

Rwanda Energy Group (REG)  
Ministry of Infrastructure (MININFRA)  
The Republic of Rwanda

**PREPARATORY SURVEY REPORT  
ON  
THE PROJECT FOR  
IMPROVEMENT OF SUBSTATIONS  
AND  
DISTRIBUTION NETWORK (PHASE 3)  
IN  
THE REPUBLIC OF RWANDA**

**FEBRUARY 2018**

**JAPAN INTERNATIONAL COOPERATION AGENCY  
(JICA)**

**YACHIYO ENGINEERING CO., LTD.**

**WEST JAPAN ENGINEERING CONSULTANTS, INC.**

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## **PREFACE**

Japan International Cooperation Agency (JICA) decided to conduct the preparatory survey and entrust the survey to the Consortium consist of Yachiyo Engineering Co., Ltd. and West Japan Engineering Consultants, Inc..

The survey team held a series of discussions with the officials concerned of the Government of Rwanda, and conducted field investigations. As a result of further studies in Japan, the present report was finalized.

I hope that this report will contribute to the promotion of the project and to the enhancement of friendly relations between our two countries.

Finally, I wish to express my sincere appreciation to the officials concerned of the Government of Ghana for their close cooperation extended to the survey team.

February, 2018

Toshiyuki NAKAMURA

Director General,

Industrial Development and Public Policy Department

Japan International Cooperation Agency

## SUMMARY

### ① Overview of the Country

The Republic of Rwanda (hereinafter referred to as “Rwanda”) is located in central Africa between 1° - 3° south latitude, and 29° - 31° east longitude, and is bordered by Tanzania to the east, the Democratic Republic of the Congo to the west, the Republic of Uganda to the north, and Burundi to the south. The population of Rwanda is about 12.1 million (2014). Its territory is approximately 26,300 km<sup>2</sup> (about 0.07 times of the area of Japan) and almost completely flat land more than 1,500 meters above sea level. Its climate is subtropical throughout the year with an annual average temperature of about 21.3°C. The heavy rainy season extends from February to May.

However, economy of Rwanda is dependent on the primary industry, as its main exporting materials are coffee and mineral resources. Rwanda is exposed to fluctuation of their international market prices.

### ② Background of the Project

Under these circumstances, Rwanda is planning to increase the installed capacity and diversity energy resources by utilizing indigenous resources in accordance with the “National Energy Policy and Strategy”, “Economic Development and Poverty Reduction Strategy”, “Electric Development Strategy”, etc. Nevertheless, more policies and strategies are insufficient to achieve the targeted increased and diversified electrical energy sector unless such policies and strategies are accompanied by a well prepared concrete Electricity Master Plan that takes into consideration an effective and efficient energy mix.

The distribution network in Kigali city was mainly established in the 1980s and it does not cover all the metropolitan area. Besides the civil war and insufficient maintenance has deteriorated existing facilities and it has led to the high distribution loss rate and show accident restoration in the network. To meet the increasing demand for electricity in Kigali City, the distribution network is needed to be upgraded and expanded.

Based on the background, the Government of Rwanda (GOR) has requested the Government of Japan (GOJ) on the Project for Improvement of Substations and Distribution Network (Phase 3).

### ③ Outline of the study findings and Project contents

In response to the request, JICA dispatched the Survey Team to Rwanda from May 26 to July 2, 2017 (first field survey) in order to reconfirm the contents of the request and discuss the contents for implementation with related agencies on the Rwanda side (responsible government agency: Ministry of Infrastructure (MININFRA), and implementing agency: EDCL), and survey the Project sites and gather related materials and data.

On returning to Japan, the Survey Team examined the necessity, social and economic impacts and validity of the Project based on the field survey materials and compiled the findings into the draft

preparatory survey report. Also, JICA dispatched the Survey Team to Rwanda for the second field survey (outline explanations) from December 9 to December 17, 2017 in order to explain and discuss the draft preparatory survey report and reach a basic agreement with the Rwandan counterparts.

The Project plan compiled based on the survey findings targets the procurement and installation for the improvement of transmission and distribution lines and substation facilities, and the construction of new substations and related facilities. The Outline of the Basic Plan is as follows;

#### Outline of the components of the Project

|                          | Major Components  | Quantity/Capacity   |
|--------------------------|---|---|
| Procurement/Installation | <b>1. New Gasogi Substation</b><br>(1) Transformer<br>1) 15 MVA, 110/15 kV Transformer (Outdoor)<br>2) 250 kVA, 15/0.4 kV Earthing transformer (Outdoor)<br>(2) 110 kV Switchgear (Single busbar system)<br>1) Transmission line bay (Outdoor)<br>2) Transformer bay (Outdoor)<br>3) Busbar (Outdoor)<br>4) Voltage transformers for busbar (Outdoor)<br>5) Accessories for 110 kV outdoor switchyard (Outdoor)<br>(3) 15 kV Switchgear (Gas insulated type, single busbar system)<br>1) 110/15 kV Transformer panels (Indoor)<br>2) 15 kV Feeder panels (Indoor)<br>3) Voltage transformer panel (Indoor)<br>4) Busbar connection panel (DS only) (Indoor)<br>(4) Control and protection (Indoor)<br>(5) SCADA system (Indoor)<br>(6) Communication system (Indoor)<br>(7) Substation power supply system (Indoor)<br>(8) Relocation of Existing 15 kV switchgear (Indoor) | 2 units<br>2 units<br>2 sets<br>2 sets<br>1 set<br>1 set<br>1 lot<br>2 panels<br>5 panels<br>1 panel<br>1 panel<br>1 lot<br>1 lot<br>1 lot<br>1 lot<br>3 panels |
|                          | <b>2. 110 kV Transmission Lines between Existing Transmission Line - New Gasogi Substation</b><br>110 kV Overhead lines (ACSR 240 mm <sup>2</sup> , single conductor)   | Approx. 0.2 km  |
|                          | <b>3. 15 kV Distribution Lines</b><br>(1) New Gasogi Substation - Nyagasambu<br>(2) New Gasogi Substation - Masaka Hospital<br>(3) New Gasogi Substation - Existing Distribution Line   | Approx. 11.5 km<br>Approx. 8.5 km<br>Approx. 0.1 km   |
|                          | <b>4. Maintenance Tool for the Equipment of the Project</b><br><b>5. Spare Parts for the Equipment of the Project</b>   | 1 lot<br>1 lot  |
| Construction Work        | <b>6. Foundation for the Equipment of the Project (Transformers, Towers for 110 kV Transmission Line, etc.)</b>   | 1 lot   |
|                          | <b>7. Building of new Gasogi substation</b>   | 1 building  |

Source: Preparatory Survey Team

#### ④ Project implementation schedule and cost estimation

In the event where the Project is implemented based on the Japan's Grant Aid scheme, the total cost of the Project will be (*confidential*). The costs to be borne by the Rwanda side will be 861,000

US\$ (approximately 96.5 million yen). The contents and costs to be borne by the Rwanda side are as given below:

- ① RAP Compensation and Expense for land preparation: 183,000 US\$ (20,500,000 JPY)
- ② Expenses for stockyard: 40,000 US\$ (4,500,000 JPY)
- ③ Expenses for Procurement and Installation of equipment related to SCADA system: 550,000 US\$ (66,100,000 JPY)
- ④ Expenses for Demolish work of 110 kV towers at Gasogi Substation: 10,000 US\$ (1,100,000 JPY)
- ⑤ Contingency (10 % : Payment of bank commission based on banking, etc.): 78,000 US\$ (8,800,000 JPY)

The implementation schedule for the Project including the detailed design will be approximately 24 months.

#### (1) Relevance

The Project is deemed to be highly appropriate as an aid undertaking since it will aid realization of development plans and energy policy in Rwanda and impart benefits for the general public of Rwanda.

#### (2) Efficiency

##### 1) Quantitative effects

| Outcome Indicator  | Base Value<br>(2017 Current Value) | Target Value (2023)<br>(3 years after the completion of the Project) |                  |
|--|------------------------------------|--|------------------|
|  |                                    | Without the Project  | With the Project |
| 1. 110 kV Transformer facility capacity of Gasogi substation (MVA) <sup>*1</sup>           | 10 MVA                             | 10 MVA   | 30 MVA           |
| 2. Annual Electricity Supply from Gasogi substation at the sending end (MWh) <sup>*2</sup> | 13,469 MWh                         | 57,159 MWh   | 86,724 MWh       |
| 3. Transformer load factor in Gikondo substation (%) <sup>*3</sup>                         | 56%                                | 82~100%  | 79~97%           |
| 4. Transformer load factor in Birembo substation (%) <sup>*3</sup>                         | 79%                                | 58~101%  | 53~87%           |

<sup>\*1</sup> Indicate facility capacity of Gasogi substation. (included New Gasogi substation)

<sup>\*2</sup> Indicate 15 kV evacuated power from Gasogi substation. (included New Gasogi substation)

<sup>\*3</sup> Described as an indicator after distribution load allocated. (Maximum demand / Facility capacity)

## 2) Qualitative effects

| Present Status and Problems  | Project Countermeasures<br>(Grant Aid Project)   | Extent of Project Effects and Improvement   |
|--|--|---|
| <p>1. The power demand in Gasogi area has been rapidly increasing, but the present capacity of power transformer is not sufficient and aging. It is a major cause of the unstable power supply and transmission and distribution network loss.</p> | <p>Procurement and installation of the following equipment:</p> <ol style="list-style-type: none"> <li><b>1. 110 kV Substation equipment</b> <ul style="list-style-type: none"> <li>• 30 MVA = 15 MVA × 2 banks</li> </ul> </li> <li><b>2. 110 kV Transmission and 15 kV distribution equipment</b> <ul style="list-style-type: none"> <li>• 110 kV overhead line (Approx. 0.2 km)</li> <li>• 15 kV overhead line (Approx. 20 km)</li> </ul> </li> </ol> | <p>Stable power supply will revitalize the industries and economic activities in Kigali and improve stable operation of public welfare facilities and healthcare services as well as the living environment of local residents.</p> |

To sum up, since Project implementation can be expected to have major effects, it is confirmed to be relevant for implementation under the Grant Aid scheme of the Government of Japan. Moreover, the Rwanda side is deemed to possess adequate personnel and budget for implementing the Project and conducting operation and maintenance after implementation.

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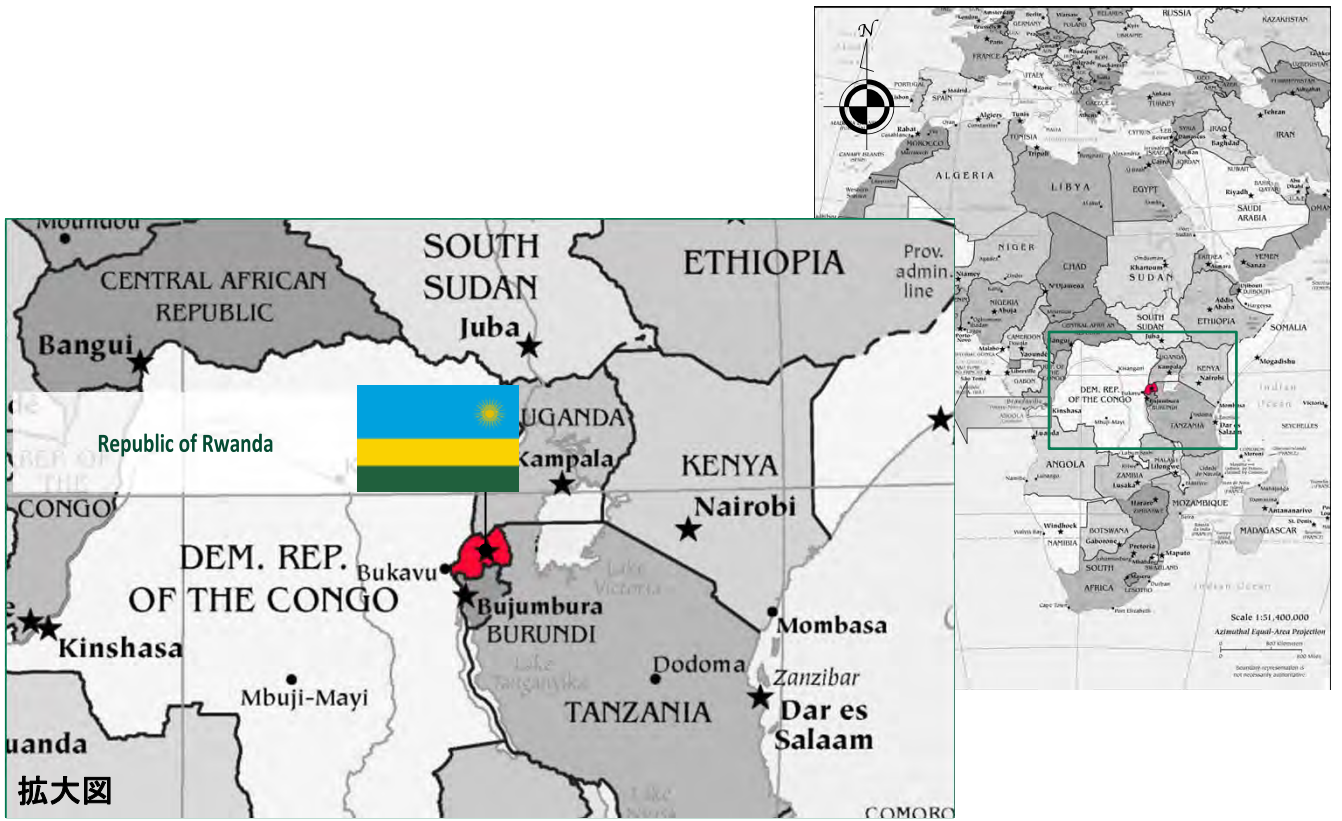


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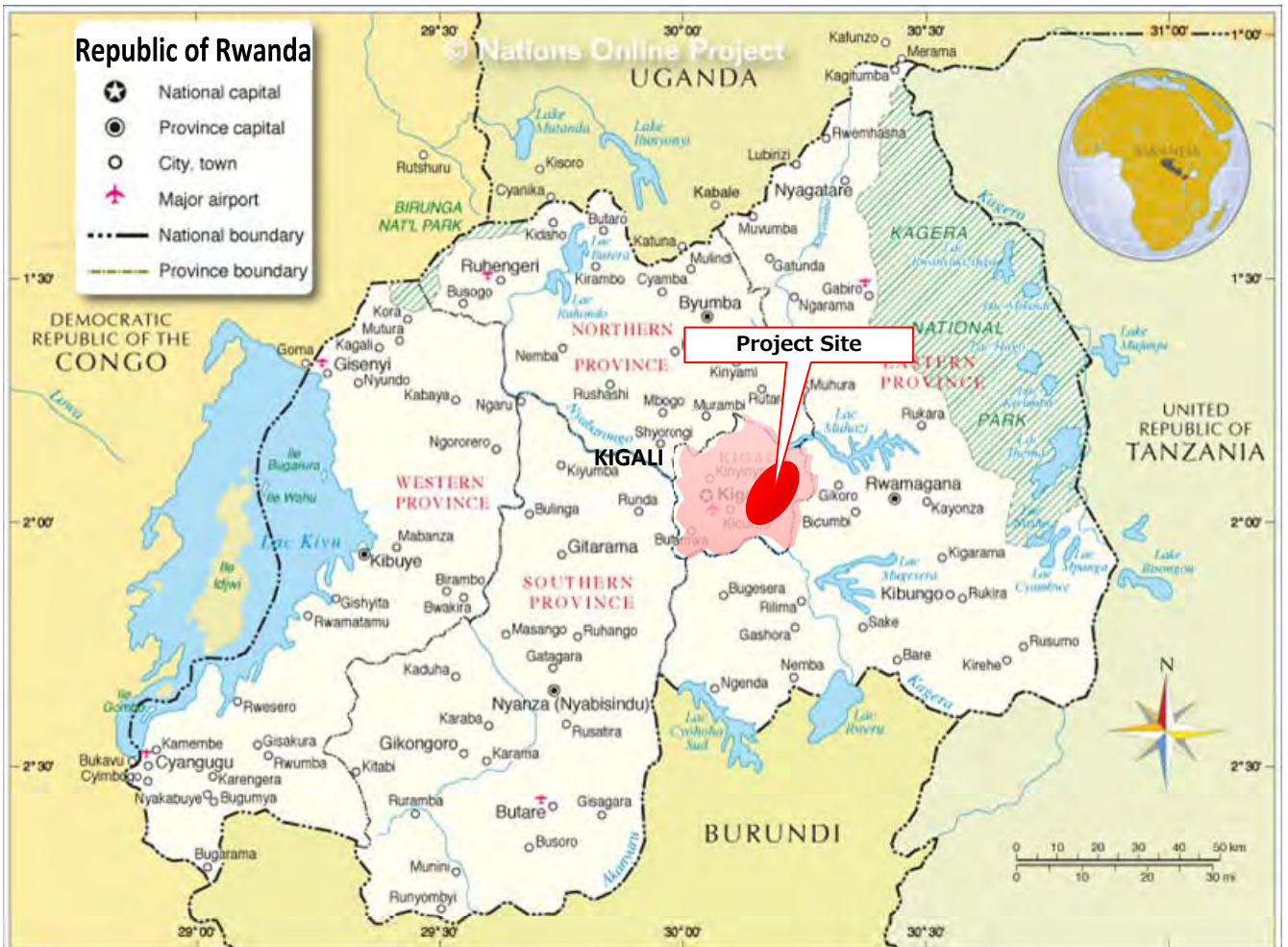
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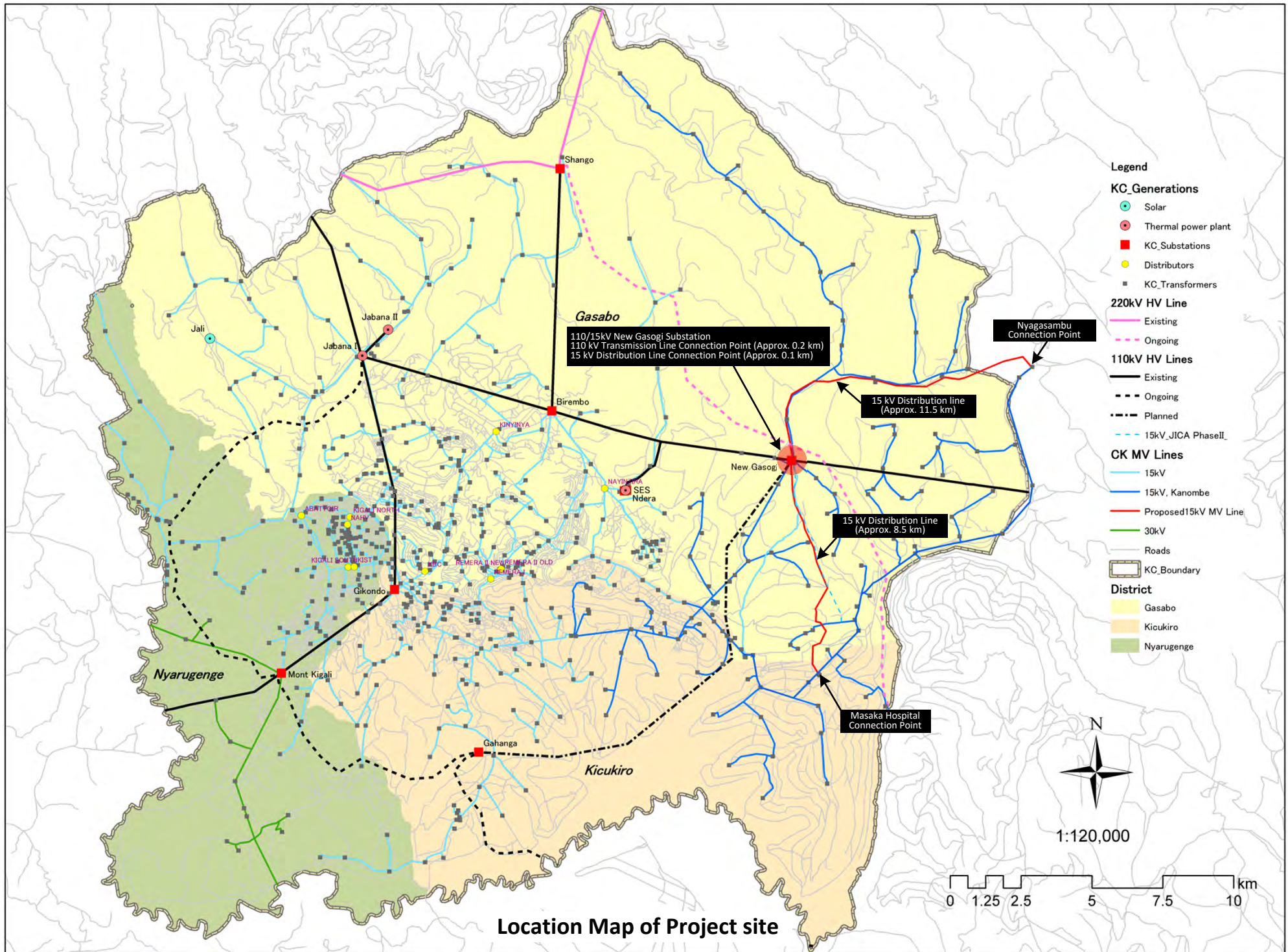
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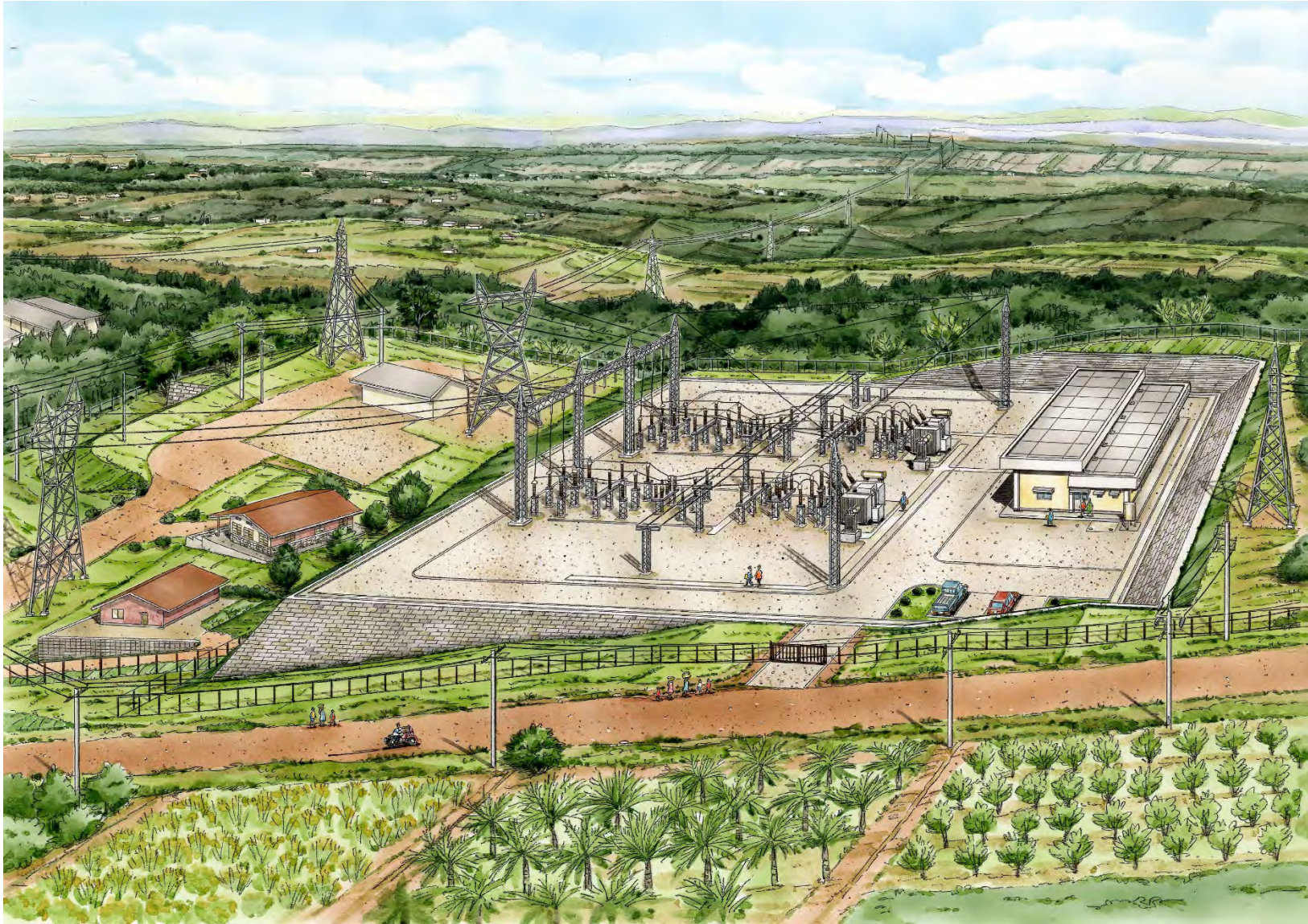
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Location of Project Site



