A-7 Field Report

PREPARATORY SURVEY ON THE PROJECT FOR RURAL ELECTRIFICATION PHASE III IN THE REPUBLIC OF UGANDA

THE FIRST FIELD SURVEY

FIELD REPORT

April 21st, 2011

Presented and submitted by:

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ANNEX

Extension of 33	kV distribution line in Iganga, Bugiri and Busia Distri	ct (Area-4)
1. Socio-econo		
2. Network Di	agram	
3. Route Map	of Distribution Line	
PART 2		
Extension of 33	kV distribution line in Masaka and Rakai District (Ar	ea-2)
1. Socio-econo	mic Data	
2. Network Di	agram	
3. Route Map	of Distribution Line	
PART 3		
Extension of 33	kV distribution line in Bushenyi and Rukungin Distric	t (Area-5)
1. Socio-econo	and the second	1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1
2. Network Di	iagram	
3. Route Map	of Distribution Line	
PART 4 Pole Ass	embly Drawing for Distribution Line	
DWG No. T-01	Intermediate Pole (Line Angle 0 to 5 degrees)	TYPE
DWG No. T-02	Light angle Pole (Line Angle 5 to 30 degrees)	TYPE
DWG No. T-03	Heavy angle Pole (Line Angle 30 to 50 degrees)	TYPE
DWG No. T-04	Heavy angle Pole (Line Angle 50 to 90 degrees)	TYPE
DWG No. T-05	Section Pole	TYPE
DWG No. T-06	Section Pole (VERTICAL)	TYPE
DWG No. T-07	Terminal Pole	TYPE
DWG No. T-08	Load Break Switch Pole	TYPE
DWG No. T-09	T-off Pole	TYPE.
DWG No. T-10	Transformer Pole	TYPE
DWG No. T-11	3 Member Pole	TYPE
DWG No. T-12	Bulk Metering Unit Pole	TYPE
DWG No. T-13	Connection Plan to the Existing Line (Extension Type)	TYPE
DWG No. T-14	Connection Plan to the Existing Line (Cross Type)	TYPE
DWG No. T-15	33kV Auto Reclose Pole	TYPE :
PART 5 Question	anaire for the Second Field Survey	

Table of Contents

I.	Introduction 1
2.	Information and Results of the Site Survey
2.1	Areas where the Site Survey was carried out
2.2	Beneficiary of the Project
	2.2.1 Extension of 33 kV distribution line in Iganga, Bugiri and Busia District (Area-4) 5
	2.2.2 Extension of 33 kV distribution line in Masaka and Rakai District (Area-2)
	2.2.3 Extension of 33 kV distribution line in Bushenyi and Rukungin District (Area-5)7
2.3	Network Diagrams and Route Maps of the Project
	2.3.1 Extension of 33 kV distribution line in Iganga, Bugiri and Busia District (Area-4)
	2.3.2 Extension of 33 kV distribution line in Masaka and Rakai District (Area-2)9
	2.3.3 Extension of 33 kV distribution line in Bushenyi and Rukungin District (Area-5) 10
2.4	Environmental and Social Considerations 11
	2.4.1 Environmental and Social Aspects
	2.4.2 Location of the 33kV Distribution Lines
	2,4.3 Environmental Certificate (EC)
3.	Priority of the Requested Sites
4.	Design Conditions and Technical Specifications
4.1	Design Conditions 14
	4.1.1 Climatic Conditions and a second secon
	4.1.2 Basic Electrical Design Conditions
	4.1.3 Applicable Codes / Standards and Units
4.2	Basic Technical Specifications 16
5.	Data Collection of connecting situations in the Previous JICA's Project Area
6,	Questionnaire for the Second Field Survey
7.	List of Parties Concerned in the Recipient Country 20

1. Introduction

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In June 2009, the Government of the Republic of Uganda made a request for Grant Aid for the Project for Rural Electrification Phase III (the Project) to the Government of Japan. The Japan International Cooperation Agency (JICA), the official agency implementing technical cooperation, ODA loans, and Grant Aid, has conducted Data Collection Survey on Rural Electrification (the Previous Survey) from June to July, 2010. As a result of the Previous Survey, JICA decided to conduct a Preparatory Survey (the Survey) to formulate Outline Design, project plan, cost estimation and sent the Survey team for the First Field Survey (the Team), headed by Dr. Akira NTWA, Senior Advisor, JICA.

In order to build mutual understanding between the Ugandan side and the Team (Both Parties) on the technical and engineering aspects, this Field Report has been prepared based on the results of the first field survey and discussions with the Ugandan side, i.e., Rural Electrification Agency (REA) and Ministry of Energy and Mineral Development (MEMD). However, the final components of the Project will be decided by the Government of Japan.

Both parties confirmed the necessity and orgency of the requested sites, and evaluated the priority of the sites in terms of contributions to rural development through electrification, technical features, and environmental & social considerations as shown in Minutes of Discussions (M/D) signed by both parties on 8th April, 2011. Contents of main components and priority ranking confirmed by Both Parties are shown in Table 1, which is also as described in M/D.

Based on the discussion and agreement between Both Parties, a site survey was carried on three sites which was rated as Priority Ranking A and Priority Ranking B in M/D. Some components requested by the Government of Ugunda have been constructed by itself after the request, and these components are omitted from the Project and the sife survey. Scope of the site survey is shown in Table 2.

Project	Area@Region) Priority Contents of main components ⁽²⁾ Pro-	-	Priority Ranking ⁽¹⁾	Contents of main components ⁽²⁾	Project Features
-	Baale-Galiraya (Central) ⁽³⁾		ų	 Supply and installation of 33kV distribution Lines (approx. 44,1km) and distribution transformers (33kV/415-230V) 	tion Need socio-economic justification for 44km extension those the existing kayunga-Banke line (JICA J) Leareth of line passing CTR8** approx. 10km
~	Bikira-Namirembe & Masaka-Nyabyajjwe (Central)	*	в	 Supply and installation of 33kV distribution Lines (approx. 93.9km) and distribution transformers (33kV/415.230V) 	
61	Kiganda-Mubende (Central)		ų.	 Supply and insultation of 33kV distribution Lines (approx. 37.1km) and distribution transformers (33kV/415-230V) 	
*	lganga-Nakabugu & Mayuge-Lumino (Gastern) ⁽⁴⁾	~	×	 Supply and installation of 33NV distribution Lines, (appex). 160.88m) and distribution transformers (33NV/415-230V) 	
(10)	Kitagata-Kasanna & Kitagata-Kabwohe (Western) ⁽³⁾	4	æ	 Supply and installation of 33kV distribution Lines (approx. 58.7km) and distribution transformers (33kV/415-230V) 	
			0	Ø	0
		-			is now limited to Kitagata-Kasama-Kagati with spu Rubondo. Rwania-Karisto, Kitasena-Anklikirisi

Uganda. The remaining project scope proposed to JICA with spur t Electrification Projects funded by the Government various benefit p Length of line passing CFRs*: approx. 7.5km is now limited to Hoima-Mbaraara-Kinyara iddess to a N omic reduced Length of line passing CFRs*: None features of benefits in electrification. after connecting trading centers. Kiryamboogi and Kyabasgya. Need clarification of socio-Project scope has been Rwobugimbi-Kitagata. Rwaria cukondo. These of the local division of the local div distribution distribution and d Supply and installation of 33kV dii Lines (approx. 61.8km) and dii transformers (33kV/415-230V) impacts to rural idend in evaluation of priority ranking are: U Kinvar which are BARD-Hoima-Mbar a (Western) Partors' 6

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readour project to supply the District the charged as Iganga-Kacilo boom ver, il has How Iganga-Nakabugu Length of the line or from the Government The line originally (Nakabugu) from Kr

aged by NFA. The p ed was Iganga-Nakabu been hinded by the Go abugu) from Karile stands for Central

Information on wettand will be acciliment advectors by sequences meaning unuse presents care are advectored at the project. The present advectored at the project structure of the project structure of the project structure of the project structure of the evolution for the evolution for

Table 2 Scope of the Site Survey

Priority A: Area-4

No.	Project Area	Length [km]
4.0	Iganga-Nakabugu, Mayuge-Lumino	137.7
4.1	Banda lugala	4.9
4.2	Haarembe	5.9
4.3	Matale Point	5.0
4.4	Busiro	7.3
-	Subtotal	160.8

Priority B: Area-2

Extension of 33 kV distribution line in Masaka and Rakai District No. Project Area Length [km] 2.0 aiyaga wunga Subtotal 93.9

Area-5

Extension of 33 kV distribution line in Bushenyi and Rukungin District No. Project Area na-Kagati, Length [km] Rwanja-Karisiz ata Ka 56.3 ta-Mukibirizi, Rwonbugimbi-Kitagata 24 Subtotal 58.7

us are omitted from the Project in M/D

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2. Information and Results of the Site Survey

2.1 Areas where the Site Survey was carried out

Based on the discussion and agreement between Both Parties, the site survey was carried on three sites which was rated as Priority Ranking A and Priority Ranking B in M/D. The location of areas where the site survey was carried out is shown in Figure 1.



Figure 1 Areas where the Site Survey was carried out

2.2 Beneficiary of the Project

2.2.1 Extension of 33 kV distribution line in Iganga, Bugiri and Busia District (Area-4)

(1) Primary beneficiaries

1) Potential Consumers

In the inland, main livelihoods of potential consumers are farming (cassava, maize, ground nut, beans, rice, millet, sugarcane), trading and they also have livestock (cattle, goat, chicken), All activities are in small scale. On the lake shore, the main livelihood is dominated by fishing of tilapia and Nile perch although they have farming. Approximate average monthly incomes are 50,000 - 100,000 UGX/household by farming, 150,000 - 200,000 UGX/household by fishing and

up to 950,000 UGX/household by trading.

Most trading centers have generators and solar panels for TV theaters, barber sliops, lighting, charging for mobile phones and even distributing electricity for neighbor houses. Milling machines are also inevitable to process local food materials (maize, millet and cassava) for daily life. They also consume oils for kerosene lamp and tadoba as main lathing. They are willing the electricity for the activities done by the generators and solar panels, the lighting and to establish new businesses like food processing, cool storage, welding and carpentry.

The amounts of potential consumers are as follows.

- > Trading center (TC): 37 TCs
- > Household: 9,095 households
- > Population: 69,990 persons

Table 1 Amounts of Potential Consumers in Area-4

No.	Size of TC	No. of TC	Household	Population	Remarks
1	Over 1,000 households	2	4,200	31,800	Namayingo TC is the district center of newly established district last year.
2	500 - 999 households	0	0	0	The second se
3	100 - 499 households	24	4,340	34,080	
4	Under 100 households	11	555	4,110	
5	Total	37	9,095	69,990	

2) Public Facilities

(a) School

- > Primary school: 101 schools
- Secondary school: 17 schools > Tertiary school: 2 schools

(b) Health Center

- > Health center IV: 2 centers
- > Health center III: 5 centers > Health center II: 8 centers

(2) Secondary heneficiaries

> Pulish population covered by schools and health centers

2.2.2 Extension of 33 kV distribution line in Masaka and Rakai District (Area-2)

(3) Primary beneficiaries

1) Potential Consumers

In the inland, main livelihoods of potential consumers are farming (pineapple, coffee, matoke, cassava, maize, beans, and sugarcane). Trading and they also have livestock (cattle, goat, and chicken). The pineries outstand in the farming activities. On the lake shore, the main livelihood is dominated by fishing of tilapia and Nile perch although they have farming. Approximate average

for cattle. Coffee is also outstanding in local agricultural crops. Approximate average monthly incomes are 50,000 - 100,000 UGX/household by farming.

Most trading centers have generators for TV theaters, barber shops, lighting, and charging for mobile phones. Milling machines are also inevitable to process local food materials (maize, millet and cassava) for daily life. They also consume oils for kerosene lamp and tadoba as main lighting. They are willing the electricity for the activities done by the generators, the lighting and to establish new businesses like coffee factory, cool storage, welding and carpentry.

The amounts of potential consumers are as follows

- > Trading center (TC): 10 TCs
- > Household: 985 households
- ➤ Population: 6,860 persons

82	Size of TC	No. of TC	Household	Population	Remarks
	Over 1,000 households	0	0	0	
	500 - 999 households	0	0	0	
	100-499 households	4	770	5,540	
	Under 100 households	6	215	1,320	
1	Total	10	985	6,860	

2) Public Facilities

- (a) School
 - Primary school: 20 schools > Secondary school: 4 schools
 - > Tertiary school: 2 schools

(b) Health Center

Health center III: 2 centers > Health center II: 2 centers

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(6) Secondary beneficiaries

Pulish population covered by schools and health centers

2.3 Network Diagrams and Route Maps of the Project

2.3.1 Extension of 33 kV distribution line in Iganga, Bugiri and Busin District (Area-4)

The requested component in Area-4 had been separated into two parts. A part had been a distribution line from Iganga to Nakabugu. The other had been distribution lines from Mayuge to Lumino. Through discussion between Both Parties, it had been confirmed that Nakabugu, which is the biggest demand area in the former part, has already been electrified by 33 kV distribution line from Kaliro. Therefore, the electrification between Kiyungi and Iganga had been requested in discussion before the site survey. However, it was confirmed through the site survey that the part is also under construction of 33 kV distribution lines by UEDCL. As the result, it is agreed between

monthly incomes are 50,000 - 150,000 UGX/household by farming, 50,000 - 100,000 UGX/household by fishing and 300,000 UGX/household by trading in a comparatively large trading center in the area.

Most trading centers have generators and solar panels for TV theaters, harber shops, lighting, charging for mobile phones and even distributing electricity for neighbor houses. Milling machines are also inevitable to process local food materials (maize, millet and cassava) for daily life. They also consume oils for kerosene lamp and tadoba as main lighting. They are willing the electricity for the activities done by the generators and solar panels, the lighting and to establish new businesses like food processing (coffee factory, juice factory), cool storage for fish and milk.

The amounts of potential consumers are as follows

- > Trading center (TC): 13 TCs
- > Household: 1,980 households
- Population: 9,300 persons T-11- 7 3

	1.4	Die # Jemon	uts of a otentio	ai consumers	III /KI CaPA
No.	Size of TC	No. of TC	Household	Population	Remarks
1	Over 1,000 households	1	1,000	3,000	
2	500-999 households	0	0	0	
3	100-499 households	7	790	5,250	
4	Under 100 households	5	190	1,050	
5	Total	13	1,980	9,300	

2) Public Facilities

(a) Schoo

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- > Primary school: 25 schools
- > Secondary school: 5 schools
- > Tertiary school: 3 schools

(b) Realth Center

- > Health center III: 2 centers
- > Health center II: I centers
- > Health center I: 2 centers

(4) Secondary beneficiaries

Pulish population covered by schools and health centers

2.2.3 Extension of 33 kV distribution line in Bushenyl and Rukungin District (Area-5)

(5) Primary beneficiaries

1) Potential Consumers

Main livelihoods of potential consumers are farming (matoke, coffee, cassava, beans), trading and they also have livestock (cattle, goat, chicken). The land use of Area-5 is dominated by ranch

Both Parties that the part shall be omitted from the Project.

As the result of the site survey, it was also agreed between Both Parties that the other part is 33 kV distribution lines between Mayuge (Connection Point A) and Lumino (Connection Point B) including T-off lines to Busiro and Bumeru. Around Nankoma area, which is located in middle between Mayoge and Lumino, has been already electrified, and the requested distribution lines of the part are also separated into two parts. It is composed of construction of 33 kV distribution lines between Mayuge (Connection Point A) and Nankoma (Connection Point B), and ones between Nankoma (Connection Point C) to Lumino (Connection Point D) including T-off lines to Busiro and Burnera. They are finally the components of the Project in Area-4

Based on the results of the site survey, their network diagram and route maps of distribution lines are shown in "ANNEX" of this Field Report. And number of Tracing Centers where distribution transformers shall be installed was specified as 37, which is also shown in socio-economic data in "ANNEX" of this Field Report.

Based on the results of the site survey, Total Length of the distribution line is Approx. 130 km. And length of the distribution lines of the component of the Project in Area-4 is as follows;

>Line from Mayuge (Connection A) to Nankoma (Connection B):	Approx. 22 km
>Line from Nankoma (Connection C) to Lumino (Connection D):	Approx. 45 km
>T-off line to Busiro:	Approx. 30 km
≻T-off line to Bumeru:	Approx. 33 km

And it was agreed by Both Parties that T-off Lines to Matale Point (4.2) and Haarembe (4.2) shall be omitted from the Project, because they are very small villages and appropriateness for the Japan's grant aid was not confirmed.

2.3.2 Extension of 33 kV distribution line in Masaka and Rakai District (Area-2)

The requested component in Area-2 had originally been construction of 33 kV distribution lines between Masaka and Kyotera. However, it was confirmed through the site survey that 33 kV distribution line between Kyambazi and Ndeeba-Lwaggle, which are located in middle between Masaka and Kyotera, including a T-off Line to Dimo Landing Site is under construction (However the line will be connected to existing 11kV line and operated in 11kV). The component of the Project In Area-5 is separated into two parts. A part is a distribution line from Nyendo (Connection Point A) to Kyanbazi including a T-off line to Namirembe. The other is a distribution line from Ndeeba-Lwaggulwe to Kyoterra (Connection Point B).

Based on the results of the site survey, their network diagram and route maps of distribution lines are shown in "ANNEX" of this Field Report, Number of Tracing Centers where distribution transformers shall be installed was specified as 13, which is also shown in socio-economic data in "ANNEX" of this Field Report.



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Based on the results of the site survey, Total Length of the distribution line is Approx. 65 km. And length of the distribution lines of the component of the Project in Area-2 is as follows:

>Line from Nyendo (Connection A) to Kyambazi: Approx. 36 km

>Line from Nankoma (Connection C) to Ndeeba-Lwaggle: Approx. 29 km

Based on the results of the site survey, it was agreed by Both Parties that T-off Lines to Zzimwe (2.2) shall be omitted from the Project, because it is a very small village and appropriateness for the Japan's grant aid was not confirmed.

2.3.3 Extension of 33 kV distribution line in Bushenyi and Rukungin District (Area-5)

Concerning Area-5, construction of 33 kV distribution line in length of 86.0 km had been originally requested. It had been confirmed through discussion between Both Parties that some part of the requested component has been already constructed or under construction by the Ugandan side. Therefore, construction of 33 kV distribution line in length of 58.7 km had been specified in M/D as the components of the Project. However, it was confirmed through the site survey that most of the distribution lines in the length of 58.7 km specified in M/D has also been constructed or under construction. The rest of the requested lines were separated to four parts and the length of each part is less than 10 km.

Area between Kabwohe and Kitagata has already been electrified or under construction in 11 kV, and this area shall be omitted from the Project. While, area between Kitagata and Karisizo has already been electrified or under construction in 33 kV, and this area shall also be omitted from the Project.

Based on the results of the site survey, the component of the Project in Area-5 are composed of a line from Kitagata (Connection A) to Furuma including a T-off line to Katoma, a line from Kitagata (Connection B) to Katagi including Kassana, a line from Kitagata (Connection C) to Rukondo, and a T-off line to Kihanga which is a branch line from the line between Kitagata and Karisizo already under construction. They shall be in 33 kV.

Based on the results of the site survey, their network diagram and route maps of distribution lines are shown in "ANNEX" of this Field Report. Numher of Tracing Centers where distribution transformers shall be installed was specified as 10, which is also shown in socio-economic data in "ANNEX" of this Field Report.

Based on the results of the site survey, Length of the distribution lines of the component of the Project in Aren-5 is as follows;

Line from Kitagata (Connection A) to Furuma including a T-off line to	Katoma: Approx. 8 km
>Line from Kitagata (Connection B) to Katagi including Kassana:	Approx. 10 km
>Line from Kitagata (Connection C) to Rukondo:	Approx. 4 km
►T-off line to Kihanga:	Approx. 8 km

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- Area-4: The main requested route along the road between Mayuge TC and Lumino TC is managed by UNRA. It can be seen that the road reserve is secured even not certainly 15m from the road center in the TCs. LC I chairpersons or local council members interviewed
- in the field survey are aware of the road reserve along the main route. Area-2: The requested routes are located along rather wider district roads.
- Area-5: All roads are narrow passing in mountainous site.

On that basis, the road reserves of selected routes should be cleared according to road classification of national and district levels, if REA will use the road reserves for the Project. Even in case that REA will not use the road reserve, distances to be kept from them should be cleared.

Meanwhile, REA's policies and procedures how to secure the routes of 33kV distribution lines should be confirmed. REA will take the following steps for compensation on the routes.

- > Community meeting
- > Survey and Explanation to persons whose properties are affected
- > Agreement with the wayleaves consent form
- > Evaluation of properties on the routes with the wayleaves assessment form
- > Preparation of evaluation report
- > Submission of the evaluation report to a Chief Government Valuer in Ministry of Land
- > Assessment and authorization by a Chief Government Valuer

Explanation of evaluation results to the affected owners and payment

2.4.3 Environmental Certificate (EC)

REA shall obtain an Environmental Certificate (EC) from NEMA to implement the Project. As the first step, REA shall submit NEMA a Project Brief which describes the outline of the project, likely impacts caused by the Project and the mitigation measures. NEMA will determine whether or not the Project is exempted from an EIA based on the Project Brief. For obtaining the EC with the Project Brief exempted from the EIA, one of important issue is negative impact on natural environment especially on the central forest reserves (CFR) and wetlands.

In the requested areas, most lands along the requested routes are cultivated already and the Environment Officers say the wetlands have common aspects in the country. In this context, the 33 kV distribution lines can minimally affect the natural environment. The major aspects of nature are as follows. Regarding these aspects, Area-4 will have the least negative impacts on the natural environment by the Project.

