SURVEILLANCE

Environmental and social surveillance will be carried out during construction works. It aims to ensure compliance of the works with commitments and obligations listed in the ESMP, and due application of all mitigation measures.

The environmental and social surveillance program aims to ensure that the Lead Contract's specifications and management measures are applied in accordance with their activities. If necessary, penalty terms should be applied for non-compliance with environmental and social clauses included in the specifications. The Lead Contractor will also have to identify an E&S specialist, as per mentioned in section 8.3.1.5 above.

The Supervising Engineer's role and powers with respect to contractors should also be indicated in the specifications. He will have the necessary authority to require contractors to modify their techniques or approaches to work, if the situation warrants.

A site meeting will take place at the beginning of the work with all contractors. Other meetings can also be led at an increasing frequency during the construction phase. These meetings will be intended especially to inform and educate staff on environmental, social and safety provisions to observe during construction activities.

In general, environmental and social surveillance should result in the following:

- Review of Contractors' Method Statements to ensure that environment and social risks are assessed and mitigations put in place before any activity commences;
- Regular visits to work areas, and reporting of general findings;
- Take note of contractors' strict compliance to various commitments, obligations, actions and other requirements according to table 8-1 above;
- Assess the quality and effectiveness of management measures and adapt mitigation measures if required;
- Note and report any non-compliance or environmental and social issues.

The environmentalist and social scientist in charge of the surveillance will then share his observations with the site manager so that appropriate corrective actions are given and adopted as soon as possible. The corrective actions will then be integrated in the surveillance program to ensure the follow up of the application and effectiveness of the corrective actions taken. Sites inspection on a regular basis as well as surveillance activities will be based on table 8-1 above which will guide the elements to be surveyed during the pre-construction / construction phase.

8.4.2 ENVIRONMENTAL AND SOCIAL MONITORING

Environmental and social monitoring allows assessing the efficiency of mitigation measures during the pre-construction/construction phase. The effectiveness of the management measures is validated to ensure proper mitigation of anticipated impacts throughout the life of the Project. Consequently, the monitoring plan should evolve and be adapted over time to address any unexpected changes or impacts. Environmental and social monitoring is based on:

- Site inspections;
- Verification of the effectiveness of mitigation measures.

Table 8-3 below lists the project's main E&S monitoring measures to be applied during the pre-construction / construction phase. It should be stressed that the monitoring obligations below are meant to add up to those detailed in Table 8-1 which relate to application of mitigation measures themselves.

Additionally and as per mentioned in section 8.3.1.5 above and appendix 8-3, responsibility for collection of baseline measurement and conditions' data prior to initiation of works lies with the Contractor. This arrangement is meant to ensure that baseline conditions to which monitoring results are compared are site-specific, recent and therefore reflect the true situation on the field prior to construction works. Baseline data collection should be performed at various representative sites along the project line route.

The cost of these environmental and social surveillance and supervision measures cannot be specified at this point since they will be borne out by project stakeholders from their operating budgets.

Table 8-3 Environmental and Social Control Measures, Pre-Construction / Construction Phase

COMPONENT	PARAMETER	STANDARDS / TARGETS	LOCATION	FREQUENCY	RESPONSIBILITIES	SUPERVISION
Soil Erosion	Visual inspection of construction sites and access roads	Avoid significant degradation of baseline conditions; Avoid heavy rainfall periods; Where possible, maintain natural vegetation; Design channels and ditches for post-construction flows and avoid gulley formation; Stabilize soils and re-vegetate areas promptly; Bypass and minimize length and steepness of slopes; Reduce water velocity; At the end of construction work, sow or stimulate natural vegetation recovery.	Along ROW, access roads and work areas	Continuous during preconstruction and construction activities	Contractor, supervising engineer	PIU
Surface water quality	pH, TSS, turbidity, phosphorus, BOD, coliform bacteria, temperature increase, visual observations (presence of oil, litter, etc.)	Avoid significant degradation of baseline conditions. World Health Organisation (WHO) and National standards; Prevent release of water at high speed in the watercourse (by maintaining natural vegetation, softening slopes, avoiding gulley formation, soil stabilization, etc.); Segregate or divert clean water runoff to minimize the volume of water to be treated prior to release;	Selected sites along rivers and streams crossed by the ROW Workers' camps and communal water withdrawal points near work sites	Once a month during construction work	Contractor, supervising engineer	PIU
State of vegetation	Visual inspection of construction sites and access roads	Avoid significant degradation of baseline conditions	ROW and Substation sites	Continuous during pre-construction and construction activities	Contractor, supervising engineer	PIU