Location Map of Project site



The Project for Improvement of Substations and Distribution Network (Phase 3)  
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| Table 3-4-2.2 | Qualitative Impacts (Whole Project) ..... | 3-5 |

## Abbreviations

|           |   |
|-----------|---|
| AFD       | Agence Française de Developpemen                                |
| AfDB      | African Development Bank  |
| ARAP      | Abbreviated Resettlement Action Plan                            |
| ACSR      | Aluminium Conductors Steel Reinforced                           |
| BCU       | Bay Control Units   |
| BTC       | Belgian Technical Corporation                                   |
| COMESA    | Common Market for Eastern and Southern Africa                   |
| DFID      | Department for International Development                        |
| DIN       | Deutseher Normenausschuss                                       |
| EAPP      | Eastern African Power Pool                                      |
| EARP      | Electricity Access Rollout Program                              |
| EDCL      | Energy Development Corporation Limited                          |
| EDPRS2    | Economic Development and Poverty Reduction Strategy (2013-2018) |
| EGL       | Energie des Grands Lacs   |
| EIA       | Environmental Impact Assess                                     |
| E/N       | Exchange of Notes   |
| ESSP      | Energy Sector Strategic Plan                                    |
| ETAP      | Electrical Power System Analysis & Operation Software           |
| EU        | European Union  |
| EUCL      | Energy Utility Corporation Limited                              |
| EWSA      | Energy Water and Sanitation Authority                           |
| FMO       | Financierings-Maatschappij voor Ontwikkelingslanden             |
| FONERWA   | Fund for Environment and climate change in Rwanda               |
| G/A       | Grant Agreement   |
| GDP       | Gross Domestic Product  |
| GIS       | Gas Insulation System   |
| GIZ       | Gesellschaft für Internationale Zusammenarbeit                  |
| GSW       | Galvanized Steel Wire   |
| IDA       | International Development Association                           |
| IEC       | International Electrotechnical Commission                       |
| IMF       | International Monetary Fund                                     |
| JEC       | Japanese Electrotechnical Committee                             |
| JEM       | Japan Engineering Management Inc.                               |
| JICA      | Japan International Cooperation Agency                          |
| JIS       | Japan Industrial Standards                                      |
| KfW       | Kreditanstalt für Wiederaufbau                                  |
| M/D       | Minutes of Discussions  |
| MCCB      | Molded Case Circuit Breaker                                     |
| MDGs      | Millennium Development Goals                                    |
| MINECOFIN | Ministry of Finance and Economic Planning                       |



|          |   |
|----------|---|
| MININFRA | Ministry of Infrastructure                      |
| MINIRENA | Ministry of Natural Resources                   |
| NECC     | National Electricity Control Centre             |
| OJT      | On the Job Training                             |
| ONAF     | Oil Natural Air Forced                          |
| ONAN     | Oil Natural Air Natural                         |
| OPGW     | Optical Ground Wire                             |
| PAPs     | Project Affected Persons                        |
| RDB      | Rwanda Development Board                        |
| REG      | Rwanda Energy Group                             |
| REMA     | Rwanda Environmental Management Agency          |
| ROD      | Record of Discussion                            |
| ROW      | Right of Way                                    |
| RPPA     | Rwanda Public Procurement Agency                |
| RTU      | Remote Terminal Unit                            |
| RURA     | Rwanda Utilities Regulatory Authority           |
| SCADA    | Supervisory Control and Data Acquisition System |
| TOR      | Term of Reference                               |
| VUP      | Vision 2020 Umurenge Programme                  |

# **CHAPTER 1      BACKGROUND OF THE PROJECT**

# **Background of the Project**

## **1-1 Background of the Project**

Electrical power consumption per capita in Rwanda is extremely low comparing with other East African countries, and 84 % of whole energy consumption is provided by traditional biomass sources such as charcoal and wood. Electrical power generated has been increased since 2004, when the serious power shortage occurred, however, the indexes of power supply, such as an electrification rate of Approx. 24 % (as of June 2016) and installed capacity of 175.98 MW (as of April 2017) are still at the lower end and indicate insufficient power supply to meet increasing power demand that results from a consistently growing economy (average of 8 % growth over past 2-3 years) and improved living standards.

The power generation plants in Rwanda consists mainly of hydro (47.9 %) and diesel (39.1 %), and thus the country faces a big challenge to raise foreign currency to import fossil fuel (for diesel power plants) whose prices on the world market are incessantly surging.

Under these circumstances, Rwanda is planning to increase the installed capacity and diversity energy resources by utilizing indigenous resources in accordance with the “National Energy Policy and Strategy”, “Economic Development and Poverty Reduction Strategy”, “Electric Development Strategy”, etc. Nevertheless, more policies and strategies are insufficient to achieve the targeted increased and diversified electrical energy sector unless such policies and strategies are accompanied by a well prepared concrete Electricity Master Plan that takes into consideration an effective and efficient energy mix.

The distribution network in Kigali city was mainly established in the 1980s and it does not cover all the metropolitan area. Besides the civil war and insufficient maintenance has deteriorated existing facilities and it has led to the high distribution loss rate and show accident restoration in the network. To meet the increasing demand for electricity in Kigali city, the distribution network is needed to be upgraded and expanded.

Based on the background, the Government of Rwanda (GOR) has requested the Government of Japan (GOJ) on the Project for Improvement of Substations and Distribution Network Phase 3.

## **1-2 Natural Conditions**

### **1-2-1 Location**

Sites conducted natural condition survey are shown as below.

- ◆ New Gasogi substation (Approx. 8,583 m<sup>2</sup>)
- ◆ 110 kV Transmission line (New Gasogi substation – Branch point, Approx. 0.2 km)
- ◆ 15 kV distribution line (New Gasogi substation – Nyagasamb, Approx. 11.5 km)
- ◆ 15 kV distribution line (New Gasogi substation – Masaka hospital, Approx. 8.5 km)

### **1-2-2 Topographic condition**

#### 1) New Gasogi substation

The construction site of New Gasogi Substation is scheduled for hillside on the north side of the existing substation. Earth work including cutting/filling shall be done at the site, but the altitude was 1,640 m at the southern side with the lowest elevation, and was 1,650 m at the highest northern site boundary. Because the site has a height difference of about 10 m, large volume of earth work. The balance between the cutting and the filling is important, but it is also important to support the foundation of substation equipment on a stable ground. On the basis of this survey result, secure necessary land for transformer substation, implement appropriate and stable construction plan.

#### 2) 110 kV Transmission line and 15 kV Distribution line

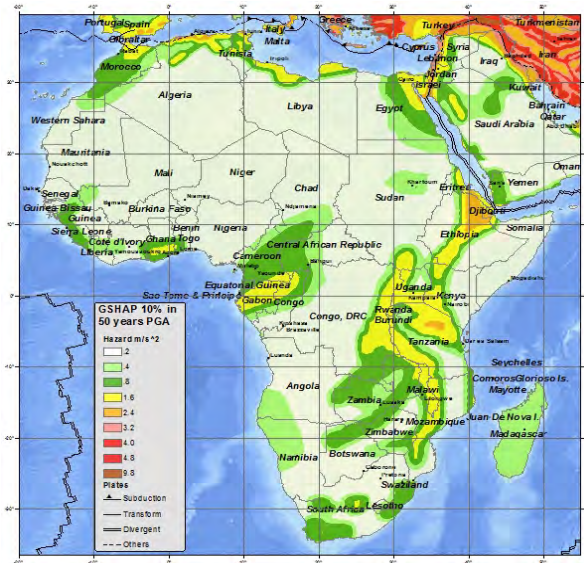
For the construction of transmission/distribution lines, topographical surveys of transmission/distribution lines and bearing surveys at the locations of the new towers shall be conducted.

### **1-2-3 Geological condition**

The geology of the planned area is the ground mainly composed of red clay layer, weathered rock, rocky ground etc., the ground condition is good, the ground water level can not be seen because it is a hilly land. As a whole, the ground is solid, there is no problem as a supporting ground for transformer facilities and tower foundation, remove humus soil on the ground surface and adopt the foundation directly.

### **1-2-4 Earthquakes**

A magnitude 4.7 earthquake on January 17, 2002, and a magnitude 6.0 earthquake on February 4, 2008 had been recorded in Rwanda. Disaster Prediction Map in Africa is shown in Figure 1-2-4.1. The earthquake on 2008 was away approximately 300 kilometers north-west of Kigali at a depth of 10 kilometers. There is no record about the seismic intensity of Kigali by the earthquake on 2008. Therefore, seismic load shall be considered as horizontal load 0.10 G.



Source: U.S. Geological Survey

Figure 1-2-4.1 Disaster Prediction Map in Africa

### 1-2-5 Ground water quality

Groundwater quality does not include substances affecting buildings.

### 1-2-6 Weather conditions

Weather conditions are shown in Table 1-2-4.1.

Table 1-2-4.1 Weather Conditions

| Area                          |         | Kigali city             |
|-------------------------------|---------|-------------------------|
| Altitude                      |         | 1,560m                  |
| Temperature                   | Maximum | 32°C                    |
|                               | Minimum | 12°C                    |
|                               | Average | 22°C                    |
| Maximum humidity              |         | 67~87%                  |
| Maximum wind speed            |         | 35 m/s                  |
| Rainfall (Maximum in a month) |         | 188 mm                  |
| Seismic load                  |         | 0.10 G                  |
| Soil bearing capacity         |         | Depend on boring survey |

Source: Rwanda Meteorology Agency

## 1-3 Environmental and Social Considerations

### 1-3-1 Outline

#### 1-3-1-1 Schedule

Environmental and social considerations for this project consist of 1) Environmental Impact Assessment (EIA), 2) Preparation of Abbreviated Resettlement Action Plan (ARAP), 3) Implementation of ARAP. The schedule for EIA and ARAP, which was agreed upon between EDCL and JICA Study Team, is shown in Table 1-3-1-1.1. The details of EIA and ARAP (land acquisition and resettlement) are described in 1-3-2 and 1-3-3 respectively.

Table 1-3-1-1.1 Schedule of Environmental Assessment and Preparation of ARAP

| Items                  | Activities                                       | Organizations in charge     | 2017 |      |      |      |      |      |      |      |      |      |      |     | 2018 |  |   |
|------------------------|--|-----------------------------|------|------|------|------|------|------|------|------|------|------|------|-----|------|--|---|
|                        |  |                             | Jun. | Jul. | Aug. | Sep. | Oct. | Nov. | Dec. | Jan. | Feb. | Mar. | Apr. | May |      |  |   |
| EIA                    | Submission of project brief to RDB for screening | EDCL/JICA/ Local consultant | ■    |      |      |      |      |      |      |      |      |      |      |     |      |  |   |
|                        | Issue of screening results                       | RDB                         |      | ■    |      |      |      |      |      |      |      |      |      |     |      |  |   |
|                        | Further environmental study                      | EDCL/ Local consultant      |      | ■    | ■    | ■    |      |      |      |      |      |      |      |     |      |  |   |
|                        | Submission of EIA report to RDB                  | EDCL/ Local consultant      |      |      |      | ■    |      |      |      |      |      |      |      |     |      |  |   |
|                        | Issue of EIA Certificate of Authorization        | RDB                         |      |      |      |      |      |      |      |      |      |      | ■    |     |      |  |   |
| Preparation of ARAP    | ARAP study                                       | EDCL/ Local consultant      |      | ■    | ■    | ■    | ■    | ■    | ■    | ■    | ■    | ■    | ■    | ■   |      |  |   |
|                        | Submission of ARAP to JICA Study Team            | EDCL/ Local consultant      |      |      |      |      |      |      |      |      |      |      |      |     |      |  |   |
|                        | Approval of ARAP by EDCL                         | EDCL                        |      |      |      |      |      |      |      |      |      |      |      |     |      |  |   |
| Implementation of ARAP | Completion of land acquisition/ compensation     | EDCL                        |      |      |      |      |      |      |      |      |      |      |      |     |      |  | ■ |
| Others                 | Mobilization of a local consultant               | JICA/ Local consultant      | ■    | ■    | ■    | ■    | ■    | ■    | ■    | ■    | ■    | ■    | ■    | ■   |      |  |   |

Note: Implementation of ARAP should be fully completed within three months after the approval of the Project by the Japanese Government.

Source: JICA Study Team

#### 1-3-1-2 Directions of Land Acquisition and Resettlement

The schedule of land acquisition agreed upon between EDCL and JICA Study Team is shown in Table 1-3-1-2.1. For the smooth implementation of the project, EDCL agreed to complete all the land acquisition as well as compensation process within three months after the approval of the Project by the Japanese Government.

Table 1-3-1-2.1 Schedule of Land Acquisition after ARAP Preparation

| Stage   | Responsible bodies                        | Actions   | Timeframe                       |
|---|---|---|---------------------------------|
| 1. Submission of the Payment order to MINECOFIN | From EDCL Finance Department to MINECOFIN | From EDCL finance department, the Payment order and the original compensation forms are forwarded to the Ministry of Finance for Payment. | At the beginning of March, 2017 |

| Stage                           | Responsible bodies                                | Actions  | Timeframe   |
|---------------------------------|---|--|---|
| 2. Payment process by MINECOFIN | From the MINECOFIN to the National Bank of Rwanda | MINECOFIN submits the Payment Order to the National Bank of Rwanda. The Payment by the National Bank of Rwanda through Project Affected Persons' (PAPs') respective Bank accounts. | March to April, 2018  |
| 3. Relocation of PAPs           | PAPs/ EDCL  | The PAPs will be relocated.  | April to May, 2018  |
| 4. Land title request           | EDCL/ Kigali City                                 | EDCL will submit request for transfer of land title to Kigali City   | May, 2018<br>(Within 3 months after the approval of the Project by Japanese Government) |

Source: JICA Study Team

## 1-3-2 Environmental Impact Assessment

### 1-3-2-1 Summary of the Project Components

The details of all project components are described in the Chapter 2. Among these, the components that may have impacts on natural and social environments are shown in Table 1-3-2-1.1.

Table 1-3-2-1.1 Project Components and Land Required for Project

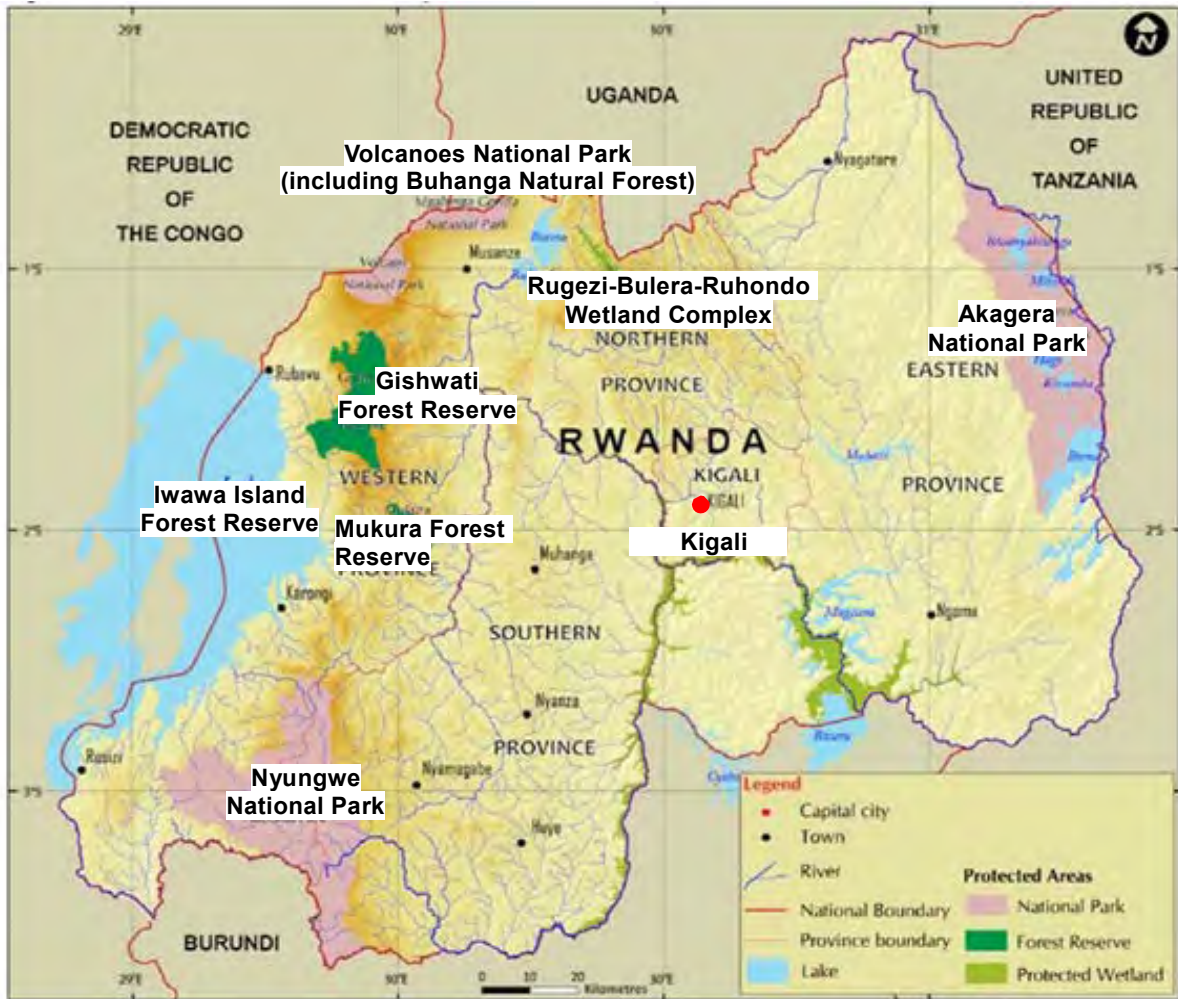
|    | Project Components   | Land Required   |
|----|--|---|
| 1. | New Gasogi substation  | 8,583m <sup>2</sup>   |
| 2. | 110 kV Transmission line<br>From the existing transmission line (between Birembo (Ndera) and Musha substations) to New Gasogi Substation | Approx. 0.2 km, 2 towers  |
| 3. | 15 kV Distribution line<br>New Gasogi substation – Nyagasambu  | Approx. 11.5 km<br>ROW 12m (6m + 6m)<br>Land required for tower base 13,950m <sup>2</sup><br>(225m <sup>2</sup> (=15m x 15m) x 62 towers) |
| 4. | 15 kV Distribution line<br>New Gasogi substation – Masaka  | Approx. 8.5km<br>ROW 12m (6m + 6m)<br>Land required for tower base 10,800m <sup>2</sup><br>(225m <sup>2</sup> (=15m x 15m) x 48 towers)   |

Note: ROW (Right-of-Way): ROW is stipulated in the Guideline of Rwanda. Refer to 1-3-3-1 for the detail information.

Source: JICA Study Team

### 1-3-2-2 Outlines of Project Sites

The proposed project site is located within the City of Kigali at an altitude of around 1,500m with several hills. The city center of Kigali has commercial and residential areas, surrounded by residential and agricultural areas.



Source: Rwanda State of Environment and Outlook, 2015, REMA

Figure 1-3-2-2.1 Protected Areas in Rwanda

There are no protected areas within and around the City of Kigali. Rwanda has three National Parks (Akagera, Nyungwe, Volcanoes), three Forest Reserves (Gishwati, Iwawa Island, Mukura), one Forest of cultural importance and one Ramsar registered site (Rugezi-Bulera-Ruhondo wetland complex) (Figure 1-3-2-2.1). However, all of these are situated near the borders, away from Kigali. There are no ecologically, historically, and culturally important habitats designated by the laws within and around the City of Kigali.

### 1-3-2-3 Legal and Institutional Frameworks for Environmental and Social Considerations

#### (1) Legal Framework for Environmental and Social Considerations in Rwanda

Legal framework relevant to environmental and social considerations in Rwanda is summarized in Table 1-3-2-3.1. According to the Constitution, every citizen is entitled to a healthy and safe environment and every person, together with the State, has the duty to protect, safeguard and promote the environment. Further, environmental laws and development policies and strategies promote proper environmental management system aimed at poverty reduction and sustainable



development.

In terms of Environmental Impact Assessment, *Ministerial Order No. 003/2008 of 15/08/2008 relating to The Requirements and Procedure for Environmental Impact Assessment* and the *Ministerial Order No. 004/2008 of 15/08/2008 establishing the List of Works, Activities and Projects that have to Undertake an Environment Impact Assessment* stipulate requirements of the EIA Process and projects which require EIA. These two orders are the basis of EIA in Rwanda. EDCL uses World Bank safeguard policies as a benchmark to handle environmental and social aspects.

Regarding the ROW, Rwanda Utilities Regulatory Authority (RURA) formulated the *Guideline No. 01/GL/EL-EWS/RURA/2015 on Right-of-way for Power Lines* in 2015, based on which the ROW of this project was determined.

Table 1-3-2-3.1 Legal Framework Concerning Environmental and Social Considerations (including guidelines)

| Category                          | Name   | Year |
|-----------------------------------|--|------|
| Constitution                      | The Constitution of the Republic of Rwanda   | 2003 |
| Environment                       | No.04/2005 Organic Law determining the modalities of protection, conservation and promotion of environment in Rwanda   | 2005 |
|                                   | No.08/2005 of 14/07/2005 Organic Law determining the use and management of land in Rwanda”   | 2005 |
| EIA                               | Ministerial Order No. 003/2008 of 15/08/2008 relating to The Requirements and Procedure for Environmental Impact Assessment                                  | 2008 |
|                                   | Ministerial Order No. 004/2008 of 15/08/2008 establishing the List of Works, Activities and Projects that have to Undertake an Environment Impact Assessment | 2008 |
|                                   | General Guidelines and Procedure for Environmental Impact Assessment 2006  | 2006 |
|                                   | Sector Guidelines for EIA for Hydro-Power Development Projects   | 2008 |
| Land Acquisition and Resettlement | No. 08/2005 Organic Law determining the Use and Management of Land in Rwanda   | 2005 |
|                                   | Law No. 43/2013 of 16/06/2013 governing land in Rwanda determining the use and management of land in Rwanda  | 2013 |
|                                   | Law No. 17/2010 of 12/05/2010 establishing and organizing the real property valuation profession in Rwanda   | 2010 |
|                                   | Presidential Order No. 54/01 of 12/10/2006 determining the structure, the responsibilities, the functioning and the composition of Land Commissions          | 2006 |
|                                   | Ministerial Order No. 001/2006 determining the structure of land registers, the responsibilities and the functioning of the District Land Bureau             | 2006 |
|                                   | Ministerial Order No. 008/2009 determining the reference land prices in the City of Kigali   | 2009 |
|                                   | Law No. 18/2007 Relating to Expropriation in the Public Interest   | 2007 |
|                                   | Guideline No. 01/GL/EL-EWS/RURA/2015 on Right-of-way for Power Lines   | 2015 |

Source: JICA Study Team

## (2) Institutional Framework for Environmental Impact Assessment

The Investment Promotion and Facilitation Department of Rwanda Development Board (RDB) is the responsible body for EIA Certificate Authorization, where an EIA officer is allocated. Rwanda Environment Management Agency (REMA) under Ministry of Natural Resources (MINIRENA) is responsible for monitoring of impacts caused by projects.

There is no specific division for environmental and social considerations under EDCL; however, one environmental specialist for EIA and two social safeguard officers for resettlement and land acquisition are allocated to take care of EDCL projects.