- Area-4: The Area has totally gently undulating hills in topography and the requested route passes a CFR named Irimbi CFR which is used for industrial and commercial plantation on rocky hill in the short length at approximately 500m. In the inland, there are seasonal wetlands that the local people have been cultivating, and few wetlands on the lakeshore area.
- > Area-2: In Masaka District, the topography is hilly and the requested routes pass through

2.4 Environmental and Social Considerations

2.4.1 Environmental and Social Aspects

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In the field survey, environmental and social aspects in the Areas are summarized as follows

Area	Area-4	Area-2	Area-5
District	Mayage, Bugiri, Namayingo, Busia	Masaka, Rakai	Busheny, Rukungiri
Topography	 Hilly site Lake shore site 	 Hilly site Lake shore site 	 Mountainous site Both sides along the routes are rather steep slopes.
Land Use	 cultivated lands, Ranch Woodlot (forestry) 	 Ranch, cultivated lands (pinery) Woodlot (forestry) 	 Ranch, cultivated lands Woodlot (forestry)
Socio-economy	 Faming: cassava, maize, ground nut, beans, rice, millet, sugarcane Fishing: Lilapia, Nile perch Livastock: cattle, good, chicken Approx. average monthly income: 50,000 - 100,000 (farming), 150,000 - 200,000 (fabring), up to 500,000 (fishing), up to 9,00,000 (fishing), up to 9,00,000 	 Farming: pincapple, coffee, matoke, ciasava, maize, beans, sugarcane Fishing: tilapia, Nile perch Livestock: rattle, goal, chicken Trading: retailers Approx. average mountily income: 50,000 - 150,000 (famming), 300,000 (trading), UGX/household 	 Parming: matoke, coffee, cassava, beans Livestock: cattle, goat, chicken Trading:retailers Approx, average manihay income: 50,000 - 100,000 (farming) UGX/household
Forest Reserve	 Irimbi CFR (Bugiri): Approx. 500m on the route 	 Nabukonge CFR (Masaka): Approx. 500m on the route Kifasi CFR (Masaka): Approx. 500m on the route Mujuzi CFR (Masaka): Approx. 2km on the route 	None
Wetland	 Common wetlands There are few wetlands and most them are seasonal ones. Local people have been cultivating the wetlands 	Common wetlands There are permanent wetlands The route in Rakai passes a wetland at 2km	 Common wetlands There are permanent wetlands
Suggestions from EOs*	 No erosion from the embanka Involvement of communities Sensitization for workers and Conserve cultural and valuab Electricity is a step for impro- Prevent preservatives of poles 	tion in the wetlands should be sho nent (local councils), district offices ar local peoples le trees and re-plantation ving livelihood leading to conserv	ad sub-counties

2.4.2 Location of the 33kV Distribution Lines

In three Areas, the structures along the requested routes are built set-back especially in the trading centers. However, the other lands along the routes are mostly used for cropland, ranch and woodfor except natural vegetation and wetlands. Some branch routes are located along very narrow roads. The major aspects of roads on the requested routes are as follows.

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three CFRs and several permanent wetlands. One of them, Majuji CFR, is located along the shore of Lake Vietoria. In the route of Rakai District, there are gently undulating hills and no CFRs but the route passes a permanent wetland at approximately 2km.

Area-5: There are no CFRs although several wetlands are located, and Area-5 has mountainous topography. Lands along the requested routes are rather steep slopes than the other Areas. Several trading centers are also built on the slopes.

3. Priority of the Requested Sites

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Based on the discussion and agreement between Both Parties, the site survey was carried on three sites which was rated as Priority Ranking A and Priority Ranking B in M/D. The areas where the site survey was carried out were shown in following Table.

Rate	Arcas	Components
Priority A	Area-4	Extension of 33 kV distribution linein Iganga, Bugiri and Busin District
Priority B	Ares-2	Extension of 33 kV distribution line in Masaka and Rakai District
Priority B	Area-5	Extension of 33 kV distribution line in Bushenyl and Rukungin District

Concerning Area-5, construction of 33 kV distribution line in length of 86.0 km had been originally requested. It had been confirmed through discussion between Both Parties that some part of the requested component has been already constructed by the Ugandan side, and construction of 33 kV distribution line in length of 58.7 km had been specified in M/D as the components of the Project. However, it was confirmed through the site survey that most of the distribution line in the length of 58.7 km specified in M/D has also been constructed or under construction. The rest of the requested lines were separated to four parts and the length of each part is less than 10 km. Therefore, the scale of the components is considered to be too small for the Japan's grant aid project, and the scale merit is not expected. It is strongly recommended that the component is constructed with budget of the Ugandan side.

Following Table shows the total number of Trading Centers, public facilities such as schools and health centers, and general households from the site survey. Comparing with Area-4 and Area-2, the number of those in Area-4 is extremely bigger than those in Area-2, even though difference of the length of the components is took into consideration.

Table 6 Areas where Site Survey was carried out

Households		Kaller .	Health C			Schools		Trading	Longft	Anne
			10	IV I	Tertiay	Secondary	Primary:	Center	fical	
969		5	5	2	2	17	101	37	150	Aniel
1980	2	1	2		3	5		13	65	Anir-1
		Concession, name				the second second		and the second se		STATE OF

the Thin numbers described above are specified based on the results of the site survey

Based on the results of the site survey, the Team prioritized the components of the Project as follows in consideration of contributions to activities of public facilities and general households, and project effectiveness.



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Table 7 Priority Rankin of the Components

Priority Ranking	Areas	Companents	* Length [km]
150	Area-4	Extension of 33 kV distribution linuin Iganga, Bugin and Busia District	Approx. 130 km
2nd	Area-2	Extension of 33 kV distribution line in Masaka and Rakai District	Approx. 65 km
3td	Area-5	Extension of 33 kV distribution line in Bushenyi and Rokungin District	Approx. 30 km

4. Design Conditions and Technical Specifications

4.1 Design Conditions

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Design conditions to be applied to the Project are described as follows.

4.1.1 Climatic Conditions

Natural conditions for the equipments and facilities design are described as follows.

			The Project Area	
ltem		Area-4 (Iganga, Bugiri and Busia District)	Area-2 (Masaka and Rakai District)	Area-5 (Bushenyi and Rukungin District)
Altitud	le	Less than 1,000m	Less than 1,000m	Less than 1,500m
1	Maximum	35°C	33°C	30°C
Ambient	Minimum	15°C	12°C	10°C
Maximum Humidity		25°C	22°C	20°C
		85%	80%	75%
Max. Wind	Velocity	20m/sec.	15m/sec.	25m/sec.
Rainfa	11	2,200mm/year	2,500mm/year	2,700mm/year
Seismic F	orce	Horizontal 0.1G	Horizontal 0.1G	Horizontal 0.1G
Soil Bearing	Capacity	5 ton/m ²	5 ton/m ³	10 ton/m ²

4.1.2 Basic Electrical Design Conditions

(1) Electric System (Voltage and Wiring System)

Voltage, wiring, frequency and earthing system to be applied for the 33kV distribution line shall be the same as those of the existing facilities. The summary of the electrical system concerned with the Project is shown in the following Table

14

6) Auto Recloser Auto Recloser shall be installed at major connection point or branch point.

7) Metering Unit

Metering Unit shall be installed at connection point where the operator (UMEME, FERDSULT, others) is not yet decided.

4.1.3 Applicable Codes / Standards and Units

(1) Applicable Codes/Standards

The following Japanese and International standards/codes shall be generally applied to the Project as well as the Uganda National Primary Grid Code and other technical standards specified by REA.

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- > British Standard (BS)
- International Standardization Organization (ISO)

International Electrotechnical Commission (IEC)

- Japanese Industrial Standard (JIS)
- Japanese Electrotechnical Commission (JEC)
- > The Standard of Japan Electrical Manufacturer's Association (JEM)
- Japan Cable Maker's Association Standard (JCS)
 Other Japanese and International Standards concerned
- Other Japanese and International Standards concer

(2) Units

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Unit of length, area, volume, mass (weight), etc. used in the Project (such as Design, manufacturing, Installation, Testing and Reporting) shall be in accordance with the International System of Units (SI) unless otherwise specified.

4.2 Basic Technical Specifications

Basic technical specifications of major equipment and materials are described as follows.

Table 9 Summary of Electricity System

Nominal Voltage	33 kV
Maximum Voltage	36 kV
Wiring Method	3 phase, 3 wires
Frequency	50 Hz
Earthing System	Effective Earth
Earth Fault Current	25kA
Lightning Impulse Withstand Voltage (LIWV)	170kV
Commercial Frequency Withstand Voltage	70kV
Creepage distance	16 mm / kV
Overhead Grounding Wire	Not Required

(2) Other Electrical Systems 1) Color coding

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Applicable color coding shall be in accordance with IEC standard, Red, Yellow, Blue and Black (Neutral).

2) Safety Factor	
Following Safety Factor shall b	e maintained in all design and construction works
> Pole, Foundations:	2.0
> Conductor, Crossarms:	2.5
Insulators:	2.0
3) Clearance for Conductors	
Clearance on 33kV overhead li	ne shall be as follows:
> Minimum Clearance	
- Phase to phase:	430 mm

- Phase to ground 380 mm
 - Minimum Height from Ground Level
 Road Crossing: 7.5 m
 Roadside 6.5 m

4) Electrical Pole Span Length

Single and double pole: Maximum 100m
 Three member pole: Maximum 300m

5) Load Break Switch

Load Break Switch shall be installed at major branching point and at intervals of about 13km for inspection and maintenance of the 33kV distribution line.

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Table 10 Basic technical specifications of major equipments

	Equipment	Specifications
0	 (1) Distribution Transformers Applicable Standard Type Nominal Voltage Impedance Voltage Impedance Voltage (%) on HV Side Phase Prequency Vector Symbol Capacity Efficiency (%) 11) Accessories 	IEC, JIS, JEC, JEM or Equivalent Oil immersed, Hermetically-sealed, Outdoor, Pole-mount type 33,000/415:240 V 4-5 % 42.5 %, ±5.0 % (no voltage tap changer) HV:3 phases , LV :3 phase,4-wire 50 Hz Dyn11 50, 100, 200 kVA 50 kVA:97.2<, 100 kVA:97.7<, 200 kVA:98< -Name Plate -Oil temperature indicator and breatter
0	 (2) Load Break Switch Applicable Standard Type Rated Nominal Current Rated Voltage Rated Frequency LIWV Rated Short-Time Current Creepage Distance Accessories 	IEC, JIS, JEC, JEM or Equivalent Manual Operation 630 A 33 kV 50 Hz 170 kV 630 A (at load current) 16 kA (1 sec.) min. 825 nun -Name Plate -Operation mechanism -Hot-dipped galvanized steel support with fixing material (Cross Arm Set, etc)
Q	 (3) Fused Cutout Switches Applicable Standard Type Rated Current of Unit Rated Voltage Rated Frequency LIWV Interrupting Current Fuse Operation Accessories 	IEC, JIS, JEC, JEM or Equivalent Outdoor Type 100 A 33 kV 50 Hz 170 kV 8 kA 6 A to 25 A (depending on the size of Tr.) To be operated by rod from the ground +Hook 5 m, -Ho-dipped galvanized steel support with fixing material

Equipment	Specifications
 (4) Lightning Arrester Applicable Standard Type Nominal System Voltage Rated Voltage Rated Voltage Nominal Discharge Current Protection Ratio Accessries 	IEC, JIS, JEC, JEM or Equivalent Outdoor, Zinc-oxide, Gapless Type 33 kV Minimum 30 kV (rms) 5 kA (8/20 µs) Minimum 1.2 Hol-dipped galvanized steel support with fixing material
 (5) Metering Unit Applicable Standard Metering Unit 	IEC or Equivalent 33 kV STC 18kA -1sec 200 or 100 Amp, Outdoor oil filled, Pole mounted (CT-VT) Class:33,000:110 Volt/50 VA/Class 0.2 ZxCT: 200-05-60:1 Amp/10 VA Class 0.2
 Electric Meter (Remarks: Electric Meter is to be provided two(2)) (Main and Checking) (Ontrol Cable Outdoor Metering Kiosk Terminal Blocks Cable Ties 	KWhr & kVar Import/Export Measurement, KVAh Derivation 16 times of use 4V free out pour relays, Load Profiling (450 days, 1 channel, 30 mins), 3-Phase, 3-Wire, 50 Hz, Voltage 110 V, Current/l A, Class 0.2 Min. 2.5 ma ⁷ 7C cu, 10m Waterproof type, with pad-lock (spare key: 3pcs) 13 way 1 lot
 (6) Auto Recloser 1) Applicable Standard 2) Type 3) Continuous Current Capacity 4) Rated Short-Time Current 5) Control Cubicle (6) Accessories. 	IEC or Equivalent Pole mounting, gas insulated auto circuit recloser 630A 16 kA (1 sec.) Simple programming is provided from the control panel. Closing and tripping is fron high quality and long life harteries which charge capacitors. Control cubicle is statiless steel enclosure. - Volage transformers (33kV/110V, Accuracy class 1.0, 50VA) - Surge arresters (10kA, 8/20 µs) - Control cables - Fixing materials for electrical pole - Relay software - Technical and installation manual
 (7) Conductor for 33kV Distribution Line Applicable standard Type Size Length per a Drum 	TEC or Equivalent All Aluminum Alloy Conductor (AAAC) 100 mm ² 2,000 m

Equipment	Specifications
(8) Wooden Pole with Pole Cap	
 Wooden Pole 	And the second sec
 Material 	Creosoted wooden pole
- Length	11 m/12 m/15 m
 Diameter at top Min. 	11 m(190-210mm) / 12m(210-235mm)
2) Pole Cap	and the second se
 Material 	15m(220-245mm)
 Accessories 	Steel Plates/Iron Sheets
Sur an and	Nail (Q'ty 2 pcs/cap)

5. Data Collection of connecting situations in the Previous JICA's Project Area

The Ugandan side shall prepare answers for the questionnaire, which asks the record of the number of connected customers, customer category, and electricity consumption for the sites of the previous projects (JICA 1 and II) by April 26, 2011.

6. Questionnaire for the Second Field Survey

For basic design of the Project, the Ugandan side shall prepare answers for the questionnaire for the second field survey attached in this Field Report as Part 5 of "ANNEX" before the second field survey.

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7. List of Parties Concerned in the Recipient Country Name **Employment Position**

Ministry of Energy and Mineral Development (MEMD)

Eng. Moses Murengezi Mr. Sajjabi J. Fredrick Emmanuel Sande Nsuboga Advisor to Chairman (EMSWG) Senior Energy Officer Energy Officer (Electrical)

Ministry of Finance, Planning and Economic Development (MFPED)

Ms. Jennifer Muwuliza Mr. Mugagea Denis Mr. Tomohito Kanaizuka

Ms. Joan Kayanga Mutiibwa

Mr. James Gideon Litta

Mr. Daniel Muganura

Rural Electrification Agency (REA)

Mr. Benon Bena

AG. Commissioner Aid Liaison Department Economist - Aid Liaison Department ODA Loan Advisor Aid Liaison Department

Natural Resource Management Specialist

Environmental Impact Assessment Officer

(Biodiversity & Rangelands)

Manager Investment Planning & Promotion Mr. Philip F.P.Ggayi Senior Planning Engineer Mr. Werike K. Godfrey Manager Project Monitoring & Evaluation Mr. Muguwa Andrew Senior Planning Engineer Ms. Deborah Nantume Senior Construction Engineer Ms. Flavia Uwayezu

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Project Engineer Planning Project Encineer Construction Wayleaves Officer Intern

Uganda Electricity Transmission Company Ltd. (UETCL)

Mr. Eriasi Kiyenba Managing Director/CEO Uganda Electricity Generation Company Ltd. (UEGCL) Mr. Dan W Mayanja Technical Manager Mr. Kitayimwa Godfrey Electrical Engineer Procurement Financial Specialist Mr. Kanzira Milton Mr. Jimmy, C. Oconel Hedonic Engineer / Consultant Mr. Otim Moses Environmental Specialist

National Environment Management Authority (NEMA)

Mr. Francis Ogwal

Mr. Alex Winyi Kiiza

20

Ministry of Water and Environment (MWE) Ms. Lucy lyango

Uganda National Road Authority (UNRA) Mr. Patrick Muleme

National Forestry Authority (NFA) Mr. Paul Musamali Buyerah

Electricity Regulatory Authority (ERA) Eng. Semitala Norbert Mr. Patrick J. Mwesige

O Ferdsult Engineering Services Ltd. Mr. Simbwa Emeil Umeme Limited Mr. Ssonko Asuman

> Mr. Michael Oputo Mr. Sande John Baptist

Hydromax Limited Mr. Maheshwara Reddy Mr. Sentumbwe Godfrey

) Masaka District Ms. Rose Nakyejwe Mr. Behwera Wilson

> Rakal District Mr. Kiyingi Jamil

Mayuge District Mr. Mr. Aramu Thomas

Bugiri District Ma. Benadet Kauma Assistant Commissioner Wetlands

Project Engineer - Technical Services

Director Corporate Affairs

Director, Technical Regulation Director Financial & Admin' Services

Projects Manager

Supervisor of Hamanve s/s District Manager Iganga and Kamuli Technical Officer

Executive Director General Manager

Environment Officer Wetland Officer

Wetland Officer

Environment Officer

Assistant Environmental Officer

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Busia District Mr. Johnson Erienyu Forest Officer Ms. Teopista Namajja Municipality Environmental Officer Royal Norwegian Embassy Ms. Katrin C. Lervik Energy Counsellor The World Bank Uganda Country Office Somin Mukherji Senior Financial Analyst Sustainable Development Department Africa Region KfW Development Bank O Dr. Jan Martin Witte Senior Project Manager Mr. Klaus Gihr Division Chief Sub-Saharan Africa Energy Transport Telecommunication Wildlife Conservation Society Mr. Andy Plumptre Director Albertine Rift Ms. Sarah Prinsloo Staff JICA Uganda Office Mr. Tetsuo Seki Chief Representative Ms. Akiko Nanami Representative 0 Ms. Masae Iijima Project Formulation Advisor Mr. Daniel Rutabingwa Consultant for Infrastructure Sector

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PART 1

Extension of 33 kV distribution line in Iganga, Bugiri and Busia District (Area-4)

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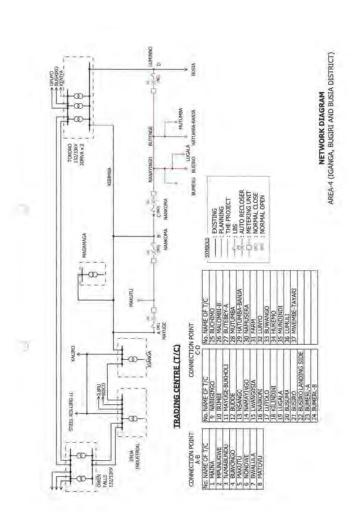
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	Ku	THAT THAT IS NOT	Rural Electrification ruase III Socio-economic Data III Area-4	CHIT T I				A MARTIN A		4-0	
Trading Center	Pari	Sub-county		Schools			Health Center	Center		Households	Remarks
			Primary	Secondary	Tertiary	IV	ш	п	-		
Maina	Maine	Mpungwe	3	0	a	0	0	1	0	001	
Mpunagwe	Mujji	Mpangwe	5	-	0	0	0	0	0	450	
Nemabundu	Kasuri	Makutu		0	0	0	0	0	0	100	
Bawango	Makutu	Makutu		0	0	0	0	0	0	120	
5 Makutu	Makatu	Makutu	2	2	0	0	-	0	0	150	
Nondwo	Kason	Makotu		0	0	0	0	0	0	200	
Bwalula	Isegeno	Nankoma	2	-	0	0	0	0	0	300	
8 Matovu	Matovu	Nunkoran	N	0	0	0	0	0	0	200	
9 Nabigingo	Namigingo	Bulidra	2	0	0	0	0	1	0	200	
10 Inimbi	Kitamba	Muteroro	2	0	0	0	0	0	0	30	
Mayugo-Bukholi	Mayuge	Budaya	5	0	0	0	-	0	0	1200	
12 Budde	Buwolya	Budaya	0	0	0	0	0	0	0	100	
13 Nsango	Kifuyo	Buyinja	6	1	0	0	0	1	0	350	
14 Namayingo	Ninuyingo	Numuyingo T.C.	12	4	-	-	0	0	0	3000	
15 Lwangosia	Lwangosia	Buyinja	7	1	0	-	0	0	0	06	
16 Nairobi	Buwoya	Banda	-	0	0	0	0	0	0	04	
7 Lutolo	Intolo	Brindia	-	-	0	0	-	0	0	260	
18 Kilindini	Latolo	Banda	24	0	0	0	0	0	0	15	
19 Lugala	Lugala	Banda	3	0	0	0	0	1	0	300	
20 Busuna	Buchamba	Banda	-	0	0	0	0	0	0	001	
21 Busino	Bojuwanga	Banda	2	0	0	0	0	1	0	001	
22 Busiro Landing Site Bujuwanga	ite Bujuwanga	Banda	3	0	0	0	0	0	0	150	
23 Bunneru A	Bushimo	Mutamba	5	0	0	0	0	0	0	50	
The second se	1000					1					

ANNEX

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Trading Center	Parish	Sub-county		Schools			Healt	Health Center		He	Housebolds	Remarks
			Primury	Soondary	Tortiary	IV	111		-	-	-	
25 Bochimo	Buchima	Muturba	12	1	0	0		0	0	0	40	
26 Mulombi B	Muwens	Muturela	-	0	0	0		0	T	0	100	
27 Butchey A	Mawarita	Muturita	-	0	0	0		0	0	0	40	
28 Mutumba	Mutumba	Mutumba	-	1	0	0		-	0	0	200	
29 Haumbu-Banja	Bulate	Mutumba	-	0	0	0		0	0	0	150	
30 Nabusera	Bulate	Mutumba	-	0	0	0	-	0	0	0	001	
31 Farm	Sinde	Buheraba	-	0	0	0		0	-	0	200	
32 Lunyo	Busiahan	Lunyo	14	1	0	0		-	0	0	260	
33 Buwangu	Netwire	Luryu	~	0	1	0	-	0	0	0	80	
34 Hukeno	Nalwire	Lunyo	m	0	0	0	-	0	0	0	150	
35 Mundindi	Mundiadi	Busime	4	0	0	0	-	0	1	0	70	
36 Lumuli	Ruhaka	Busime	-	0	0	0		0	0	0	50	
37 Mwanbe-Tayari	Busime	Busine	-	0	0	0		0	0	0	50	
Total			101	121	E.	2		~	90	0	5606	