COMPONENT	PARAMETER	STANDARDS / TARGETS	LOCATION	FREQUENCY	RESPONSIBILITIES	SUPERVISION
Air quality	Visual inspection of construction sites and access roads	Avoid significant degradation of baseline conditions	Along ROW, access roads and work areas	Continuous during preconstruction and construction activities;	Contractor, supervising engineer	PIU
Noise Levels	Inspection of construction sites and access roads	World Bank and national standards	All communities and cluster of houses within 500 m of ROW	Continuous during preconstruction and construction activities	Contractor, supervising engineer	PIU
Damage to neighbouring properties	Visual inspection of construction sites and access roads, as well as properties used for cultures, livestock and other activities	Avoid significant degradation of baseline conditions	ROW and Substation sites	Continuous during preconstruction and construction activities	Contractor, supervising engineer	PIU
Employment and economic development	Inflation of base product prices	Similar or lower than national rate for given year	Community markets within 3 km of worker camps	Every 3 months during preconstruction and construction activities	Contractor, supervising engineer	PIU
	Proportion of local workers among contractor employees (distinction to be made between men and women)	35% minimum	Entire construction workforce	Continuous during preconstruction and construction activities	Contractor, supervising engineer	PIU
	Business established and estimated jobs created (excluding construction workers)	2 businesses in each district crossed 5 jobs per business created	Entire project area	Every 3 months during preconstruction and construction activities	Contractor, supervising engineer	PIU
Cultural and Archaeological Heritage	Number of complaints for destroyed / damaged cultural heritage elements	0	Along ROW, access roads and work areas	Continuous during preconstruction and construction activities;	Contractor, supervising engineer	PIU
Gender relations	Proportion of women among contractor employees	15% minimum	Entire construction workforce	Continuous during preconstruction and construction activities	Contractor, supervising engineer	PIU

COMPONENT	PARAMETER	STANDARDS / TARGETS	LOCATION	FREQUENCY	RESPONSIBILITIES	SUPERVISION
	Number of sexual abuse cases involving project workers (distinction to be made between the vulnerable groups, including children)	0	Entire project area	Continuous during preconstruction and construction activities;	Contractor, supervising engineer	PIU
Communities and Social Cohesion	Proportion of issues solved via grievance redress mechanism	100%	ROW and Substation sites	Continuous during preconstruction and construction activities	Contractor, supervising engineer	PIU
	Number of complaints related to worker behaviour	0	Entire project area	Continuous during preconstruction and construction activities;	Contractor, supervising engineer	PIU
	Proportion of children and students who get similar education during reconstruction of their schools affected by line route	100%	Displaced schools	Preconstruction and construction phase	Contractor, supervising engineer	PIU
Community Health and Security	Accidents involving project vehicles and community members or assets	0	Entire project area	Continuous during preconstruction and construction activities;	Contractor, supervising engineer	PIU
	Number of underage sex cases (including pregnancies)	0	Entire project area	Continuous during preconstruction and construction activities;	Contractor, supervising engineer	PIU
	Number of child labour cases	0	Entire project area	Continuous during preconstruction and construction activities;	Contractor, supervising engineer	PIU
	Number of people accessing HIV/AIDS services when needed	100%	Districts crossed by project	Every year during preconstruction and construction activities	Contractor, supervising engineer	PIU
	Number of complaints regarding project-	0	Entire project area	Continuous during preconstruction and construction activities;	Contractor, supervising engineer	PIU