### **(3) EIA Procedure in Rwanda**

#### **1) Legal Framework of EIA Procedure**

Article 67 of No.04/2005 Organic Law determines the modalities of protection, conservation and promotion of environment in Rwanda. It stipulates that every project, program and policy shall be subjected to environmental impact assessment, before obtaining authorization for its implementation. Article 69 of the same law mentions that the EIA shall be conducted at the expense of developers and be approved by REMA (after 2009, by RDB).

General Guidelines and Procedure for EIA (2006) provides EIA procedure, example of ToR for EIA study, contents of EIA report, public participation, etc. EIA must be carried out by EIA experts (individual or company) registered by REMA.

General EIA procedure in Rwanda is indicated in Figure 1-3-2-3.1. The procedure will commence upon submission of a Project Brief from the project proponent to RDB.

#### **2) EIA Screening**

Based on a Project Brief submitted to RDB, RDB will carry out screening and the project will be categorized as shown in Table 1-3-2-3.2 to move on to the procedure. *Ministerial Order No. 004/2008 of 15/08/2008 establishing the List of Works, Activities and Projects that have to undertake an Environment Impact Assessment* has a list of projects requiring EIA; however, there are no quantitative criteria. Categorization is based on contents, location, characteristics and scope of impacts of each project. For projects that are not required to have an EIA, RDB will issue an EIA Certificate of Authorization.

Table 1-3-2-3.2 Categories of EIA Screening

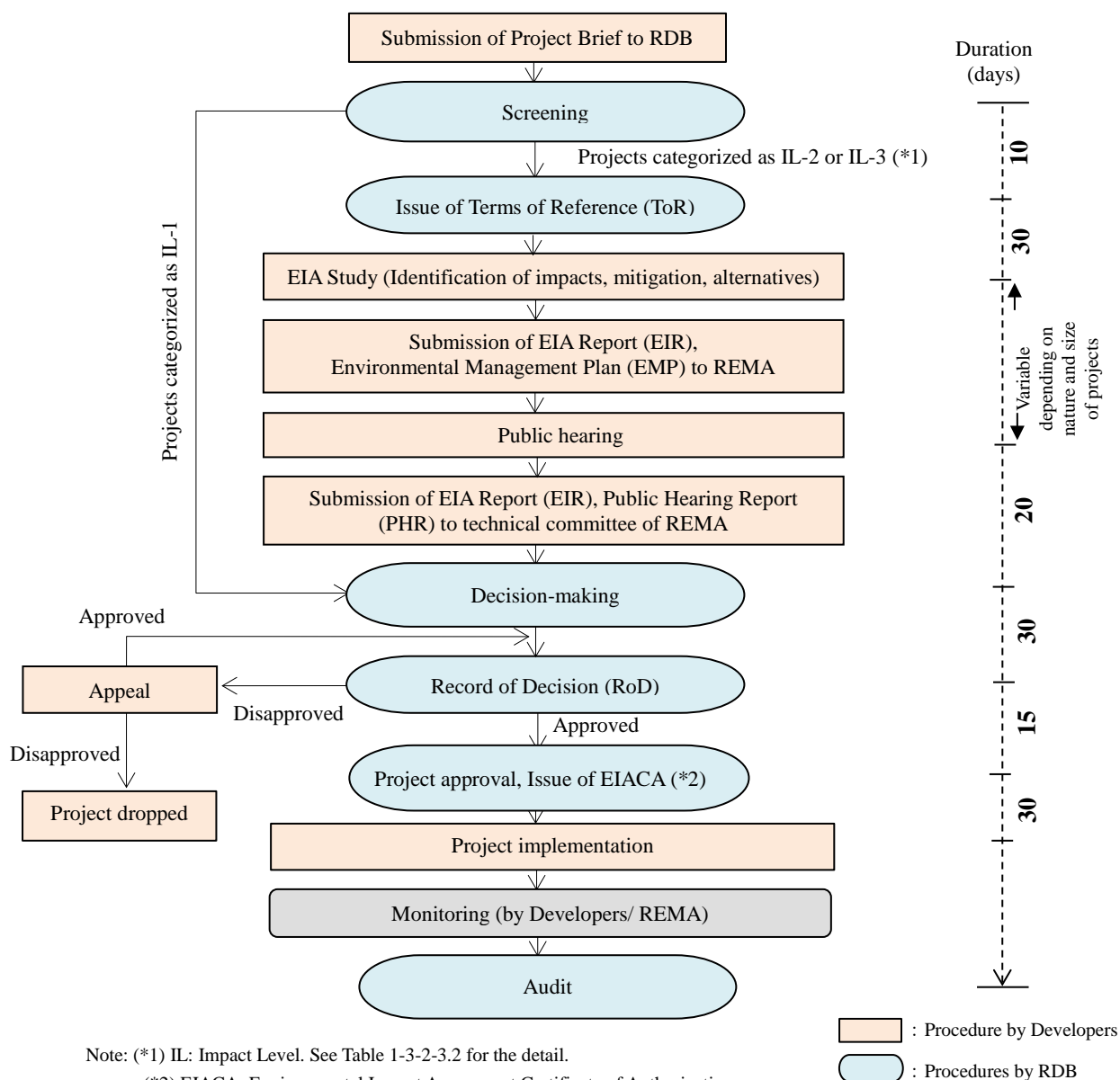
| Categories            | Contents  |
|-----------------------|---|
| IL 1 (Impact Level 1) | Projects not requiring further environmental analysis:<br>The project passes directly to decision-making level without further environmental analysis.  |
| IL 2 (Impact Level 2) | Projects not requiring a full EIA but necessitate further level of assessment:<br>This category represents projects believed to have adverse, but not irreversible environmental impacts and mitigation and management measures can be readily designed and incorporated into the project. The EIA process for these projects is similar to that of IL3 projects. |
| IL 3 (Impact Level 3) | Projects requiring a full EIA:<br>This category involves projects for which it is evident that there will be significant and adverse environmental impacts whose mitigation measures cannot readily be prescribed, and thus, must undergo through a complete EIA process.   |

Source: Prepared by JICA Study Team based on General Guidelines and Procedure for EIA (2006)

#### **3) Obtaining an EIA Certificate of Authorization for the Project**

EDCL submitted a Project Brief to RDB on June 12, 2017. RDB issued a letter to EDCL

stating the necessity of an EIA study for the project and its TOR on July 10, 2017. Then, after EDCL submitted an EIA report to RDB on August 17, 2017, RDB reviewed it and issued an EIA Certificate of Authorization on September 28, 2017.



Note: (\*1) IL: Impact Level. See Table 1-3-2-3.2 for the detail.

(\*2) EIACA: Environmental Impact Assessment Certificate of Authorization

Source: Prepared by JICA Study Team based on General Guidelines and Procedure for EIA (2006)

Figure 1-3-2-3.1 Procedure for EIA in Rwanda

#### 1-3-2-4 Comparison of the Alternatives

Analysis of the alternatives is shown in Table 1-3-2-4.1. Alternatives of the project components were examined from the viewpoints of natural and social environment and project cost.

With no-project alternative (Zero-option), resettlement and land acquisition can be avoided. However, the power transmission and distribution facilities will not be improved to meet the increasing demand on the power in the capital city Kigali, and the stable power supply cannot be

expected. Especially, the decrease of power supply will be observed around the end of existing distribution lines from Gasogi substation. This situation of unstable power supply will hinder economic development and improvement of living standards of people.

Table 1-3-2-4.1 Analysis of Alternatives

**1) Location of New Gasogi substation/ Incoming and outgoing of existing transmission line**

| Item                           | Alternative 1  | Alternative 2 (Original components)*1   |
|--------------------------------|--|---|
| Outline                        | <p>Compared with Alternative 2, New Gasogi substation is constructed at the southern part of the slope.</p> <p>The transmission line connected with Gasogi substation is allocated inside the existing substation site.</p> <p>The necessary construction work for Alternative 1 is as follows:</p> <ul style="list-style-type: none"> <li>- Number of newly-constructed towers: 2</li> <li>- Length of newly-constructed 110 kV transmission line: 0.2km</li> </ul> | <p>Compared with Alternative 1, New Gasogi substation is constructed at the northern part of the slope.</p> <p>The transmission line connected with Gasogi substation is allocated outside the existing substation site.</p> <p>The necessary construction work for Alternative 2 is as follows:</p> <ul style="list-style-type: none"> <li>- Number of newly-constructed towers: 4</li> <li>- Length of newly-constructed 110 kV transmission line: 0.6km</li> </ul> |
| Impacts on natural environment | <p>Compared with Alternative 2, the amount of excavation for the construction of New Gasogi substation is less, and has less impact on the environment.</p> <p>It also has less impact on landscape because the length of transmission line is shorter and the number of towers is less.</p>   | <p>Compared with Alternative 1, the amount of excavation for the construction of New Gasogi substation is more, and has more impact on the environment.</p> <p>It also has more impact on landscape because the length of transmission line is longer and the number of towers is more.</p>   |
| Impacts on social environment  | <p>Compared with Alternative 2, land acquisition due to tower construction is smaller.</p> <p>No difference for shut-down period caused by the construction.</p>   | <p>Compared with Alternative 1, land acquisition due to tower construction is larger.</p> <p>No difference for shut-down period caused by the construction.</p>   |
| Project cost                   | <p>Compared with Alternative 2, the project cost is lower because of the following reasons:</p> <ul style="list-style-type: none"> <li>- Fewer towers are newly constructed.</li> <li>- Newly constructed transmission line is shorter.</li> <li>- Fewer amount of excavation and filling sand is produced due to the construction work.</li> </ul>  | <p>Compared with Alternative 1, the project cost is higher because of the following reasons:</p> <ul style="list-style-type: none"> <li>- More towers are newly constructed.</li> <li>- Newly constructed transmission line is longer.</li> <li>- More amounts of excavation and filling sand are produced due to the construction work.</li> </ul>   |
| Evaluation                     | <p>Recommended due to less impacts on surroundings and lower cost.</p>   | <p>Not recommended due to more impacts on environmental and social aspects as well as higher cost, compared to Alternative 1.</p>   |

Note: (\*1) Original components are prepared by EDCL prior to the commencement of the study in Rwanda in May 2017.

Source: JICA Study Team

### 1-3-2-5 Scoping

The scoping was conducted as shown in Table 1-3-2.5.1, in consideration of the impacts caused by this project.

Table 1-3-2-5.1 Scoping

|                    | No. | Item   | Phase                 |           | Expected Impacts  |
|--------------------|-----|--|-----------------------|-----------|---|
|                    |     |  | Planning Construction | Operation |   |
| Social Environment | 1   | Involuntary Resettlement   | B-                    | D         | Planning/Construction Phase: There may be small scale involuntary resettlement due to the land acquisition for 15kV distribution line.<br>Operation Phase: No impact is expected.   |
|                    | 2   | Poverty  | B-                    | D         | Planning/Construction Phase: There may be poor people among the PAPs for resettlement.  |
|                    | 3   | Indigenous/Minorities  | D                     | D         | There are no indigenous people or minorities within the project sites.  |
|                    | 4   | Economic activities, living and livelihood   | B+/-                  | A+        | Planning/Construction Phase: Some temporary adverse impacts are expected due to the involuntary resettlement. On the other hand, positive impacts such as employment for construction works and contribution to local economic activities due to the presence of construction workers may be expected during construction.<br>Operation Phase: Positive impacts on socio-economic aspects of residences and industries due to the stable power supply are expected. |
|                    | 5   | Land Use and Utilization of local resources  | D                     | D         | Although land is acquired for the Gasogi Substation and distribution line, development activities are limited and will not cause changes in land use and local resources.   |
|                    | 6   | Water Use and Water Right  | D                     | D         | There is no major water body near the project sites.  |
|                    | 7   | Existing social infrastructure and services  | B-                    | A+        | Planning/Construction Phase: Traffic around the construction sites may be affected due to delivery of materials, etc. Temporary power cuts are expected due to the works on the existing lines.<br>Operation Phase: Positive impacts are expected due to the stable power supply.   |
|                    | 8   | Social institutions such as social infrastructure and local decision-making institutions | D                     | D         | No impacts are predicted as the project sites are limited at the local level. The project will contribute to the improvement of public service in power sector; hence will not cause any impact on social institutions.   |
|                    | 9   | Misdistribution of benefits & damages  | D                     | D         | The project will contribute to the improvement of public service in power sector; hence will not cause any misdistribution  |
|                    | 10  | Local conflicts of interest  | D                     | D         | The project will contribute to the improvement of public service in power sector; hence will not cause any conflict   |
|                    | 11  | Heritage   | D                     | D         | There is no heritage or culturally important site near the project sites.   |
|                    | 12  | Landscape  | D                     | D         | There is no naturally or culturally important landscape near the project sites.   |
|                    | 13  | Gender   | D                     | D         | No adverse impact on gender issues is expected by the project.  |
|                    | 14  | Children's right   | D                     | D         | No adverse impact on children's right is expected by the project.   |

|                     | No. | Item                                | Phase                 |           | Expected Impacts   |
|---------------------|-----|-------------------------------------|-----------------------|-----------|--|
|                     |     |                                     | Planning Construction | Operation |  |
|                     | 15  | Infectious Disease (HIV/AIDS, etc.) | D                     | D         | No impact on infectious diseases due to workers coming from outside is expected, because workers during the construction stage are planned to be hired from surrounding local communities.   |
|                     | 16  | Occupational health hazards         | B-                    | D         | Construction Phase: It is necessary to protect workers from the hazards and risk of accidents.   |
| Natural Environment | 17  | Protected Areas                     | D                     | D         | No protected area is present near the project sites  |
|                     | 18  | Ecosystem                           | B-                    | D         | The project sites are within a built-up area of the Kigali city and there is no important fauna and flora which will be affected by the project. However, trees within the ROW of distribution lines will be removed.  |
|                     | 19  | Hydrology                           | D                     | D         | There is no major river or stream near the project sites.  |
|                     | 20  | Geological Features                 | B-                    | D         | Construction Phase: Levelling of the land is necessary for the new Gasogi Substation, but it is limited to the site and will not have any major impact.  |
| Pollution Control   | 21  | Air Pollution                       | B-                    | D         | Planning/Construction Phase: Due to the land leveling work at the new Gasogi Substation and operation of heavy machineries during the construction works, temporary impacts on air pollution are expected. However, these impacts may be mitigated largely by general measurements that are required from the contractor.                          |
|                     | 22  | Water Pollution                     | D                     | D         | No activity that may cause water pollution is expected. No water bodies are present near the project sites.  |
|                     | 23  | Soil Pollution                      | B-                    | B-        | Construction/Operation Phase. Insulating oil will be used for transformers. It may cause soil pollution if leaked.   |
|                     | 24  | Waste                               | B-                    | D         | Although the leveling is planned, waste soil will not be generated. Dismantling of existing towers, responsibilities of the project proponent, may incur waste materials.  |
|                     | 25  | Noise/Vibration                     | B-                    | D         | Construction Phase: Temporary impacts are expected due to the operation of heavy machineries.<br>Operation<br>Operation Phase: Transformers at the Gasogi Substation may cause noise. However, these will be located away from the boundaries of the site. There are no sensitive receptors such as residential area, hospitals or schools nearby. |
|                     | 26  | Ground subsidence                   | D                     | D         | No impact is expected.   |
|                     | 27  | Odor                                | D                     | D         | No impact is expected.   |
|                     | 28  | Bottom sediment                     | D                     | D         | There is no river or swamp near the project site, hence no impact is expected.   |
|                     | 29  | Electromagnetic field               | D                     | C         | Operation Phase: Some impacts may be incurred to residents nearby.   |
| Others              | 30  | Accidents                           | B-                    | B-        | Construction Phase: Erecting towers and rewiring may trigger general accidents caused by construction works such as falling accident of workers or parts.<br>Operation Phase: Electrocution may occur by climbing the tower. Fire accidents may occur due to the broken conductors or lighting.  |
|                     | 31  | Global warming                      | D                     | D         | The project will not cover a large area; hence global warming or impacts across the borders are not expected.  |

A+/-: Significant positive/negative impact is expected.

B+/-: Positive/negative impact is expected to some extent.

C+/-: Extent of positive/negative impact is unknown. (A further examination is needed, and the impact could be clarified as the study progresses)

Source: JICA Study Team

### 1-3-2-6 TOR for Environmental and Social Considerations Study

Based on the scoping results above, the TOR for EIA study was determined as shown in Table 1-3-2-6.1.

Table 1-3-2-6.1 TOR for Environmental and Social Considerations Study

| No. | Item  | Evaluation  | Study Item  | Methods   |
|-----|---|---|---|---|
| 1   | Involuntary resettlement                    | Planning Phase<br>B-<br>Construction Phase<br>B-  | <ul style="list-style-type: none"> <li>Confirming necessity and scale of resettlement and land acquisition</li> <li>Mitigation measures for resettlement</li> </ul> | <ul style="list-style-type: none"> <li>Study on scale of resettlement and preparation of resettlement action plan by local consultant</li> <li>Site visit</li> </ul>                |
| 2   | Poverty                                     | Planning Phase<br>B-<br>Construction Phase<br>B-  | <ul style="list-style-type: none"> <li>Same as above</li> </ul>   | <ul style="list-style-type: none"> <li>Same as above</li> </ul>   |
| 4   | Economic activities, living and livelihood  | Planning Phase<br>B-<br>Construction Phase<br>B-  | <ul style="list-style-type: none"> <li>Same as above</li> <li>Land use and socio-economic activities in the project site</li> <li>Benefits</li> </ul>               | <ul style="list-style-type: none"> <li>Same as above</li> <li>Socio-economic study by local consultant</li> <li>Review of existing literature and data</li> </ul>                   |
| 7   | Existing social infrastructure and services | Construction Phase<br>B-                          | <ul style="list-style-type: none"> <li>Social infrastructures nearby</li> </ul>   | <ul style="list-style-type: none"> <li>Site visit</li> </ul>  |
| 16  | Occupational health hazards                 | Construction Phase<br>B-                          | <ul style="list-style-type: none"> <li>Labor Safety measures</li> </ul>   | <ul style="list-style-type: none"> <li>Review of existing literature and data (relevant labor regulations, environmental and social guidelines for tendering, etc.)</li> </ul>      |
| 18  | Ecosystem                                   | Construction Phase<br>B-                          | <ul style="list-style-type: none"> <li>Situation of project site within the ROW of distribution lines</li> </ul>  | <ul style="list-style-type: none"> <li>Site visit</li> </ul>  |
| 20  | Geological Features                         | Construction Phase<br>B-                          | <ul style="list-style-type: none"> <li>Land leveling for the new Gasogi Substation</li> </ul>   | <ul style="list-style-type: none"> <li>Review of existing literature and data (design, methods, etc.)</li> </ul>  |
| 21  | Air Pollution                               | Construction Phase<br>B-                          | <ul style="list-style-type: none"> <li>Operation of heavy machineries</li> </ul>  | <ul style="list-style-type: none"> <li>Review of existing literature and data (environmental and social guidelines for tendering, etc.)</li> </ul>                                  |
| 23  | Soil Pollution                              | Construction Phase<br>B-<br>Operation Phase<br>B- | <ul style="list-style-type: none"> <li>Setting of transformer and insulating oil pipe.</li> </ul>   | <ul style="list-style-type: none"> <li>Review of existing literature and data (environmental and social guidelines for tendering, examples from other substations, etc.)</li> </ul> |
| 24  | Waste                                       | Construction Phase<br>B-                          | <ul style="list-style-type: none"> <li>Disposal of wastes from dismantling the existing towers and lines</li> </ul>   | <ul style="list-style-type: none"> <li>Review of existing literature and data (environmental and social guidelines for tendering, etc.)</li> </ul>                                  |
| 25  | Noise/<br>Vibration                         | Construction Phase<br>B-<br>Operation Phase<br>B- | <ul style="list-style-type: none"> <li>Noise</li> <li>Surrounding of the new Gasogi Substation</li> </ul>   | <ul style="list-style-type: none"> <li>Review of existing literature and data</li> <li>Construction methods and design of the new Gasogi Substation</li> </ul>                      |
| 29  | Electric magnetic Fields                    | Operation Phase<br>C                              | <ul style="list-style-type: none"> <li>Distance between the power line and buildings</li> </ul>   | <ul style="list-style-type: none"> <li>Review of existing literature and data (report from international organization, etc.)</li> </ul>   |
| 30  | Accident                                    | Construction Phase<br>B-<br>Operation Phase<br>B- | <ul style="list-style-type: none"> <li>Situation of the project site</li> <li>Accident prevention measure during construction phase</li> </ul>                      | <ul style="list-style-type: none"> <li>Review of existing literature and data (contract manual for construction, etc.)</li> <li>Interview with EDCL etc.</li> </ul>                 |

Source: JICA Study Team

### 1-3-2-7 Results of Environmental and Social Consideration Study

The results of the Study based on the TOR above are summarized in Table 1-3-2-7.1.

Table 1-3-2-7.1 Results of Environmental and Social Consideration Study

| No. | Item  | Results   |
|-----|---|---|
| 1   | Involuntary resettlement                    | <ul style="list-style-type: none"> <li>• 16 households (63 persons) will be displaced before the construction work.</li> <li>• 33,333m<sup>2</sup> of land acquisition is required. (8,583m<sup>2</sup> for New Gasogi Substation; 13,950m<sup>2</sup> for towers of distribution line between new Gasogi Substation and Nygasambu; 10,800m<sup>2</sup> for distribution line between the new Gasogi Substation and Masaka)</li> <li>• The target of economic displacement is a cumulative total of 151 households (404 persons).</li> <li>• All the affected households own other lands in the vicinity or are not depending on the land as residence or for living. Hence there is no household severely affected by the project resulting changing livelihood or residence.</li> </ul> |
| 2   | Poverty                                     | <ul style="list-style-type: none"> <li>• There is no poor among PAPs.</li> </ul>  |
| 4   | Economic activities, living and livelihood  | <ul style="list-style-type: none"> <li>• Planning/Construction Phase: Some temporary impacts on living and livelihood are expected due to the resettlement</li> <li>• On the other hand during the construction, positive impacts by employments by construction works and contribution to local economic activities due to the presence of construction workers may be expected.</li> <li>• Operation Phase: Positive impacts on socio economic aspects of residences and industries due to the stable power supply are expected.</li> </ul>   |
| 7   | Existing social infrastructure and services | <ul style="list-style-type: none"> <li>• Planning/Construction Phase: Traffic around the construction sites may be affected due to delivery of materials, etc. Temporary power cuts are expected due to the works on the existing lines.</li> <li>• Operation Phase: Positive impacts are expected due to the stable power supply.</li> </ul>   |
| 16  | Occupational health hazards                 | <ul style="list-style-type: none"> <li>• Without proper measure, accidents and poor labor environment may occur during construction phase.</li> </ul>   |
| 18  | Ecosystem                                   | <ul style="list-style-type: none"> <li>• Planning Phase: Some trees within ROW of distribution lines will be removed; however, the affected area is limited and it is considered that no significant negative impacts would occur.</li> </ul>   |
| 20  | Geological Features                         | <ul style="list-style-type: none"> <li>• Planning Phase: Levelling of the land is necessary for the new Gasogi Substation, but it is limited to the site and will not have any major impact.</li> </ul>   |
| 21  | Air Pollution                               | <ul style="list-style-type: none"> <li>• Planning/Construction Phase: Due to the land leveling work at the new Gasogi Substation and operation of heavy machineries during the construction works, temporary impacts on air pollution are expected. However, these impacts may be mitigated largely by general measurements that are required to the contractor.</li> </ul>   |
| 23  | Soil Pollution                              | <ul style="list-style-type: none"> <li>• Planning/Construction/Operation Phase. Insulating oil will be used for transformers. It may cause soil pollution if it is leaked.</li> </ul>   |
| 24  | Waste                                       | <ul style="list-style-type: none"> <li>• Although the leveling is planned, it is not expected to have left over soil. Dismantling of existing towers, responsibilities of the project proponent, may incur wasted materials.</li> </ul>   |
| 25  | Noise/Vibration                             | <ul style="list-style-type: none"> <li>• Construction Phase: Temporary impacts are expected due to the operation of heavy machineries.</li> <li>• Operation Phase: Transformers at the new Gasogi Substation may cause some noises; however, they will be located away from the boundaries of the site. The location is within Free Zone with factories and roads. There is no residential area, hospital or school.</li> </ul>   |
| 29  | Electric magnetic Fields                    | <ul style="list-style-type: none"> <li>• Clearance between structure and power line is 5m. There will be no impacts by electric magnetic fields to residents living near the project sites.</li> </ul>  |
| 30  | Accident                                    | <ul style="list-style-type: none"> <li>• Construction Phase: General accident related to construction activities such as erection of towers and rewiring of power line may happen.</li> <li>• Operation Phase: Without proper measures, electrocution may occur by touching the tower, and there may be risks of fire caused by broken conductor and lightning during operation phase.</li> </ul>   |

Source: JICA Study Team



### 1-3-2-8 Impact Evaluation

Based on the study results above, the impacts of the project are evaluated and compared to the evaluations at scoping as shown in Table 1-3-2-8.1.