Route Map for Extension of 33 kV Distribution Line in Iganga, Bugiri and Busia District (Area-4)

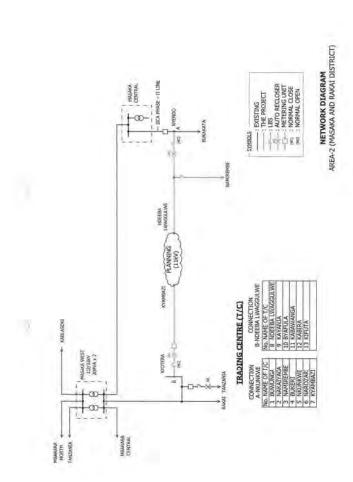
PART 2

Extension of 33 kV distribution line in Masaka and Rakai District (Area-2)

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Trading Center	Parisin	Sub-county		Schools			Hcalth	Health Center		Households	Remarks
			Primary	Secondary	Tertiary	IV	m	11	-		
Buwunga	Buwunga	Buwungs	5	0	0	0	0		0	1 120	
Nakaiyaga	Nalezanic	Buwungs	-	0	-	0	0	Î	0	1 100	
Namirembe	Bayaga	Kyamemikaka	-	0	0	0	0		0	0 1000	
Bukeri	Kanywa	Buwunga	m	1	0	0	-		0	0 50	
Nkunkwe	Kanywa	Buwunga	m	0	0	0	0		0	0 100	
Narozari	Bugere	Buwungt	-	1	1	0	0		0	0 10	
Kyanbazi	Kyuntale	Kynamkoka	2	0	0	0	0		0	0 80	
Ndceba Lwuggulwe Laggulwe	Laguture	Kysilga	4	-	0	0	0		0	0 120	
9 Kayanja	Kayanja	Lwankoni	0	0	0	0	0		-	0 30	
10 Byafida	Kayanja	L'wankowi	P	0	0	0	0		0	0 20	
Kabawanga	Bisanja	Kabira	4	0	0	0	0			0 100	
12 Kabira	Njala	Kabira	N.	1	0	0	1		0	0 120	
13 Kifun	Njala	Kabira	5	1	-	0	0		0	0 130	
Total			23	5	10	0	14		-	2 1980	

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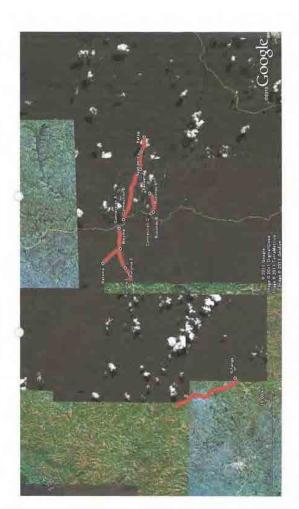
PART 3

Extension of 33 kV distribution line in Bushenyi and Rukungin District (Area-5)

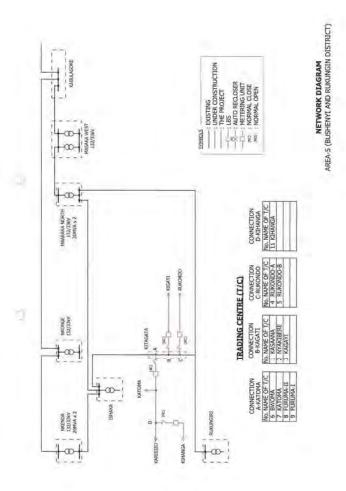
Route Map for Extension of 33 kV Distribution Line in Masaka and Rakai District (Area-2)

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Trading Center	Parish	Sub-county		Schools			Health Center	Center		Fouscholds	Remarks
			Primary	Secondary	Tertiary	IV	10	п	-		
Kassenn	Kasama Wost	Kitegata	E	2	1	0		0		0 300	
Nyakibere	Kasama East	Kitagata	0	0	0	0	0	0		0 25	
Kagati	Kasana East	Kitagata	4	0	ŭ	0	0	1		0 150	
Rukondo A	Rukondo	Kitagatu	4	-	0	0	0	-		0 200	
Rukondo B	Rakondo	Kitagata	~*	-	0	0	a.	0		0 20	
Bwoma	Kyaushakara	Kitagata	1	0	0	0	0	0		04 40	
Katoma	Kyaoshakam	Kingata	11	0	0	0	0	0	-	0 120	
Furuns II	Bukengora	Mutara	11	0	0	0	0	0		0	
9 Furans I	Bukongora	Muttaria	0	0	- 3	0	0	0		0 30	
0 Kiltunga	Kihanga	Buhanga	17	0	0	0	4	0		0 80	
Total	-		20	4	2	0	~	~		0 985	



Route Map for Extension of 33 kV Distribution Line in Bushenyi and Rukungiri District (Area-5)



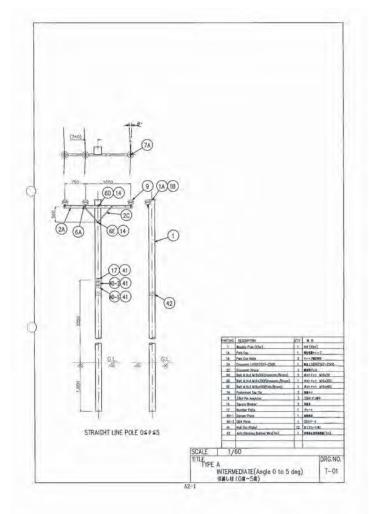
PART 4

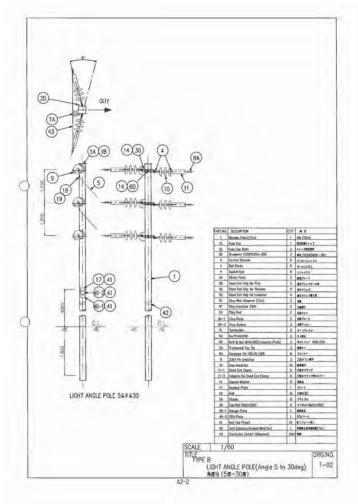
Pole Assembly Drawing for Distribution Line

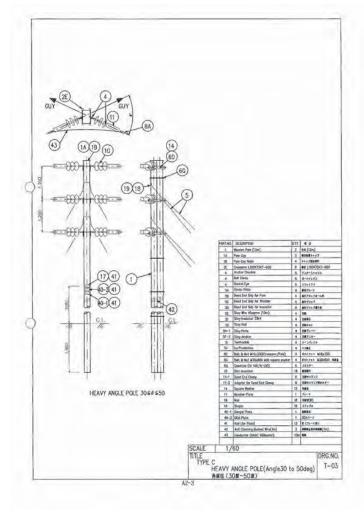
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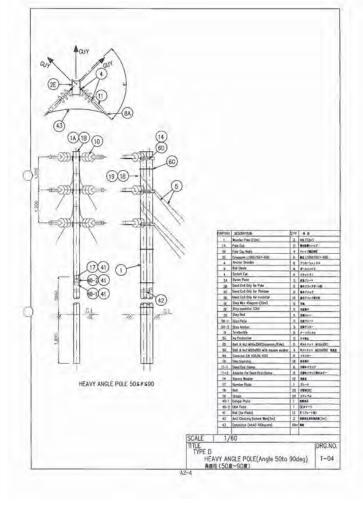
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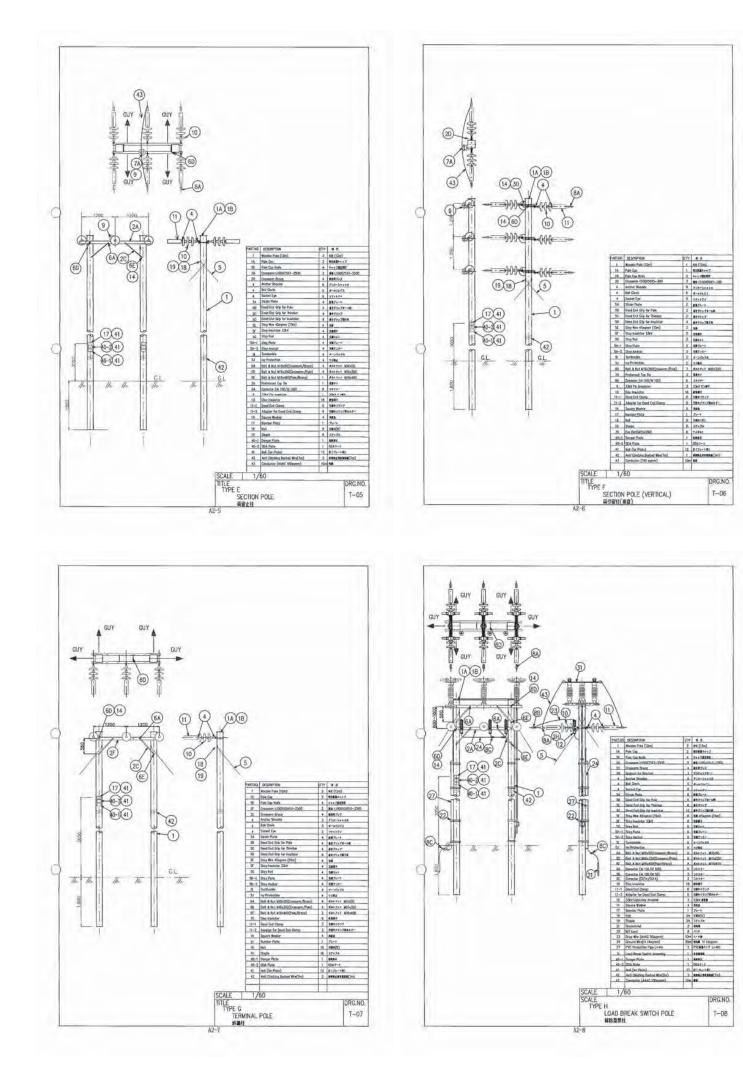
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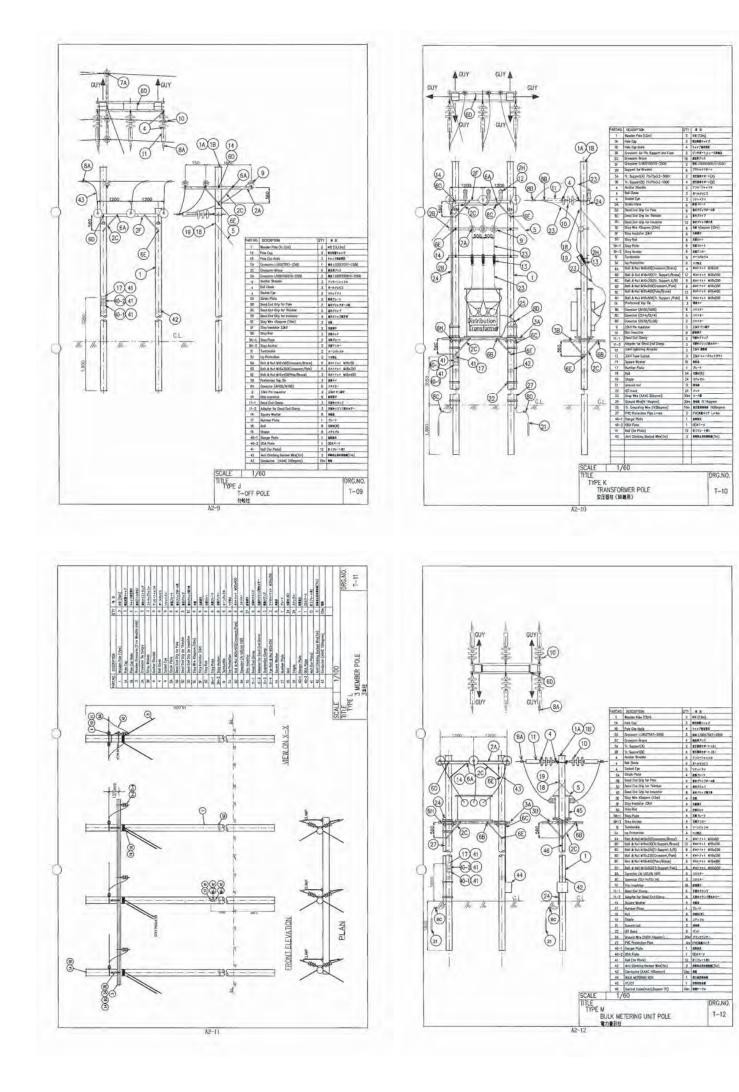


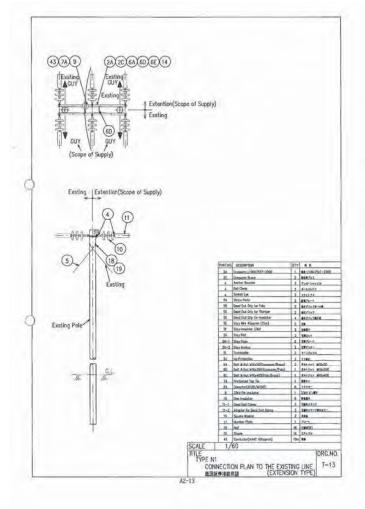


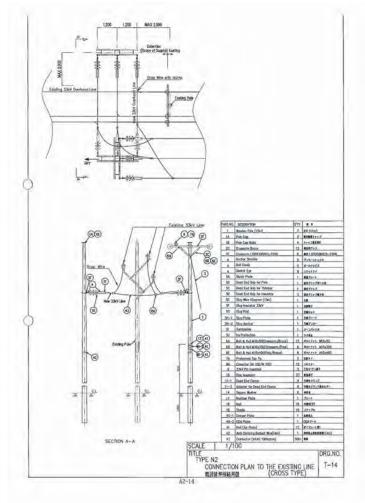








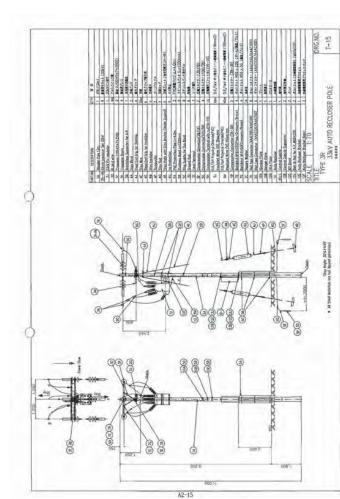






Questionnaire for the Second Field Survey





PREPARATORY SURVEY ON THE PROJECT FOR RURAL ELECTRIFICATION PHASE III IN THE REPUBLIC OF UGANDA

0

QUESTIONNAIRE

for the Second Field Survey

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April 2011

JAPAN INTERNATIONAL COOPERATION AGENCY (JICA) YACHIYO ENGINEERING CO., LTD. 0

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1.1 Preparation of Network Diagrams related to the Project

Power source for some distribution lines currently under construction was not confirmed clearly. The Ugandan side shall prepare exact network diagrams for the existing distribution and transmission lines and ones under construction related to the Project. In the preparation of the network diagram, scope described in the network diagrams attached to this Field Report shall be referred.

1.2 Preparation of Route Maps of distribution and transmission lines related to the Project

It was confirmed in the site survey that actual location of some distribution lines was not in conformity with the information in the GIS data of REA. The Ugandan side shall prepare exact route maps of distribution and transmission lines for the existing ones and ones under construction related to the Project. The Ugandan side shall also specify voltage levels by color in the route maps for certain distinction. In the preparation of the route maps, scope described in the network diagrams and route maps attached to this Field Report shall be referred.

1.3 Preparation of Single Line Diagrams for 132/33kV Substations related to the Project including basic specifications of main transformers

For confirmation of protection system and capacity of the existing equipment, single line diagrams for 132/33 kV substations related to the Project including basic specifications of main transformers, i.e. capacity, vector group, percent impedance, installation year and etc., shall be prepared by the Ugandan side. The related 132/33 kV substations are as follows;

- > 132/33 kV Substation in the Owen Falls Power Plant (Area-4)
- Tororo Substation (Area-4)

Masaka West Substation (Area-2)

- > Mbarara North Substation (Area-5)
- Nkenda Substation (Area-5)

1.4 Operational Data of each 33kV feeders in the 132/33kV Substations related to the Project

(1) Maximum Demand of the related 33 kV feeders

For confirmation of operational conditions of the existing equipment, maximum demand of all the 33 kV feeders in the 132/33 kV substations related to the Project for the recent four years shall be described in the following tables. Feeder number and feeder name shall be specified in the Table.

Table 1-1 Maximum demand of each 33 kV feeder in 132/33 kV Substation in the Owen Falls Power Plant (Area-4)

h	Feeder Name	Rated		Recorded	Data [A]	
ran	Lecost Lennib	[A]	2007	2008	2009	2010
-		1		-	-	
			-		-	
-		-		-	_	-

No.	Feeder Name	Rated	Recorded Data [A]				
140.	Presider Ivalance	[A]	2007	2008	2009	2010	
1		1.1.1	1000	-		1	
					·	-	

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т

 No.
 Fonder Name
 Rated I AI
 Recorded Data (A)

 No.
 Fonder Name
 Rated I AI
 Recorded Data (A)

		 -		-	
	2		1.1.1		
			1.000	-	-
_		 	-		

Table 1-4 Maximum	demand o	of each 3	3 kV	feeder in	Mbarara	North	Substation
		_			_	_	_

Ma.	Feeder Name	Rated		Recorded	Data [A]	
two:	Posses Pauloe	[A]	2007	2008	2009	2010
_				-		
-		-	-	-		
			-	-	-	-
-		1		-	-	-

50	Fooder Name	Rated		Recorded	Data [A]	in [A]		
140.	Pocaer Name	[A]	2007	2008	2009	2010		
-		-	-		-			
-		-	-		-			
-		-	-		-	-		

(2) Specifications and operational records of the existing conductors which the distribution lines of the Project will be connected to

For basic design of the Project, specifications and operational records of the existing conductors which the distribution lines of the Project will be connected to shall be described in the following tables. Table 2-1 Specifications and operational records of the existing conductors which the distribution lines from Mayuge (Connection A) to Nankoma (Connection B) of the Project will be connected to

No,	Feeder Nanse	Sizc [num ²]	Aliowable Current [A]	Maximum Current [A]					
				2007	2008	2009	2010		
_		1	1			-	-		

Table 2-2 Specifications and operational records of the existing conductors which the distribution lines from Nankoma (Connection C) to Lumino (Connection D) of the Project will be

No	Feeder Name	Size	Allowable	Maximum Current [A]				
		[mm ²]	IAL	2007	2008	2009	2010	

Table 2-3 Specifications and operational records of the existing conductors which the distribution lines from Nvendo (Connection A) to Kvambazi of the Project will be connected to

No.	Fooder Name	Size	Allowable Current [A]	Maximum Current [A]				
-	_	(mm ²)		2007	2008	2009	2010	
-		-		-	-		1	

Table 2-4 Specifications and operational records of the existing conductors which the distribution lines from Nankoms (Connection C) to Ndeebs-Lwaggle of the Project will be

No.	Feeder Name	Size	Allowable Current		Maximum	aximum Current [A]		
_		{mm ² }	[A]	2007	2008	2009	2010	

Table 2-5 Specifications and operational records of the existing conductors which the distribution lines from Mayuge (Connection A) to Nankoma (Connection B) of the Project will be

No.	Feeder Name	Size	Allowable		Maximum Corrent [A]			
-		[mm ²]	IAI	2007	2008	2009	2010	

Table 2-6 Specifications and operational records of the existing conductors which the distribution lines from Kitagata (Connection B) to Katagi of the Project will be connected to

No	Feeder Name	Size [mm ²]	Allowable Current [A]	Maximus Current [A]				
				2007	2008	2009	2010	
-			1		-	-		

(3) Failure Records of 33kV feeders which the distribution lines of the Project will be connected

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For confirmation of operational conditions of the existing equipment, failure records of the 33 kV feeders which the distribution lines of the Project will be connected to for the recent four years shall be described in the following tables.

Table 3-1 Failure records of the 33 kV feeder which the distribution lines of the Project will be connected to in Iganga Substation

		the star official							
No.	Feeder Name	2007		2008		2009		2010	
30.	Peoder Name	Times	Hours	Times	Hours	Times	Hours	Times	Hours

Table 3-2 Failure records of the 33 kV feeder which the distribution lines of the Project will be

	connected	to in Toro	ro Substa	tion					
10	Feeder Name	20	07	20	800	20	09	20	010
Su.	Feculer (vanue	Times	Hours	Times	Hours	Times	Hours	Times	Hours

Table 3-3 Failure records of the 33 kV feeder which the distribution lines of the Project will be connected to in Masaka West Substation

Na	Feeder Name	20	07	20	108	20	09	20	10
Nett.	Fecotr Name	Times	Hours	Times	Hours	Times	Hours	Times	Hours
_		-	-	1		1.1.1			-
		1		-					11

Table 3-4 Failure records of the 33 kV feeder which the distribution lines of the Project will be connected to in Masaka Central Substation

No.	Feeder Name	20	07	20	08	20	09	20	10
140.	Pooder Name	Times	Rours	Times	Hours	Times	Boars	Times	Hours
- 1									

Table 3-5 Failure records of the 33 kV feeder which the distribution lines of the Project will be

No.	Feeder Name	20	07	20	08	20	09	. 20	10
10.	Feeder (vanise	Times	Hours	Times	Hours	Times	Hours	Times	Hours
_		-	-	_		-	-		-

connected to in Isbaka Substati 2007 2008 Times Hours Topes Hours Feeder Name No Hours Times Hours Tin

2. Data Collection of connecting situations in the Previous JICA's Project Area

The Ugandan side shall prepare data of the number of connected customers, customer category, and electricity consumption for the sites of the previous projects (JICA I and II) according to the Attachment of this questionnaire.