COMPONENT	PARAMETER	STANDARDS / TARGETS	LOCATION	FREQUENCY	RESPONSIBILITIES	SUPERVISION
Worker Health and Safety	Number of non-compliance events to labor / employment act and other applicable obligations (including identification of laborers, compliance to code of conduct, labor contracts, and labor rights)	0	Entire construction workforce	Continuous during preconstruction and construction activities	Contractor, supervising engineer	PIU
	Proportion of workers having received health & safety training	100%	Entire construction workforce	Continuous during preconstruction and construction activities	Contractor, supervising engineer	PIU
	Proportion of work accidents duly reported	100%	Entire construction workforce	Continuous during preconstruction and construction activities	Contractor, supervising engineer	PIU
	Number of notices of violation received for failure to comply with health and safety regulations	0	Entire project area	Continuous during preconstruction and construction activities;	Contractor, supervising engineer	PIU

8.5 ENVIRONMENTAL AND SOCIAL FOLLOW-UP

Environmental and social follow-up is an essential component of the ESMP. E&S follow-up allows assessing the Project's environmental and social performance during its operation phase. The effectiveness of the management measures is validated to ensure the proper mitigation of anticipated impacts throughout the life of the Project. Consequently, the monitoring plan will evolve and be adapted over time to address any unexpected changes or impacts.

Follow-up efforts are conducted at different scales (on site, in neighboring communities or at a local and regional level) and require the cooperation of many participants. Essentially, this exercise should provide ongoing and reliable information on actual changes that occur in natural and socio-economic systems that may be modified by the project, as well as the achievement of planned management and compensation measures. Throughout the project cycle, monitoring result allows a continuous assessment and improvement of the effectiveness of the proposed environmental and social measures, thus contributing significantly to the Project's sustainability.

Environmental and social monitoring is based on:

→ Site inspections;

→ Verification of effectiveness of mitigation measures applied in the operation phase.

Components that will be subject to follow-ups are indicated in Table 8 4.

Table 8-4 Valued Environmental Components that will be the object of a follow-up

VALUED ENVIRONMENTAL COMPONENTS	
Natural Environment	**Human Environment**
• Soil Erosion • Surface water quality • Natural habitats • Evolution of vegetation, fauna and wetlands • Bird strikes monitoring • Noise Levels	• Social and economic benefits for local communities • Gender relations • Communities and social cohesion • Communities' health and safety • Worker health and safety

Elements to implement with regards to follow-up on the project are listed in Table 8-5 with the parameters, location, frequency, and the designated official. It should be noted that the baseline studies that have been mentioned above should be undertaken at the end of the work. The baseline data collected during the construction phase will make a comparison with data collected during follow-up activities.

Table 8-5 Environmental and Social Follow-up Measures

COMPONENT	PARAMETER	STANDARDS / TARGETS	LOCATION	FREQUENCY	RESPONSIBILITY
Soil Erosion	Visual inspection of construction sites and access roads	Avoid significant mid/long-term degradation	Project - related structures near waterbodies or wetlands	Once a year	UETCL
Surface water quality	pH, TSS, turbidity, phosphorus, BOD, coliform bacteria, temperature, visual observations (presence of oil, litter, etc.)	Avoid significant degradation of baseline conditions.	Selected sites along rivers and streams crossed by the ROW	Twice per year	UETCL
Natural habitats	Diversity, evenness and species importance value indices	Avoid significant mid/long-term degradation	In targeted habitats of higher ecological value along the ROW	Prior to ROW clearing Annual during operation	UETCL