Table 1-3-2-8.1 Impact Evaluation

|                     | No. | Item   | Evaluation at Scoping                |                 | Evaluation Based on Results          |                 | Reason for Evaluation   |
|---------------------|-----|--|--------------------------------------|-----------------|--------------------------------------|-----------------|---|
|                     |     |  | Planning Phase<br>Construction Phase | Operation Phase | Planning Phase<br>Construction Phase | Operation Phase |   |
| Social Environment  | 1   | Involuntary Resettlement   | B-                                   | D               | B-                                   | D               | Involuntary resettlement is triggered; however, it is a small scale, and they can be resettled within their own property or nearby. |
|                     | 2   | Poverty  | B-                                   | D               | D                                    | D               | No impact due to the absence of the poor among PAPs.  |
|                     | 3   | Indigenous/Minorities  | D                                    | D               | N/A                                  | N/A             |   |
|                     | 4   | Economic activities, living and livelihood   | B+/-                                 | A+              | B+/-                                 | A+              | The Impacts are limited to planning and construction phase only and their scope is also limited.                                    |
|                     | 5   | Land Use and Utilization of local resources  | D                                    | D               | N/A                                  | N/A             |   |
|                     | 6   | Water Use and Water Right  | D                                    | D               | N/A                                  | N/A             |   |
|                     | 7   | Existing social infrastructure and services  | B-                                   | A+              | B-                                   | A+              | The impact is limited during construction phase. It is temporary and locally limited and can be mitigated by general measures.      |
|                     | 8   | Social institutions such as social infrastructure and local decision-making institutions | D                                    | D               | N/A                                  | N/A             |   |
|                     | 9   | Misdistribution of benefits & damages  | D                                    | D               | N/A                                  | N/A             |   |
|                     | 10  | Local conflicts of interest  | D                                    | D               | N/A                                  | N/A             |   |
|                     | 11  | Heritage   | D                                    | D               | N/A                                  | N/A             |   |
|                     | 12  | Landscape  | D                                    | D               | N/A                                  | N/A             |   |
|                     | 13  | Gender   | D                                    | D               | N/A                                  | N/A             |   |
|                     | 14  | Children's right   | D                                    | D               | N/A                                  | N/A             |   |
|                     | 15  | Infectious Disease (HIV/AIDS, etc.)  | D                                    | D               | N/A                                  | N/A             |   |
|                     | 16  | Occupational health hazards  | B-                                   | D               | B-                                   | D               | The impact is only during construction phase and can be mitigated with general measures.  |
| Natural Environment | 17  | Protected Areas  | D                                    | D               | N/A                                  | N/A             |   |
|                     | 18  | Ecosystem  | B-                                   | D               | D                                    | D               | The affected area by cutting trees is limited, and no significant negative impacts will occur.                                      |

|           | No.    | Item                  | Evaluation at Scoping                |                 | Evaluation Based on Results          |                 | Reason for Evaluation  |
|-----------|--------|-----------------------|--------------------------------------|-----------------|--------------------------------------|-----------------|--|
|           |        |                       | Planning Phase<br>Construction Phase | Operation Phase | Planning Phase<br>Construction Phase | Operation Phase |  |
|           | 19     | Hydrology             | D                                    | D               | N/A                                  | N/A             |  |
|           | 20     | Geological Features   | B-                                   | D               | D                                    | D               | Leveling will not cause any impact.  |
| Pollution | 21     | Air Pollution         | B-                                   | D               | B-                                   | D               | The impact is limited during construction phase. It is temporary and locally limited and can be mitigated by general measures.                                       |
|           | 22     | Water Pollution       | D                                    | D               | N/A                                  | N/A             |  |
|           | 23     | Soil Pollution        | B-                                   | B-              | B-                                   | B-              | The impact is expected during construction and operation phase, however it is limited only to the inside of the substation and can be mitigated by general measures. |
|           | 24     | Waste                 | B-                                   | D               | B-                                   | D               | The impact is limited during construction phase. It is temporary and locally limited and can be mitigated by general measures.                                       |
|           | 25     | Noise/Vibration       | B-                                   | D               | B-                                   | D               | The impact is limited during construction phase. It is temporary and locally limited and can be mitigated by general measures.                                       |
|           | 26     | Ground subsidence     | D                                    | D               | N/A                                  | N/A             |  |
|           | 27     | Odor                  | D                                    | D               | N/A                                  | N/A             |  |
|           | 28     | Bottom sediment       | D                                    | D               | N/A                                  | N/A             |  |
|           | 29     | Electromagnetic field | D                                    | C               | D                                    | D               | The impact is limited, because considerations for the residents under the electrical lines are fully paid, such as securing enough clearance from the power lines.   |
|           | Others | 30                    | Accidents                            | B-              | B-                                   | B-              | B-   |
| 31        |        | Global warming        | D                                    | D               | N/A                                  | N/A             |  |

Source: JICA Study Team

### 1-3-2-9 Environmental Management Plan (Mitigation Measures)

Environmental management plan (mitigation measures towards the items with adverse impacts) is summarized in Table 1-3-2-9.1.

Table 1-3-2-9.1 Environmental Management Plan (Mitigation Measures)

| No.                | Item  | Impact   | Mitigation Measures  | Implementation/<br>Responsible<br>Body | Cost (Rwf)                     |
|--------------------|---|--|--|--|--------------------------------|
| Planning Phase     |   |  |  |  |                                |
| 1                  | Involuntary Resettlement                    | Loss of assets, income and livelihood due to resettlement (including temporary ones) | <ul style="list-style-type: none"> <li>In accordance with JICA guidelines and WB OP4.12, an ARAP will be prepared based on the consensus with project affected people, compensation at full replacement cost and support will be provided.</li> </ul>  | EDCL                                   | 156,098,242.2                  |
| Construction Phase |   |  |  |  |                                |
| 4                  | Economic activities, living and livelihood  | Impacts on living and livelihood due to resettlement (including temporary ones)      | <ul style="list-style-type: none"> <li>Same as above</li> <li>PAPs will have priority for the project related employment opportunities.</li> </ul>   | Same as above                          | N/A                            |
| 7                  | Existing social infrastructure and services | Impacts on traffic during construction works<br>Power Cut during construction works  | <ul style="list-style-type: none"> <li>By announcing construction plans to nearby residents and collaborating with local police, enforcement of traffic safety and mitigation of traffic congestion</li> <li>Preparation of power cut plan and sharing the plan with affected communities</li> </ul>   | EDCL<br>Contractor                     | N/A                            |
| 16                 | Occupational health hazards                 | Health and safety of construction workers  | <ul style="list-style-type: none"> <li>EUCL will confirm environmental and social safety management plan proposed by contractor at tendering. Based on this plan, the contractor will carry out safety and management tasks and avoid and mitigate risks of accidents.</li> <li>Based on laboring laws, the contractor must provide protective gear to workers, ensure them to wear them and provide safe working environment.</li> <li>Construction site (especially the storage site) will be fenced, lighted and guarded by security guards to prevent intruders and theft</li> </ul> | EDCL<br>Contractor                     | Included in construction costs |
| 21                 | Air Pollution                               | Air pollution by heavy machineries during leveling and construction works            | <ul style="list-style-type: none"> <li>Minimizing the number of deliveries through timely scheduling.</li> <li>Only contract automobiles with vehicle inspection certification, which are expected to have less exhaust emissions.</li> <li>Installing the cover of trucks transporting soils or construction debris from the site</li> <li>Sprinkling water at the site to avoid dust</li> </ul>  | Contractor                             | N/A                            |

| No.                    | Item                | Impact   | Mitigation Measures   | Implementation/<br>Responsible<br>Body | Cost (Rwf)                     |
|------------------------|---------------------|--|---|--|--------------------------------|
| 23                     | Soil Pollution      | Spillage of insulating oil from transformer  | <ul style="list-style-type: none"> <li>Insulating oil as well as transformers will be set in the metal box. To prevent spillage, oil dike will be set under the transformers and filled with stone chips.</li> <li>Protection of exposed ground with vegetation and rain drainage, etc. to prevent run-off</li> </ul>                     | Contractor                             | Included in construction costs |
| 24                     | Waste               | Dismantling of the existing tower under the responsibility of the implementing agency<br>Waste during construction | <ul style="list-style-type: none"> <li>EDCL will recycle any materials saved from dismantling the existing towers and unrecyclable materials will be properly handled over to waste management companies.</li> <li>Regular disposal of solid waste to a dump site or have a contract with a registered waste disposal company.</li> </ul> | Contractor                             | included in construction costs |
| 25                     | Noise/<br>Vibration | Noise during leveling and construction   | <ul style="list-style-type: none"> <li>Controlling operation time (7a.m.-5p.m.) to reduce impact by noise as much as possible.</li> <li>Use of proper automobile with inspection certificate</li> </ul>   | Contractor                             | N/A                            |
| 30                     | Accidents           | Accidents involving workers and residents  | <ul style="list-style-type: none"> <li>Same as for occupational health hazards</li> <li>When wiring or removing power lines, fall prevention net will be used.</li> </ul>   | Contractor                             | included in construction costs |
| <b>Operation Phase</b> |                     |  |   |  |                                |
| 23                     | Soil pollution      | Spillage of insulating oil from transformers   | <ul style="list-style-type: none"> <li>Insulating oil as well as transformers will be set in the metal box. To prevent spillage, oil dike will be set under the transformers and filled with stone chips.</li> </ul>  | EUCL                                   | included in construction costs |
| 30                     | Accidents           | Electrocution caused by contacting with wire or tower/<br>Fire risks caused by broken insulators                   | <ul style="list-style-type: none"> <li>Tower will be equipped with metals to prevent climbing and signboard indicating high voltage. Residents nearby will be informed about prevention of electrocution.</li> <li>EUCL will check house wiring carefully.</li> <li>Ground wires with enough capacity will be set.</li> </ul>             | EUCL<br>Contractor                     | included in construction costs |

Source: JICA Study Team

### 1-3-2-10 Environmental Monitoring Plan

Environmental monitoring plan for each item is described in Table 1-3-2-10.1.

Table 1-3-2-10.1 Environmental Monitoring Plan

| No                    | Item                                      | Methods                                       | Frequency  | Responsible body   |      |
|-----------------------|---|---|--|--|------|
| <b>Planning Phase</b> |   |   |  |  |      |
| 1                     | Involuntary Resettlement/Land acquisition | Compensation payment to bank accounts of PAPs | Counting the number of payment transaction to PAPs | Monthly until completion of land acquisition (planned to be completed by May 2018) | EDCL |

| <b>Construction Phase</b> |   |   |   |  |                 |
|---------------------------|---|---|---|--|-----------------|
| 1                         | Land Use and Utilization of local resources | Work schedule and progress  | Work schedule                                       | Monthly during construction                    | Contractor/EDCL |
| 2                         | Existing social infrastructure and services | Rewiring of the existing line<br>Power cut  | Confirming work plan<br>Confirming a power cut plan | During rewiring works<br>During construction   | Contractor/EDCL |
| 3                         | Occupational health hazards                 | Workers with protective gear<br>Reports on accidents  | Site inspection<br>Confirming the reports           | Daily during construction                      | Contractor/EDCL |
| 4                         | Air pollution                               | Inspection of certification for vehicle and heavy machineries (schedule and cover to avoid dust)<br>Water sprinkler of the site | Site inspection                                     | Daily during construction phase                | Contractor      |
| 5                         | Soil Pollution                              | PAHs, BTEX  | Soil sampling at the new Gasogi substation          | 3 times, before, during and after construction | Contractor      |
| 6                         | Waste                                       | Waste management  | Site inspection                                     | Daily during construction phase                | EDCL            |
| 7                         | Noise/vibration                             | Inspection of certification and schedule for vehicle and heavy machineries  | Site inspection                                     | Daily during construction phase                | Contractor      |
| <b>Operation Phase</b>    |   |   |   |  |                 |
| 1                         | Soil Pollution                              | PAHs, BTEX  | Soil sampling at the new Gasogi substation          | Annually                                       | EUCL            |
| 2                         | Accidents                                   | Climbing prevention measure at towers, Fire prevention measures   | Site inspection                                     | At commission and regular maintenance          | EUCL            |

Source: JICA Study Team

### 1-3-2-11 Stakeholder Meeting

The TOR for the EIA study by RDB does not require stakeholder meetings, as the project's impacts are limited locally and temporarily, and their characteristics are related to general construction works (e.g. noise/vibration, dust, air pollution, traffic, power cuts, etc.). However, together with the preparation process of a resettlement plan, stakeholder meetings concerning EIA were held at the timing of the meetings for resettlement for each sector.

During stakeholder meetings, the proponent explained the project characteristics, components and their locations, project schedule, adverse and positive impacts by the projects, resettlement and land acquisition, compensation entitlement and process and grievance redress mechanism.

The opinions raised by stakeholders during meetings were supportive of project implementation. These were incorporated into the EIA study items and mitigation measures were reflected in the environmental management and monitoring plan. The summary of opinions raised during meetings is listed below.

- Benefits brought by this Project (increase of electricity provision, creation of local employment during the construction stage)

- Positive/ Negative impacts brought by this Project (policy of compensation, beneficiaries to receive electricity, worries about electrocution)
- Mitigation measures (prioritization of local employment, fire prevention, installation of traffic signs)

The outline of stakeholder meetings is described in Table 1-3-2-11.1. The main comments raised and responses during stakeholder meetings are summarized in Table 1-3-2-11.2.

Table 1-3-2-11.1 Outline of Stakeholder Meetings

| Date  | Place  | Participants   | Number of participants | Contents  |
|---|--|--|------------------------|---|
| 3 <sup>rd</sup> - 7 <sup>th</sup> July 2017   | Gasabo, Rwamagana, Kicukiro Districts                | Sector Representatives   | 5                      | <ul style="list-style-type: none"> <li>• To explain; Project objectives, Components of the project, project area of development, benefits gained from the project and the purpose of the consultation,.</li> <li>• To record and understand; local perception of the project, likely benefits, the likely impacts by the Project and proposals on mitigation measures to negative impacts.</li> </ul> |
| 3 <sup>rd</sup> - 7 <sup>th</sup> July 2017   | Ndera, Rusororo, Gikomero, Fumbwe and Masaka sectors | Cell Representatives   | 11                     |   |
| 10 <sup>th</sup> – 21 <sup>st</sup> July 2017 | Project intervention Cells                           | Cell leaders, village leaders and communities in project affected areas. | 52                     |   |

Source: JICA Study Team

Table 1-3-2-11.2 Main Comments Raised and Responses during Stakeholder Meetings

| Items  | Comments from Stakeholders  | Responses from EDCL   |
|--|---|---|
| Benefits anticipated from improvement of the substation and distribution network | <ul style="list-style-type: none"> <li>- Power capacity will increase in the project areas, allowing for increased electricity connectivity of households, businesses and institutions.</li> <li>- Electricity will increase in Masaka hospital.</li> <li>- Employment opportunities will be created during construction stage.</li> <li>- There is a possibility of increment of businesses in trading centers, as results of increased amount of power in the area.</li> </ul>              | -   |
| Common issues/worries  | <ul style="list-style-type: none"> <li>- Land, structures, crops and trees will be lost due to the power line project, and local people wanted to know whether they would be fairly compensated.</li> <li>- Questions were raised on whether Job opportunities were available for locals during construction phase.</li> <li>- They also questioned whether the power lines would serve their communities.</li> <li>- They worried about pollution of air by dust from soil piles.</li> </ul> | <ul style="list-style-type: none"> <li>- ARAP will be prepared and PAPs compensated for losses at full replacement cost by Government of Rwanda under mandate of EDCL.</li> <li>- An affirmative program was suggested that gives locals in the area, employment priority during construction.</li> <li>- Communities were informed that purpose of the power lines was to increase the amount of power in the Sectors of Ndera, Rusororo, Gikomero, Fumbwe and Masaka.</li> <li>- Compaction and water spraying of completed soil stabilization to reduce generation of dust.</li> </ul> |

Source: JICA Study Team

### 1-3-3 Land Acquisition and Resettlement

#### 1-3-3-1 Necessity of Land Acquisition and Resettlement

In Rwanda, ROW of transmission and distribution lines is determined in “Guideline No.

01/GL/EL-EWS/RURA/2015 on Right-of-way for Power Lines” adopted by Rwanda Utilities Regulatory Authority. In line with this guideline, ROW applied for 15 kV distribution lines is shown in Table 1-3-3-1.1.

Table 1-3-3-1.1 ROW for 15kV Distribution Lines applied for the Project

| Items                      | Criteria   |
|----------------------------|--|
| ROW                        | 12m width (6m +6m)   |
| Land Acquisition           | Lands are acquired only where towers are erected.  |
| Resettlement of structures | All the permanent buildings within ROW shall be resettled.<br>(There is no specific stipulation about the distance between the electrical lines and structures.) |

Source: JICA Study Team

Project components and the land required for each component are presented in Table 1-3-3-1.2.

Table 1-3-3-1.2 Project Components and Required Land

|    | Project Components  | Land Required   | Note   |
|----|---|---|--|
| 1. | New Gasogi substation   | 8,583m <sup>2</sup>   | Land acquisition has not started yet. There are several houses to be resettled within the proposed site. Agricultural lands are developed. (Figure 1-3-3-1.1)  |
| 2. | 110 kV Transmission line<br>From the existing transmission line (between Birembo (Ndera) and Musha substations) to New Gasogi Substation;<br>Approx. 0.2 km, 2 towers | -   | No land acquisition is required, because new towers and power lines are constructed within the existing Gasogi substation site.  |
| 3. | 15 kV Distribution line<br>New Gasogi substation – Nyagasambu ;<br>Approx. 11.5 km, ROW 12m (6m + 6m)   | Land required for tower base:<br>13,950m <sup>2</sup><br>(225m <sup>2</sup> (=15m x 15m) x 62 towers) | Land acquisition for the towers is required. Involuntary resettlement is also necessary.<br>The crops are temporarily affected by the project during construction; however, they are allowed to continue the cultivation during operation. |
| 4. | 15 kV Distribution line<br>New Gasogi substation – Masaka;<br>Approx. 8.5km, ROW 12m (6m + 6m)  | Land required for tower base:<br>10,800m <sup>2</sup><br>(225m <sup>2</sup> (=15m x 15m) x 48towers)  | Land acquisition for the towers is required. Involuntary resettlement is also necessary.<br>The crops are temporarily affected by the project during construction; however, they are allowed to continue the cultivation during operation. |

Source: JICA Study Team



Figure 1-3-3-1.1 Project site (area to require land acquisition due to the construction of New Gasogi Substation)

### **1-3-3-2 Legal Framework on Land Acquisition and Resettlement**

#### **(1) Legal Framework in Rwanda**

Legal framework for land acquisition and resettlement in Rwanda is shown in Table 1-3-2-3.1.

*Law No. 18/2007 Relating to Expropriation in the Public Interest* stipulates the process of land acquisition of public works (hereinafter “Expropriation Law”).

*Ministerial Order No. 001/2006 determining the structure of land registers, the responsibilities and the functioning of the District Land Bureau* regulates function and responsibilities of District Land Bureau.

*Law No. 17/2010 of 12/05/2010 establishing and organizing the real property valuation profession in Rwanda* states that real property valuation must be carried out by certified valuers (hereinafter “Valuation Law”)

#### **(2) JICA Policies on Resettlement**

The key principles of JICA policies on involuntary resettlement are summarized below.

- I. Involuntary resettlement and loss of means of livelihood are to be avoided when feasible by exploring all viable alternatives.
- II. When, population displacement is unavoidable, effective measures to minimize the impact and to compensate for losses should be taken.
- III. People who must be resettled involuntarily and people whose means of livelihood will be hindered or lost must be sufficiently compensated and supported, so that they can improve or at least restore their standard of living, income opportunities and production levels to pre-project levels.
- IV. Compensation must be based on the full “replacement cost” as much as possible.
- V. Compensation and other kinds of assistance must be provided prior to displacement.



- VI. For projects that entail large-scale involuntary resettlement, resettlement action plans must be prepared and made available to the public. It is desirable that the resettlement action plan include elements laid out in the World Bank Safeguard Policy, OP 4.12, Annex A.
- VII. In preparing a resettlement action plan, consultations must be held with the affected people and their communities based on sufficient information made available to them in advance. When consultations are held, explanations must be given in a form, manner, and language that are understandable to the affected people.
- VIII. Appropriate participation of affected people must be promoted in planning, implementation, and monitoring of resettlement action plans.
- IX. Appropriate and accessible grievance mechanisms must be established for the affected people and their communities.

The principles above are complemented by World Bank OP 4.12, since it is stated in JICA Guideline that “JICA confirms that projects do not deviate significantly from the World Bank’s Safeguard Policies”. Additional key principles based on World Bank OP 4.12 are as follows.

- X. Affected people are to be identified and recorded as early as possible in order to establish their eligibility through an initial baseline survey (including population census that serves as an eligibility cut-off date, asset inventory, and socioeconomic survey), preferably at the project identification stage, to prevent a subsequent influx of encroachers of others who wish to take advantage of such benefits.
- XI. Eligibility of Benefits include; the PAPs who have formal legal rights to land (including customary and traditional land rights recognized under law), the PAPs who don't have formal legal rights to land at the time of census but have a claim to such land or assets and the PAPs who have no recognizable legal right to the land they are occupying.
- XII. Preference should be given to land-based resettlement strategies for displaced persons whose livelihoods are land-based.
- XIII. Provide support for the transition period (between displacement and livelihood restoration).
- XIV. Particular attention must be paid to the needs of the vulnerable groups among those displaced, especially those below the poverty line, landless, elderly, women and children, ethnic minorities etc.
- XV. For projects that entail land acquisition or involuntary resettlement of fewer than 200 people, abbreviated resettlement plan is to be prepared.

In addition to the core principles of the JICA policy stated above, emphasis is given to a detailed resettlement policy inclusive of all the above points; project specific resettlement plan; institutional framework for implementation; monitoring and evaluation mechanism; time schedule

for implementation; and, detailed financial Plan, etc.

### (3) GAP Analysis between the JICA Guidelines and Laws of Rwanda

Table 1-3-3-2.1 below shows the gap analysis between the JICA Guidelines and laws of Rwanda, as well as the policies applied to fulfill the gaps.