ATTACHMENT

JICA I

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		Proiec	Estimated rower bemanu in rrolect site Al Project Site A1 (Nieru-Kavunda-Bale)	Nieru-K	avunda-E	ale)			
Residential	Residential Commercial	L	Schools	Health	Health Center	- me	and successive	Energy	Energy Demand
		Primary	Primary Secondary Center	Center	Clinic	anno	Sman ractory	(KWN)	(WW)
								-	

Bale						
Bukeeka						
Nyize						1
Wakisi				1	1	
Kikubamutwe						
Naminya						
Lugasa					1	
Total					•	
	H	otal in the Site	10			
	Energy	Demand	Customer			
	(KWh)	(KW)	Number			
Domestic						
Comertial						
Maddinen Industry						

. 1	r	7	5	
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Estimated Power Demand in Project Site A2

TC Name	Residential	Residential Commercial	Sci	Schools	Hoalth Center	Center	CHEAN	Currell Environs	Energy	Demand
			Primary	Primary Secondary	Center	Clinic	anno	Strant Lectory	(KWh)	(KVV)
Buwenda	-									
Bujagali										
vunamba										
Vamize										
Budondo S/C			1							
Budando TC										
Buyala										
Kabowa										
Nakanyonyi							1			
Vamagers										
Butagaya										
ubani										
Budima					Ĩ					
Nankandulo										
Kisozi										
Vamaganda						1				
Kiyunga										
Muwange					Ì					
Vamwenda									1	
Total		1								0

	Te	otal in the Si	te
	Energy	Demand	Customer
	(KWh)	(KW)	Number
Domestic	-		
Comercial			
Meddium Industry			
arge Industry			
EX-large Industry			
Total		0	0

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TC Name

Demand

Energy (kWh)

Office Small Factory

Project Site B (Wabigaro-Migera) schools Health Center Clinic

Primary

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Estimated Power Demand in Project Site B

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ТАС	нм	EN'	г	

Total gera

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Estimated Power Demand in Project Site C

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			Proje	Project Site C (Hoima-Munteme)	Hoima-M	unterne)				
TC Name	Residential	Residential Commercial		Schools	Health	Health Center	Office	Could Factory	Energy	Energy Demand
			Primary	Primary Secondary Center Clinic	Contor	Clinic	anterna .	Autors a timulo	(KWh)	(KW)
Buawekera										
Buhimba										
Kikube										
Munteme										

0

Total

	-	Project Site A (Nabitende/Itanda Area in Iganga District)	A (Nabi	itende/Itar	nda Area	in Igang	a District)		
Parish	Residential	Residential Water Pump	Sch	Schools	Health	Health Center	Martine & slave with	Energy	Demand
			Primary	Primary Secondary Grade IV Others	Grade IV	Others	maice o Lice min	(KWh)	(KM)
Namungalwe									
Nabitende									
Naluko									
Ituba									
Bugono									
tanda									
Kiwany!									
Nawangaiza									
Total		1	ľ	ľ		ľ	•		0

	Te	otal in the St	e
	Energy	Demand	Customer
	(KWh)	(KW)	Number
Domestic			
Comertial			
Meddium Industry			
Large Industry			
EX-large Industry			
Total	-	0	0

L

Parish	Residential	Residential Water Pump	Sch	Schools	Hoalth	Health Center	Maine & since will	Energy	Demand
			Primary	Primary Secondary Grade IV Others	Grade IV	Othors	Intel and a Anom	(KWh)	(KW)
(ayugi									
Vabusabu Camp									
Ssunga									
000									
Bunaddu									
Katiko				1					
Lambu Landing site									1
lukakata									
Kachnga									
Total	ľ	,	+	*		-			0

	To	tal in the Si	9
	Energy	Demand	Customer
	(KWh)	(KVV)	Number
mestic			
omential			
eddium Industry			
inge Industry			
(-large industry			
Total	0	0	0

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Parish	Residential	Water Pump	Sch	Schools	ricaron	Health Center	Multan P ston mill	Energy	Demand
			Primary	Primary Secondary Grade IV	Grade IV	Others		(KWh)	(KW)
Kigo									
Kabwoya									
Kitooke									
<icange< td=""><td></td><td></td><td>1</td><td></td><td></td><td></td><td></td><td></td><td></td></icange<>			1						
Karama									
Pachwa 2									
Pachwa 1									
Mabaale									
Kitemuzi									
Kaitemba									
Mugalike									
Kyenzige				1					
Kiryane						1			
Total	ľ		ľ	ľ		ľ			0

		THE R. L.	
	Energy	Demand	Customer
	(kWh)	(KW)	Number
Domestic			
Comertial			
Meddium Industry			
Large Industry			
EX-large Industry			
Total		0	0



Estimated Power Demand in Project Site C

Parish	Residential	esitontial Water Pump	Set	Water Pump Schools Health Canter	Health	Health Contor	At the O street with	Energy	Demand
			Primary	Secondary	Grade IV	Others	MULATING OF LICE HIM	(KWh)	(KW)
Bugeso									
wemba									
Buyala									
Nabirere									
Nambo									
Total			ľ		1			1	0

	Te	stal in the Si	te
	Energy	Demand	Customer
	(KWN)	(KW)	Number
Domestic			
Comertial			
Meddlum Industry		2	
Large Industry			
EX-large Industry			
Total		0	0

PREPARATORY SURVEY ON THE PROJECT FOR RURAL ELECTRIFICATION PHASE III IN THE REPUBLIC OF UGANDA

THE SECOND FIELD SURVEY

FIELD REPORT

July 18th, 2011

inted and submitted by: Regunari nogam Kark nam NOGANT for Mr. Musatsugu KOMIYA Chief Consultant, JICA Study Team, Jacan International nal Cooperation Agency Japan Intera (JICA)

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Confirmed Ch Mr. Fred Kaba Chairman of Rural El Board

Ministry of Energy and Minerel Developer (MEMD) Witness

Mr. Godfrey R. Turyanikayo nin. usointyrk. Turyahikayo Eaccuive Director, Rural Electrification Agency (REA), Ministry of Energy and Mineral Development (MEMD)

Contents of Drawings

1. Single Line Diagram of the Project. DWG No. UG3-E1: 33kV Distribution Network Diagram on the Project (Mayage + Lamino)

÷,	Route Map of the Project		
	DWG No. R-0)	Round May	p of the Erupect
	DWG NO. RD-D1-RD-30	Detail	Route Map of the Project

5. Pole Assembly Drawings for Distribution Lines DWG No. T-01 Internediate Pole (Line Augle: 0 - 5 degree) Pole Type A

DWG No. 7-02	Pole Type H	Light Angle Pole (Line Angle: 5-30 dource)
DWG No. 7-03	Pole Type C	Henvy Angle Pide (Line Angle: 30 - 50 degree)
DWG No. T-04	Pide Type D	Heavy Angle Polo (Lino Angle: 50 - 90 dagree)
DWG No. 1-05	Fulz Type B	Section Pole (Horizontal Arrangement)
DWG No. T-07	Pole Type G	Terminal Pojo
DWG No. T-58	Pale Type H	Louid Break Stwitch (LBS) Pole
LIWG No. 1-09	Pete Type J	T-off Pale (Branch)
DWG No. 7-10	Pole Type L	Transformer Pole (Line und)
DWG No: T-IT	Phile Type K	Transformer Pole (on Line)
DWG No.T-12	Pote Type M	Bulk Metering Unit Pole
DWG No. T-15	Pole Type N	Connection Plan to the existing line (extension type)
DWG No. THA	Pole Type Q	Sharp Angle Pole (Line Angle: 50-90 dogree) ((Inrugantal)
DWG No. T-15	Pela Type R.	Auto Re-closer Pale
DWG No. T-16	Pole Type W	Intermediate Pole (area to be flooded)

Table of Contents

32	Introduction
2	Project Site Information
2.1	Project Site Locations
2.2	Beneficiary of the Project
2.3	Progress of Customer Confection in the Previous Project Sites (JICA) and II) 7
2.4	Power Demand Forecast in the Project Sites
3.00	sign Conditions and Technical Specifications
3.1	Design Conditions 12
3,2	Basic Plans of Components
3.3	Procurement and Installation Plan of Equipment and Materials
3,4	Procurement Plan of Spare Parts and Maintenance Tools
3.5	Upgrading of the Existing Distribution Lines (from Busia to Nankoma, around Nankoma) 22
3.6	Tentative Implementation Schedule of the Project
4	Environmental and Social Considerations
4,1	Excition of 33 kV Distribution Line 26
42	Points of Environment and Social Considerations 26
43	Site Survey 28
4.4	Environmental and Social Impacts and Mitigation Measures
85	Preparation of Project Brief (PB)
5.	Work Demarcations for Both Parties 000000000000000000000000000000000000
	All and a second set from a stated

ANNEX

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- h. Members of the Team
- 2. List of Parties Concerned in the Recipient Country
- Minutes of Discussion 3.
- 4. Results of socio-occino it survey
- ž. Estimation of loads of each consuma-
- Fact finding sheets 6.
 - Mayuge, Iganga, Busin, Namayingo and Bugiri district-

Drawings

- 1. Single Line Diagrams of the Project
- Route Maps of the Project
- 3 Pole Assembly Drawings for Distribution Lines

1. Introduction

In order to build common understanding between the Ugandan side and the Second Preparatory Survey Team (hereinafter referred to as "the Team") for the Project for Rural Electrification ("near III in the Republic of Ugands (hereinafter referred to as "the Project") on the technical and engineering saturds, this Field Report has been propared leased on the results of the second field survey and discussions with the Ugandan side, i.e., Rimal Electrification Agency (REA) and Ministry of Energy and Minetal Development (MEMD)

The Ugandan side and the Penn agreed that the proposed distribution line moversing through parts of five districts. Mayage, Ijamga, Bugiri, Namayingo and Basia as the most prioritized site in the Minutes of Discussions (M/D) signed on 16th June, 2011. Main reasons for the prioritization are (1) electrification of beneficiaries in terms of the number of consumers which include trading centers, households, schools and health centers, (2) the importance of electrification of new district headquarters in Manayingo, and (3) project impacts including synergy with the Interconnection of Electric Grids of Nile Basin Initiative Countries Interconnection Project.

The main component of the Project is shown in Tuble 1. However, the final components of the Project will be decided by the Government of Japan.

1				
4	_		Sammary of the Project	
	Precime	to equilately tree (reco	the following equiptions and materials for 23 kV stamburus line-	
	10	33 by Distribution Lin	a (Final Length Approx (344 km)	
4	2	Trush line from Ma	suge Trisility, Centra (T/C) to reackerna T/E beingth Minnegae T/ET	Appaux 21.5 km
물		Britada luse tirim M	pingwe LiC to Makana LiC	Approx 10.2 kor
Procurences and inguilation		Trunk line from Nar	Approx 175 km	
		Brough How Busin No	Aparta 20.9 km	
100	1.8	Binardo line: It up 14	ensystem T/C to Hastin Landing Site and Engels	ARTON 14 T LO
1cul		Franch Little Stran P	marmo T/C to Admilia J T/C, and Massemilips-Physics T/C.	10.7 kp
E III	(8)	11/0/415-02401/9 0		
1961		200 KV (n = 4 ampts.		
-	111	Matering Limit	4 muits	
	(9)	Auto Re-closer	4 minis	
	(5)	Load Break Switch	14 sterite	
	Spare p	and maintanance to	als for 33 kV distribution line	
Procuremen	(1)	Emergency Spare Part		
octil.	(2)	Replacement Spare Far	**	
Pa	(3)	Maintenance Tools		

2. Project Site Information

2.1 Project Site Locations

The project site is located in Eastern Uganda. The project will involve the installation of approximately 135 km or 33 kV distribution line traversing through parts of five districts, Mayuge, Iganga, Bugiri, Namayingo and Basia. The main component of the Project, includes electrification of Namayingo district Headquarter, major facilities such as Buyinja Health Center IV which is expected to be upgraded to a District Hospital in the near future, Nalwire Technical Institute offering eight vocational courses directly contributing to the improvement of vocational skills in the area, Namayingo Town Council, and four landing sites for example.

The project site location is shown as Figure 1.



Figure I Project Site Location

2

2.2 Project Beneficiaries

(1) General Information of heaeffcharies in the Project Site

A socio-economic survey was carried out and general information for the project area was established. General information obtained from the socio-economic survey is shown in Table 2. showing the, number of trading center, household school and health centers (from grade) to 115.

The months of the spelo-economic survey are shown in Annea 4.

- > Total number of Trading Center (T/C): 38
- Based on site survey, Minterere T/C is requested to be included in the Project.
- Total number of Households: 9,395 nonseholds
- > Total number of schools: 108 > Total number of Health Center, 15
- > 1 District Headquarter (HQ) and 1 District Police Station
- (2) General Imuscholds

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- > Total beneficiaries: 48,090 populations (9,395 households)
- > Occupation of the consumers
 - · Farming: Most of the potential commerce are farmers, whose main products are maize, cassava and cofflee.
 - · Milling machine owner maize and cassava are main products to the project site. Diesel Engine is applied for granding and processing these crops consumed as staple foods in the project area.
 - · Fisheries: There are 4 landing sites in the project site, i.e., Burnerii A, Burnerii B, Bustro Landing site and Lugala. Main products are Tilapia, Nile Perels, Mukene and Nkejje. They are working without refrigeration due to a tack of electric power. Retail trade: Each T/C has some retail aloops solling foods, drinks and daily
- nocessaries. Some of the shops are using konsene refrigerators.
- Fabrication: Especially in Namayingo, annull welders und carpentries are working with generators as well as manual machines.

(3) Public Facilities

- > Some important public facilities are included in the project.
- Buyinja Health Center IV in Namayingo District (It is expected to be the District Hospital of Namayingo)
- Nalwire technical school in Busia District
- Namayingo District Headquarter in Namayingo District
- Namayingo Police Office in Namayingo District

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Table 3	Major Hen	eficiaries of	HIC III/IV I	r the Project	
Name of Health Center	Cirale	Envertige population	Outpatient (day	Ostroach /migntb	Suff
Makamar	101	27,300	75	320	
Muserere	(1)	31,200	70	200	-
Mayuge	ĝi.	33,000	142	20	
Bayinja	IV.	221,700	350	460	1
LWangestin	16	27,800	70	260	
Latolo	311	48,300	75	380	-
Mujumba	In	\$2,600	00	320	-
Lunyo	III	29,700	70	6801	
Total		#347.900	1.012	2.590	

Table 3 Major Beneficiaries of H/C III/IV in the Project

1 1-342.900 1.012 2,590 51 Completely ROX Study Tensor using the data fittions Overage, population of Infoliance. Manager these year, descapement plan, for the period 20(0/2011-2012/011

Covenies population of Muercev and Manage (gaspit times your development plan, for the particul 2010/2011) - 2013/2013

2000/2017 - 2012/2013 Coverage perphasion of Disputs Liveragenci, creater, bitmethia Vannaynpa HQ Coverage perphasion of Langer Busin Dismit Alternas Huma (Drift Otor information in primary information Traff Average perphasion in distantian pomora in populations of Liveragencia, Librati and Manuelle, which are included the coverage population of Hugins HOC-IV.

(b) Schools

Total besoficiaries: 62,000 population

• The number include students, teachers and hoarders in Tuble 4 below > Some of the sindents staying far from the schools are staying in the bourding facilities when require alearnicity for night studying.

(a) Primary school

District	No: of schools	•No. of students	-No. of teachers
Mayilige	- 8.	5,915	107
Iganga	6	4,119	69
Bugiri	26	13,950	240
Nameyinga	41	22,424	736
Busia	12	7,073	184
Fotal	93	\$3,481	902

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emplant by IICA Souly Torina wang data below IIGANDA EDISTRICTS Information Handbeel (2017-2008) Canter of spinishe and bactera and scalarly an anne dutain average of malenet and schart another thiser samber of avlately

(a) Health Center (H/C)

- Total coverage populations: 461,600 population
- · Generally, one H/C IV shall be in each district, one II/C III shall be in each sub-county, so that coverage population is estimated by the population where the IUC covered.
- > Number of outpatients:1012/ day
- > Number of outreaches: 2390/ month > Total number of staffs in charge: 51 people
- > installing lights is urgently needed for night delivery, inpatients, emergencies etc.
- > Steam sterilizers and refrigerators are most needed equipments when electrified.

Table 2 Beneficiaries in the Project

1000				1	faileril Skok			11-11-11-1	1		finante di filmati datti /	Dentila	ej Ling.	- of Mill
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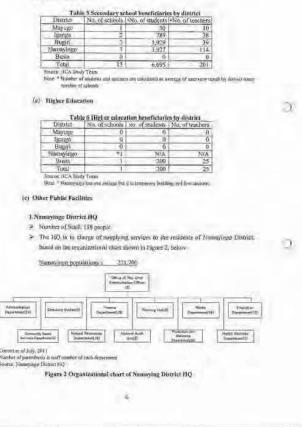
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(B) Secondary athool



diesel engine are utilized for milling in areas not electrified, fuel cost and troubles in engine have burdened milling machine owners with. And these burdenes are also troubling the living people. It is expected that release from these troubles by introduction of electric motor have caused such growth in connection of milling machine owners in Table 7.

Table 7 also shows low connections of public facilities, i.e., health centers and schools. In the site survey, the Team visited some districts offices of the previous project sites, It is confirmed that acceleration program for connection of these facilities are currently carried out with budget of each district government in addition to ordinal budget from the Ministry of Health. It will contribute to necelerate connection of public facilities in the area of RGA 1 and ICA II.

Table 7 also shows that connection of general isouscholds and shops in RCA II site is stayed in 3 % in average after 2 years from commissioning, JICA II was divided into two plaze of installation terms. Plaze I (Masaka and Hisina) was completed in Pebraary, 2009, while Phase II (Iganga and Bugiri) was completed in December, 2009. Connection rate in Phase I site is 7 %, while one in Phase II site is 1%. They are implying that 6 % growth of connection in Phase II site is possible in the next 10 month and connection of households and shops is impriving gradually in the IICA II sites.

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2. Namayingo Police Station

Number of Staff: 30 police officers

- > Installing lights in Police Station is urgently required for scenarity.
- Street lamps and lights in each households also can help to prevent crimes

Number of orimes is approximately 70 cases/month in Namayingo District. Namayingo Police Station manages 18 outposts shown in Figure 3 and covers the whole Namayingo district.



Source: Namavinen Police St

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Figure 3 Organization chart of outposts under Namayingo Police Station

2.3 Progress of Customer Connection in the Previous Project Sites

2.3.1 Results of the Site Survey in the Previous Project Sites (JICA I and JICA II)

To design the equipment and materials for the Project appropriately and also take some measures to improve progress of customer connection after commissioning of 33 kV distribution fine of the Project, progress of customer connection in the previous project sites was studied in the second field survey. The results are shown in Table 7.

In the project site, milling machine owners are supplying grinding service of staple foods such as maize, cassava, rice and ground nuts to people living in each village. These people are paying milling charge (100 UGX / kg for maize) to the milling machine owners. Though milling machines driven by

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Table 7 Progress of enstance connection in the previous project site

Dented	10	0//	5.A/5	ALM		44 ····	MAKAS	Girdlin					
Line .	184. march	discone:	1.	-thee	Manager Street	e-file-app.	Weinpel	1000	- 11	n(1)			
13170702-0	1	ų į	1.00	E .	1.000	14		17		00	ALTER	DE	Propria a
1000 dates	-Gabial	Diam	Nitual.	Deister	Adult	TALE!	Arriel	Deliger	. Incari	Design	Arrial	Decer	Convertion
Panetti Como	040	10	-9	3.t.	τ.	98		- 1		123	1	15	1 1
5446	1	- 11.		-47	- 2	-18	n	4.1	- T -	- 10	14.0	49	
Small Office	3-	14	1.00	1.90	- 0		- B		1.21	24	1	2	-20
and destinated	OWE	4	17	241	1.2	38	5	- R. 1	13		128	39	10
Panil and Rup	LAN.	£0.	1.11E	1.100	63	c.trt	THE	100	1000	11105	1,625	2071	18
Turki.	126	903	201	2724	ant.	2251	419	-252	2010	1.591	1,838	12400	
Text man #6	520	10	-	1228		4.044	-	328		3188	- 20	1.376	

 District
 MICOM
 District
 <thDistrict</th>
 <thDistrict</th>
 <thD

2. DCA Study Team Vote: All the data of DCA. Is a selected by Oganda Electricity Transmission Company Lad Inter, UNEDEE and Fruthed in CCard May, 2011.

in (C2DM May, 2011) Linis of Flught, BCA 1 is autoened free ligates (Offers in of 16th Auer, 2011). The scher data of TICA 11 are galaxied by Uganda Electricaly Transmission Company Lisk from 104UAIT and Technik on of 22nd May, 2011.

Completion of installation work of each previous project is as follows

Roral Electrification (JICA I) had completed in 2000.

Rural Electrification Phase II (/ICA II) had completed in 2009.

Major findings obtained from the survey are as follows:

- Connection of general bouseholds and thops has reached 3% of the projection in Basic Design Study 2 years after from the commissioning of the Project (JICA 11).
- Connection of general households and shops has reached 66% of the projection in Basic Design Shidy 11 years after from the commissioning of the Project (RCA 1)
- Connection of mill machines has reached 28% of the projection in Basic Design Study 2 years after from the commissioning of the Project (JICA II).
- Connection of mill machines has reached 90% of the projection in Basic Design Shudy 11 years after from the commissioning of the Project (JICA I).