COMPONENT	PARAMETER	STANDARDS / TARGETS	LOCATION	FREQUENCY	RESPONSIBILITY
Evoluation of vegetation, fauna and wetlands	Visual inspection of rehabilitated construction sites	Avoid significant mid/long-term degradation	Work sites	Twice per year	UETCL
Bird Mortality Monitoring	Mortality rate due to collisions and/or electrocution	-	Targeted zones (highest risk of collisions)	Quarterly (for first year of operation) and each year during 3 years	UETCL
Noise Levels	Noise levels (dBA)	World Bank and national standards	All communities and cluster of houses within 500 m of ROW	Annual	UETCL
Social and Economic advantages for local communities	Rate of rural electrification and number of new projects in development	Maximizing economic benefits for communities	Communities in the ROW and near Substation sites	Annual	UETCL
	Proportion of local workers among UETCL employees working on project facilities	50% minimum	UETCL project facilities	Annual	UETCL
Gender relations	Proportion of women among UETCL project employees	30% minimum	UETCL project facilities	Annual	UETCL
	Number of sexual abuse cases from UETCL employees	0	UETCL project facilities	Continuous	UETCL
Communities and social cohesion	Number of complaints related to UETCL worker behaviour	0	UETCL project facilities	Continuous	UETCL
Communities' health and safety	Accidents involving project vehicles and community members or assets	0	Communities in the ROW and near Substation sites	Continuous	UETCL
	Number of underage sex cases related to UETCL workers	0	Communities in the ROW and near Substation sites	Continuous	UETCL
	Number of child labour cases involving UETCL	0	Communities in the ROW and near Substation sites	Continuous	UETCL
	HIV/AIDS prevalence rate increase	-1% every 5 years during operation	Districts crossed by project	Every year	UETCL
	Number of complaints regarding project-related nuisances (noise, dust, air pollution)	0	Communities in the ROW and near Substation sites	Continuous	UETCL
Worker Health and Safety	Proportion of workers having received health & safety training	100%	UETCL project facilities	Continuous	UETCL
	Proportion of work accidents duly reported	100%	UETCL project facilities	Continuous	UETCL

COMPONENT	PARAMETER	STANDARDS / TARGETS	LOCATION	FREQUENCY	RESPONSIBILITY
	Number of notices of violation received for failure to comply with health and safety regulations	0	UETCL project facilities	Continuous	UETCL

8.6 PERMITS AND COMPLIANCE

Various permits and approvals will be necessary prior to initiation of construction works. Table 8-6 below summarizes those that are necessary, as per information provided by UETCL representatives. Responsibility for coordination of and final application for those permits and approvals lies with UETCL as project owner.

Table 8-6 Permits and Approvals Required for the Project

PERMIT OR APPROVAL REQUIRED	ENTITY REQUIRING PERMIT/ APPROVAL
Social Environmental Assessment (SEA) Permit/Approval	National Environment Management Authority (NEMA) and Other Lead Agencies
Wetlands Permit	NEMA
Pollution Permit	NEMA /Government of Uganda
Roads Permit	Uganda National Roads Authority (UNRA)
Forest Permit	National Forestry Authority, Kalungu District Local Government and Licensee Tree Farmers

In addition to the permits listed above, compliance on Employment act, Children act, HIV/AIDs Policy and Gender policies, etc. will be necessary.

8.7 INSTITUTIONAL CAPACITY-BUILDING AND TRAINING NEEDS

The ESMP is based on a collaborative approach where the responsibility for the implementation and monitoring of the environmental and social management measures is shared among many stakeholders, to varying degrees. Relevant authorities and stakeholders have their own specific expertise, but do not always make the connection between their work and cross-cutting themes of environmental and social management.

In this context, successful ESMP implementation and more particularly its institutional arrangements and its environmental and social monitoring programs, will be based on a program of institutional support and capacity-building that focuses on the following points:

- Educate and train all project participants (departmental staff to entrepreneurs and workers) on the implementation of the ESMP monitoring procedures and their rationale;
- Through the PIU and its technical and environmental and social staff, facilitate the increased participation of UETCL and governmental departments involved in the planning in multidisciplinary consultation meetings;
- Promote improved engagement of civil society organizations in ESMP implementation (for example, implementation of mitigation measures that require local knowledge), monitoring and continuous adjustments.