Table 1-3-3-2.1 GAP Analysis between the JICA Guidelines and Laws of Rwanda

| No. | JICA Guidelines   | Laws of the Country   | Gap between JICA Guidelines & Laws of the Country   | Policies applied to the Project  |
|-----|---|---|---|--|
| 1.  | Involuntary resettlement and loss of means of livelihood are to be avoided when feasible by exploring all viable alternatives. (JICA GL)  | No similar provisions in the Rwandan National Law.  | Expropriation of land for public interest is regarded as inevitable and the affected persons shall be given fair and just compensation Article 3 of the expropriation law       | Alternative analysis, including no project option, is conducted to minimize impacts of involuntary resettlement and loss of means of livelihood.   |
| 2.  | When population displacement is unavoidable, effective measures to minimize impact and to compensate for losses should be taken. (JICA GL)  | In the Rwandan National Law on expropriation, compensation of destroyed properties is considered  | No measures to minimize impact of the displaced people  | Alternative analysis, including no project option, is conducted to minimize impacts of involuntary resettlement and loss of means of livelihood.<br>Compensation will be made for any loss caused by the project as described in this ARAP based on legislations of the country and JICA guidelines. |
| 3.  | People who must be resettled involuntarily and people whose means of livelihood will be hindered or lost must be sufficiently compensated and supported, so that they can improve or at least restore their standard of living, income opportunities and production levels to pre-project levels. (JICA GL) | There are no explicit provisions on livelihood restoration  | The Rwandan legislation is silent on this matter.   | Compensation will be based on full replacement costs and provided before resettlement. Assistance and supports are provided to PAPs to restore their livelihood at least at its original level, if not better.   |
| 4.  | Compensation must be based on the full replacement cost as much as possible. (JICA GL)  | Compensation is calculated considering the size, nature and location and considering the prevailing market prices. (Article 22) The Expropriation Law | No gap. Although the word "market price" used in the Expropriation Law actually includes any fees, costs, taxes, etc. hence it is actually the same as "full replacement cost." | Compensation will be based on the full replacement cost, including any fees and costs involved.  |
| 5.  | Compensation and other kinds of assistance must be provided prior to displacement. (JICA GL)  | The Expropriation Law, Article 23 stated the just compensation shall be awarded to the  | No gap. Compensation will be provided prior to relocation.  | Compensation and other kinds of assistance will be provided prior to displacement.   |

| No. | JICA Guidelines   | Laws of the Country  | Gap between JICA Guidelines & Laws of the Country  | Policies applied to the Project   |
|-----|---|--|--|---|
|     |   | expropriated person before he or she relocates.  |  |   |
| 6.  | For projects that entail large-scale involuntary resettlement, resettlement action plans must be prepared and made available to the public. (JICA GL)   | It is not indicated in the Rwandan National Law, however it is requested by the Rwandan Development Board to be mentioned in the EIA report  | No gap.  | Since this project will not trigger a large scale resettlement, an ARAP will be prepared in accordance with JICA GL.  |
| 7.  | In preparing a resettlement action plan, consultations must be held with the affected people and their communities based on sufficient information made available to them in advance. (JICA GL)   | The expropriation law governs the specifics of land acquisition. The law provides for public dissemination on the importance of the project to be established and the need for expropriation. (Article 11, 12, 13)   | No major gap.  | Information about the project and ARAP will be shared with PAPs and their communities in advance. Consultations will be held at least twice, and continued if necessary.                            |
| 8.  | When consultations are held, explanations must be given in a form, manner, and language that are understandable to the affected people. (JICA GL)   | The medium of exchange in Rwanda is Kinyarwanda and all Rwandans can hear and speak Kinyarwanda language.  | No gap   | Kinyarwanda will be used in consultation and Compensation payment agreements with PAPs are prepared in Kinyarwanda.   |
| 9   | Appropriate participation of affected people must be promoted in planning, implementation, and monitoring of resettlement action plans. (JICA GL)   | General Guidelines and Procedure for EIA states public participation in planning and decision making for the project.  | There are no specific guidelines for participation of affected people in planning, implementation, and monitoring of RAP.                                | Consultations during EIA and ARAP preparation will be used as opportunities for public participation in ARAP planning, implementation and monitoring.   |
| 10. | Appropriate and accessible grievance mechanisms must be established for the affected people and their communities. (JICA GL)  | The expropriation law article 26 provides complaints procedures for individuals dissatisfied with the value of their compensation. The law stipulates that the dissatisfied person has a period of 30 days after the project approval decision has been taken to appeal (Article 19) | No gap.  | An appropriate and accessible grievance mechanism will be established.  |
| 11. | Affected people are to be identified and recorded as early as possible in order to establish their eligibility through an initial baseline survey (including population census that serves as an eligibility cut-off date, asset inventory, and | According to the Rwandan expropriation law, the census of the affected people is conducted as well as inventory of their properties at the beginning of the land survey, which is considered the cut-off date. (Article 17)  | No gap in terms of conducting inventory and establishment of cut-off date. However, no socio-economic survey is conducted by government funded projects. | An initial baseline survey (including socio-economic survey) will be conducted based on WB OP 4.12. A cut-off date for this project will be set up on the first day of the initial baseline survey. |

| No. | JICA Guidelines   | Laws of the Country   | Gap between JICA Guidelines & Laws of the Country  | Policies applied to the Project  |
|-----|---|---|--|--|
|     | socioeconomic survey), preferably at the project identification stage, to prevent a subsequent influx of encroachers of others who wish to take advance of such benefits. (WB OP4.12 Para.6)  |   |  |  |
| 12. | Eligibility of benefits includes, the PAPs who have formal legal rights to land (including customary and traditional land rights recognized under law), the PAPs who don't have formal legal rights to land at the time of census but have a claim to such land or assets and the PAPs who have no recognizable legal right to the land they are occupying. (WB OP4.12 Para.15) | The Rwandan legislation (organic land law 5, 6, 7) defines the eligibility as both formal (legal) and informal (customary) owners of expropriated land.<br><br>Article 18 of the Expropriation law considered in addition to legal documents, a document or testimony of the neighbors confirming ownership for the land as evidence. | There is a gap. The Rwandan legislation does not specifically recognize all users of land to be expropriated while OP 4.12 chapter 14(a),(b),(c) entitles those with formal legal rights to land, those with no formal legal rights to land and those who have no recognizable right or claim to the land they are occupying | Follow the OP4.12 guidelines and principles. Eligibility to benefits includes both formal and informal owners of land and owners of other assets affected by the Project.  |
| 13. | Preference should be given to land-based resettlement strategies for displaced persons whose livelihoods are Land-based. (WB OP4.12 Para.11)  | Article 23 of the expropriation law provides for fair and just compensation and it stipulates that this could be monetary or an alternative land or a building equivalent to the determination of just monetary compensation.   | No major gap.  | Due to the fact that land owners as well as displaced persons opted for full payment compensation as opposed to land to land, monetary based compensation will be generally applied.                                   |
| 14. | Provide support for the transition period (between displacement and livelihood restoration). (WB OP4.12 Para.6)   | There are no explicit support for transition period and livelihood restoration  | The Rwandan legislation is silent on this matter.  | Since full compensation is by cash transfer payment as opted by all PAPs, there will be no need for support during transition period. It shall be observed that property can only be acquired after PAP has been paid. |
| 15. | Particular attention must be paid to the needs of the vulnerable groups among those displaced, especially those below the poverty line, landless, elderly, women and children, ethnic minorities etc. (WB OP4.12 Para.8)  | No clear provision on the vulnerable groups among those displaced   | The Rwandan legislation is silent on this matter.  | No vulnerable groups were found in this project area hence would not apply.  |
| 16. | For projects that entail land acquisition or  | No indication in the Rwandan National law   | The Rwandan legislation is silent on this matter   | PAPs were fewer than 200 people hence ARAP will  |

| No. | JICA Guidelines   | Laws of the Country | Gap between JICA Guidelines & Laws of the Country | Policies applied to the Project |
|-----|---|---------------------|---|---------------------------------|
|     | involuntary resettlement of fewer than 200 people, abbreviated resettlement plan is to be prepared. (WB OP4.12 Para.25) |                     |   | be prepared for this project.   |

Source: JICA Study Team

#### (4) Policies Applied to the Project

EDCL uses the World Bank safeguard policy as a benchmark. In the Field Report (dated on June 22, 2017, and signed by JICA Study Team, EDCL and EUCL) the Rwanda side agreed to abide by the JICA Guideline under this project. Therefore, this project will be implemented on the basis of the World Bank safeguard policy and the JICA Guideline. In case there are any gaps between these policy and guideline, the gaps will be fulfilled by referring to the similar RAPs/ARAPs prepared in Rwanda under the support of World Bank and JICA.

This section discusses the principles of the Project Policy based on the type and degree of their losses, which will bridge the gaps between the policy and guideline. Where there are gaps between Rwanda's legal framework for resettlement and JICA's Policy on Involuntary Resettlement, practicable mutually agreeable approaches will be designed consistent with Government practices and JICA's Policy.

- I. Land acquisition and involuntary resettlement will be avoided where feasible, or minimized, by identifying possible alternative project designs that have the least adverse impact on the communities in the project area.
- II. Where displacement of households is unavoidable, all PAPs (including communities) losing assets, livelihoods or resources will be fully compensated and assisted so that they can improve, or at least restore, their former economic and social conditions.
- III. Compensation and rehabilitation support will be provided to any PAPs, that is, any person or household or business which on account of project implementation would have his, her or their:
  - Standard of living adversely affected;
  - Right, title or interest in any house, interest in, or right to use, any land (including premises, agricultural and grazing land, commercial properties, tenancy, or right in annual or perennial crops and trees or any other fixed or moveable assets, acquired or possessed, temporarily or permanently;
  - Income earning opportunities, business, occupation, work or place of residence or habitat adversely affected temporarily or permanently; or

- Social and cultural activities and relationships affected or any other losses that may be identified during the process of resettlement planning.
- IV. All affected people will be eligible for compensation and rehabilitation assistance, irrespective of tenure status, social or economic standing and any such factors that may discriminate against achievement of the objectives outlined above. Lack of legal rights to the assets lost or adversely affected tenure status and social or economic status will not bar the PAPs from entitlements to such compensation and rehabilitation measures or resettlement objectives. All PAPs residing, working, doing business and/or cultivating land within the project impacted areas as of the date of the latest census and inventory of lost assets(IOL), are entitled to compensation for their lost assets (land and/or non-land assets), at replacement cost, if available and restoration of incomes and businesses, and will be provided with rehabilitation measures sufficient to assist them to improve or at least maintain their pre-project living standards, income-earning capacity and production levels.
  - V. PAPs that lose only part of their physical assets will not be left with a portion that will be inadequate to sustain their current standard of living. The minimum size of remaining land and structures will be agreed during the resettlement planning process.
  - VI. People temporarily affected are to be considered PAPs and resettlement plans address the issue of temporary acquisition.
  - VII. Where a host community is affected by the development of a resettlement site in that community, the host community shall be involved in any resettlement planning and decision-making. All attempts shall be made to minimize the adverse impacts of resettlement upon host communities.
  - VIII. The resettlement plans will be designed in accordance with Rwanda's expropriation law No. 18/2007 and JICA's Policy on Involuntary Resettlement.
  - IX. The Resettlement Plan will be translated into local languages and disclosed for the reference of PAPs as well as other interested groups.
  - X. Payment for land and/or non-land assets will be based on the replacement cost.
  - XI. Compensation for PAPs dependent on agricultural activities will be land-based wherever possible. Land-based strategies may include provision of replacement land, ensuring greater security of tenure, and upgrading livelihoods of people without legal land titles. If replacement land is not available, other strategies may be built around opportunities for re-training, skill development, wage employment, or self-employment, including access to credit. Solely cash compensation will be avoided as an option if possible, as this may not address losses that are not easily quantified, such as access to services and traditional rights, and may eventually lead to those populations being worse off than without the project.

- XII. Replacement lands, if the preferred option of PAPs, should be within the immediate vicinity of the affected lands wherever possible and be of comparable productive capacity and potential. As a second option, sites should be identified that minimize the social disruption of those affected; such lands should also have access to services and facilities similar to those available in the lands affected.
- XIII. Resettlement assistance will be provided not only for immediate loss, but also for a transition period needed to restore livelihood and standards of living of PAPs. Such support could take the form of short-term jobs, subsistence support, salary maintenance, or similar arrangements.
- XIV. The resettlement plan must consider the needs of those most vulnerable to the adverse impacts of resettlement (including the poor, those without legal title to land, ethnic minorities, and women, children, elderly and disabled) and ensure they are considered in resettlement planning and mitigation measures identified. Assistance should be provided to help them improve their socio-economic status.
- XV. PAPs will be involved in the process of developing and implementing resettlement plans.
- XVI. PAPs and their communities will be consulted about the project, the rights and options available to them, and proposed mitigation measures for adverse effects, and to the extent possible be involved in the decisions that are made concerning their resettlement.
- XVII. Adequate budgetary support will be fully committed and made available to cover the costs of land acquisition (including compensation and income restoration measures) within the agreed implementation period. The funds for all resettlement activities will come from the Government.
- XVIII. Displacement does not occur before provision of compensation and of other assistance required for relocation. Sufficient civic infrastructure must be provided in resettlement site prior to relocation. Acquisition of assets, payment of compensation, and the resettlement and start of the livelihood rehabilitation activities of PAPs, will be completed prior to any construction activities, except when a court of law orders so in expropriation cases. (Livelihood restoration measures must also be in place but not necessarily completed prior to construction activities, as these may be ongoing activities.)
- XIX. Organization and administrative arrangements for the effective preparation and implementation of the resettlement plan will be identified and in place prior to the commencement of the process; this will include the provision of adequate human resources for supervision, consultation, and monitoring of land acquisition and rehabilitation activities.
- XX. Appropriate reporting (including auditing and redress functions), monitoring and evaluation mechanisms, will be identified and set in place as part of the resettlement management system. An external monitoring group will be hired by the project and will evaluate the

resettlement process and final outcome. Such groups may include qualified NGOs, research institutions or universities.

### Cut-off-date of Eligibility

In the Project, the Cut-off date was set as November 3, 2017. This date was disclosed to the PAPs during preliminary meetings with PAPs and local authorities. The establishment of eligibility cut-off date is intended to prevent the influx of ineligible non-residents who might take advantage of project entitlement. The cut-off date was informed through each cell offices and radio.

### Principle of Replacement Cost

All compensation for land and non-land assets owned by households/ shop owners who meet the cut-off date will be based on the principal of replacement cost. Replacement cost is the amount calculated before displacement which is needed to replace an affected asset without depreciation and without deduction for taxes and/or costs for transaction.

Based on the above policies, the RAP was prepared (Appendix 13)

### **1-3-3-3 Scope of Land Acquisition and Resettlement**

A census survey, asset inventory and socio-economic survey were conducted from October 9 to 27, 2017. The Project Affected Households (PAHs) and PAPs are shown in Table 1-3-3-3.1. An ARAP was developed, since the number of people to be resettled due to the project is less than 200 (63 persons/16 households in total).

Table 1-3-3-3.1 Number of PAHs and PAPs

| Displacement               | Impact                | Unit | Magnitude of Displacement |          |          |          |           | Total      |
|----------------------------|-----------------------|------|---------------------------|----------|----------|----------|-----------|------------|
|                            |                       |      | Gasabo                    |          |          | Kicukiro | Rwamagana |            |
|                            |                       |      | Ndera                     | Gikomero | Rusororo | Masaka   | Fumbwe    |            |
| Loss of Residential Houses | Physical Displacement | PAH  | 12                        | 3        | 1        | 0        | 0         | <b>16</b>  |
|                            |                       | PAP  | 50                        | 12       | 1        | 0        | 0         | <b>63</b>  |
| Loss of Agricultural Land  | Economic Displacement | PAH  | 42                        | 9        | 17       | 1        | 3         | <b>72</b>  |
|                            |                       | PAP  | 102                       | 27       | 46       | 5        | 12        | <b>192</b> |
| Loss of Crops/<br>Trees    |                       | PAH  | 36                        | 7        | 33       | 1        | 2         | <b>79</b>  |
|                            |                       | PAP  | 109                       | 23       | 63       | 5        | 12        | <b>212</b> |
| Land owned by district     |                       |      | 1                         | 0        | 1        | 0        | 4         | <b>6</b>   |

Source: JICA Study Team

#### **(1) Census Survey**

According to the census survey, 14 houses (56 PAPs) are required to be displaced along the ROW of distribution lines, while 2 houses (7 PAPs) are removed in Gasogi Substation. The number of PAHs and PAPs for Distribution Lines and Gasogi substation is shown in Table 1-3-3-3.2 and Table 1-3-3-3.3 respectively.



Table 1-3-3-2 Number of PAHs and PAPs for Distribution Lines

| Type of loss   | No of PAHs |         |       | No of PAPs |         |       |
|--|------------|---------|-------|------------|---------|-------|
|  | Legal      | Illegal | Total | Legal      | Illegal | Total |
| Required for displacement  |            |         |       |            |         |       |
| 1 HH (Structure owner on Gov. land )                               | 0          | 0       | 0     | 0          | 0       | 0     |
| 2 HH (Structure on Private land)                                   | 14         | 0       | 14    | 56         | 0       | 56    |
| 3 HH (Tenants)   | 0          | 0       | 0     | 0          | 0       | 0     |
| 4 CBEs (Structure owner Gov. land)                                 | 0          | 0       | 0     | 0          | 0       | 0     |
| 5 CBEs (Structure owner on Private land)                           | 0          | 0       | 0     | 0          | 0       | 0     |
| 6 CBEs (Tenants)   | 0          | 0       | 0     | 0          | 0       | 0     |
| 7 Community owned structures including physical cultural resources | 0          | 0       | 0     | 0          | 0       | 0     |
| Not required for displacement                                      |            |         |       |            |         |       |
| 8 Land owners  | 68         | 0       | 68    | 171        | 0       | 171   |
| 9 Wage earners   | 0          | 0       | 0     | 0          | 0       | 0     |

Source: JICA Study Team

Note: HH: House Hold, CBEs: Commercial and Business Enterprises

Table 1-3-3-3 Number of PAHs and PAPs for Gasogi Substation

| Type of loss   | No of PAUs |         |       | No of APs |         |       |
|--|------------|---------|-------|-----------|---------|-------|
|  | Legal      | Illegal | Total | Legal     | Illegal | Total |
| Required for displacement  |            |         |       |           |         |       |
| 1 HH (Structure owner on Gov. land )                               | 0          | 0       | 0     | 0         | 0       | 0     |
| 2 HH (Structure on Private land)                                   | 2          | 0       | 2     | 7         | 0       | 7     |
| 3 HH (Tenants)   | 0          | 0       | 0     | 0         | 0       | 0     |
| 4 CBEs (Structure owner Gov. land)                                 | 0          | 0       | 0     | 0         | 0       | 0     |
| 5 CBEs (Structure owner on Private land)                           | 0          | 0       | 0     | 0         | 0       | 0     |
| 6 CBEs (Tenants)   | 0          | 0       | 0     | 0         | 0       | 0     |
| 7 Community owned structures including physical cultural resources | 0          | 0       | 0     | 0         | 0       | 0     |
| Not required for displacement                                      |            |         |       |           |         |       |
| 8 Land owners  | 4          | 0       | 4     | 21        | 0       | 21    |
| 9 Wage earners   | 0          | 0       | 0     | 0         | 0       | 0     |

Source: JICA Study Team

Note: HH: House Hold, CBEs: Commercial and Business Enterprises

## (2) Asset Inventory

The implementation of this project will cause the loss of assets such as land, buildings and crops. In total, 33,333 m<sup>2</sup> of the farmland will be affected. Table 1-3-3-4 shows the affected land area and land use type of each location.

Table 1-3-3-4 Lands Affected by the Project

| No. | Location (Sector/Sub District)   | Land Type    | Affected Area (m <sup>2</sup> ) | Total (m <sup>2</sup> ) |
|-----|--|--------------|---------------------------------|-------------------------|
| 1   | Gasogi substation  | Farm Land    | 8,583                           | 8,583                   |
| 2   |  | Housing Land | 0                               |                         |
| 3   | Towers of Distribution line (between New Gasogi substation - Nyagasambu) | Farm Land    | 13,950                          | 13,950                  |
| 4   |  | Housing Land | 0                               |                         |
| 5   | Towers of Distribution line (between New Gasogi substation - Masaka)     | Farm Land    | 10,800                          | 10,800                  |
| 6   |  | Housing Land | 0                               |                         |

| No.   | Location (Sector/Sub District) | Land Type | Affected Area (m <sup>2</sup> ) | Total (m <sup>2</sup> ) |
|-------|--------------------------------|-----------|---------------------------------|-------------------------|
| Total |                                |           |                                 | 33,333                  |

Source: JICA Study Team

The buildings affected by this project are shown in Table 1-3-3-3.5. Some households will lose their houses to expropriation. Resettlement of houses shall occur for those under the ROW for the distribution lines.

Table 1-3-3-3.5 Project Affected Buildings by this Project

| No.                          | Location (Sector/Sub District)                                 | Type of Building                   | Number of structures |
|------------------------------|--|------------------------------------|----------------------|
| <b>Residential Buildings</b> |  |                                    |                      |
| 1                            | Gasogi substation  | Single story, mud brick, residence | 2                    |
| 2                            | Distribution line (between New Gasogi substation - Nyagasambu) | Single story, mud brick, residence | 14                   |
| 3                            | Distribution line (between New Gasogi substation - Masaka)     | Single story, mud brick, residence | 0                    |
| <b>Shops</b>                 |  |                                    |                      |
| 4                            | Gasogi substation  | Street stalls                      | 0                    |
| 5                            | Distribution line (between New Gasogi substation - Nyagasambu) | Street stalls                      | 0                    |
| 6                            | Distribution line (between New Gasogi substation - Masaka)     | Street stalls                      | 0                    |
| <b>Public Institutions</b>   |  |                                    |                      |
| 7                            | Gasogi substation  | Hospital/ Mosque                   | 0                    |
| 8                            | Distribution line (between New Gasogi substation - Nyagasambu) | Hospital/ Mosque                   | 0                    |
| 9                            | Distribution line (between New Gasogi substation - Masaka)     | Hospital/ Mosque                   | 0                    |

Source: JICA Study Team

Perennial crops and trees within the ROW likely to grow and interfere with the power line will be lost. Compensation would be directed to the land owner and not the crop owners, because payment is done by MINECOFIN, which only makes payments against land on which the crops exist. Records of land users will be kept by the District, so that these payments can be tracked to ensure all PAP receive due compensation. In the event of none payment of compensation to land users by land owners, land users will be able to raise grievances with the District. The crops and trees affected by this project are shown in Table 1-3-3-3.6 and Table 1-3-3-3.7.

Table 1-3-3-3.6 Project Affected Crops for Distribution Lines and Gasogi Substation

| Crop Type                      | Area affected (m <sup>2</sup> ) |
|--------------------------------|---------------------------------|
| Napier grass "Ubwatsi bw'inka" | 90                              |
| Cassava leaves "Isombe"        | 11                              |
| Imiravumba                     | 2                               |
| Passparum                      | 27                              |
| <b>Total surface area</b>      | <b>130</b>                      |

Source: JICA Study Team

Table 1-3-3-3.7 Project Affected Trees for Distribution Lines and Gasogi Substation

| Tree Type                   | Number of trees affected |
|-----------------------------|--------------------------|
| Mangoes                     | 44                       |
| Avocado                     | 66                       |
| Cassava "Imyumbati"         | 206                      |
| Banana                      | 631                      |
| "Imiyenzi"                  | 109                      |
| Macadamia "Makadamiya"      | 6                        |
| Eucalyptus trees "Inturusu" | 2601                     |
| Cedrela                     | 41                       |
| Greveria "Gereveriya"       | 50                       |

| Tree Type                    | Number of trees affected |
|------------------------------|--------------------------|
| Guava "Amapera"              | 1                        |
| "Kasiya"                     | 11                       |
| "Filawo"                     | 21                       |
| "Umunyinya"                  | 24                       |
| Paw paw "Ipapayi"            | 5                        |
| "Umusave"                    | 13                       |
| "Cypres"                     | 40                       |
| Tobacco "Itabi"              | 4                        |
| Umuvumu                      | 1                        |
| Coffee "Ikawa"               | 2                        |
| <b>Total number of trees</b> | <b>3,876</b>             |

Source: JICA Study Team

### (3) Socio-Economic Baseline of PAPs

The socio-economic information of PAHs is shown in Table 1-3-3-3.8.

Out of 114 PAHs, 43 households are headed by females. However, in Rwanda, women have equal right for possession of property; female headed household means simply woman has properties and does not mean social vulnerable household. It was also found out that no PAHs' heads is above 80 years or less than 20 years.

Table 1-3-3-3.8 Socio-Economic Information of PAHs

|   |   |
|---|---|
| Gender of Head s of Households                    | Male : 71 households, Female : 43 households  |
| Age of Heads of Households                        | 0 - 20 years old: 0 household<br>21-30 years old: 15 households<br>31-40 years old: 31 households<br>41-50 years old: 21 households<br>51-60 years old: 21 households<br>61-70 years old: 9 households<br>71-80 years old: 5 households<br>81-90 years old: 1 household<br>More than 91 years old: 0 household<br>Not responsive: 11 households |
| Typical House Type                                | Earth bricks, mud, stick walls<br>Roofed with iron sheets or clay baked roof tiles  |
| Employment status of Heads of Affected Households | Farming: 62 households<br>Self-employment: 27 households<br>Employment: 7 households<br>Civil Servant: 3 households<br>Others: 15 households  |
| Main income sources                               | Agriculture, Self-employed, Public service  |
| Bank accounts                                     | 92 households have bank accounts  |

Source: JICA Study Team

### (4) Vulnerable Groups

According to the results of the census survey and socio-economic survey, there is one (1) household headed by an elderly (over 80 years old) among PAHs. However, since it is not a physically, but economically displaced household, economic restoration assistance will be provided based on the Vision 2020 Umurenge Programme (VUP) (direct economic support, medical support) as part of Rwanda governmental program for vulnerable groups.