9

Progress of connection of public facilities such as health center and school, and

whill offices does not show clear head

Table 8 Outline of the sur growth in the pre-		stamer munsella
After commissioning	2 years after	1 years after
General households and shows	鹅	66%
Milling machines	28%	90%

2.3.2 Analysis of the Site Survey in the Previous Project Sites

in the project site, it is expected from the results of non-socio-sconomic survey that the driving loads will be mainly composed of the demana of general households, shops and milling topchines proceeding stople foods. Based on the results shown in Table 8, the period required for completion of connection in the provious project sites are respectively entireated by Least Square Approximation and Hown III Table 9. And increase rate of connection is also shown in Table 4, respectively

The results are as follows:

- > Connection of general households and shops will complete in years after from the commissioning of the Project
- > Connection of milling machines will complete 10 years after from the commissioning of the Project

After commissioning	Periods	Incomese Rate of connection
General customer and shops	If years	6.26 % year
Milling teachings	10 years	10.0 %/year

Though public facilities such as health centers or schools are important as beneficiaries of the Project, their demand does not effect the total demand remarkably, as their respective number are not so large compared with one of general households and shops. Though number of milling Machines is not sohave within, their respective domaind are sun small

2.4 Power Demand Forecast in the Project Sites

The conditions for the ilemand forecest are shown below and the results shown in Table 10

Conditions for the demand forecast

> Increased rate of customer connection in the project site is assumed as 1.5 times of the rate in the previous project sizes in consideration of introduction of subsidy scheme for customer pomiection in the project site. General Intesenced and shops: 9.39 %/year

iR.

		2012	204	361	206	3117	300	Report Capility	Teen Lepure
Tinking Come	Dimut	1,349	390	-846	-aW.	aw.	NM/	8318	AV/A
i Mana.	Mayaar	148	2.41	3.18	7.54	12.84	- FR (11)	17	
2 Mramarsk	Marage	4.33	18.82	25.40	38.76	19.43	48.20	101	100
7 Narrational	Manage	1.51	-1.58	4.13	8.41	12.14	14.13	35	
4 Towner	Hamps.	1.42	3.63	4.83	6.23	1130	12.82	19	
T MAIN	lawa	4.82	0,78	14.83	20.23	5518	15.23	04	
e Noražee	flager	2.84	19-19	29.25	38.62	18.71	#\$ \$7	н	184
Nilozabila	Bagel	- 4.KI	10.00	14:11	89.43	25.45	-18 9.9		- 44
B-MARONU-	Harr	2.52	510	7.45	112.9.1	71.53	22.10	- 21	
Widowe	Diamet	2.68	2.44	8.25	11.24	22.40	28.03	78	
0/05588-	Bagen	010	1.52	1.87	7.63	7.85	4.75	12	
11 Maternat	Bur	7.04	14.47	21.00	29.78	58 67	TIME	0	100
12Mayor-Balanti	thegen	19.73	34.01	61.60	78.26	128.76	145.81	720	
(3)Bullet	Bage	1.13	7.05	1.21	4.75	10.10	11.00	a	
14Naige	Name	5.21	10.52	10.18	T) DL	22.64	45.53	- 41	
US Namesinger	Name	82.54	-42.03	123-06	168 50	110.01	1000.04	350	I first (the United
IN/Lowening	Namman	1.17	181	E atl	7.67	13,54	18.48	23	
17 Naverice	Newsge	0.82	1.19	- X.MI	7.45	7.45		12	
19 Laborer	Nimurings	240	4.61	18.94	14.79	31.13	74.54	52	
FEKAnam	Manager	6.43	0.09	1.24	1.82	1.67	7.15	11	
29 Lapsia	Managarangal -	2.78	.1.75	11.74	12.81	31.51	80.62	132	
2) lineara	Name	1.03	1.57	281	3.30	10.67	12.80	18.	
22 Dawn	Seminage	154	3.84	4.79	4.43	12.21	14.94	20	
21 Barry Louis 546	Alexen ware	2.09	4.23	8.44	8.76	18.47	22.64	-15	
30 Fam	Nonarran	2.54	8.17	7.28	10.07	21.14	22.00	11	
11 Natures	Newyinst	1.28	2.81	231	5.20	16.87	12.40	(8)	
William Bargh	Namayinga	1.84	371	8.67	7.43	18,15	31.78	TI	
75 Mautha	Namerore	1.89	8.03	6.25	32.84	22.81	10.0	ti	
25 Balling A	Name report	11.14	1.18	1.81	2.45	7.43	3.84	12	
of this of the	Newyre	1.24	2.60	2.87	1.34	10.02	12.75	10	
Di Balhim	Nanay Kap	0.69	182	1.31	576	8.84	12.41	15	
28 Oamers A	Name	122	2.49	2.78	5.0	10.53	707.37	10	
25 (inamera 31	Name	1.24	1.31	3.87	1.96	10.64	-32.60	18	
710 augus	Hanta	- 225	8.81	10.40		311 104	15.70		
Milliowala.	Bait	3.54	7.24	13.24	1627	77.34	36.01		23
3438Alemi	Busia	2 00	4.78	6.40		10.47	12.60	33	
Watter	Basi	1.42	7.16	11.82	16.63	21.45		24	- 25
with the second second	Himu	010	1.43	3.16		1.84	8.80	13	
18 Altorether Taxati	Hubb	6.70	1.42	2.36			8.53	13	
Torasi		111.42	107.02		100.34	itter at	1172.00		

Source IICA Study Team

Note: "Required capacity" is colculated in cont termion of Power Factor 0.85 and Demand Factor D.8 "Frasiformer capacity" is the minimum rated capacity to meet "Required Capacity"

3. Design Conditions and Technical Specifications

3.1 Design Conditions

Design conditions applied to the Project are described as follows.

3.1.1 Climatic Conditions

Natural conditions which need considerations for the equipment and facilities design are shown in Table 11.

Table 10 Demand Forecast for the Project

i.	lens	Mayagar, Iga
Altitude		
	Massimien	
Ambient. Temperame	Miningum	
a margine and a	Mean	
Maritmutri Humi	day	
Maximum Wind	Vulntity	

Voltage, wiring, frequency and earthing system applied to the 33kV distribution line and distribution transformer LV side shall be the same as those of the existing facilities. The summary of the electrical system concerned with the Project is shown in Table 12. T.11. 14 C.

Table 12 Summary of Electrical System							
Nominal Volunge	33 kV	415-240 V					
Maximum Voltage	36 kV	460 V					
Witing Method	3 phase, 1 wires	3 phase, 4 wittes					
Frequency	50 Hz	50 Hz					
Earthing System	Effective Earth	Efflictive Earth					
Short-circuit Current	Less titan 25 kA (1 sec,) at 33 kV switchgear in substation	Less than 10 kA (Isec.) at distribution transformer LV side					
Lightning Impulse Withstand Voltage (LIWV)	170 kV						
Power Proquency Withstand Voltage	70 kV						
Creepage distance	16 mm / kV	1 C C C C C C C C C C C C C C C C C C C					
Overhead Grounding Wire	Not Required	-					

(2) Other Electrical Systems 1) Color coding

IICA Study Tr

Applicable color coding shall be applied to IEC standard that is red, yellow, blue and black II) Safety factor

The following safety factor shall be applied to design and installation works

(a) Polic and foundation: 20

- (b) Conductor and cross-arms: 2.5 (c) Insulatoris: 2.0
- 1) Clearance of conductors
- The Clearance of 33kV overhead line shall be as (bliows.

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ta:	nn-	The Project Area Mayner, Ignuga, Buriri, Namuyiego and Burie District
Altitule		Lizzi iban 1,200 m
	Masimum	33 °C
Ambient	Miningum	15 °C
Tengenative	Means	25 E
Marimute Hunid	115	85 %
Maximum Wind 1	/ulecity	30 m/sec
Concerne Con	-	

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3.1.2Basic Electrical Design Conditions (i) Electric System (Voltage and Wiring System)

Separatic Force alain

> It was mentioned by REA that the subsidy scheme will be introduced only for customers who will connect to the grid within some years after commissioning of 33 kV distribution line of the Project. The period to subsidize customers is assumed as 5 to 5 years in the demand forecast.

15.0 %/year

 Subsidy period: 4 years

· Milling Machinesi

> Increase rate of derivant is assumed 1.65 %/year in consideration of the growth trend of mitinual demand of Uganda for the past ten years and the recent 5 years.

· Increase rate of demand: 1.65%/year

- > Denami of each public facility is assumed as follows based on information obtained from the socio-economic survey carried out in the site survey. Number of public facilities are shown in Table 2. The loads of each consumer are estimated in Asnes 3. Based on the site streveys
 - · Primary School 1.400 W . Scenndary School and Testiary School 1,900 W. · Health Center IV: 25,000 W
 - · Heatth Center III and Health Center II 1,600 W
- In general, it takes a few years to clapse before a rapid connection of milling machines to the grid, as procurement of motor (Approx. 10kW to 25kW) require some cost to their owners. It is assumed that the first boost will occur 2 to 4 years after from the commissioning of the Project based our data to the previous project site.
 - The time of first boost of connection of milling machines: four years after from the commissioning.

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	Table 11 Climatic	Conditions	for the	Equipment	and	Facilities Desig
1			-	The Pre	ileier :	Area

	Ť.le	nn-	The Project Area Maynes: Jumpa, Bugin, Namayingo and
	Altitude		Less than 1,200 m
		Masimum	33 %
	Ambient. Temperature	Miningam	15 °C
	a southinstense	Means	25 E
	Atanimptor Hamid	dia 1	21.6

	Ambient.	Miningara		
	Mean			
	Marimum Humid	hity		
	Maximum Wind	Vulncity	3	
	Reinfall		7.30	





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			The basic plan of the components is shown in Table 13.
(a) Minimum Clemance			
(i) Plusse to phase: 4:11 inni			Table 13 Basic Plan of Components
b) Pluse to ground: 380 mm			Basic plan of Components
(b) Minimum Height from Ground Level			Programming and installation of the following equipment and materials for 33 kV distribution line
a) Road Crossing: 7.5 m			()) 33 KV Distribution Line (Total Length: Anyone, 134.4 km)
b) Rosthide: 6.5 m			Frank lize from Mayogr Trading Center (T/C) to Nankonia T/C through Mpung set T/C Approx. 21.5 kins
 Span length of electrical pole 			 Branch has from Mpangve T/C to Makan Y/C Approx. 10.2 km
a) Single pole and deable poles: Maximum 100m			F Truth Internet Networks TAC 46 Lemine TAC through Nanayings TAC and Huberns FAC Approx. 37.5 km
5) Location of serion pole			> Branch line from Numsyogn T/C to Humans A T/C and Haman B T/C Approx. 29.9 km
Every # spians			> Branch Line from Numsyrops 110 to Busing Lingston Approx. 24.8 km
(i) Location of Load Break Switch	-	-24	Berndel Line from Fairmen TiC to Monjinij TiC and Manwamber-Topor TiC Appens, 10.5 mm (7) 13.7 / 9.15 / 2.90 kV functionation manformer (Trani Non-ier: 30 mm3) 200 kVA + 4 mm1, 100 kVA + 7 mm6, 50 kVA + 1 (1 mm, 25 kVA + 28 mm8) (1) Mercup Cuin (Total A mini)
Losd Break Switch shall be installed at aconnection point with estating 33kV	0	0	[2] (2) 83.70.415-0.240 kV Distribution transformer (Total Nardosci 30 mills)
distribution line, major tranching point and it intervals of about 13km for			300 kVA = 4 mm, 100 kVA = 7 m(0, 50 kVA = 11 mm, 25 kVA = 28 miles
inspection and maintenance of the 33kV distribution line.			
			Consection point of Mayage 1 unit
7) Location of Auto Reclaser			Connection point di Mayage 1 was Connection point ai Variatoria 2 unit Connection point ai Variatoria 2 unit Connection point ai Instituti 1 unit
Auto Recloser shall be installed at connection point with existing I3kV distribution line.			Connection point in Limitary 1 unit.
 Metering Unit 			(4) Anite Ro-Lieser (Tetal: 4 unite)
Menning (Joir shall be installed a connection point with existing 33kV distribution line.			5 Conjuction point of Mayagie, 1 unit
			20 Construction primi at Ninkkoma. 2 units
3.1.3 Applicable Codes / Standards and Units			> Connection point in Laneture Vanite
			(5) Logal Break Switch (Total: 14 anita)
(I) Applicable Codes/Standards			 Connection point at Mayner 1 unit, Connection point at Nunkamm 2 units, Connection robot at Larvaux 1 unit
The following Japanese and International standards/codes shall be generally applied			and Major branch point: 4 upple and howevels of 13 km is upits
to the Project	- CA	0	Spare parts and maintenance more for 37 KY distribution fine
() International Electrotechnical Commission (IEC)		0	100 Encourses (Francesco II) but
2) British Standard (BS)			 Constrainty of an entry of the of the out Switch and Diminimum Transformer Lightning Arester, Fased Cus-out Switch and Diminimum Transformer
3) International Standardization Organization (ISO)			(2) Replacement Spare Parts (1 for)
() Japanses Industrial Standard (JIS)			 (2) Replacement Spare Parts (1) (a) Past element for contrast available and contrasts for load break sources
5) Japanese Plettrotechnics: Commission (JEC)			(3) Maintennice Tools (1.lot)
6) The Standard of Japan Electrical Manufacturer's Association (JEM) To Japan Cickle Melocity International Control (JCCC)			 Ulgital-type multi-meter, Clip-on roeter, Phase rotation meter, etc.
 Japan Cable Maker's Association Standard (JCS) Other Japanese and International Standards concerned 			Source: JICA Study Team

(2) Units

Unit of length, area, volume, mass (weight), etc. used in the Project (such as Design, Manufacturing, Installation, Testing and Reporting) shall be in accordance with the International System of Units (SI)

14

3.3 Procurement and Installation Plan of Equipment and Materials

(1) Procurement Plan of Equipment and Materials

1) Quantity of Major Equipment and Materials

(a) Distribution Transformer

~		Quantities of Tsansformers [unit]			unit	- 1. L	Lucia and a second
	Trading Center	25 kVA	SO KVA	100 kVA	200 kVA	Total	Additional Transformer
1 M	birta .	1				1	
2 M	punugwe	1		-1		2	25 kVA for secondary school
3 No	indivic	1		1		2	25 kVA for small town nearby
4 B1	vglula	4	1.			2	25 kVA for primary school
5 M	Movu		1	-	1	1	and the second second
6 Na	mobundo	- 1				1	
7 Bi	Iwongo	1		-		1	A Contraction of the second
8 M	akam	1 1	1			2	25 kVA for schools
9 Ne	bigings				1	1	
	entilizi	1			1	1	
11 M	aterate	1		1		2	25 RVA for schools
12 M	avage-Bukbeli	1		10000	1	2	25 kVA for health center
13 Bi	idilar	1			1	1	
14 No	sango	-	-	1	1	1	
15 14	intayingo	-	1	1	. 2	ā	* District capital of Name inso
16 1.5	myo		1.00	1 1		- 1	
17 81	AN ADSOLUTION	1				2	25 kVA for Sub-county headquister
18 H	akemo		- 1 -	1	-	1	
19 1.4	imuli	1	-	1000		1	
20 M	wembe-Tayari	1				1	
21 M	unifindi	2		1		1	25 kVA for primary school
22 La	wingosia	1	-			1	
23 Na	airobi	1				1	-
24 Lt	utclo			1		1	-
25 K	lindini	1				1	
26 L1	ngata.	-	1.00	1	1	1	
27 Bu	astima	1			-	1	-
28 Ba	isiro	- 1 -				1	
29 B:	estro Landing site	-	- I	1		1	
30 Fa	um		1			1	
31 No	abusera	1	1	1	1000	1	
32 Ha	ntumba-Banja	10.00	15	1.00		1	
33 M	atumba		12		-	1	
34 Ba	utchey-A	1				1	
	silombi-B	1				1	
36 B4	nchima	1		-		1	
37 B	umeni-A	I			-	1	
38 Bi	umeru-B	1		Column 1	1	1	
T	tal	28	11	7	4	50	

Toomer, IR2A Study Team Source, IR2A Study Team Note: * The District equal of Namayingo Diatrics expands widdly. Based on the demand forecast for the project 5 Immilteners of Isolal apacity of 406 MAV are boarded

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(b) Lond Honak Switch

3.2 Basic Plans of Components

Ounsility and location of load break switch is as initiates. a) Connection point in London: 1 set. 10 Connection point at Mankgron: 2 sets c) Connection points at Mayage 1 sets d) Major branch point: 4 sets e) Intervals of 13kmi 5 sets

(c) Metering Unit

Quantity and location of metering unit is as follows. ii) Connection point at Lumino: 1 set 0) Connection point # Nankoma: 2 sets c) Connection points at Maynge: 1 set

(d) Auto Recioser

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- Quantity and location of auto recloser is as follows
 - a) Connection point at Lumino, 1 set
- Ii) Connection point at Nankoma, 2 sets a) Connection politik at Mayage:) set

(a) Conductor

11) Accessorins

The procumment length of conductor for 33kV distribution lines is as follows: (i) Design origin of bonductors: $(34.4)km \times 3$ phase = 403.2km[6] Procumment length of conductor $403.2 \times 1.05 = 423 \mathrm{km}$ (1.05 margin)

(2) Specifications of Major Equipment and Materials

The specifications of major equipment and materials any shown in Table 15

	Equipment	Spanner
(1)	Distribution Transformers	
	1) Applicable Staulard	IEC. hS. HC, HM or Ennorthers
	I) Type	Of temperard, OMAP, Threatically stated, Ostices, Pole-result Op- 33,000/433-250 V
	3) Nominal Voltage	4-5 %
	4) Intpedance Wittige	a2.5 %, 45.0 % (no volume up thonger)
	5) Tapping Voltage (%) on HV Side	and the second
	6) Phase	HV.3 phases , LV :3 phase 4-wwe
	7) Frequency	50 Hz
	8) LIWV	17067
	9) Vector Symbol	Dynil
	10) Capacity	25, 30, 100, 200 kVA.

Same Plate 17

(Cincile Project)	Specifications			
	-OA to set indicator and to be a statistic for the statistic for			
 (2) Lond Week Switch i) Applicable Standard 2) Type 2) Hoted Nominal Clarent 	160. JIS, JEO JEM we Equivalent Manual Optimismi 160.3			
f) Rand Volugie Nated Transenty f) Rated Transenty f) I (WV T) Rated Transking Casar()	33 KV 35 Hz 136 KV K30 A (11 Iold starright)			
Kondo Jimer Timer Quagenty Kondo Jimer Timer Quagenty Vicenty Quage Distances Internet Modernet Modernet Modernet Modernet Modernet Modernet Moderne	FOURALIST IE KA (In 1906 au Teor) HE KA (In 2006 au Teor) Mana Plan - Warma Plan - Warma Plan - Machington galachatedee dated sceptour with (Ferra) panatarial			
(3) Figead Contout Systems	- pound-ben Frederick and and and land humings			
 Applicable Standard Tanid Carmo-O'Unit. Banid Carmo-O'Unit. Ranid Volkage. Reid Volkage. Reid Friegenco. LiWV Gued Friegenco. Corrent. Full. 	1202, 782, 1952, 4934 we Expanded an (notifyer Type) 100 A 325 (V 356 file 1799 VV 16 bA 2 A to 25 A (degending on like sequency or distribution termboride) we be expensively for and Security general			
S) American	-Jperation (inf(Lem(h 5 m)			
(II) Accounting	-Hat-dipped galvernizes need auppent wab if bing material			
Elytombog Armester I. Applicable Standard Syntamic Standard If type Houseast Walays Kansi Walays Nontinal Unstitute Chernel Accessoriet	EC, 38, JEC, IDM ar Egnovated interfore, 20to-reade, Dayliem Type 25, V Homomen 30, KV trens) 3 & A(M229, so) Bot-dipped gavernand steel support, with Daug material			
(5) Matering Upit	Constitution of COVV minuted bulk instances with			
17 Applicable Standards 1677/7 and al Mill 16 Theorem and Mill 17 Tope 18 Mode Amplies 19 Time Amplies 19 Tope 10 Tope State 10 Tope 10 Tope State	12.C or 2 anisother 20.0 pt 103. Anisother current (H M, 1100.) 100 pt 103. Anisother current (H M, 1100.) 12.000.010 (Y, 20 VA, Accumey table 0.23 20.000.0000 (Y, 20 VA), A (MA, 20 VA), A (MA, 20 VA), A (MA, 20 VA), 2 man (M, 20 VA), A (M, 20 VA), A (M, 20 VA), A (M, 20 VA), 2 man (M, 20 VA), A (M, 20 VA), A (M, 20 VA), A (M, 20 VA), 2 man (M, 20 VA), A (M, 20 VA), A (M, 20 VA), A (M, 20 VA), 2 man (M, 20 VA), A (M, 20 VA), A (M, 20 VA), A (M, 20 VA), 2 man (M, 20 VA), A (M, 20 VA), A (M, 20 VA), A (M, 20 VA), 2 man (M, 20 VA), A (M, 20 VA), A (M, 20 VA), A (M, 20 VA), 2 man (M, 20 VA), A (M, 20 VA), A (M, 20 VA), 2 man (M, 20 VA), A (M, 20 VA), A (M, 20 VA), 2 man (M, 20 VA), 2 m			
 Cennel Gate. Coddner Merettig Kund. Hermitian Blocks. Hermitian Blocks. 	1-3 more and 1-3 more appendix to an Man, 2-3 more 7 more and appendix (more key 3 pice) (3 way (3 more			
(6) Anth Reclasts	1 ms			
Apptfunkle Sumiland Type Southeast Charge Copacity Bated Short-Trans Charges Consta Collisies	BLC or Expansion Pole researches, gas missiones caractroclaser (330 A. 1953A. (Inst.) General constraints: La provided time that annual annual literatio constraints: La provided time that annual annual			

Equipendrit	Specification			
9) Accessocies	Change and topping its from high quality and large life statistics while divings capacity leves. Control collabolity is manipulation under material - Manage under the statistical statistical statistics of the - Games Leables - Falling numerics for eleverical politi- - Technical and institutions generated.			
 (7) Conductor for 33kV Distribution Unic (1) Applicable Standin (I (2) Type (3) Size (4) Length for a Druce 	(EC or Equivalent Alt Alimanian'ADiry Conductor (AAAC) (00 mm ³ 2.000 m			
(6) Wooden Pole outp. Pole Cap () Wooden Pole • Material • Shape • Longle • Diameter of pole (at trg). 2) Pole Cap • Material • Advector	Crossined wooden puls Beauti pole 1) m v0/2 m 1 m v0/6: 190-319 mm Lam pole 110-235 mm Sted Thata/ana Stiese Mat (Chy a poleton)			
(9) Insubstein 1) Fin mulatate -Applicable structured +Type -Metanal +Coloring of particular +Coloring of particular +Coloring of thrace -Popel coloring +Type -Marstell +Darnet of timulary +Drawning discusse +Correspond discusse +Correspond discusse +Correspond discusse	Fig: or Eigenvisit National National Policitatio Policitatio Policitatio Policitatio Policitatio Fig: Structure Fig: Structure			

(3) Installation Plan of Equipment and Materials

The roote of 33kV distribution lines and location of distribution transformers shall be designed in accordance with the following measures

)) Technical Aspects

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(n) 33kV distribution lines are designed ideng wasting road and location of electrical pole is basically designed within road reserve.