In addition, training is important to ensure the continuous improvement of environmental and social practices and compliance with the requirements of current legislation relating to the environment and social aspects.

Contractors must also be aware of the need to integrate best practices in their work. A training program will be implemented through the ESMP to enhance the environmental and social awareness of contractors' key personnel.

UETCL staff directly assigned to the project will also receive specialized training in environmental and social issues related to electricity interconnection projects, as well as training in health, safety and quality.

Finally, experience in previous power lines projects shows that some people still erect buildings within the right of way in locations where they are not permitted to. Training and awareness-raising activities for these populations are necessary to prevent accidents and improve safety. However, this ESMP does not contain specific measures dealing with this category of stakeholders since it befalls on UETCL, in their normal activities of awareness-raising and information, to discuss these subjects with their clientele.

The table 8-7 presents the main aspects of the Capacity-Building Plan.

Table 8-7 Capacity-Building and Training Program

TRAINEES	TRAINING MODE	THEMATIC	AGENCY ANIMATING TRAINING	APPROX. COST
UETCL Environmental & social Personnel Ministries Staff	Workshops and Seminars Case Studies on site of existing projects and current project	Overview of environmental & social aspects of energy projects Regulations and Laws surrounding environment, socioeconomic issues and energy activities ESMP Health and Safety Quality	External National Consultants International Experts	According to the number of participants and sessions may go up to 100 000 USD
UETCL operating and maintenance personnel	Workshops Case Studies on the site of existing projects and current project	ESMP Implementation Best Environmental & social Practices Integrating environmental & social management measures in plans and specifications Environmental & social Monitoring of construction work Environmentally-friendly and socially responsible construction management Health and Safety Quality	External National Consultants International Experts	According to the number of participants and sessions may go up to 100 000 USD

8.8 SUMMARY OF ENVIRONMENTAL COSTS AND BENEFITS

The majority of costs associated with the implementation of mitigation measures and improvement cannot be specified at this stage of the study. Indeed, many of these measures are to be under the responsibility of the contractor(s) who will build the project (see Appendix 9), so those costs will be integrated with other construction costs. It should be mentioned that the present ESMP imperatively needs to be appended to the construction tender documents to be published in order to ensure that those costs are indeed placed under the responsibility of project contractor(s).

In addition, since the implementation of certain measures will be under UETCL and Project implementation unit's (PIU) responsibility, part of the operational budget to be applied to the application of E&S measures is not known at this point.

Table 8-8 below shows a summary of the costs of the main mitigation measures that involve the introduction of devices, the development of specific programs and control at a national or regional level.

Table 8-8 Preliminary ESMP Budget Estimate

PHASE	ITEM	COST (USD)
Pre-Construction / Construction	Grievance Redress Mechanism (3 years)	75 000 $
	Development of Communication and Stakeholder / Community Engagement Plan	20 000 $
	Development of Management plan on Gender, STD and HIV/AIDS, Sexual abuse, Child labour and other relevant social issues	20 000 $
	Implementation of Communication and Stakeholder Engagement Plan, and implementation of Gender, STDs, Sexual Abuse, Child Labour Management Plan	80 000 $
	Survey of sensitive areas for bird populations	150 000 $
	Habitat compensation program for loss of breeding/nesting sites for birds	75 000 $
	Installation of bird diverters in areas where required	100 000 $
	UETCL and PIU operating budgets	375 000 $
	Supervision of construction works by an archeologist	60 000 $
	Capacity Building and Training Program	200 000 $
	Sub-total	**1 155 000 $**
Operation	Prepare and implement an Emergency Response Plan	20 000 $
	Implementation of Communication and Stakeholder Engagement Plan, and implementation of Gender, STDs, Sexual Abuse, Child Labour Management Plan	80 000 $
	Spill Containment Kits and training of on-site staff in spill response	10 000 $
	Invasive alien species monitoring program following project construction and site re-vegetation in identified sensitive areas.	20 000 $
	Invasive alien species control program	50 000 $
	Monitoring of natural resources exploitation and community sensitization program on natural resources protection.	25 000 $
	Bird mortality monitoring program	100 000 $
	Development of specific mitigation measures for species impacted by bird mortality.	15 000 $
	Development of Community Engagement Plan for Operations Phase	20 000$
	Sensitization program for safety around transmission lines	100 000$
	Development of local and regional emergency plans in case of infrastructure breakdowns	20 000 $
	Sub-total (preliminary)	**460 000 $**
	Grand Total (Preliminary)	**1 615 000 $**