## **(5) Compensation and Assistance Policy**

In accordance with the above-mentioned laws and regulations as well as the JICA guideline and World Bank Safeguard Policy, the Policy to be applied for this project is described as follows:

- Type: Loss of partially or fully displaced buildings and structures, Loss of crops, Loss of income sources or livelihood accompanied with resettlement
- Eligibility: All the PAPs
- Compensation methods: Cash compensation, Recovery of structure loss
- Calculation methods: Market price or replacement cost

### **1) Compensation toward Loss**

The cut-off date for compensation and assistance is November 3, 2017.

The resettlement and compensation committees, comprised of members from EDCL and Sector authorities are established at each Sector. Their duty is to verify all assets valued and all PAPs have been fully compensated at the full replacement cost agreed by both the PAPs and EDCL. Losses caused by the Project and compensation toward them are as summarized below.

#### Loss of Land

A total of 33,333m<sup>2</sup> will be lost by the project. If the remaining land is considered economically not viable in terms of the size and shape and if PAPs opt to, the remaining land or the land larger than the area required for the project is acquired based on consensus of the owner. Compensation is at full replacement cost based on the recent market price. Since all PAPs prefer monetary compensation, there is no land for land compensation.

#### Loss of Houses

The project caused loss of 27 structures (for 16 PAHs). Compensation will be paid at full replacement cost toward construction materials, labor etc. The full replacement cost includes the cost required for moving houses (physical displacement). Since there is enough time for the construction of new houses, there is no assistance for transitional period.

#### Loss of Agricultural Crops

The crops affected by the project are compensated at the average price of the last three years. After the completion of the construction works, people are allowed to cultivate, hence the impacts on the PAPs are temporarily.

#### Loss of Trees

Trees affected by the project will be compensated based on the species, tree ages, etc. Reforestation is not required under the ROW; however, land owners can continue to grow other crops other than trees that could interfere with power lines.

## 2) Livelihood Restoration

The Livelihood Restoration Plan is designed to have two stages, i.e. Short-term measures during the construction of the New Gasogi substation and tower erection, to support the transition of PAHs, and Long-term measures to achieve a sustainable livelihood for PAHs. As short-term measures to restore the loss of PAPs income sources, PAPs are given priority to be employed as unskilled and skilled labor during the construction period. As long-term measures, PAPs are given priority for paid temporary employment as skilled and unskilled labor to work during the maintenance of erected towers and clearing trees within the ROW and access roads. The cultivation within the ROW during the operation is allowed, as long as they are seasonal crops (because perennial crops may grow tall to interfere with the power lines).

## 3) Entitlement Matrix

In line with the Rwanda laws and regulations, JICA Guideline and World Bank Safeguard Policy, the compensation and assistance policy for the project, such as eligibility and compensation valuation is shown in Table 1-3-3-3.9.

Table 1-3-3-3.9 Entitlement Matrix

| Type of Loss  | Eligible Groups        | Impact   | Entitlement   | Responsible Bodies              |
|---|------------------------|--|---|---------------------------------|
| Houses  | Owner of the structure | - Loss of residential dwelling   | <ul style="list-style-type: none"> <li>Cash compensation at full replacement cost for entire structure and other fixed assets without depreciation and additional 5% disruption fee as stipulated by the local expropriation law</li> <li>Right to salvage materials from the displaced house</li> </ul>  | EDCL/<br>MINECOFIN              |
| Other structures (kraals, livestock sheds, stores etc.) | Owner of the structure | - Loss of structure  | <ul style="list-style-type: none"> <li>Cash compensation at full replacement cost</li> <li>Right to salvage materials from the displaced structures</li> </ul>  | EDCL/<br>MINECOFIN              |
| Land  | Land owner             | <ul style="list-style-type: none"> <li>Displacement of people from land used for agriculture or housing</li> <li>Loss of livelihood</li> </ul> | <ul style="list-style-type: none"> <li>Cash compensation at current market value (including all transaction fees) for affected land plus additional 5% disruption fee</li> <li>Priority for employment opportunities associated with construction and erection of the New Gasogi Substation and towers</li> <li>Awareness training on saving and access to credit schemes so as to manage acquired cash compensation</li> </ul> | EDCL/<br>MINECOFIN              |
| Seasonal crops  | Crop owner             | <ul style="list-style-type: none"> <li>Loss of seasonal crops used for subsistence</li> <li>Loss of livelihood</li> </ul>                      | <ul style="list-style-type: none"> <li>Seasonal crops may continue to be planted under the ROW even after erection of towers as long as they do not grow tall to interfere with the power lines</li> </ul>  | EDCL/<br>EUCL                   |
| Perennial crops   | Crop owner             | <ul style="list-style-type: none"> <li>Loss of perennial crops used for subsistence</li> <li>Loss of livelihood</li> </ul>                     | <ul style="list-style-type: none"> <li>Cash compensation based on prices of such crops based on the sage, size, are coverage and type of crop</li> </ul>  | EDCL/<br>MINECOFIN<br>/ Sectors |
| Trees   | Tree owner             | <ul style="list-style-type: none"> <li>Loss of trees used for subsistence, shade, etc.</li> <li>Loss of livelihood</li> </ul>                  | <ul style="list-style-type: none"> <li>Cash compensation at replacement value based on type, age and productive value of affected trees</li> </ul>  | EDCL/<br>MINECOFIN<br>/ Sectors |
| Waged employment (Day laborers/ traders)                | Employee               | - Loss of livelihood   | <ul style="list-style-type: none"> <li>Employment opportunities during construction of the New Gasogi Substation and towers for labors and</li> </ul>   | EDCL /<br>Districts/<br>Sectors |

| Type of Loss      | Eligible Groups   | Impact   | Entitlement  | Responsible Bodies |
|-------------------|-------------------|--|--|--------------------|
|                   |                   |  | skilled traders  |                    |
| Vulnerable Groups | Vulnerable Groups | <ul style="list-style-type: none"> <li>- Displacement of people from land used for agriculture or housing</li> <li>- Loss of livelihood</li> </ul> | <ul style="list-style-type: none"> <li>• Livelihood restoration measures (direct economic assistance, medical insurance) according to the Vision 2020 Umurenge Programme (VUP).</li> </ul> | EDCL/<br>MINECOFIN |

Source: JICA Study Team

## (6) Grievance Redress Mechanism

Grievance and complaints for the ARAP of the project will be dealt as below based on Article 19 and 26 of the Expropriation Laws and locally practiced conflict resolution methods at community level. Beside the Resettlement and Compensation Committees at Sector level, an independent group comprised of PAPs, Sector authorities, and representatives from EDCL will be formed at each Sector in order to supervise that grievance are handled properly.

Stage 1- PAP will raise the issue with Village leaders for a solution to be reached. If the resolution at this stage does not satisfy the PAP, it is raised to the next level.

Stage 2- The issue is raised and discussed at the Cell level.

Stage 3- The issue is raised and discussed at the Sector level. The District land commission seat to resolve the issue between the PAP and developer (EDCL).

Stage 4: Should the above fail, the matter is raised by the grieving PAP to the Courts of law.

The above mentioned process is explained to the PAPs through the public consultations, negotiation at the individual level and a monthly village meeting. From Stage 1 to 3, the process will not involve any fees, however at Stage 4, fees for a legal service and valuation will be borne by the PAPs with grievance. The entire process at any stage will be carried out in Kynyarwanda.

At any stage, EDCL will be present in discussion. According to REG, all cases of grievance or complaints have been resolved up to Stage 2. Grievance and complaints should be dealt within 30 days. However, even after this period, they will be dealt until they are resolved. The grievance mechanism will be available until consensus is reached with all PAPs and compensation payment to all PAPs is completed.

## (7) Institutional Framework

Institutional framework for implementation of the ARAP is as follows.

### 1) EDCL

EDCL is responsible for implementation and monitoring of environmental and social considerations. It has one (1) environmental safeguard expert and two (2) social safeguard experts, even though there is no specific division for environmental and social safeguards. The social

safeguard experts prepare and finalize a payment order for compensation, then submit it to the MINECOFIN. EDCL is in charge of handling grievance from planning until construction stage.

## 2) EUCL

EUCL has a responsibility to conduct environmental and social monitoring during operation stage.

## 3) Resettlement and Compensation Committee

The committee will be established at the Sector level and will be comprised of Sector authorities and EDCL social safeguard experts. Their duty is to verify all assets valued and all PAPs have been properly compensated prior to resettlement.

## 4) District Land Bureau

The District Land Bureau is responsible for land management (land registration, land use, supervising property transactions, etc.) at Sector level.

## 5) MINECOFIN

MINECOFIN submits a payment order for compensation to the National Bank of Rwanda.

### 1-3-3-4 Implementation Schedule

The schedule of ARAP preparation and implementation is shown in Table 1-3-3-4.1 and 1-3-3-4.2 respectively.

Table 1-3-3-4.1 Schedule of ARAP Preparation

| Stage   | Responsible bodies  | Actions  | Time frame            |
|---|---|--|-----------------------|
| 1. Mapping  | EDCL Social Safeguards Specialists/EDCL-GIS Experts/ Local consultant | A land survey is carried out to identify exact locations and sizes of lands affected by the Project and their land use types and potential.  | By September 1 , 2017 |
| 2. Consultation with the local leaders (sectors/ districts) | EDCL Social Safeguards Specialists/ Local consultant                  | Consultation with local leaders. The consultations include the importance/advantages of the project to the people, the strategies to avoid, minimize and mitigate the adverse effects etc.   | September 4- 29, 2017 |
| 3. Consultation with PAPs                                   | EDCL Social Safeguards Specialists/ Local consultant                  | Consultation with the people who will be affected by the project (PAPs). The consultations include the importance/advantages of the project to the people, the strategies to avoid, minimize and mitigate the adverse effects etc.   | October 2- 13, 2017   |
| 4. Census   | Local consultant /EDCL Social Safeguards Team                         | The census of all PAPs <ul style="list-style-type: none"> <li>◆ Enumerating and collecting basic information on the affected population</li> <li>◆ Registering the affected population by residence or locality.</li> <li>◆ Establishing cut-off date and creating a list of legitimate beneficiaries</li> </ul> | October 9- 27, 2017   |
| 5. Inventory of   | Certified valuers in  | A detailed survey of all losses caused by the  | October 9- 27, 2017   |

| Stage   | Responsible bodies   | Actions   | Time frame                          |
|---|--|---|-------------------------------------|
| Affected Assets   | collaboration with local leaders, District Land Bureau                             | project, including land acquisition and loss of physical assets as well as loss of income either temporary or permanent.  |                                     |
| 6. Socioeconomic Studies                                    | Local consultant   | Social economic data collection on all affected households.   | October 9- 27, 2017                 |
| 7. Data Analysis/ Entitle Matrix                            | Local consultant   | Analysis of data collected in the census, assets inventory and socioeconomic studies.<br>Establishment of an entitlement matrix <ul style="list-style-type: none"> <li>♦ Designing appropriate livelihood restoration.</li> <li>♦ Establishing baseline information for future monitoring and evaluation of ARAP implementation.</li> </ul> | October 16- 27, 2017                |
| 8. Consultation with PAPs                                   | EDCL Social Safeguards Team, Local consultant                                      | With the information provided by the surveys and studies, resettlement planner engages in informed and constructive consultations with the affected community regarding the RAP strategy for livelihood restoration. A committee of representative is nominated and serves as the focal point.  | October 23- 27, 2017                |
| 9. Submission of 1st draft ARAP to JICA Study Team and EDCL | EDCL Social Safeguards Team, Local consultant                                      | 1 <sup>st</sup> draft ARAP will be submitted for the review of JICA Study Team and EDCL   | October 31, 2017                    |
| 10. Preparation and signing of compensation forms           | EDCL Social Safeguards Team, Local consultant, Local leaders, District Land Bureau | After valuation exercise conducted by the certified valuers, the compensation forms must be signed by PAPs and all relevant stakeholders like; the cell leader, the sector leader and the district mayor for approval at district level.  | October 30, 2017 - November 3, 2017 |
| 11. Agreement with District, Sectors and Cells              | EDCL Social Safeguards Team, Local consultant, District, Sectors, Cells            | Local government such as District, Sectors and Cells will agree with the ARAP.  | November 6 – 24, 2017               |
| 12. Submission of final ARAP to EDCL                        | EDCL Social Safeguards Team, Local consultant                                      | Final ARAP will be submitted for the review of JICA Study Team and EDCL   | December, 2017                      |
| 13. Checking and Approval by Social Safeguard Team/EDCL     | EDCL Social Safeguards Team  | The compensation forms must be approved and checked further by the social safeguards team at EARP/EDCL level as well as correcting some mistakes if any.  | December 31, 2017                   |
| 14. Process by EDCL Finance Department                      | From EDCL Social Safeguards Team to EDCL Finance Department                        | After approval by social safeguards team, the compensation forms are forwarded at the EDCL finance department to process payment.   | At the beginning of March, 2017     |

Source: JICA Study Team

Table 1-3-3-4.2 Schedule of ARAP Implementation

| Stage   | Responsible bodies                                | Actions  | Time frame                      |
|---|---|--|---------------------------------|
| 1. Submission of the Payment order to MINECOFIN | From EDCL Finance Department to MINECOFIN         | From EDCL finance department, the Payment order and the original compensation forms are forwarded to the Ministry of Finance for Payment.              | At the beginning of March, 2017 |
| 2. Payment process by MINECOFIN                 | From the MINECOFIN to the National Bank of Rwanda | MINECOFIN submits the Payment Order to the National Bank of Rwanda. The Payment by the National Bank of Rwanda through PAPs' respective Bank accounts. | March to April, 2018            |
| 3. Relocation of                                | PAPs/ EDCL  | The PAPs will be relocated.  | April to May, 2018              |



| Stage                 | Responsible bodies | Actions  | Time frame  |
|-----------------------|--------------------|--|---|
| PAPs                  |                    |  |   |
| 4. Land title request | EDCL/ Kigali City  | EDCL will submit request for transfer of land title to Kigali City | May, 2018<br>(Within 3 months after the approval of the Project by Japanese Government) |

Source: JICA Study Team

### 1-3-3-5 Cost and Finance

Costs for land acquisition and resettlement and budget required for implementation, and their breakdowns are shown in Table 1-3-3-5.1, Table 1-3-3-5.2 and Table 1-3-3-5.3. EDCL is responsible for securing the fund for costs displayed in the ARAP.

Table 1-3-3-5.1 Cost and Budget for Implementation

| Item                       | Cost (Rwf)           |
|----------------------------|----------------------|
| Compensation costs         | 141,271,129.2        |
| ARAP Implementation budget | 14,827,113.0         |
| <b>Total</b>               | <b>156,098,242.2</b> |

Source: JICA Study Team

Table 1-3-3-5.2 Cost of Compensation

| Items for Compensation | Cost (Rwf)            |
|------------------------|-----------------------|
| Land                   | 87,321,214.75         |
| Crops/Trees            | 11,040,135.00         |
| Buildings              | 42,909,779.45         |
| <b>Total</b>           | <b>141,271,129.20</b> |

Source: JICA Study Team

Table 1-3-3-5.3 Breakdowns for Implementation Budget

|              | Activities  | Responsible Organizations         | Unit     | Quantity | Cost (Rwf)        |
|--------------|---|-----------------------------------|----------|----------|-------------------|
| 1            | Implementation Preparation  |                                   |          |          |                   |
| (1)          | Consultations with PAPs through Sector and Cell authorities on progress of project and compensation | EDCL/Cell Leaders, Sector Leaders | Trips    | 5        | 150,000           |
| 2            | Implementation  |                                   |          |          |                   |
| (1)          | Notification to PAPs of Compensation Payment  | EDCL/ Sector Leaders              | Trips    | 5        | 150,000           |
| (2)          | Grievance Redress   | EDCL/ Sector Leaders              | Lump sum | 10       | 300,000           |
| 3            | Contingency   | EDCL Sector Leaders               |          |          |                   |
| (1)          | Contingency funds for increased costs   | EDCL                              | Lump sum | 1        | 14,127,113        |
| 4            | Documentation of compensation process   | EDCL                              | Lump sum | 1        | 100,000           |
| <b>Total</b> |   |                                   |          |          | <b>14,827,113</b> |

Source: JICA Study Team

### 1-3-3-6 Monitoring System

The monitoring of resettlement and land acquisition will be carried out by EDCL in collaboration of representatives at the sector and cell level. A draft of monitoring form for land acquisition is under 1-3-4-1 Draft Monitoring Forms.

### **1) Performance monitoring**

Performance monitoring will be conducted to monitor the progress of resettlement and land acquisition. The items to be monitored include the followings:

- Stakeholder meetings
- Grievance redress procedures following the existing dispute resolution structure of the local government in place
- Institutional frameworks aligned with the relevant phase of the resettlement process
- Census, asset inventories, socio-economic study
- Identification and calculation of assets affected by the project
- Disbursement of compensation payment
- Agreement on livelihood restoration schemes with affected communities
- Monitoring and evaluation reports

### **2) Impact monitoring**

Compared with the baseline obtain by socio-economic study etc., the status of livelihood restoration will be monitored in order to analyze the effectiveness of ARAP and to evaluate qualitatively, ensuring the ARAP meets the needs of the affected people. The examples of items to be monitored are listed below.

- Ownership of household goods such as phones and radios
- Changes in quality and quantity of agricultural production
- Changes in the number of working household members versus total number of household members
- Changes in household income levels and expenditure patterns
- Changes in access to social infrastructure and services
- Changes in asset ownership/ quality and size
- Proportion of children in each household attending primary school

### **3) Completion audit**

The completion audit will be undertaken 2 years after all ARAP inputs have been completed. The audit will analyze whether the compensation has been completed according to the ARAP and the affected livelihood (socio-economic status) has been restored by mitigation measures as expected. EDCL will put in place corrective actions if necessary.

### **1-3-3-7 Stakeholder Meeting**

Prior to the stakeholder meetings, stakeholder analysis of this project was conducted. 1) PAPs/ PAHs, 2) Local government officials at sectors, cell and village level, and 3) Representatives of EDCL are identified as stakeholders. No registered or operating NGOs were identified in the project area and so are not included in the stakeholder categories.

For PAPs/ PAHs, public meetings, focus group discussions and one-to one discussions were organized. For local government officers and representatives of EDCL, interviews and one-to-one discussions were conducted.

During the stakeholder meetings, the outline and likely impacts of the project were explained with a guiding questionnaire. All the participants expressed an agreement for the project. An issue raised by one individual or a group of people was cross-checked and analyzed by discussing it with other individuals or groups.

For meetings held with the sector authorities, EDCL issued letters to the relevant authorities, and informed them of the project activities and land acquisition etc., then arranged the date of stakeholder meetings with local government officers such as cells and villages.

The following information was explained during stakeholder meetings: The summary of stakeholder meetings is explained in Table 1-3-3-7.1.

- Project purpose, activities and schedule
- ROW of the project affected area
- Likely impacts by the Project. (positive and negative impacts)
- Process of land acquisition and resettlement
- Eligibility and entitlement to compensation
- Development initiatives proposed for the livelihood restoration of the displaced persons
- Proposed stakeholders engagement process
- Proposed grievance and redress mechanism for any concerns

PAPs were involved in the process of documentation and valuation of their assets. Property valuation forms were presented to PAPs for verification; once they were comfortable with the proposed full replacement cost for their property, they sign and seal the documents as a sign of agreement. These compensation agreement forms shall be attached to the ARAP report. The ARAP in English and Kinyarwanda will be disclosed after the approval by REG and a translated copy of ARAP in Kinyarwanda will be displayed at Cell, Sector and District offices.

Table 1-3-3-7.1 Summary of stakeholder meetings

| Date and Time                       | Place  | Methods                                      | Type of participants                                | Number of participants | Purpose/ Contents of meeting  |
|-------------------------------------|--|--|---|------------------------|---|
| June 19 and 23, 2017                | Kigali   | Interview/one-to-one discussion              | EDCL  | 3                      | <ul style="list-style-type: none"> <li>Project purpose, benefit, impact and mitigation measures</li> <li>Role of executing agency</li> </ul>  |
| June 21, 2017                       | Kigali   | Interview/one-to-one discussion              | RURA  | 7                      | <ul style="list-style-type: none"> <li>ROW to be applied for electrical lines</li> <li>Guideline to be applied for the project.</li> </ul>  |
| July 3- 7, 2017                     | Gasabo, Rwamagana, Kicukiro Districts                | Interview/one-to-one discussion              | Sector Executive secretaries                        | 5 in total             | <ul style="list-style-type: none"> <li>Project purpose, components, target areas and benefit</li> <li>Land acquisition process, Preparation for asset inventory, Valuation of compensation</li> <li>Local perception of the project (including benefits, impact and mitigation measures)</li> </ul> |
| July 5-12, 2017                     | Ndera, Rusororo, Gikomero, Fumbwe and Masaka sectors | Interview/one-to-one discussion              | Cell Executive secretaries                          | 11 in total            |   |
| July 10-21, 2017                    | Project intervention Cells                           | Public meeting/Focus group discussion        | Cell leaders, village leaders and communities       | 52 in total            |   |
| October 9-13, 2017                  | Ndera, Gikomero, Rusororo and Fumbwe sectors         | One-to-one discussion with PAPs              | PAHs  | 114 in total           | <ul style="list-style-type: none"> <li>Census, asset inventory, socio-economic survey</li> <li>Confirmation of process of land acquisition and compensation (necessary documents etc.)</li> </ul>   |
| October 16-20, 2017                 | Ndera, Rusoro and Masaka Sectors                     | One-to-one discussion with PAPs              | PAHs  | 114 in total           |   |
| October 30, 2017 - November 3, 2017 | Ndera, Gikomero, Rusororo, Fumbwe and Masaka Sectors | Focus Group Discussion/one-to-one discussion | PAHs  | 114 in total           | <ul style="list-style-type: none"> <li>Verification of the results of asset inventory</li> <li>Consensus building with PAPs</li> </ul>  |
| November 6-24, 2017                 | Ndera, Gikomero, Rusororo, Fumbwe and Masaka Sectors | Interview/one-to-one discussion              | Local authorities at sector, cell and village level | 78 in total            | <ul style="list-style-type: none"> <li>Authorization of ARAP by local authorities at sector, cell and village level</li> </ul>  |

Source: JICA Study Team

Main comments raised during the stakeholder meetings and responses from EDCL were described in Table 1-3-3-7.2.

Table 1-3-3-7.2 Main comments and responses during the stakeholder meetings

| Issues raised by the participants   | Responses from EDCL   |
|---|---|
| <ul style="list-style-type: none"> <li>There is a possibility that the project would cause the loss of land, structures, crops and trees. The compensation should be fairly done.</li> <li>What is the eligibility for compensation i.e. which structures, land, crops and trees would be compensated?</li> </ul> | <ul style="list-style-type: none"> <li>An ARAP was being prepared to guide the resettlement process. PAPs will be compensated for assets lost at fair market price with an additional 5 % disruption cost.</li> <li>Asset inventory and valuation would be done by an independent registered valuer. Prices of land, structures, crops and trees will be referred from commissioned prices set by the Institute of Real Property Valuers in Rwanda.</li> <li>Compensation will be paid in 120 days from signature of agreement by the PAPs as long as all supporting land lease title documents are in order.</li> <li>In reference to the RURA 2015 guideline, all structures under ROW of power lines will be displaced.</li> </ul> |

| Issues raised by the participants  | Responses from EDCL  |
|--|--|
|  | <ul style="list-style-type: none"> <li>• Land displaced will be the land on which the towers shall be erected and any other portion of the plot of land left that is not of any economic use after tower has been lost.</li> </ul>   |
| <ul style="list-style-type: none"> <li>• Job opportunities are available for locals during the construction phase?</li> </ul>            | <ul style="list-style-type: none"> <li>• An affirmative program was suggested that gives locals in the area, employment priority during construction.</li> </ul>   |
| <ul style="list-style-type: none"> <li>• The power lines will serve the local communities?</li> </ul>                                    | <ul style="list-style-type: none"> <li>• The purpose of the power lines was to increase the amount of power in the Sector of Ndera, Rusororo, Gikomero, Fumbwe and Masaka.</li> </ul>  |
| <ul style="list-style-type: none"> <li>• Are there any risks of exposure to electro-magnetic for those under the power lines?</li> </ul> | <ul style="list-style-type: none"> <li>• A clearance of more than 5 m above the lowest conductor was maintained for all structures within which no impacts by electro-magnetic or electrocution can occur. Sharp spokes will be placed at lower members of towers to prevent unauthorised people from climbing.</li> </ul> |
| <ul style="list-style-type: none"> <li>• Are there any risks of human electrocution?</li> </ul>  |  |

Source: JICA Study Team

### 1-3-4 Others

#### 1-3-4-1 Draft Monitoring Form

Draft monitoring forms for environmental management as well as resettlement/ land acquisition are shown below.