(b) 100m apart is applied for pole interval of 33 distribution line basically inconformity with the Ugendan standard.

(c) Distribution transformers are located in load center of each trading Center. 19

In case important public facilities are far away from the location of transformer (over 500m), can not supplied from the transformer and additional transformers are requested by REA based on the survey.

Trading Centers where additional transformer are located:

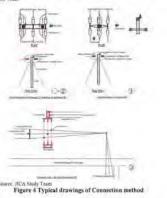
Mpunugwe, Nondwe, Buwalula, Makuutu, Muterere, Mayuge-Bukholi, Namayingo, Buwanga and Mundindi.

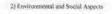
(d) Method of Connecting Existing and New Distribution Lines

New 33kV distribution lines shall be connected to the existing 33kV distribution lines and be extended to project sites. The connection method is shown in Table 16 and typical drawings are shown in Figure 4.

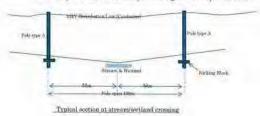
Table 16 Connection Method between New 33kV Distribution Lines and

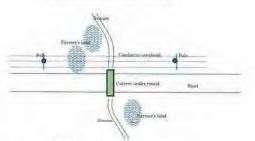
Project Sile	Connection Method	No
Mayage	New tipe shall be extended from the existing time at dead end pole in Mayuge.	10
Nankonia (West)	New line shall be extended from the existing line at dead end pale in Nankoma (West)-	-00
Hankoma (Fiest)	New line shall be branched (T-off) from the existing line in dead end pole in Nandauna (Entr)	700
Lamment	New free shall be extended from the excising fine at dead end pole in Lumino.	10





(a) Based on the site survey, we could find the mitigation measures of all cases of wetland as described Figure 5; Position of electrical poles are designed in 100m span as standards.





Typical Plan at stream/worland crossing

Source: JICA Study Team

Figure 5 Typical Arrangement around Wetland/Stream

- (b) 33kV distribution lines routes are designed to avoid play-grounds in schools, cultural sites (shrines) and valuable trees, where possible.
- (c) In case of crossing seasonal flood plains, position of electrical pole is designed in maximum 100m span. Type of electrical pole is intermediate double poles (Type W) is applied.

3.4 Procurement Plan of Spare Parts and Maintenance Tools

The spare parts and maintenance tools for the Project are shown in Table 17 and Table 18.

Table 17 Spare Parts List

Equipment	Q'IV	Desatiplanti
(1) Emergency Searce Part		
T) Lighting America	2.00	REEV. Not, single plans
2) Finned Lucestut stellpati-	3 (545)	THEY, CHELT DINNE
3) Dimension Lensformer	I sup of facily type:	25, 54, 100, 200kVA
(2) Replacement Street Faces		
1) Fine-chement his coson swah	3 sea al multi (spe	8
2) (Sectional for feast break sweets	3 pc.	

Table 18 Maintenance Tool List

Tigetperver	QSiv	Desatrigation
1) Shipted-type health metter	1 int	Fat genital purpase
2) Elip-minutur	ist.	En conclanged menering will
1. Plane rotation mean	1 intt	Fot general purpose
() Voltage detector	long.	For SSMY Line
 Valuage datection 	1.825	For law wolnings
53 Freedomines beautoment teation	1.002	The Huggest test, 37kW idon-
T) Insulation remains or tester	1.458	For messare and low enhance
R) Fourth recontinue texter	1 1 100	Eas general parasis
 Operations and 	Liet	First fitted ditt-set swneth

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 \Box

3.5 Upgrading of the Existing Distribution Lines (from Busia to Lumino, around Nankuma)

For stable and qualitative power supply to the project sile, the capacity of power equipment in the back home suppy level of the project aits was established through a site survey and discussions with REA, UMEME and Uganda Electricity Transmission Company Limited (UETCL). The power system incomet the project site is shown in Figure 6.

- 3.3 kV distribution line of the Project will be connected to the existing distribution line from lines Industrial Substation to (gampa S/S in the Jima side of the Project size.
- > 33 kV distribution line of the Project will also be assumeded to the existing distribution line from Tororo S/S to Majanji through Busia and Lumian in the Lumino Site.

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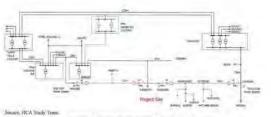


Figure.6 Project System around the project site

Currently, the power system infrastructure from Jinja Industrial S/S to Iganga S/S is almost loaded at full capacity due to huge power consumption of big factories such as the steel rolling mills in the Iganga area.

- Conductor type: 150 mm² AAAC
- Normal Load of Line 15 MVA / Capacity of Power line 17 MVA
 It was confirmed through discussion with UETCL that they plan to install and commission a
- new Iganga S/S (132 / 33 kV, Capacity 80 MVA) in 2015 between Owen Falls S/S and Iganga S/S. Therefore, it is projected that the power source to the project site from the Jinja side will be relieved from over-load a few years after commissioning the Project.
- Currently, specifications of the existing 33 kV distribution line from Toroto 8/S to Busia are partly 25 mm³ AAAC or ACSR. It was confirmed through discussion with UMEME that the rehabilitation and urgent upgrading work for the line will be carried out starting in this year, 2011 in consideration of development of Busia.
 - Rehabilitation work of supporting structures for the line: 220 poles
 - Upgrading work of conductor size at the parts where the size of conductor is 25 mm² hetween Tororo and Busia.
 50 mm² ACSR (By the work, all the conductor between Tororo S/S and Busia will be 50 mm².)

The extension work of the distribution line shall be in conformity with the current conditions of the existing distribution system. In consideration of urgency of the Project, the Project is targeting. Five years after from the time of the Preparatory Survey, i.e. 2016. Above mentioned upgrading work will contribute to keep the voltage drop within 10 % at the load center (Nankoma T/C) of the project site until the target year based on the demand forecast for the Project shown in Table 10.

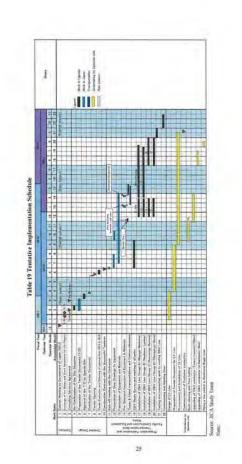
23

- The Uggnular, the also plane to suggrade 34 kV distribution line from Toruro S/S to Majarji to 100 mm² AAAC to conformity with development of Busic and Luminn within a few years. The organiding work will contribute to stable and qualitative power supply to the project site from viewpoint of medium term as well as construction of New Iganga S/S, in case that the Project is commissioned.
- The above mentioned upgrading work is planned to inclusio upgrading of the existing 33 kV distribution the around Nankoma T/C, which is between Point R and C in Fig.6, from 25 htm2 AAAC to 100 emi? AAAC
- The Team researched the Ugaedan side to include installation work of transformer for the pumping attation is supply where to Nankonia TCC which was autifirmed in the site survey herween Malova FIC and Nankama T/C. It is desirable 33 kV distribution line of the Project such be autified effectively by installation of the transformer for the pumping station.

3.6 Tentative Implementation Schedule of the Project

Tentative implementation schedule is shown as Table 19. In case that the Project is decided by the Japanese Government, the Project will proceed as [billows in case of the suffices sciencein, as sizewards Table 19. Insultation work of the Project starts in December, 2012.

- The Exchange of Notes between the Ugandian and Japanese Government will be tigned in January, 2012.
- > The Tender Opening will be held in June, 2012.
- Installation work of the Project will start in Decamber, 2012.
- Commissioning of the Project will be in November, 2013.
- Design and preparation of tender the installation of low vortage distribution line berne by the Ugardan side shall be commenced immediately after the Exchange of Note. In conformity with the time of commissioning of the Project, the Ugardan side precure and install low voltage line in timely manner to escape stagnation of progress of customer connection.



4. Environmental and Social Considerations

4.1 Location of 33 kV Distribution Line

The proposed Project Route passes through five districts at about 134.4 kilometers. Table 20 annuarizes the sensations of proposed Project Route, those approximate lengths and respective local administrations and Figure 7 shows the proposed Project Site. P.11. 30. 1

Table 40 Propos	60 PT0	COL HOULE N	ith Local Administrations
Project Route	(km)	District	Sub-county
11 Mayage - Nankteria	21.5	Mayure	Mayage TC Bukatabe, Mnungwe, Kigandara
	1.0	Igonga	Makoutu
29 Myongwes- Malanu	10.2	Mayau	Mpungwe
	1.00	Igamm	Makuum
31 Naskomi - Limim	37.5	Bugin	Naskama, Baliaha, Minerere, Budhaya)
		Namayingo	Namajingo IC, Buyinja
		10260	Luoya Lamina
4) Namayurgo - Bumeru A	製剤	Mamayingo	Namayinga TC. Bunamba
5) Namayingo - Lugala - Bustov Landing Site	24.8	Namayingo	Namayingo TC, Buitemba, Bunda
6) Hukemo - Mwembe-Taşari - Mundindi	10.5	Rusia	Lonyo
Tatal	1899.8		



Figure 7 Proposed Project Site

4.2 Points of Environment and Social Considerations

The following sections summarize the results of 1st field survey of the Project Rome. The following points are derived from those results for the works of environmental survey in 2nd field



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1) Socio-economic activities can be affected on the Project routes

2) Land use and structures can be affected on the Project routes

3) Nature areas can be affected on the Project routes (CFR, wetlands, rivers, vegetation especially roadside valuable trees)

4) Local people's involvement

4.2.1 Points of Environment and Social Aspects

The results of 1st field survey shows that most lands along the Project routes of Area-4 are cultivated already and many trade centers (TCs) are located on. The Project Site has totally cently undulating hills in topography and the requested route passas a Central Forest Reserve (CFR) named Trimbi CFR which is used for industrial and commercial plantation on rocky hill in the short length at approximately 1km. In the inland of Project Site, there are seasonal wetlands tint the local people have been cultivating and few wetlands. Respective District Environment Officers say that the local wetlands have common aspects in the country. Table 21 summarizes the environmental and social aspects of Project Site from the 1st site survey and interviews to district environment officers and local representatives (Local Council Chairmen).

Area	Description
District	Maywge, Igonaga, Bugiri, Namayingo, Busia
Topography	- Gently hilly site - Lake shore site
Land Use	Settlements (trading centers) Cultivated (ands, Cattle grazing land Wooldot (forestry)
Socio-economy	 Farming: cassive, maize, ground nut, beam; rice, millet, sugarcance Fishing: tilapianlic.prech Liversnoit; culte, goat, choizen Approx. average: monthly income: 50,000 – 100,000 (farming), 150,000 – 200,000 (finaling, un te 592,000 (rading) UCX/household
Forest Reserve	- Jrimbi CFR (Bugiri District): Approx. Ikm on the Project Route
Weiland	Common wetlands in vegetation There are lew permanent wetlands Most wetlands are sensoral ones Local people have been cultivation the wetlands

42.2 Focal Points for the Environmental and Social Considerations from the District Officers

In the 1st field survey, the Team visited district environment officers and forest officers, and obtained their suggestions on the specific points for the environmental and social considerations of Area-4 us follows.

27

4.3.2 Fact Findings with District Environment Officers

The Team and REA will avoid or minimize development propaint adverse impacts on the awirontizent and local communities. Based on the policy, both of them conducted the site survey involving the District Involumental Officers to identify the focal points of environmental and social impacts to reflect them on the route desired

Through the size survey, the Team, REA and the District Environment Officers found and concluded the following points should be considered must in the Project Site, which are described in the Pact Sheets attached in ANNEX 6.

- > Wetlands (permanent and essonal))
- > Forest (Irimhi CFR)
- > Columni Site (Marine)
- > Overclouded building area at Nonayingo teanch point

(1) Wetlands

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The Teem, REA and respective District Environment Different observed wetlands (seasonal and permitteni) seasonal streams, flood plains, water valley tanks along the Project Route. They are highly modified for cultivation mainly with maize and rice except the water valley tanks. The other crops, sugarcane, cassava, matoke (henana), were observed in the wetlands. Cattle grazing, are also typical activities in the wetlands. Small water pools around box cutvent were observed a the lowest points in them with the common weilland vegetatives mainly of mode, sedges, allolfs, plutagamites, elephant grass, acacia, and thomy luches. In the south area of the Project Site, siona the Project Rottles up to the lake shere, the water valley tindes are main domestic water sources as there are few hore halfs.

- > Wetlands: Sussonal (33 places), Perranset (5 places)
- > Seasonal streams; 5 places
- > Protected spring: 1 place > Water valley ranks: 2 places
- > Seesonal water priol. I place
- Sensional flood plaim:) where

(2) Forest (Irimb) CFR)

Irimbi CFR managed by NFA is located at 250 meters from frimbi TC. Main function of the frimhl CPR is categorized in industrial and commercial forest plantations. The area is located on rocky lembi hill and a protects soil from crossion for the aurounding villages. The CFR also supplies fael words to Bugiri, humon and the surrounding trading comers. There are three licensed persons in four parts of land along the read. The plantations at the south side are more than the much side atom the road. Types of plantations

> North side aspects: Young Grevilles and Pine trees at about 1 meter tall are planted

Electricity is a step for improving livelihood leading to conserve environment

- Water flow in the wetlands should not be obstructed by poles · Embankment for pole installation in the wetlands should be shorten from reads
- > No erosion from the embankment > Prevent preservatives of poles being into the wetlands
- > Involvement of communities (local councils), district offices and sub-counties > Sensitization for workers and local peoples (to prevent risks of extension of
- diseases/HIV or to respect local cultures)
- Conserve cultural and valuable trees or ne-plantation

Key Findings

- Adverse impacts on wetlands should be prevented or minimized.
- Involvement of local peoples is necessary.
- > Valuable trees should be conserved.

4.3 Site Survey

4.3.1 Survey Area

Based on the points of environment and social considerations through the 1st field survey, the Team and REA with the respective District Environment Officers conducted the 2nd site survey covering the following Project Site shown in Figure 8.

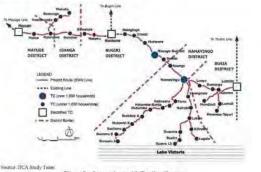


Figure 8 Survey Area with Trading Centers

analogy. Another type of plantation is Burtydaria trees which is also planted few Most land is mixed with malze collevation uncrouched by local peoples. Burryuinia trees anout 5 years grown (about fin tall) are planted sparsely. A uniformal rite (Kszimba Kungim) is located on the read

> South side aspects: Grevillea. Pine mes and Burrydaria mees about 5 years grown (about 6m fall) are planted in one ficeased area. These trees can be used for timbers. A part of land is used mixed with vegetable and marize cultivation encroached by local peoples. Few trees are planted at half part of tand along the road. Most fand is ailivated with make.

(3) Cultural Site (shrine)

Thuse are two shrines were identified along the Project Route. Baisemena is located on the north side of the read at the border of Iganga Diviries and Mayoge District, which is taken care by Nalogodha (a cultural leader). There are several rocks surrounded by trees. The other shrine: called Kazimba Kungita is located on the northern side of the read in trimb) CFR. The site is trided by tall tre

(4) Overclouded building area at Namayingo branch point

Residential buildings are established close to the carriageway at the user of the preliminary Project Route branch to Burneru A TC at Namayingh TC. The preliminary Project Route with affect the residential buildings along the road at about 400 meters. The space is the narrow to pass the Project Route along the road

4.3.3 Other Subjects to be Considered

In addition to the fact findime, the Tean and REA have concluded that the subjects to be

- considered as much as possible for the Route dosign as follows > Buildings and Structures should not be affected
 - > Loss of crops will be min mized
 - · School especially playgranted will be avoided
 - > Tall/largistrees or materive texes will be availed or those lasses will be minimized

1.3.4 Findings from Environment Officers

The followings are findings for the Project Route from interviews to the District Environment Officers of five distnets.

- > Important ecosystems: wetlands, Irimb) CFR, plantations > Environment issues: dofe-estation, welland degradation,

30

> Likely positive impacts: lighting, value added agricultural production, welding, produce processed materials, boost of economic activities, growth of trading contenreduce use of fire wood (deforestation)

- Mitigation measures: compensation, re-plantation, minimum excavation > Specific land use; mostly cultivated land with nutize, cassava, mullet, potato, settlements (shops), schools, plantation along the road
- > Threatened species: nothing special, local trees (Myule-Millein Excelsa)

435 Findings from Local Representatives

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It is also important to involve local representatives in the process of the Project. The Team and REA visited 43 local representatives including sub-county headquarters and local representatives (LC) chairmen and mayors of TCs) to explain the Project, collect information and ask corporation The residu are summarized as follows.

- > Specific tand use, ecosystems (forests, wetlands, etc.), trees, graveyards, structures, to be considered along the Project Route. Nothing special, some grave yords but not clean
- > Positive impacts: Milling (Maize, Rice, Coffee), Charging phone and battery, Sawmith Refrigerator for cool drink. Welding (workshop), Carpenny, Saton, Industrialization (processing factory), Video theater, Health center, School, Reduce use of fire wood (deforestation)
- > Negative impacts and feats. Loss of crops, mange trees, Construction workers encroach on land, Accidents (lack of knowledge), Accidents on the fissibiles (point and wires), Expension electricity charge/connection cost.
- Mitigation measures for the impacts: compensation, sensitization
 Others: Peoples are aware of road reserve (need sensitization); Peoples can allow the Project Rome pass in front of/betilnd buildings: Peoples are waiting power long time

4.4 Environmental and Social Impacts and Mitigation Measures

Anticipated Environmental and Social Impacts 4.4.1

Likely Impacia

Oburnetion of residential buildings

hung af einpe and tiocs ob the Project Anale Construction workers proceeding on the last Obstancition of cultural tites
 jubititaty Obstruction of schools expectally playground

Anticipated environmental and social impacts are summarized as shown in Table 22 incorporating the findings of the site survey and interviews with various stakeholders. Most lands are dominated by familands even in both seasonal/permanent wetlands and familand/residence mixed lands along the Project Route. Total 38 TCs include residential/commercial area of larger TC and settlement of smaller TC. The focal points of environmental and social impacts found with the District Environment Officers are already mitigated and reflected on the route design as well as the other subjects mentioned in section 4.3. In this context, the installation of 33 kV distribution lines can minimally affect the natural environment. Loss of crops and trees is the most negative impacts on the cultivated lands along the Project Route, however, will be compensated by REA.

Meanwhile, the power supply to un-electrified households will possibly provide new means of

Descriptions

31

livalihood and extend night-time learning for children at home. At health centers and schools, their public services will be more accessible and reliable for people in a wider area.

1) 1	Likely impacts Positive impacts Sefare/During Construction Phase	Descriptions
1) 1	Before/During Construction Phase	
1		
-	cial Environment]	La Laboraria and all be and a sub-
	Cirain jub upportunitios as construction workers	 As the construction work will be mostly manually conducted, the worker's demand (especially unskilled) can provide a remporary boart for local employment.
2	Facilitate business opportunities for local service sector	 Local services sector can provide the construction workers accommodation, fields and beverages
	Operation Phase	
150	scial Environment]	
1	Create opportunities to establish new basinesses (micro enterprises) to improve income sources for the local peoples	The power supply to households will create the scope of developing new live/thouse sump electricity and create the scope of developing + Kickk with refrigerator + Welding, Corpentry, Sawmill + Video theater; allon + Lore conducting to so will live
14	Improvement of living: environment	The producing sector and inprove the living anvironment like, N object raik of fire and health damage from kenesche lump Prodicitate ausses to social information and entertainment with TV, raid or, elemental device Fusikitate damaging mobile plance and communication • Improve home safety and awareness on samitation with lighting. • Provide a leager time of benervoir fie ehilders, a leager
E.	Improvement of social services: (school, health center, water aurphy)	Factor and more reliable public services will be provided by the factor contents and schools for people in worker sampling and where the local peopler headly can aclose in demonstic water supplied by fore half an peopler headly can aclose in demonstic water supplied by fore half an episita, electrification could induce a water pumping system in those point. In the least centers, the following transmiss can contribute for the headly maintaneous of local peoples. The second second second entities and the second second second second second second entities and the second second second second second second entities and second second second second second second second improve medical care services aclosing immunitative in the schools, students and bearders can be indicated equipment, and e Exactle them of headly examing
4	Improvement of agricultural industry	The most, likely development in improve agricultural industry is techetification of grinding milling separability for mutice and rice. The electric grinding mills can produce house quality floar and more quantify with lower coat, and those nows can be sold with better prices. Additionally, availability of power can promote investment to establish agricultural processing factories.
in l	Improvement of social sufery	Lighting in households, installation of street iumps and lighting at polics stations can contribute ur prevent crimes like thief and violence in the darkness, Moreover, the lighting on moderate mental fear to the clarkness.
(2	Negative Impacts	

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Description: At Runsylogi, biselsch pollar of the Project Route, libera is an arme viewe the grassin invantation to parts the Project Route, along the read-The other atomy against it arm along the Namaying's Mainten under a "Baun" indication graine. The Project Route and alloyer has read-pathing the anomy against the Project Route and alloyer has read-field the statistic read-More India along the Project Route and collowates even in methemion. This other anomy and the read-tion of the statistic read-tion of the statistic read-pathing and these statistics are collevered along the Route This event and these with his discussion of the local readers. There are too workers are induced for the local readers individual postborning workers are induced to the induced individual postborning workers are induced to the local readers. There are too which and aphen. There are too which is the induced too work in the local readers. There are too which are aphene individual the temperature is induced to the induced individual the temperature is an individual work in the individual too work there with his an induced, and traject is an unitation and individual the temperature is individual and the individual the temperature individual method and aphene The vertice and any individual and isolated from the project. Route The vertice and environment is and the work in the individual their second readividual on the physice mathy. Expansion of HIV/A IDE HIV/AIDS INAMPAL FUTURE EN The Project Routs parser sing, willands (seemael and pectasoet), assimal invests, flobil philos, were valley tasks, Sazai aster pools arrand hes, subjects were basered an the soul with bases of weiland equations. The polse are leaving in first of the base silvers, wain flows run he abraiced. The Traject Routs of dengand thoug the road passing through head CFR at about 1 dengand thoug the road passing through head CFR at about 1 dengand thoug the road passing through the function line. The least of attrafficture the states can be fulled to make the <u>intribution line</u>. Obstraaling of white flow in wetlands Low of land to live by Live by LER. Loss of vegetation and pointle. TAccidents) Although a contractor will use few tracy machinery, the economi-nations of the work means that trace is not uppermathy for accidents involving optical in local. The north to install points and wires can induce the accidence in the bical peoples. Accidenta of construction waters and lineal students 2) Quesallon Phase [Accidents] Due to hack of intervicing of electricity, the knowlengie can have successful like benefit where it means. The results of interviews in the function people's representationses. LotUNI challenges and recently officially also full the interviced challenges of and danged mean mar-sentence of density. The other provide accelerate of the facilities are accelerated density. The other provide accelerate of the facilities are 10 Accidents in kureschuldes LI Aucideets as the facilities norident or disentor. The other possible theil, vandalism of burns in the field.