8.9 IMPLEMENTATION SCHEDULE

On top of being a reference source in the management of environmental impacts of the project, the ESMP is also a guide for the rolling-out of various steps and procedures that are necessary for its sound implementation. The following provides an overview of the key logical steps necessary to ensure the efficiency of the ESMP, avoid doubling efforts and make sure that information is shared among all key parties to the project.

The pre-construction phase enables the creation of the PIU according to the guidelines provided above. The fact that several individuals have to contribute to the PIU on a regular basis calls for a sound selection of the members. Institutional continuity is key in this process, and changes in the composition of the teams should be kept to a minimum to maximise their efficiency. Therefore, nearly 6 months are attributed to the identification, selection and preparation (including training) of the PIU team.

Ground work is also completed, with final consultations of populations as well as final determination of ROW and surveying of PAPs.

The construction phase is characterised, with regards to the ESMP, by the clearing of the ROW and the compensation/rehabilitation of revenue-generating properties and land. Also, and in parallel with these activities, is the implementation of the ESMP and its monitoring by the PIU. It is crucial that responsibilities for the supervision and monitoring of the ESMP are clearly defined within the PIU. It is recommended that the supervision and verification of the implementation of the ESMP is done through periodical audits, preferably by a third party. The cost of audits is included in the overall ESMP implementation costs.

In the first year of the operation phase, some measures of the ESMP will still be implemented (such as some wildlife monitoring plans). More generally, however, the first year of operation will be devoted to measuring the performance of the project against the environmental and social indicators listed above.

A detailed ESMP implementation schedule is proposed in table 8-9 below.

Table 8-9 ESMP Implementation Schedule (Preliminary)

ACTIVITIES	CALENDAR (YEAR / MONTHS)																																	
	Year 1												Year 2												Year 3											
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11	12
Preconstruction Phase																																				
Setting up of the Environmental Committee of the PIU																																				
Acquisition of permits																																				
Information and awareness-raising of communities																																				
Marking of the ROW																																				
Survey of properties																																				
Annual environmental audit																																				
Construction Phase																																				
Clearing of the ROW																																				
Compensation of income-generating property																																				
Supervision and follow-up of mitigation measures																																				
Annual environmental audit																																				
Operation and Maintenance phase																																				
Evaluation of ESMP performance																																				
Annual environmental audit																																				

8.10 PRINCIPLES FOR POTENTIAL PROJECT DESIGN ADJUSTMENTS

At the time of drafting the present ESIA and as per mentioned in Chapter 2, some minor uncertainties remain on some elements of the LGNA Project design. In order to ensure that those minor potential project design changes are properly managed and their impacts mitigated, it has been agreed that the project design elements listed below shall be managed according to the principles set out in the present ESIA. Therefore, all mitigation measures and management requirements described in the present ESIA shall be applied to the project design elements listed above, whenever relevant.

8.10.1 PROJECT ELEMENTS SUBJECT TO POTENTIAL DESIGN ADJUSTMENTS

The present ESMF shall apply to the following project design elements:

- Switching station to be built in the vicinity of Lira to allow connection of the LGNA project with other projects in the Northern Region;
- Any route adjustment to the transmission line required to connect the LGNA project with the above switching station;
- 33 kV distribution lines associated to the LGNA project;
- Any project realignments to be decided upon after submittal of the present ESIA;
- Any additional component / project design change to be decided upon after submittal of the present ESIA.

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