#### MONITORING FORM

#### 1. Responses/Actions to Comments and Guidance from Government Authorities and the Public

| Monitoring Item   | Monitoring Results during Report Period      |
|---|--|
| Number and contents of comments from Governmental Authorities | Number:<br>Contents:<br>Actions to be taken: |
| Number and contents of comments from the Public               | Number:<br>Contents:<br>Actions to be taken: |

#### 2. Mitigation Measures

##### - Air Quality (Emission Gas / Ambient Air Quality) (Construction Phase)

| Item | Unit              | Measured Value (Mean) | Measured Value (Max.) | Country's Standards | Referred International Standards | Remarks (Measurement Point, Frequency, Method, etc.) |
|------|-------------------|-----------------------|-----------------------|---------------------|----------------------------------|--|
| PM10 | mg/m <sup>3</sup> |                       |                       | N/A                 | 20 (1-year)<br>50 (24-hour)      |  |

**Note)** Negative impact on air quality is expected to some extent during construction such as dust. Hence, EDCL and Contractor shall monitor the status of necessary mitigation measures, including daily site inspection for certification of vehicle and heavy machineries.

##### - Waste (Construction Phase)

| Monitoring Item | Monitoring Results during Report Period |
|-----------------|---|
|                 |   |

**Note)** EDCL and Contractor should monitor disposal methods (storage, transport, disposal) of waste materials incurred by dismantling of existing towers in accordance with relevant laws and regulations of Rwanda.

##### - Noise / Vibration (Construction Phase)

| Item        | Unit | Measured Value (Mean) | Measured Value (Max.) | Country's Standards | Referred International Standards | Remarks (Measurement Point, Frequency, Method, etc.) |
|-------------|------|-----------------------|-----------------------|---------------------|----------------------------------|--|
| Noise level | dB   |                       |                       | N/A                 | 55                               |  |

**Note)** Noise and vibration standard for construction work is not stipulated in national standards of Rwanda (Acoustics- Noise Pollution- Tolerance limits RS236/2014; Vibration- Tolerance limits RS

237: 2014). However, EDCL and Contractor shall monitor the status of necessary mitigation measures, including time regulation of construction and daily site inspection for certification of vehicle and heavy machineries.

\*1: IFC EHS Guidelines, General EHS Guidelines Table 1.7.1 Daytime (07:00-22:00)

**- Soil (Construction/ Operation Phase)**

| Monitoring Item | Monitoring Results during Report Period |
|-----------------|---|
|                 |   |

**Note)** Insulating oil will be used for transformers, which may cause soil pollution if it is leaked. Hence, EDCL and Contractor shall conduct soil sampling at the new Gasogi Station before, mid-term and end of construction; EUCL shall conduct soil sampling on an annual basis at the new Gasogi Station.

**3. Natural Environment (Construction Phase)**

**- Ecosystem**

| Monitoring Item | Monitoring Results during Report Period |
|-----------------|---|
|                 |   |

**Note)** Since the project requires cutting trees, EDCL and Contractor shall conduct compensatory measures in accordance with relevant laws and regulations of Rwanda.

**4. Social Environment**

**- Resettlement (Pre-Construction Phase)**

| Monitoring Item                                 | Monitoring Results during Report Period |
|---|---|
| 1) Approval of ARAP by EDCL                     | Status/ Completion date:                |
| 2) Payment process by EDCL Finance Department   | Status/ Completion date:                |
| 3) Submission of the Payment order to MINECOFIN | Status/ Completion date:                |
| 4) Payment process by MINECOFIN                 | Status/ Completion date:                |
| 5) Relocation of PAPs                           | Status/ Completion date:                |
| 6) Land title request                           | Status/ Completion date:                |

**1) Progress of Compensation Payment and Land Acquisition**

| Components   | Planned Total | Unit | Monthly Progress |   |          | Progress in %       |                 | Expected Date Completion | Responsible Organization. |
|--|---------------|------|------------------|---|----------|---------------------|-----------------|--------------------------|---------------------------|
|  |               |      | Jan. 2018        | ~ | May 2018 | Till the last month | Up to the month |                          |                           |
| <b>Compensation Payment</b>                                  |               |      |                  |   |          |                     |                 |                          |                           |
| New Gasogi substation  |               | HH   |                  |   |          |                     |                 |                          | EDCL/ MINECOFIN           |
| 15 kV Distribution line (New Gasogi substation – Nyagasambu) |               | HH   |                  |   |          |                     |                 |                          | EDCL/ MINECOFIN           |
| 15 kV Distribution line (New Gasogi substation – Masaka)     |               | HH   |                  |   |          |                     |                 |                          | EDCL/ MINECOFIN           |

|  |  |                |  |  |  |  |  |                    |
|--|--|----------------|--|--|--|--|--|--------------------|
| Total  |  | HH             |  |  |  |  |  | EDCL/<br>MINECOFIN |
| Land Acquisition   |  |                |  |  |  |  |  |                    |
| New Gasogi substation  |  | m <sup>2</sup> |  |  |  |  |  | EDCL/Sector Leader |
| 15 kV Distribution line (New Gasogi substation – Nyagasambu) |  | m <sup>2</sup> |  |  |  |  |  | EDCL/Sector Leader |
| 15 kV Distribution line (New Gasogi substation – Masaka)     |  | m <sup>2</sup> |  |  |  |  |  | EDCL/Sector Leader |
| Total  |  | m <sup>2</sup> |  |  |  |  |  | EDCL/Sector Leader |

Note: The figures in this table include the PAPs without consensus and absent

2) Progress of Consensus with PAPs absent and without consensus

| Type of PAPs      | Number | Unit | Monthly Progress |   |          | Expected Date Completion | Responsible Organization. |
|-------------------|--------|------|------------------|---|----------|--------------------------|---------------------------|
|                   |        |      | Jan. 2018        | ~ | May 2018 |                          |                           |
| Absent            |        | HH   |                  |   |          |                          | EDCL                      |
| Without Consensus |        | HH   |                  |   |          |                          | EDCL                      |
| Total             |        | HH   |                  |   |          |                          | EDCL                      |

3) Remarks on Progress with PAPs absent and without consensus

| No. | Name of PAP | Status/Progress in this month | Action Plan for the next month |
|-----|-------------|-------------------------------|--------------------------------|
| 1   |             |                               |                                |
| 2   |             |                               |                                |
| 3   |             |                               |                                |
| 4   |             |                               |                                |
| 5   |             |                               |                                |

**- Living / Livelihood (Pre-Construction, Construction and Operation Phase)**

| Monitoring Item                 | Monitoring Results during Report Period                   |
|---------------------------------|---|
| Livelihood restoration programs | Status (during and after livelihood restoration program): |

**- Record of grievance management (Pre-Construction/Construction/Operation Phase)**

| Monitoring Item                  | Monitoring Results during Report Period      |
|----------------------------------|--|
| Number and contents of grievance | Number:<br>Contents:<br>Actions to be taken: |



4) Remarks on Progress with PAPs absent and without consensus

| No. | Name of PAP | Status/Progress in this month | Action Plan for the next month |
|-----|-------------|-------------------------------|--------------------------------|
| 1   |             |                               |                                |
| 2   |             |                               |                                |
| 3   |             |                               |                                |
| 4   |             |                               |                                |
| 5   |             |                               |                                |
| 6   |             |                               |                                |
| 7   |             |                               |                                |
| 8   |             |                               |                                |
| 9   |             |                               |                                |
| 10  |             |                               |                                |
| 11  |             |                               |                                |
| 12  |             |                               |                                |

**1-3-4-2 Environmental Check List**

Table 1-3-4-2.1 below is the Environmental Check List of the Project based on the JICA Guidelines for Environmental and Social Consideration.

Table 1-3-4-2.1 Environmental Checklist

| Category                  | Environmental Item                        | Main Check Items   | Yes: Y<br>No: N                                    | Confirmation of Environmental Considerations (Reasons, Mitigation Measures)  |
|---------------------------|---|--|--|--|
| 1 Permits and Explanation | (1) EIA and Environmental Permits         | (a) Have EIA reports been already prepared in official process?<br>(b) Have EIA reports been approved by authorities of the host country's government?<br>(c) Have EIA reports been unconditionally approved? If conditions are imposed on the approval of EIA reports, are the conditions satisfied?<br>(d) In addition to the above approvals, have other required environmental permits been obtained from the appropriate regulatory authorities of the host country's government? | (a) Y<br>(b) Y<br>(c) Y<br>(d) N                   | (a)-(c) The EIA report has been approved on October 1, 2017. Conditions are general issues concerning the construction works and they are already addressed in the EIA report with mitigation measures and monitoring plan.<br>(d) No additional approval is required.   |
|                           | (2) Explanation to the Local Stakeholders | (a) Have contents of the project and the potential impacts been adequately explained to the Local stakeholders based on appropriate procedures, including information disclosure? Is understanding obtained from the Local stakeholders?<br>(b) Have the comment from the stakeholders (such as local residents) been reflected to the project design?   | (a) Y<br>(b) Y                                     | (a) In line with JICA guideline and local laws/regulations, stakeholder meetings were conducted.<br>(b) Main comments raised during meetings were reflected on the project design.   |
|                           | (3) Examination of Alternatives           | (a) Have alternative plans of the project been examined with social and environmental considerations?  | (a) Y  | (a) Alternative plans, including no-project option were examined. Different routes for the locations of the New Gasogi Substation were examined. The present project is most preferable in terms of lower impacts on natural, social and economic aspects  |
| 2 Pollution Control       | (1) Water Quality                         | (a) Is there any possibility that soil runoff from the bare lands resulting from earthmoving activities, such as cutting and filling will cause water quality degradation in downstream water areas? If the water quality degradation is anticipated, are adequate measures considered?  | (a) N  | (a) There are no rivers or water areas around the project sites.   |
| 3 Natural Environment     | (1) Protected Areas                       | (a) Is the project site located in protected areas designated by the country's laws or international treaties and conventions? Is there a possibility that the project will affect the protected areas?  | (a) N  | (a) The Project site is within Kigali City and there is no protected area nearby. The Project will not affect the protected area.  |
|                           | (2) Ecosystem                             | (a) Does the project site encompass primeval forests, tropical rain forests, ecologically valuable habitats (e.g., coral reefs, mangroves, or tidal flats)?<br>(b) Does the project site encompass the protected habitats of endangered species designated by the country's laws or international treaties and conventions?<br>(c) If significant ecological impacts are anticipated, are adequate   | (a) N<br>(b) N<br>(c) N<br>(d) N<br>(e) N<br>(f) N | (a) There is no forested area near the project site.<br>(b) There is no protected habitat of endangered species.<br>(c) No significant ecological impact is anticipated, even though some trees within ROW of distribution lines are removed.<br>(d) No significant impacts are expected on habitat fragmentation and migration routes.<br>(e) There is no such possibility as there is no important |

| Category              | Environmental Item         | Main Check Items   | Yes: Y<br>No: N   | Confirmation of Environmental Considerations (Reasons, Mitigation Measures)  |
|-----------------------|----------------------------|--|---|--|
|                       |                            | <p>protection measures taken to reduce the impacts on the ecosystem?</p> <p>(d) Are adequate measures taken to prevent disruption of migration routes and habitat fragmentation of wildlife and livestock?</p> <p>(e) Is there any possibility that the project will cause the negative impacts, such as destruction of forest, poaching, desertification, reduction in wetland areas, and disturbance of ecosystem due to introduction of exotic (non-native invasive) species and pests? Are adequate measures for preventing such impacts considered?</p> <p>(f) In cases where the project site is located in undeveloped areas, is there any possibility that the new development will result in extensive loss of natural environments?</p>  |   | <p>ecosystem near the project site. The project will not introduce non-native invasive species or pests.</p> <p>(f) The project site is within Kigali city, which is already developed.</p>  |
| 3 Natural Environment | (3) Topography and Geology | <p>(a) Is there any soft ground on the route of power transmission and distribution lines that may cause slope failures or landslides? Are adequate measures considered to prevent slope failures or landslides, where needed?</p> <p>(b) Is there any possibility that civil works, such as cutting and filling will cause slope failures or landslides? Are adequate measures considered to prevent slope failures or landslides?</p> <p>(c) Is there a possibility that soil runoff will result from cut and fill areas, waste soil disposal sites, and borrow sites? Are adequate measures taken to prevent soil runoff?</p>   | <p>(a) N</p> <p>(b) Y</p> <p>(c) Y</p>  | <p>(a) There are no locations along the distribution lines which have risks of slope failure and land sliding. The protection measures such as installation of rain gutters will be conducted.</p> <p>(b)-(c) The slope of the new Gasogi Substation site is gentle and will not cause landslides. Since the soil is relatively hard, there are no risks of slope failure and landslides.</p>  |
| 4 Social Environment  | (1) Resettlement           | <p>(a) Is involuntary resettlement caused by project implementation? If involuntary resettlement is caused, are efforts made to minimize the impacts caused by the resettlement?</p> <p>(b) Is adequate explanation on compensation and resettlement assistance given to affected people prior to resettlement?</p> <p>(c) Is the resettlement plan, including compensation with full replacement costs, restoration of livelihoods and living standards developed based on socioeconomic studies on resettlement?</p> <p>(d) Are the compensations going to be paid prior to the resettlement?</p> <p>(e) Are the compensation policies prepared in document?</p> <p>(f) Does the resettlement plan pay particular attention to vulnerable groups or people, including women, children, the elderly, and people below the poverty line, ethnic minorities, and indigenous peoples?</p> <p>(g) Are agreements with the affected people obtained prior to</p> | <p>(a) Y</p> <p>(b) Y</p> <p>(c) Y</p> <p>(d) Y</p> <p>(e) Y</p> <p>(f) Y</p> <p>(g) Y</p> <p>(h) Y</p> <p>(i) Y</p> <p>(j) Y</p> | <p>(a) 16 households (63 persons) will be displaced by the project. In addition, the loss of land, structures, crops and trees is predicted. The impacts by involuntary resettlement were minimized by selecting routes of distribution lines along the ROW of existing roads, where possible. Especially, the distribution line between the new Gasogi Substation and Masaka was supposed to pass a relatively dense residential area, so a route with less impact on resettlement was carefully examined.</p> <p>(b) Several stakeholder meetings were held prior to resettlement; explanation/clarification on compensation and livelihood restoration assistance was done toward the PAPs. The PAPs agreed upon it. As livelihood restoration programs, the priority for employment during the construction as skilled and</p> |

| Category | Environmental Item | Main Check Items   | Yes: Y<br>No: N | Confirmation of Environmental Considerations (Reasons, Mitigation Measures)   |
|----------|--------------------|--|-----------------|---|
|          |                    | <p>resettlement?</p> <p>(h) Is the organizational framework established to properly implement resettlement? Are the capacity and budget secured to implement the plan?</p> <p>(i) Are any plans developed to monitor the impacts of resettlement?</p> <p>(j) Is the grievance redress mechanism established?</p> |                 | <p>unskilled workers will be given for the PAPs who will lose their income source. During the operation, the PAPs will be provided with employment opportunities as skilled and unskilled workers (for clearing trees within the ROW and access roads).</p> <p>(c) A census survey, socio-economic survey and asset inventory were conducted for all the PAPs, based on which ARAP was developed. APAP includes compensation at full replacement cost and livelihood restoration programs. The full replacement cost includes the amount to move houses (physical displacement).</p> <p>(d) Compensation will be paid prior to the resettlement, which is also stipulated in Rwanda law. EDCL submits a payment order to MINECOFIN, and then MINECOFIN proceeds with the payment. After the payment, physical resettlement will be implemented.</p> <p>(e) Compensation policy was described in ARAP (including eligibility for compensation, entitlement matrix etc.).</p> <p>(f) According to the results of a census and socio-economic survey, one (1) PAH was a household headed by an elderly (over 80 years old). However, since it is not physically but economically displaced, livelihood restoration measures (direct economic assistance, medical insurance) will be conducted, according to the Vision 2020 Umurenge Programme (VUP).</p> <p>(g) An agreement with the PAPs will be obtained prior to resettlement. The PAPs were involved in the process of documentation and valuation of their assets. Once they are comfortable with the proposed property valuation, they will sign and seal the documents as a sign of agreement. Based on these documents, resettlement will be implemented.</p> <p>(h) EDCL is responsible for ARAP implementation. EDCL has two social safeguard officers who deal with resettlement and land acquisition. It was agreed that all the implementation of ARAP would be completed within 3 months after the</p> |

| Category             | Environmental Item                           | Main Check Items  | Yes: Y<br>No: N                  | Confirmation of Environmental Considerations (Reasons, Mitigation Measures)   |
|----------------------|--|---|----------------------------------|---|
|                      |  |   |                                  | approval of this project by Japanese Government (Field Report p.16 (signed on June 22, 2017 by JICA Study Team, EDCL and EUCL).<br>(i) Monitoring of resettlement and land acquisition will be conducted on a monthly basis. A monitoring plan was developed in ARAP.<br>(j) A grievance redress system was developed, with the combination of existing conflict resolution methods at community level and arbitration by the Court.  |
|                      | (2) Living and Livelihood                    | (a) Is there a possibility that the project will adversely affect the living conditions of inhabitants? Are adequate measures considered to reduce the impacts, if necessary?<br>(b) Is there a possibility that diseases, including infectious diseases, such as HIV will be brought due to immigration of workers associated with the project? Are adequate considerations given to public health, if necessary?<br>(c) Is there any possibility that installation of structures, such as power line towers will cause radio interference? If any significant radio interference is anticipated, are adequate measures considered?<br>(d) Are the compensations for transmission wires given in accordance with the domestic law? | (a) Y<br>(b) Y<br>(c) Y<br>(d) Y | (a) In addition to a small-scale involuntary resettlement, an economic displacement such as the loss of crops and agricultural land is expected. ARAP was developed and the loss will be compensated at full replacement cost.<br>(b) The project site is located within Kigali City, and no influx of population from outside of the project site is predicted.<br>(c) The project will not cause radio interference.<br>(d) Compensation under power lines will be paid according to the local laws and ARAP. |
| 4 Social Environment | (3) Heritage                                 | (a) Is there a possibility that the project will damage the local archeological, historical, cultural, and religious heritage? Are adequate measures considered to protect these sites in accordance with the country's laws?   | (a) N                            | (a) There is no such possibility as there is no heritage site.  |
|                      | (4) Landscape                                | (a) Is there a possibility that the project will adversely affect the local landscape? Are necessary measures taken?  | (a) N                            | (a) The project will not affect the landscape. The area around the project site is already developed.   |
|                      | (5) Ethnic Minorities and Indigenous Peoples | (a) Are considerations given to reduce impacts on the culture and lifestyle of ethnic minorities and indigenous peoples?<br>(b) Are all of the rights of ethnic minorities and indigenous peoples in relation to land and resources respected?  | (a) N/A<br>(b) N/A               | (a) There are no ethnic minorities and indigenous people affected by the project.<br>(b) There are no ethnic minorities and indigenous people affected by the project.  |
|                      | (6) Working Conditions                       | (a) Is the project proponent not violating any laws and ordinances associated with the working conditions of the country which the project proponent should observe in the project?<br>(b) Are tangible safety considerations in place for individuals involved in  | (a) N<br>(b) Y<br>(c) Y<br>(d) Y | (a)- (d) EDCL observes all laws and ordinances associated with working conditions of the country, conducting necessary tangible and intangible safety measures.   |

| Category | Environmental Item              | Main Check Items  | Yes: Y<br>No: N                                     | Confirmation of Environmental Considerations (Reasons, Mitigation Measures)  |
|----------|---------------------------------|---|---|--|
|          |                                 | <p>the project, such as the installation of safety equipment which prevents industrial accidents, and management of hazardous materials?</p> <p>(c) Are intangible measures being planned and implemented for individuals involved in the project, such as the establishment of a safety and health program, and safety training (including traffic safety and public health) for workers etc.?</p> <p>(d) Are appropriate measures taken to ensure that security guards involved in the project not to violate safety of other individuals involved, or local residents?</p>                               |   |  |
| 5 Others | (1) Impacts during Construction | <p>(a) Are adequate measures considered to reduce impacts during construction (e.g., noise, vibrations, turbid water, dust, exhaust gases, and wastes)?</p> <p>(b) If construction activities adversely affect the natural environment (ecosystem), are adequate measures considered to reduce impacts?</p> <p>(c) If construction activities adversely affect the social environment, are adequate measures considered to reduce impacts?</p>  | <p>(a) Y</p> <p>(b) Y</p> <p>(c) Y</p>              | <p>(a) Based on the local laws and regulations, mitigation measures will be conducted. The expected impacts are noise, vibrations, dust, exhaust gas, waste and soil. Mitigation measures to be taken will include water sprinkler, installation of cover to prevent dust and control of construction working hours.</p> <p>(b) The project site is within Kigali City hence construction activities are not going to affect the natural environment or ecosystem. Since the construction is geographically limited and completed within short period, no impacts on surrounding environment are expected.</p> <p>(c) Construction activities may disturb the traffic around the site. EDCL requires the contractor to control traffic with collaboration with local police, securing the smooth traffic and safety around the project site. The power cuts will be informed to the surround communities and residents in advance.</p> |
|          | (2) Monitoring                  | <p>(a) Does the proponent develop and implement monitoring program for the environmental items that are considered to have potential impacts?</p> <p>(b) What are the items, methods and frequencies of the monitoring program?</p> <p>(c) Does the proponent establish an adequate monitoring framework (organization, personnel, equipment, and adequate budget to sustain the monitoring framework)?</p> <p>(d) Are any regulatory requirements pertaining to the monitoring report system identified, such as the format and frequency of reports from the proponent to the regulatory authorities?</p> | <p>(a) Y</p> <p>(b) Y</p> <p>(c) Y</p> <p>(d) Y</p> | <p>(a)-(d) For the items with impacts, EDCL (planning and construction phases) and EUCL (operation phase) will be monitoring. Monitoring plan and responsible organizations were developed in the EIA report.</p>  |

| Category | Environmental Item                      | Main Check Items  | Yes: Y<br>No: N | Confirmation of Environmental Considerations (Reasons, Mitigation Measures)  |
|----------|---|---|-----------------|--|
| 6 Note   | Reference to Checklist of Other Sectors | (a) Where necessary, pertinent items described in the Road checklist should also be checked (e.g., projects including installation of electric transmission lines and/or electric distribution facilities).   | (a) N/<br>A     | (a) There is no additional Environmental Items that may be affected.   |
|          | Note on Using Environmental Checklist   | (a) If necessary, the impacts to transboundary or global issues should be confirmed, (e.g., the project includes factors that may cause problems, such as transboundary waste treatment, acid rain, destruction of the ozone layer, or global warming). | (a) N/<br>A     | (a) Since the construction is geographically limited and completed within short period, no impacts to transboundary or global issues are expected. |

**CHAPTER 2    CONTENTS OF  
THE PROJECT**



## Chapter 2 Contents of the Project

### 2-1 Basic Concept of the Project

This project is meant to help to enhance transmission and distribution facilities in the Kigali area to improve the serious damage done to economic activity in the area by insufficient supply capacity from power transmission/distribution facilities and aging facilities. Table 2-1-2.1 gives an outline of the project, while Figure 2-1-2.1 shows the location of the project system.