4.4.2 Proposed Mitigation Measures

ree IICA Study Teas

As the environmental items which may experience negative impacts of the Project based on the evaluation results, their common mitigation measures are proposed as shown in Table 23.

θė,	Parettile Negative Impacts	Miligation Mossura	Organization
1	Beliaro/During Osternation	Phase	
1	Obstruction of buildings and offer offerstructure	 To world the effections on buildings, the Project Roles will be designed in similarity the other branch three of Namaylogic – Leguis Preiert Roles in Manaylogie At timm TC, the Project Rome will be designed para behind the buildings 	REA. Constiliant
2	(ous a) crops and trees on the Project Reate	 REA will coolact community themings mevery, replain to the local peoples, make suprements evaluate the subjects with district compensations rates had compensate the owners. 	PEA
4	Construction: workers unspreciality on the land	 Continuity will admitted the construction workers about people manner in this rates and to form the foral traditions 	Contractor
Ă.	Obstoletion of collocal sites (sh(facs)	 The rolling hits will not be tampered with the Project Ruste will be designed passing the opposite side of the read 	REA, Cocasiltant
8	Observation of the seconda especially the playgrounds	 The Project Route will be designed passing the opposite side of the rout where scheets are located. 	RFA. Consultant
ű.	Expansion of HIV/ADDS	 Contractors will evolutive workers and communities with cooperation of respective health contern 	Coperantes, Health Center
		 The Project Roma will be designed in word, whet pools and not ground. The price will be insulined as approximately 100m span to avoid the loss culverts and stream 	REA; Consultant
A.	Ocometion of wetlands	 In case the poler we installed in the wetlands, the rates' location will be away from the two calvero is word obsimulion of the tiles of ware. Containes of the vegetation and nearestion will be installed in the une where the electricity golds will be installed. 	Supervision Consultant Contractor
ı	Longe of second in Initial	 The Project Route will be designed to parts for north side to avoid more massive liseneed plantaneous The pelies will be installed at approximately 100m spon to minimum flee numbers of poles in the site. 	REA. Comunit
		 BEA will comparate NFλ, the featured particles and user furgers for the fellial trees, apply and encourage regioning in they area. 	REA
		 The Project Route will be designed to avoid tall/large trees or mussive trees along the roud as much its possible 	REA, Consultant
9	Loss of vegetation and landicape	 The trees felled by necessity will be compensated by REA as same as loss of crops and trees Re-plastation program will be conducted in provide communities with seeds, tree seedings for replastation 	REA, Community

No.	Possible Negative Impacts	Miligation Measures	Organization
30	Accidents of construction workers and local residents	 Personal Protective wear will be provided for all the workers during construction according to the labor laws of Upanda and ensure good and anfe working conditions in accurdance with contractor's construction manuals which are required in the contract. 	Supervising Consoltant, Contractor
2)	Operation Phase		-
n	Accidents in households	 REA will sensitize the local peoples to educate about electricity and instruction how to use safely 	REA, District/ Sub-county offices
12	Accidents on the facilities	 Operator is obligated to maintain the facilities complying with their maintenance regulation Community development Officery will also sensitize the local people on the importance of maintaining the facilities, ared protect them from theit, vendalism or bursh to the field 	Operator, Community (LCU/III, Sub-county)

4.4.3 Procedure of Compensation

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On that basis, the road reserves of selected routes should be cleared according to road classification of national and district levels, if REA will use the read reserves for the Project. Even in case that REA will not use the road reserve, distances to be kept from them should be cleared.

Meanwhile, REA's policies and procedures how to secure the routes of 33kV distribution lines meaning, reset a potential and take the following steps for compensation on the routes. However, should be confirmed, REA will take the following steps for compensation on the routes. However, the survey will be started just before construction according to the REA's prior projects. Therefore, it is recommended that the first step of the process, the community meeting with related LCI Chairmen, will be conducted immediately after E/N and agreement are done. Besides, the local peoples will also be involved in the early meaning.

- > Community meeting with LCI Chairmen
- Survey and Explanation to persons whose properties are affected
- * Agreement with the wayleaves consent form
- > Evaluation of proporties on the routes with the wayleaves assessment form
- > Preparation of evaluation report
- > Submission of the evaluation report to a Chief Government Valuer in Ministry of Land
- > Assessment and authorization by a Chief Government Valuer
- Explanation of evaluation results to the affected owners and payment

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4.5 Preparation of Project Brief (PB)

REA shall obtain an Environmental Certificate (EC) from NEMA to implement the Project As the first step. REA shall submit NEMA a Project Drief which describes the outline of the project, Bkely impacts usuesd by the Project and the mitigation measures. NEMA will determine whether or not the Project is exempted from an EIA based on the Project Brief. To prepare the PB, an stronoment expert who belongs to MEMD joined the site survey. She will finalize the PB and submit NEMA if in the gad of August.

5. Work Demarcations for Both Parties

In the implementation of the Grant Abi Project, Japamese side and Hgandar side is required to undertakte such necessary measures as shown in Table 24

No.	Underskings	To be ce	svend by	Remarka	Item hier
NO	Louistiskiegs	Inguit	Uganda	Remarki	in MD
•1	 Keingring of Lambs of the Progression (Mattin at 23kV (Introbution Imin) 	1.52	ø		1
_	(2) Land investigs and preparation, touch (doming end removal a) obtancies in the Protect atma		α		-
12	To common the following facilities			Not Applicable (Balling antaliaion work does on Indialie)	3
	(1) The huilden,	13	-		
	(2) Fire gates soul ferrors in and around the site		6		
	(3) The populate list	0	-	1	
	(4) The road within the size	3		1	
	(5) The road outside the site		0		
+3	To provide facilities for minimum of electricity, solur apply and training and other inspferial facilities necessary for the implementation of the Project ounside the [min/[stam]]			Not Apprendie (Building untaillaion word deci not builde.)	
	(S) Haleop etcay	1.	1.000	1	r
	a. The doministing payoer loss of the site		- 40	1	
	 The deep setting and mitmal setting written the set; 	803.1			
	C. The right could etermine and transformer.	1£3.		1	
	(2) Water Supply	1.0	-	1	
	a The city water distribution main to the site.	1	0	1	
	h. The supply system within the site (receiving and elevated tanks)	0			
	(3) Dramage			1	
	 The city drainage main (for storm server and others in the siin) 		Q]	
	h The drainage system (for toilet sewer, common weste, them drainage and others) within the site	Ø			
	(4) Gas Supply			D.	
	a The city gas main to the site		0		
	b. The gas sapply system within the sate	0	1		
	(3) Telephene System	-			

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Ne	Underskings		Uraniti	Remasks	Harn No un M/F
	a. The telephone track line to the main	anpan	O		- un cont
	distribution frame/panel (MDF) of the building				
	b) The MOV and the extension after the frame/panel	Q.			
	(6) Finniture and Equipment		-	1	
	a, General furniture		0		
	b. Project equipment	0	<u> </u>		
*4	Transportation of the Equipment, sustores	0	-		-
-4	procedures and tax procedures	-			4 404 3
	 Maxime/ nür transportation to a part ef ubsemberkution. 	ø	-		
	 Prestadares for tax exemption and customs cleanance at the port of cleansharkation 		Q		
	(3) Internal transportation from a port of desembrarization to the Project sizes	0		Delivery point: Storage Vand at Nankoma	
	(4) Exemptions or payment of value-added tax (VAT) on locally procured items	1	D		1.2-
*5	Procedures necessary to obtain the following permits for the Japanese Consultant and Centracter - Permits required for insulfation works - Permits to access restricted areas		ġ	The parmits shall be obtained before project implementation.	б
*6	Proper operation and maintenance of fissibles and the Equipment after the Project		Q	including bush clearing and tenoval of obstacles along 333:V distribution intes	7
*7	To bear all the expenses, other than those covered by Grant, necessary for the implementation of the protect.		0		8
*8	Phymens of the following fees hand, on the Banking Arrangement:	1			8
	(1) A/P advising commussion	-	Ö	Appenty 10,000 Japanese Yen	
	(2) Payment commission	-	0	0.1% of the grant aid amount	
*0	Olving that enviropmental and social considerations in the implementation of the Project.		0		10
10	Securing of land of temporary material storage yard with feace and gare		Q	To be utilized Storage Yard at Nankoma	-
11	Scearing parking space during installation period		0	To be secured, beside the mod- during the installation work	
12	Site offices	0	1	Sor the Japanese Coordinat and Constants	
13	Proper storage and toffety management of the Equipment at componery material starage yard	0			
14	Securing of working space along routes of 33kV distribution lines and traffic control	-	0	When mecanity	
H	Relocation of existing overhead/underground rables or pipes of prover, telephone, water	1		When necessary	1.00
	supply/dramage, etc. and obtaining necessary permissions	-	0		-
16	Obtaining permissions on mod crossing during 33kV distribution line work:		ø	White nocessary	
17	Providing of deposal size of soil and discharged water unused by the installation work.	1	0		
18	Manufacturing and procurement of the Equipment	0		"The Equipment" is defined as the equipment and materials to be	
		4	-	provided by the Japanese side under the Project.	

140	A Guident Aligner	TH RE 12	erentit fry	(Marcolana)	Horn No.
Parts,	CONSTRACTOR	lapin:	11pants	Yisemecky	an M/D
10	lestallation of the Equipment, adjust and institut	a		The Digenstruction of the representation least test expansions and tasks in the provided resolution Project to the Japanese University university university on	
28	Temperary star down decore testalitient	2000	- Ø		
21	Bathlinion of a Idad Sela, sweet onto the waiting pile at the equination point of UAV distribution line in Nankoma		0		
22	Final connection to the relating HAV		. T.	Av Mayope, Nutikingta enti Laminia consussion palint	
21	Firsthers of mustals for the above personal final consection	-10			
24	Provides of transmit for initial operation and intimiorance of Gr Equipment	- 12-			
27	Atomical according for personnel in the Project	1.1	2	(gi tedam)	
26	Managing any dissole from constants regressing temportray after down for installation work- metalding compensation for contensors		'n	If Personal V	
77	Public nerice of scheduled that dever and implementation of the project during the mathematication states		ő.		
28	Design, processes and invaluation of tank- tion of low whome distribution there and contraction to constanting throughout and public institutions on the Property plan.		8	The Uppenden side is required (i) implement the work as parallel with 5389 discubation that work done by Japonicae side	
29	Salesy		ġ.	The Upperdus rate is respond to implement the work in parallel with 325V damperdum line work done by Japanese side	

ANNEX

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1. Member of the Team

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1 Member of the Team

Name	Assignment	Organization
Akins NIWA	Team Leader	Japan International Corporation Agency
Yoshikazu WADA	Planning and Management	Japan International Corporation Agency
Masatsugu KOMIYA	Chief Consultant / Power Supply Planning	Yachiyo Engineering Co., Ltd.
Kazamari NOGAMI	Deputy Chief Consultant/ Distribution Equipment Planning	Yachiyo Engineering Co., Ltd.
Masayaki TAMAI	Distribution System Planning	Yachiyu Engineering Co., Ltd.
Takeshi OMURA	Social and Environmental Considerations	Yachiyo Engineering Co., Ltd.
Atsubito URUNO	Procurement and Installation Plan/ Cast Estimation	Yachiyo Engineering Co., Ltd.
Ayumi KOYAMA	Coordinator/ Assistance for Distribution System Planning	Yachiyo Engineering Co., Ltd.

2. List of Parties Concerned in the **Recipient Country**

Ministry of Finance, Planning and Economic Development (MoFPED) Mr. Lawrence K Kilea

Mr. Muhamuza NTACYO Juyenal

Name

2. List of Parties Concerned in the Recipient Country

Ministry of Energy and Mineral Development (MEMD) Ms. Irene Nation Mitioni-Mr. Simon D'Janua. Mr. Ssegawa Ronald Gyagenda ling, Henry Bidasala-Jaaga, Huy, Moses Murengezi Mr. Sam Barasa Mr. James Baunabe Isingoma, Mr. Sajiahi J. Fredrick Ms Agnii Caroline Ms. May Mwogeza Me. Nabogereka Hridget Mr. Emmanuel Sande Nautraga

Minister of Energy and Minerals Minister of State for Energy Undersceretary Assistant Commissioner (Elserric Power) Advisor to Chairman (EMSWG) Personal Assistant to Minister Acting Commissioner Energy Resources Department Sonior Energy Officer Senior Peirotean Officer/ Environment Civil Engineer Electrical Engineer Energy Officer (Electrical)

Employment Position

Senior Feonomisi/ Finance Difficer Aul (Jason Department

Director Economic Affairs.

Rural Electrification Agency (REA) Mr. Godfrey R. TuryaitliAyo

Mr. Werike K. Godfrey Mr. Meguwa Andrew Mr. Phillip E.P.Gguyi Mr. Thomas Amelu Ms Joan Kavasan Mutihwa Mr. Daniel Mugarura

Uganda Electricity Transmission Company Ltd. (UETCL)

Mr. Friasi Kivenba Mr. Gerald Muganga Mr. Andrew Geno Omalia Mr. Ziria Tibalwa Ms. Stephen Kyeganwa

Executive Director

Manager Project Munituring & Evaluation Principal Planning Engineer Senior Planning Engineer Sculor Project Engrider Project Engineer Construction Intera

CEO Manager, Planning and Investor Technical Officer, Projects Principal Planning Engineer

Senior Planning Engineer

Uganda Electricity Distribution Company Ltd. (IIEDCL) Mr. Learn Ramanya

Mayage District

Mr. Omar Bongo Ductoor. Mr. Kabakaibya Samuel Mr. Luhanga Mr. Alan Thomas

Iganga District

Ms. Epodor Pauline Opio Mr. Waunala Jotham Mr. Samanya Abdul Mr. Dhikusooka Joseph Mr. Batmika Sumuel Mr. Kayamba Jomm Fred Mr. Sagers Keinhurd Mr. Neluswu Mwamud Mr. Mubikirwa Sulayi

Bugiri District

Ms. Margaret Mwanamoiza Mr. Luke L.L. Lokada Ma Benndet Kauma Mr. Kyondim Mondmudy Mr. Ngia Abebi Mr. Boguro Mozammu

Namuyingo District

Mr. Richard Mugolo Mr. Kalceba Peter Mr. Mayedo Ebwoni Mr. Kaawo Kawere Naay Mr: Bwamiki Michael Mr. Kaleeba Poter

Project Manager

District Chiarman, Mayaga District Assistant Chief Administration Officer District Natural Resource Officer District Environment Officer

Principal Assistant Secretity Assistant Chioi Administrative Efficer Distruct Forest Officer District Agricultural Officer District Community Officer District Planuer Project Support Officer CAIIP Chairpenson Nondwe Town Board Councilor of Nondwe

Resident District Commissioner Chief Administrative Officer Environmanal Officer District Planuer Water pump Operator Water pump Operator

Chief Administrative Officer Assistant Chief Administrative Officer Accountant District Educational Officer District Health Educator District Health Inspector

Basia District

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Mr. Sentean Yusuf Mr. Adeya Vincent Mr. Wabwire Patric Ma Teopista Namajja Mr Omingo Matota Julius Mr. Ondword James Ma Kinakye Mourren

Umemo Limited Mr. Charles Chapman Mr. Sam Zimbe

Mr. Robert Kisubi Mr. Zach Human Mr. Imae Serwadda Mr. Robert Mubiru Mr. Fred Wandirs Mr. Charles Magombe Ma. Patricia Ocan

Embussy of Japan in Uganda Kazue Minagawa

Eri Ogawn Shugo Shmoham

JICA Uganita Office Mr Tetsuo Seki Ms. Akiko Nanami Ms, Masae lijima

Chief Administrative Officer Deputy Chief Administrative Officer District Planner Municipality Environmental Officer Chief of Busime sub-county Accountant of Busine sub-county Intern

Managing Director

General Manager Corporate & Regulatory Affaires Support Service Manager Network Manager Planning & Loss Reduction Project Manager Area Manager Eastern Power Transformer Maintenance Manager Switchgear Maintenance Manager Planning & Design Manager

Ambassador Plenipotentiary Estraordinary Thred Secretary Coordinator for Économic Cooperation

and

Chief Represen entative Repres Project Formulation Advisor

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3. Minutes of Discussion

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Minutes of Discussions on the Preparatory Survey on the Project for Rural Electrification Phase III in the Republic of Uganda (Second Field Survey)

In response to the request from the Government of the Republic of Uganda (hereinafter referred to as "Uganda"), the Japan International Cooperation Agency (hereinafter referred to as "JICA"), in consultation with the Government of Japan, decided to conduct a Preparatory Survey (hereinafter referred to as "the Survey") on the Project for Rural Electrification Phase III (hereinafter referred to as "the Project"). JICA disparched the 2nd Field Survey Team (hereinafter referred to us "the Team") to Uganda,

headed by Dr. Akira NIWA, Senior Advisor, Department of Human Resources for Internation Cooperation, JICA, The Tenn is scheduled to may in Uganda from June 10 to July 21, 2011.

The Team held discussions with the officials of authorities concerned of the Government of Uganda (hereinafter referred to as "the Ugandau side"), and conducted a series of field surveys. In the course of the discussions, both the Ugandan side and the Téam (hereinafter referred to as "Both narties") have confirmed the main items described in the sheets attached hereto.

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Reepum Mr. Fred Kabagambe-Kaliisa

(MEMD)

Permanent Secretary,

Kampala, June 16, 2011

Preparatory Survey Team. Japan International Cooperation Agency (IICA)

Witness:

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Ms. Jennifer Muwuliza Ag. Commissioner, Aid Liaison Department, Ministry of Finance Planning and Economic Development (MoFPED) GhA

Ministry of Energy and Mineral Development

/ Chairman of Rural Electrification Board

Mr. Godfrey R. Turyahikaya Executive Director, Rural Electrification Agency (REA), Ministry of Energy and Mineral Development (MEMD)

ATTACHMENT

L. Objective of the Project

The objective of the Project is to extend the distribution system for reliable and stable supply of electricity to the raral communities within the Project sites.

2. The Project Site

The Ugendan side and the Team confirmed prioritization among six candidate project siles in the 1st Field Survey and agreed that the Area-4 as the most prioritized site in consideration of previous project scale. Main reasons for the prioritization are (1)electrification heneficiaries in terms of the number of consumera which include trading centers, households, schools and health centers, (2)an importance of electrification of new district headquarters in Namayingo, and (3)project impacts including synengy with the Interconnection of Electric Grids of Nile Equatorial

Lakes Countries Project. Both parties reconfirmed needs and urgency of rural community electrification and agreed to take necessary action by conveying strong recommendation to decision makers for the smooth and timely implementation of the Project to both governments. The Project Sites are shown in Annex-1.

3. Responsible and Implementing Organization

(1) The responsible organization for the Project is the Ministry of Energy and Mineral Development (MEMD).

(2) The implementing agency is the Rural Electrification Agency (REA). The organization clearts of MEMD and REA are shown in Anoex-2 and Annex-3, respectively.

4. Components of the Project

4. Comparison of the Project JICA explained the result of analysis on the 1th Survey to Ugandan side and also explained following main components of the Area-4, the highest prioritized project site. The detailed

contents of the components are described in Aunex 4. (1) Supply and installation of 33kV distribution lines in Mayuge-Lomino

(2) Installation of distribution transformers (J3kV/4)5-230V)

5. Janan's Grant Aid Scheme

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(1) The Ugandan side has understood the Japan's Grant Aid Scheme explained by the Team as described in Annex-5 and Annex-6.

(2) The Ugandan side will take necessary measures, as described in Annex-7, for smooth implementation of the Project as prerequisites for the Japan's Grant Aid to be implemented.

6. Environmental and Social Considerations

(1) The Ugandan side agreed to comply with the JICA Guidelines for Environmental and Social The Opinical size (2004) (hereinafter referred to its "JICA Guidelines") as well as Ugandan laws and regulations, and to prepare Environmental Checklist and Monitoring Form which are designated by JICA Guidelines for an outline design.

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(2) Both parties confirmed that a project brief document was required for the Project to obtain approval from the National Environment Management Authority (NEMA). The project brief document would duly include IEE level study and mitigation measures for the selected section of distribution line. The project brief document for the Project will be prepared and submitted to the NEMA by the end of August, 2011. An approval is to be expected by the end of October, 2011.

 (3) Both parties agreed followings in relation to environment and social considerations
 (a) REA assigned an environment officer during the 2rd Field Survey to coordinate the environmental activities, survey for environmental impacts and miligation measures, and compile baseline data for preparation of the project brief

- (b) REA will conduct stakeholder meetings (SHM) on July 13 and 14 (tentative) at Namayingo and Mayage district headquarters respectively, inviting district officials and community
- leaders from the Project areas. The proposed agendu of SHM will include; (i) Explanation of government policy and plan in rural electrification.

 (ii) Presentation of project features,
 (iii) Presentation of the route map of 33kV distribution line, location map of transformers and load centers,

- (iv) Characteristics of project impacts and mitigation measures at sltes, and (v) Enhance awareness in community.
- Records and findings of the SHM will be incorporated in the Project Brief.
- (c) JICA is to monitor the progress of environmental activities in terms of the overall project schedule and review and advise on the outcomes in order to ensure conformity with JICA Environmental and Social Consideration Guidelines.
- (4) The Ugandan side agreed to secure lands necessary for implementation of the Project. (5) The Ugandan side agreed to secure funding for and execution of the above environmental atters in a schedule as required for smooth execution of the Project.

7. Technical Considerations

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The Ugandan side will formulate the technical notes together with the Team during the 2nd Field Survey. The technical notes aims at clarifying works to be done by the Ugandan side for smooth implementation of the Project especially data and document collection for further analysis in the outline design and environmental and social consideration activities.

R. Schedule of the Survey The Team will continue the Survey in Uganda until July 21, 2011. Based on the results of the Survey, JICA plans to send a mission to explain the Draft Final Report in October, 2011.

9. Other Relevant Issues

(1) Status of the Survey

The Team explained that the purpose of the Survey is to collect necessary information and data for 1) the evaluation of the relevance, appropriateness and urgency of the Project, 2) the identification of the priorities of the components of the Project, and 3) the identification of the

issues to be cleared for implementation of the Project. Therefore the project site for the Survey and components confirmed by both parties may not necessarily be approved by the Government of Juguns,

(2) Stable and reliable electricity supply in the Project Sile

(2) statistic and remain electronic apply in the respective Both parties have discussed and confirmed necessity for further analysis in the related transmission line and diarribution lines for stable and reliable electricity apply in the Project sife. In order to realize power supply stability in the region, both parties agreed that the Ugandar elde will submit an additional proposal by the end of the 2nd Field Survey. The team will review and evaluate technical and economic viability of the proposal for the further consideration of Japanese government.

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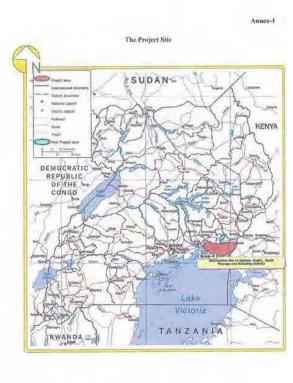
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- (3) Confirmation of information/ data submission in the 1st field survey, MEMD/REA agreed on the following measures to minimize the In the 1 replaced, encodering the desting of the communities in the Project sites.
 Revision of policy, which was specifically the Rural Electrification Strategy and Plan
 - (RESP) Social and economic data in the Ana-4 were in he confirmed during the 2" Field Survey
 - of the Project. To realize timely implementation of low valuage connection to the communities for the
 - Project by making necessary arrangements including measures for avoiding a delay in the procurament procedures by initiating the contract as soon as the Outline Design completed
- (4) Counterpart Personnel (4) Connerport resonant The Team requested the Ugandan skit that necessary number of connerport personnel shall be assigned to the Team and necessary arrangements with related organizations shall be malle during the Survey in Uganda. The Ugandan side agreed to support the Team based on the request.

(5) Questionnaices The Team requested the Ugandan side that the answers to the questionamines which the Team had already submitted to the Ugandan side shall be given to the Team by July 19, 2011

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Annexel	The Project Site
Annex-2	Organization charts of MEMD
Amex-3	Organization charts of REA
Amex-+	Components of the Project confirmed by the Ugmidan side and the Jananese side
Annex-5	Inpen's Grant Aid
Annex-6	Flow Chart of Japan's Grant Aid Procedures
Annex-7	Major Undertakings to be taken by Each Government



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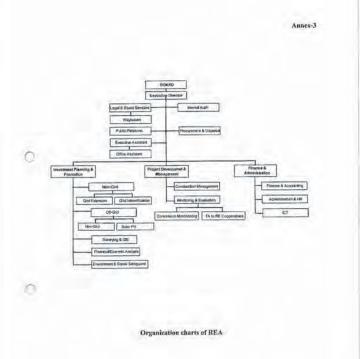
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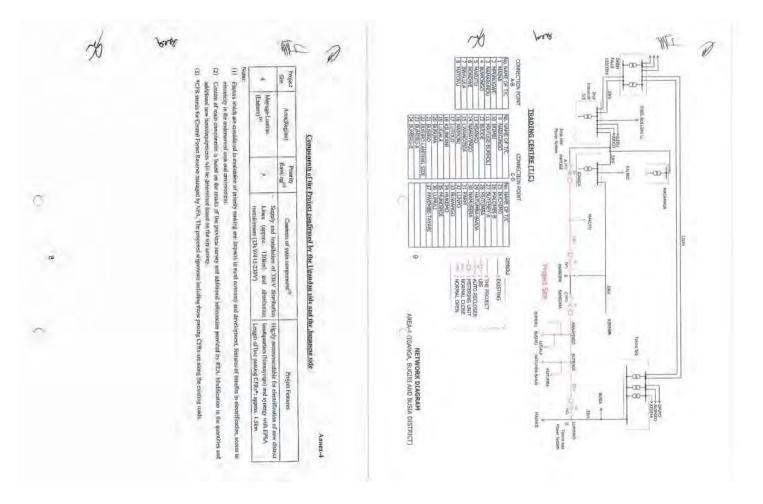
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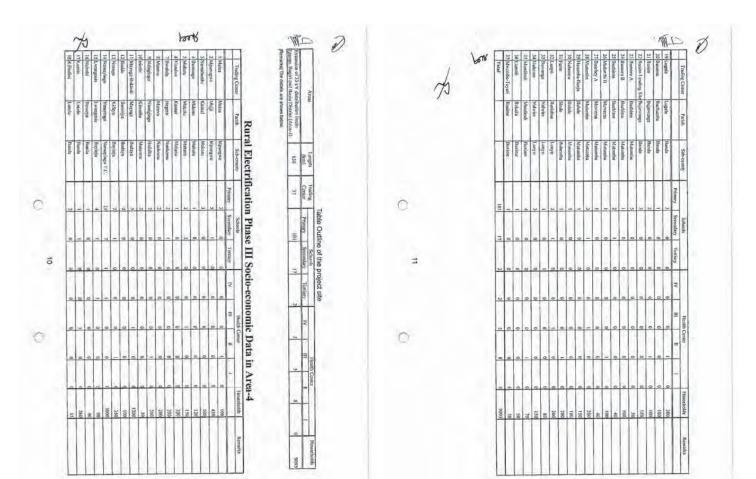
Annex-2 Т e for Mineral Develop w of Stnie INTERACT Trender 4.900 Petroleum Exploration Energy Resource Min tar Planning / Policy Addyno Unit iogy Die New & Renewable Energy Sources Dy dards Div Geology Dit Au Laboratory Div ni Ee Tax Energy Ethomoty Day Gauphynics Der Mines Dee ić Fower D Gendera De e Petrolesson Papeline and Techning Visit



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JAPAN'S GRANT AID

The Government of Japan (hereinafter referred to as "the GOJ") is implementing the organizational reforms to improve the quality of ODA operations, and as a part of this realignment, a new JICA law was entered into effect on October 1, 2008. Based on the law and the decision of the Government of Japan (horeinafter referred to as "the GOV"), JICA has become the excerding agency of the Grant Aid for General Projects, for Pisheries and for Cultural Cooperation, etc.

The Grant Aid is uon-reimbursable fund to a recipient country to procure the facilities, requipment and services (engineering services and transportation of the products, etc.) for economic and social development of the country under principles in accordance with the relevant laws and regulations of Japan. The Grant Aid is not supplied through the donation of materials as such.

1. Grant Aid Procedures

The Japanese Grani Aid is conducted as follows-Preparatory Survey (hereinafter referred to as "the Survey")
 The Survey conducted by JICA

- ·Appraisal &Approval
- Appraisal by The GOJ and JICA, and Approval by the Japanese Cabinet
- Determination of Implementation The Notes exchanged between the GOJ and a recipient country
- *Grant Agreement (hereinafter referred to as "the G/A") Agreement concluded between JIC4 and a recipient country
- · Implementa

- Implementation of the Project on the basis of the G/A

2. Preparatory Survey

(1) Contents of the Survey

The nim of the Survey is to provide a basic document necessary for the appraisal of the Project

- The part of the survey is to provide a survey are as follows: by JICA and the GO, The contents of the Survey are as follows: Confirmation of the background, objectives, and benefits of the Project and also institutional capacity of agencies concerned of the recipiont country necessary for the Implementation of the Project.
 - Evaluation of the appropriateness of the Project to be implemented under the Grant Ald
 - Scheme from a technical, financial, social and economic point of view. Confirmation of items agreed on hy both parties concerning the basic concept of the . Project.
 - Preparation of a basic design of the Project
 - Estimation of costs of the Project.

The contents of the original request by the recipient country are not necessarily approved in their initial form as the convents of the Grant Aid project. The Basic Design of the Project is confirmed considering the guidelines of the Japan's Grant Aid scheme.

JICA requests the Government of the recipient country to take whatever m



to ensure its self-reliance in the implementation of the Project. Such measures must be guaranteed even though they may fall outside of the jurisdiction of the organization in the recipient country sexually implementing the Project. Therefore, the implementation of the Project is confirmed by all relevant organizations of the recipient country through the Minutes of Discussions.

(2) Selection of Consultants

For anisoth implementation of the Survey, JICA uses (ii) registered consulting firm(s). JICA scleats (a) firm(s) based on proposals submitted by interested firms.

13) Result of the Survey

The Report on the Survey is reviewed by JICA, and after the appropriateness of the Project is confirmed. JICA recommends the GOJ to appraise the implementation of the Project.

3. Janun's Grant Aid Scheme (1) The E/N and the G/A

After the Project is approved by the Cabinet of Japan, the Exchange of Notesthereinafter referred to as "the E/A") will be singed between the GOJ and the Government of the recipient country to make a plead for assistance, which is followed by the conclusion of the G/A between JICA and the Government of the recipient country to define the necessary articles to implement the project, such as payment conditions, responsibilities of the Government of the recipient country. and procurement conditions.

(2) Selection of Consultants

The compliant firm(s) used for the Survey will be recommended by JICA to the recipient. country to also work on the Project's implementation after the E/N and the G/A, in order to maintuin technical consistency.

(3) Eligible anone country

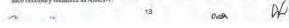
(a) eligible source country (d) where the imponess fract Aid, in principle, lapanese products and services including transmort or liose of the recipient country are in be purchased. When BCA and the Government of the recipient country or its designated authority deen it necessary, the Grant Aid may be used for the purchase of the products or services of a third country. However, the prime contractors, nanely, constructing and procurement firms, and the prime consulting firm are limited to "Japanese material". nationals"

(4) Necessity of "Verification"

(a) recessing of vertication The Government of the recipient country or its designated authority will conclude contracts denominated in Japanese year with Japanese nationals. Those contracts shall be verified by JICA. This "Verification" is deemed necessary to secure accountability to Japanese taxpayers.

(5) Major undertakings to be taken by the Government of the Recipient Country In the implementation of the Grani Ald Project, the recipient country is required to undertake such necessary measures as Aunex-7.

Annex-6



(6) "Proper Use"

The Government of the recipient country is required to maintain and use the facilities constructed and the equipment purchased under the Grant Alid properly and effectively and to assign staff necessary for this operation and maintenance as well as to hear all the expenses other than overed by the Grant Aid.

(7) "Export and Re-export"

The products purchased under the Grant Aid should not be exported or re-exported from the recipient country

(8) Banking Arrangements (B/A)

- Doming Attengeness (07) (i) The Government of the recipient sountry or its designated authority should open an account in the name of the Government of the recipient country in a bank in Japan (hereinafter referred to as "the Bank"). JICA will execute the Grant Aid by making payments in Japanese yen to cover the obligations incurred by the Government of the recipient country or its designated authority under the Verified Contracts.
- b) The payments will be made when payment requests are presented by the Bank to JICA under an Authorization to Pay (A/P) issued by the Government of the resipient country or its designated authority.

(9) Authorization to Pay (A/P)

The Government of the recipient country should bear an advising commission of an Authorization to Pay and payment commissions to the Bank.

(10) Environmental and Social Considerations

A recipient country must ensure the social and environmental considerations for the Project and must follow the environmental regulation of the recipient country and the JICA Guidelines for Environmental and Social Considerations (April 2004).

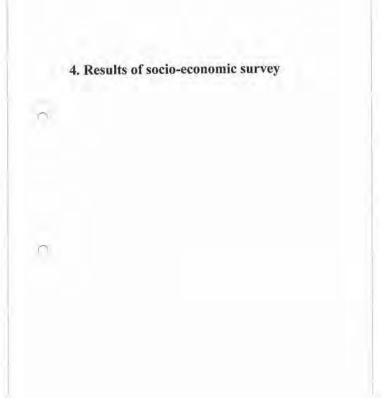
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Na,	Harres	To be covered by Groot Aid	To be covern by Recipien Side
I.	to secure [a lot] /[lota] all lond necessary for the implementation of the Project and to clear the (skal/[sites];	1.000	•
2	To construct the following facilities		1
	1) The building 2) The gates and forces in and around the site	•	
	2) the parking lot		
	4) The read within the site		
	5) The read canside the site		
3	To provide facilities for distribution of electricity, white supply and dealarges and other incidental facilities unceasing for the implementation of the Project muside the (site[field])		
	DElectricity	1.000	1
	a. The distributing power line to the size		
	b. The drop witting and internal wiring within the site	•	1
	u. The main circuit breaker and transformer		
	2) Water Supply	10	
	a. The city water distribution main to the site		
	b. The supply system within the site (receiving and clevited tanks)		
	3) Drainogs		
	 The city thatinge unin (for storn sever and ulives to the site) The duringe system (for toilet sever, contron sense, storm drainage and others) within the site 	•	1
	4) Gar Supply		1000
	a. The city gas main to the site	1	
	b. The gas supply system within the site		1.00
	5) Telephone System		
	 The telephone trank line to the main distribution frame/canel (MDF) of the building. 		
	 b. The MDF and the extension after the frame/panel b) Furthere and Equipment 		
	a, Geacal fumiane		
	h. Projecti ontriputent		-
4	To present prompt utilizating and assistants clearance of the products at ports of discriburization in the recipient country and to assist framual transportation of the	1	
	preducts 1) Marine (Afr) transportation of the Products from Japan to the recipitent country		
	2) The exercision and curtors clearance of the Product		
	at the port of risemburbation 3) Internal transportation from the post of disemburkation to the project site		
5	to use project site To ensum that constants indice, interval taxes and other fiscal locks which may be imposed in the recipient country with respect to the purchase of the products and the services { the scengted} / [be here by the Authority without using the Crunt]		
0	To succeed apparent painting where services may be required in councellon with the supply of the products and the services such settimet in may be necessary for hier entry into the receipted country and any dimension for the performance of hier work.		
7	To ensure that [the Facilities and the products]/[the Pacil(ties]/ [the products] be snaintuised and oned properly and effectively for the implementation of the Project.		
ħ	To hear all the expenses, rather itian those covered by the Grant, necessary for the		
-	implementation of the Project. To bear the following commissions paid in the Japanese bank for bonking servicer based		-
9	upon the B/A		
	1) Advising commission of A/P 2) Payment commission	-	-
10	 Payment commusion To give due environmental and social consideration in the implementation of the Project. 		

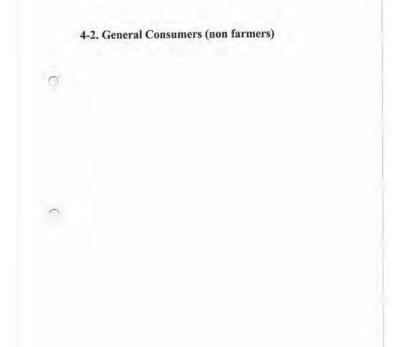


4-1. General Consumers (farmers)

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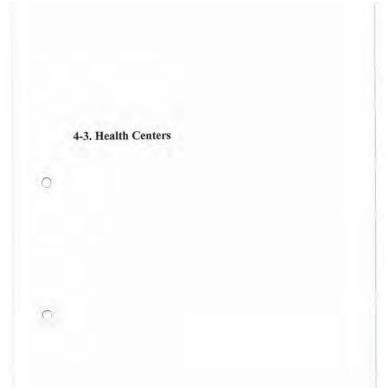


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Number of students		200
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lumber of class rooms		
tumber of boarding rooms		2
Morning or Might preps		Yes
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*Cost	UGX/month/	Non
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4-5. Other public facilities

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5. Estimation of loads of each consumer

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Village.		Blantery Ingo	Namavingo
nativitoris		District HO	Police Station
Number of staffs		581	7
Mamber of rooms		25	16
Hawker ghour mich.			
Equipments		generator(share with H/G IV)	solar panel with battery
*Cost	UGX/mth Non	Non	Nan
Louise			
Equipments		8 lights for security	2 herosene kings
*Cost	UGX/mth Non	Non	42,000
Others			
Equipments		Non	Non
Use		Non	Non
*Cost	UGX/mth Non	Non	Non
Existed aguipments		18 competens, 8 printers	radio communication, typewriter
Prospect after electrified		Install lights, atouty use of computers and printers and refrigerator	Steady use of radio equipments.
Others			[Grames situation] robbers, thefts, child abuess atc. [Number of Crimes]01/month Much expectations of lights for aecelty
Philos of fuel kerossne UGX2,800/L dissel: UGX3,200/L gasoline: UGX3,200/L dry cell: UGX1,200/Pas- centroal: UGX1,200/Pas- centroal: UGX1,200/00/C/Lindes			

	Equipment	Power Consumption	Number of Equipment	Number of reamy	Usage Fastor	Power Consumption
Primary Schoel	Deskton Computer	90]W	2]unt	I Class room	0.6	14
Contract of Contra	Printer	301W	the f	T Claza room	0.6	2
	Photosopying Mashine	500 W	1 set	1 Class room	8.0	40
-	Flaterspent Lamp	20 W	4 5A3	10 Cass room	0.8	64
	IV	100 W	1 set.	1 Elass noom	0.8	ĥ
	Floursbent Lunip	20 W	4 int	1 Boarding room	8,0	6
					-	135
-					0.0	85
Secondary School	Detistop Computer	1 90 W	12 pet	1 Class toots	0,6	2
	Printer	30 W 500fW	1 set	1 Class room	0.8	40
	Photocopying Machine	20 W	4 set	6 Class room	0.8	38
	Flourescent Lung	TIDOIW	Tiset	1 Class room	D.B	8
	Flourscent Lump	20 W	4 net	1 Boarding room	0.6	6
	Floor scene Charles			and the second second	1.00	181
				1.		190
Tenniary Solvool	Desktop Consular	Wibe	12 set	1 Glass room	0.8	38
Constant August	Printer	30 W	1 luet	1 Class room	0,8	2
	Phintocepying Machine	300 W	1 set	I Class room	0.8	40
	Floursport Lump	- 20 W	4 sut	E Class room	0,8	
1	TV	100 W	1 set	I Glass room	0.8	B
	Flouracent Lump	20 W	4 set	1 Bounding room	0.8	6
			-	3 -	-	184
		-			0.8	
Health Center IV	Desktop Gemputer	W 00	4 her	1 Room	0.8	40
	Printer	30 W	4 set	1 Popili	0.8	
	Protompying Mechine	500 W	A set.	1 Class roten 10 Roam	0.8	
	Flourscent Lump	90 W	1 1 1 1	4 Roam	0.8	
	Refrigerator Endescos Unit	700 W	1 net	1 Room	08	
	Unterpaccoe	700 W	1 807	1 Roem	0.8	50
	Mobile X-ray Mait	700 W	1 pert	1 Room	0.8	56
	Ultraspand Scamwir	1500W	2 1011	2 Room	18	
	Bedeide Monitor	BOIW	2 part	1 Room	0.8	
	Cadiograph	W DB	T yest	1 Room	0.8	
	Evacuator	60)W	2 set.	1 Room	0.8	
	Sterilizer	W 000	4 set	1 Room	0.8	192
					-	2500
			-	1 Room	0.8	
Haulth Genter III	Besktop Computer	WI08	1 set	1 Robin	0.8	
	Printer	20 W	4 00L	4 Flaom	0.8	
	Fiburscent Lamp Refrigerator	20 W	1 set.	1 Room	0.8	
	Endelde Monifer	60 W	1 pet	1 Recorr	0.8	6
	Cadiograph	WICE	i set	1 Room	0.8	
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	/Sterilizer	600 W	i set:	1 Hagen	0.8	
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Haulth Center 8	Desktop Computer	90 W	Tibet	TIRisom	0.5	
	Printer	30 W	1 set	1 Room	0,8	
	Floursdent Lano	20 W	4 105	4 Room	0.8	
-	Refrigerator	80 W	1 sat	1 Room	0.8	
	Badaide Moretor	W 08	1 set 1 set	1 Room	0.8	
	Cadograph	601W	1 oet	1 Room	0.8	
	Evacuator Sterifizer	600iW	Tisat	IRodra	0.8	
-	adefilizer	0.0011	1000			100
					1	100
Houseboulds	Flouragent Lump	13 W	1 bet	2 Noem 1 Room	0.8	
/ Shops	TV	WIGOT	1 ant	1 Room	0.8	
- subsec	Refrigerator	90 W	Tjagt	1 Room	0,8	
	and the second s				-	172

6. Fact finding sheets Mayuge, Iganga, Busia, Namayingo and Bugiri districts