Table 2-1.1 Outline of the components of the Project

|   | Major Components  | Quantity/Capacity |
|---|---|-------------------|
| Procurement/Installation  | <b>1. New Gasogi Substation</b>   |                   |
|   | (1) Transformer   |                   |
|   | 1) 15 MVA, 110/15 kV Transformer (Outdoor)  | 2 units           |
|   | 2) 250 kVA, 15/0.4 kV Earthing transformer (Outdoor)  | 2 units           |
|   | (2) 110 kV Switchgear (Single busbar system)  |                   |
|   | 1) Transmission line bay (Outdoor)  | 2 sets            |
|   | 2) Transformer bay (Outdoor)  | 2 sets            |
|   | 3) Busbar (Outdoor)   | 1 set             |
|   | 4) Voltage transformers for busbar (Outdoor)  | 1 set             |
|   | 5) Accessories for 110 kV outdoor switchyard (Outdoor)  | 1 lot             |
| (3) 15 kV Switchgear (Gas insulated type, single busbar system) |   |                   |
| 1) 110/15 kV Transformer panels (Indoor)                        | 2 panels  |                   |
| 2) 15 kV Feeder panels (Indoor)                                 | 5 panels  |                   |
| 3) Voltage transformer panel (Indoor)                           | 1 panel   |                   |
| 4) Busbar connection panel (DS only) (Indoor)                   | 1 panel   |                   |
| (4) Control and protection (Indoor)                             | 1 lot   |                   |
| (5) SCADA system (Indoor)                                       | 1 lot   |                   |
| (6) Communication system (Indoor)                               | 1 lot   |                   |
| (7) Substation power supply system (Indoor)                     | 1 lot   |                   |
| (8) Relocation of Existing 15 kV switchgear (Indoor)            | 3 panels  |                   |
|   | <b>2. 110 kV Transmission Lines between Existing Transmission Line - New Gasogi Substation</b>                  |                   |
|   | 110 kV Overhead lines (ACSR 240 mm <sup>2</sup> , single conductor)   | Approx. 0.2 km    |
|   | <b>3. 15 kV Distribution Lines</b>  |                   |
|   | (1) New Gasogi Substation - Nyagasambu  | Approx. 11.5 km   |
|   | (2) New Gasogi Substation - Masaka Hospital   | Approx. 8.5 km    |
|   | (3) New Gasogi Substation - Existing Distribution Line  | Approx. 0.1 km    |
| Procurement   | <b>4. Maintenance Tool for the Equipment of the Project</b>   | 1 lot             |
|   | <b>5. Spare Parts for the Equipment of the Project</b>  | 1 lot             |
| Construction Work   | <b>6. Foundation for the Equipment of the Project (Transformers, Towers for 110 kV Transmission Line, etc.)</b> | 1 lot             |
|   | <b>7. Building of new Gasogi substation</b>   | 1 building        |

Source: Preparatory Survey Team

## 2-2 Outline Design of the Japanese Assistance

### 2-2-1 Design Policy

#### 2-2-1-1 Basic Policy

This project primarily targets higher level power distribution facilities in the Rwanda power system. Still, in view of the development plan of the rapidly growing Kigali city, it is necessary to formulate system plans from a mid- to long-term perspective and aim for the operation and stable supply of power facilities over a wide range.

Along with being an urgent grant aid project, in light of the above point, this project must avoid equipment being replaced before the facilities reach their service life once in service. Thus, the target years for project evaluation and facility planning are to be set carefully.

Also, given that this is a development project in a region with an active socio-economy, environmental and social concerns are to be properly accounted for in the planning phase.

#### 2-2-1-2 Plan for Natural Conditions

##### (1) Temperature and Humidity

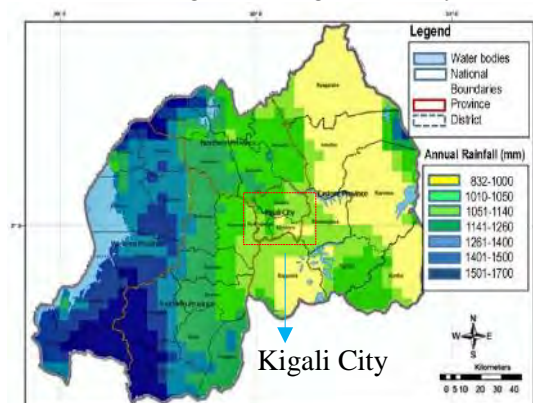
Rwanda is an inland country surrounded by Uganda in the north, Burundi in the south, Democratic Republic of the Congo in the west and Tanzania in the east. According to the Rwanda Meteorology Agency, the temperature is the highest in the southwestern part of Rwanda, with an annual average of 23 ° C to 24 ° C. The lowest temperature is on average 17.5 to 19.0 ° C in high altitude areas.

In Kigali City of this project area, the rainy season is from March to May, the altitude is as high as 1,500 m while it is directly under the equator, the average temperature is around 23.0 ° C. throughout the year, and the temperature difference is small throughout the year.

The substation facility, transmission and distribution facility adopted in this plan considers the above temperature, humidity and altitude, and the equipment operates normally for temporary temperature rise due to outside air temperature and direct sunlight and high humidity shall be careful not to hinder operation / maintenance.

##### (2) Rainfall and Lightning

Although Rwanda is located in the equatorial belt, it is quite different from the equatorial rain belt with much rain throughout the year. Rwanda climate condition is the savanna climate with tropical rainforest, the rainy season and dry season are clearly separated. Particularly rainy areas are jungle areas in the



「Rwanda Annual rainfall」

【Source】 : Rwanda Meteorology Agency

Figure 2-2-1-2.1 Location of Project site

southwestern part of Rwanda and have recorded annual rainfall of 1,500 to 1,700 mm.

In Kigali city, it is rainfall of about 160 mm a month on average in the rainy season and it is around 12.0 mm in monthly average in the dry season, but there are squalls depending on places, and the rainwater flows from a high place to a low place because of the height difference of topographically conditions and there are almost no flat places, therefore, it is necessary to rise floor level of the control room and foundation of the transformer area around 20 to 30cm from the ground level. Also, in this planning area, lightning is frequently occurs in the rainy season, therefore the lightning protection system shall be installed. The lightning protection system adopted EDCL standard which shielding angle of the overhead ground line of the transmission line tower is 30 degrees, and the shielding ratio is suppressed to about 95%.

### **(3) Earthquake**

Since the occurrence of the earthquake is small at the Project site, the structures shall be designed by seismic load as  $G = 0.10W$  ( $W$  is the vertical weight of the structure).

#### **2-2-1-3 Plan for Socioeconomic Conditions**

In the transmission line construction of this project, since it is necessary to take power outage work along with the work of relocating the existing 15 kV distribution line around Gasogi, Jabana, and Birembo substation, it is necessary to make the construction schedule so as to minimize the impact of this distribution equipment on customers and also it is necessary to consider making efforts to shorten the power outage time. During construction period, consideration should be paid as much as possible so as not to obstruct the surrounding residents, traffic, existing structures and buried materials. Regarding the transmission line design, consideration should be given so that to keep the safe separation distance from surrounding houses and shops along the road boundary line.

Also, in the section of the route, the Rwandan side shall fully explain the contents of the Project to the road station, the landowner and the surrounding residents in advance. Furthermore, at the time of the foundation work and excavation work related to the construction of substation and transmission/distribution lines, carefully attention shall be paid so as not to damage the buried materials of existing infrastructure such as telephone, water supply, sewage etc. And overhead line construction work shall be executed in accordance with the laws and provisions applied in Rwanda, securely secure the separation distance from existing distribution lines, telephone lines, roads, etc..

#### **2-2-1-4 Plan for Construction/ Procurement condition**

##### **(1) Basic policy**

The Project site is located near Kigali city of the capital of Rwanda, nowadays, there are many construction companies including electric construction companies and there are multiple suppliers who can carry out construction of ultra-high voltage substation equipment / power transmission equipment etc, under these conditions, various construction work such as public

facilities, commercial facilities, houses, etc. are undergoing. Considering these circumstance, the construction works for this project will be perform by the local companies.

There is no steel production in Rwanda country, therefore, the steel frame is expensive and there are no examples of using steel for general building construction nearby project area. Meanwhile, there are some ready mixed concrete companies in Kigali city, therefore, the control building, the Transformer foundation, the equipment foundation, the wiring pit, the distribution building, and the tower foundation etc. shall be designed by the reinforced concrete structure.

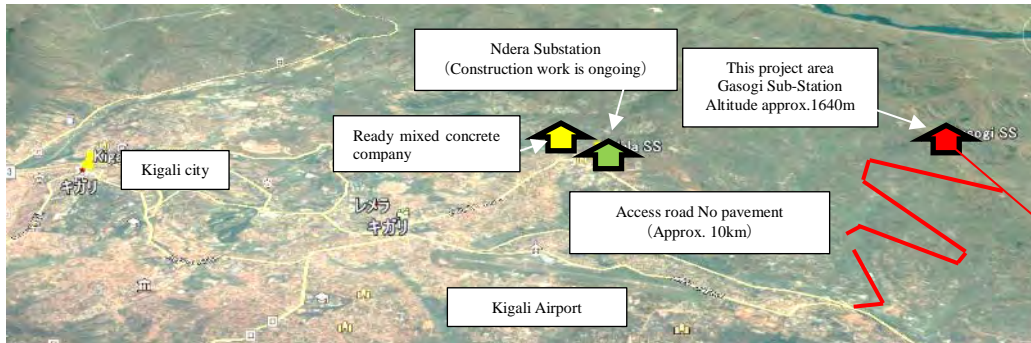


Fig. 2-2-1-4.1 Location of New Gasogi substation

## (2) Location of New Gasogi Substation and access road condition

Rwanda is a hilly terrain with an altitude difference of about 200 m overall, as it is called "the country of a thousand hills", there are almost no straight roads and flat roads. The main road in Kigali is paved but outside road from the city area is almost unpaved. The construction site of New Gasogi Substation is located on the mountain with an altitude of approximately 1,640m as shown in Fig. 2-2-1-4.1, and the access road is unpaved road and the soil



Fig. 2-2-1-4.2 Condition of the access road to Gasogi Substation

is a red clay soil as shown in Fig. 2-2-1-4.2, therefore it is expected to be muddy condition in the rainy season, there is a concern that the construction works will be tough. For this reason, it is necessary to thoroughly examine the implementation plan, construction schedule and implementation method.

**(3) Condition of New Gasogi Substation site**

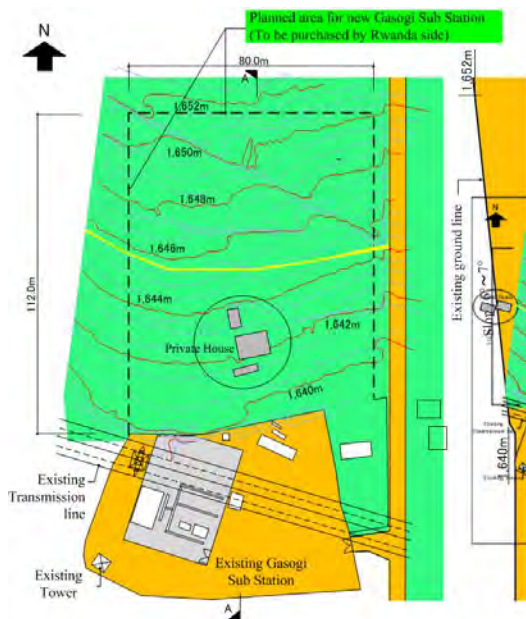


Fig. 2-2-1-4.3 Existing Gasogi Substation

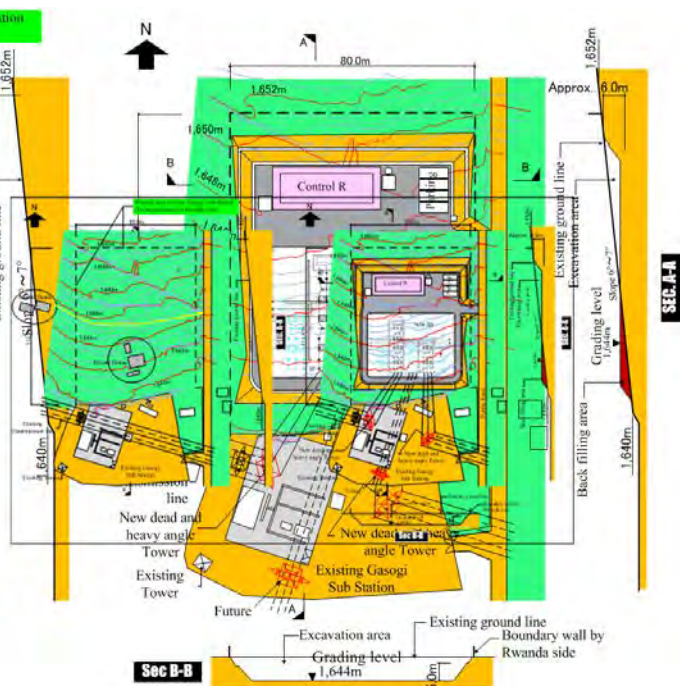


Fig. 2-2-1-4.4 New Gasogi Substation

Because the site of existing Gasogi Substation is narrow, therefore, Rwanda side is planning to secure the land on the northern part nearby existing Gasogi Substation for New Gasogi Substation. The dimensions of the land is 80.0m x 112.0m and is now an agricultural land. Since there is no flat land near the existing Gasogi power station, it is necessary to cut off the hilly land to be a construction site for the new substation, but it is necessary to pay attention to the construction schedule carefully due to large volume of the earth work. Also, if this earth work is delayed, there is a possibility of the delay of the Project schedule totally. Therefore, in order to prevent delay of the Project, this earth work shall be included in the Japanese scope.



Fig. 2-2-1-4.5 New Gasogi Substation project

**(4) Arrangement of New Gasogi Substation**

The following two plans were examined regarding arrangement plan for New Gasogi Substation.

Plan A: Proposal to place a substation

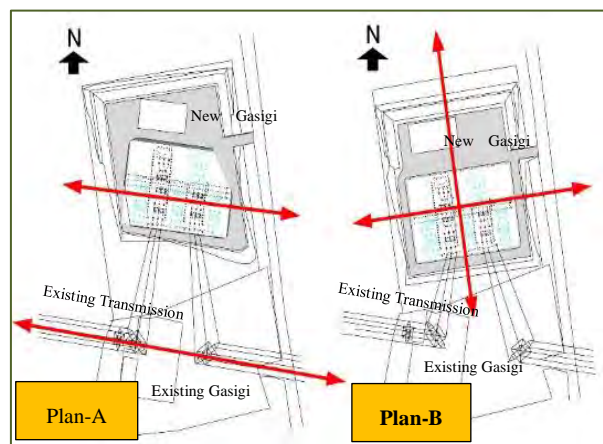


Fig. 2-2-1-4.6 Arrangement plan of New Gasogi Substation

parallel to the existing transmission line

Plan B: A proposal to place a substation parallel to the new site

As a result of the examination, Plan B is adopted because of the following reasons;

Plan A is not able to arrange the substation facilities in parallel to the project boundary line, therefore, the project area become narrow and earth work volume is bigger than Plan B.

Plan-B is not parallel to the existing distribution line, but in parallel to the project boundary line, therefore, the project area become wider and earth work volume is smaller than Plan A, and connection to the existing distribution line is able to arrange by the new dead and heavy angle tower.

#### **(5) Consideration about the slope of the land preparation**

Construction site for New Gasogi Substation will prepare a hillside slope, but since the cutting height will be as high as 8 to 9.0 m, it is necessary to pay attention to the angle and protection of the slope.

In Rwanda, technical standards concerning slope angle for the leveling work is not being authorized and there are many sites where cutting earth is done with a steep angle, but in this project, the slope angle shall be decided by considering weather, topography, geology, soil quality and groundwater condition etc..

In Japan's "residential land development criteria", the land slope angle without slope protection wall is stipulated to be less than 30 degrees. In addition, small steps must be provided every 5.0 m height. However, when planning the slope at an angle of 30 degrees, the usable site area becomes narrow. Therefore, in this project, the cutting slope is designed by 45 degrees so that to secure necessary land area and provide "retaining wall" to the sloped cutting area and filling area that exceeding the slope height of 5.0 m.

#### **(6) Plan of the land preparation level**

The new substation facilities will be constructed on the new project land which has a slope of 6 to 7.0% degree. Therefore, the new project land shall be prepared by cutting soil and filling soil.

Considering these site condition, in order to prevent unforeseen accident such as settlement and/or sliding of the foundations, the foundation of the main transformer and important equipment shall not be supported by the filing soil, but other lightweight machine less than 1.0 ton may be supported by filling soil by means of enough compaction of good backfilling soil of clay quality. And the result of load test carried out at the filling part in the construction work of the Ndera substation project (Phase II project ongoing) proof that the soil of the filling area has enough bearing capacity for support of the lightweight equipment.

Considering these conditions, lightweight equipment may be supported by filling soil area, and important equipment shall be supported by original soil, and the amount of cutting soil volume

and filling volume shall be balanced, and the floor level of the control house and transformer area shall same level, therefore, the land preparation level shall be +1,644m.

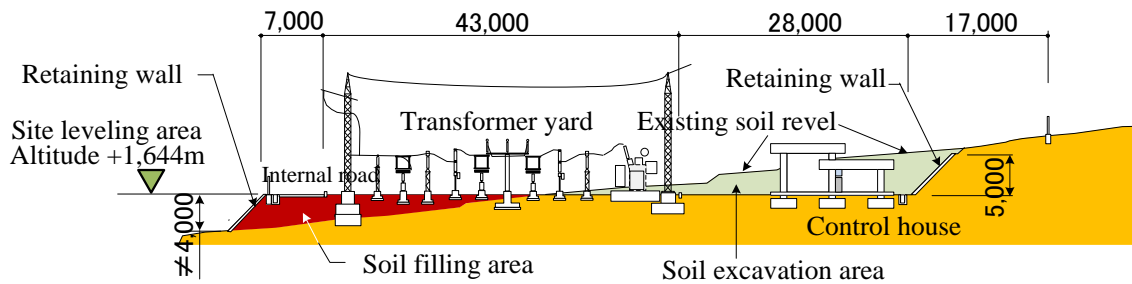


Fig. 2-2-1-4.7 Site Leveling Section

**(7) Plan of the procurement of the concrete**

As mentioned above, the ready mixed concrete company is located near Kigali city, but the access road to the construction site of New Gasogi Substation is not paved and red colored clay soil, there is a possibility of becoming a muddy road during the rainy season and disturb access of the concrete mixer car. Therefore, there is a concern that the concrete mixer car is not able to arrive at the project site within the predetermined time. For this reason, in order to prevent delivery delay of the ready mixed concrete, site mixing concrete shall be considered on the construction schedule. Moreover, although the quality testing of concrete can be carried out in Kigali city, it is required to do the testing at the Project site because the site is located at hilly mountain.

**(8) Plan of the control house**

The control building is a building that installs substation equipment necessary for operation and management of the function of substation

The building dimension is 30m length and 12m width, and the structure is the reinforced concrete, which has office rooms, conference rooms, toilets and so on necessary for management. Interior materials and exterior materials have no special finishing materials and use locally procured materials.

A water reservoir tank will be installed for supply necessary water for daily life, however, because of the hilly condition, the city water is not able to provide. Therefore, as a water supply system adopted in the rural village, to supply the water from a water reservoir installed at top of the hill shall be applied.

Also, since there is no public sewage pipe in the sewage disposal method of the toilet, the concrete septic tank is constructed on site, and asked the scooping agent for dredging sewage water as necessary.

Air conditioning equipment shall consider ensuring a proper temperature environment for the room where substation equipment is installed.

Regarding external works, the site boundary wall or fence and gate are to be borne by the Rwandan side. And gravel laying or interlocking pavement road shall be considered so that the vehicle can pass even in the rainy season.

#### **2-2-1-5 Plan for Using local Contractor and Material**

##### **(1) Plan for using local contractor**

Those who participate in the public works of Rwanda are registered in "Rwanda Public Procurement Agency" (RPPA), but they are not ranked according to the company scale, capacity, ability, performance etc. Although there are many foreign companies such as China and India in many registrars, there are few companies that always employ workers at all times, and most companies collect workers project by project, and they dismiss the workers after the construction is completed.

Nowadays, in Kigali city, there are many construction sites that using of large-sized tower cranes. It is relatively easy to procure construction workers, construction vehicles, construction equipment and other equipment, and skilled workers, ordinary workers, civil engineering work, construction work, and transmission line construction work. Considering these circumstance, the project construction plan utilizes the local contractors.

However, transformer facilities and power transmission equipment to be procured under this project are not manufactured locally, and considering operation and maintenance ability of Rwanda executing agency, etc., the equipment necessary for this project shall be procured by Japan or third country.

##### **(2) Plan for using local material**

Both rebar and cement are manufactured in Rwanda but imported mainly from Tanzania because quality is not good. Although all gasoline is imported, materials necessary for construction work can be procured locally, so procurement of third countries related to construction materials is unnecessary.

#### **2-2-1-6 Plan for O&M Capacity of Implementing Agency**

Despite its struggles with large-scale capital investments such as the current project, EUCL does have a certain level of technical capacity in system operations and has steadily handled O&M for the national power transmission and distribution network. Such equipment may similar to traditional switchgear and equipment in interior structure, but as far as operation methods, system protection functionality and other O&M issues, the required skills do not greatly exceed the technical levels for equipment used in Rwanda to date.

Accordingly, this project will not include any transfer of power technology or other soft component involving consultants focused on system operation and protections. As New Gasogi Substation has equipped with SCADA system, the Contractor shall arrange necessary manufacturer's instructor(s) to



transfer initial and operation technique of procured systems such as main equipment of substation and SCADA system, for around a half month after test operation completed.

#### **2-2-1-7 Planned Scopes for Facilities and Equipment and Setting Grades**

In light of the conditions described above, materials and equipment to be procured for the project, as well as installation scope and technical standards will be determined based upon the following policies.

##### **(1) Planned Scope for Facilities and Equipment**

Project scope will include the facilities and equipment needed to help stabilize the socioeconomic activity of the Kigali area based on the estimated power demands in the target year of the equipment plan, that being the tenth year following the start of service. In terms of the division between the Japanese side project and Rwanda side work, the Japanese side will plan on consulting with the Rwanda side to decide which items the Rwanda side can reasonably handle without exceeding Rwanda side abilities.

In order to keep the designs economical, equipment specifications will use standard products conforming to international standards when possible, selecting the minimum required equipment configurations and specifications.

##### **(2) Plan for Setting Grades**

Care will be taken not to deviate from the technical levels of EUCL when designing the power distribution facilities built, procured and installed in the project, conforming to existing facility configurations, EUCL technical standards and work manuals.

#### **2-2-1-8 Plan for Construction and Procurement Methods and Work Period**

As this project will be performed based on the Japan grant aid scheme, installation must be completed within the time limits as given in the Exchange of Notes (E/N) and Grant Agreement (G/A). In order to complete the work within the specified construction period and achieve the results expected from substation construction, the implementation plan must effectively coordinate Japanese and Rwanda work schedules to streamline importing and other various procedures.

With simultaneous construction of the substation, 110 kV transmission line and 15 kV distribution lines, care must be taken to keep scheduling efficient. Work teams need to be formed appropriately; the construction methods used need to be well known to local contractors and engineers, and the implementation system must be structured so that work progresses safely and swiftly.

**2-2-2 Basic Plan**

**2-2-2-1 Pre-condition of the Project**

**(1) Purpose of Power demand forecast for the Project**

The main project components are construction of 110/15 kV New Gasogi substation and the transmission line to the substation to improve power distribution within the Kigali area. The substation includes three 110/15 kV voltage class transformers with 15 MVA x 2 capacity, one transmission line and three distribution lines.

The purpose of the preparatory study will be to clarify project prerequisites by estimating power demand in the Kigali area. It will act as base data to verify project relevance and effectiveness in light of the power transmission/distribution facility plan, including flow analysis and evaluations on how well the project coordinates with other development projects.

**(2) Target year for the Project**

Relevance and effectiveness of the project as a grant aid project, including its urgency and benefit, will be confirmed through the preparatory study. This project primarily targets higher level power transmission/distribution facilities in the Kigali city. Still, in the absence of medium-to-long-term system plans, there are concerns that operation of lower level power facilities and even supply stability may also be impacted as the project targets an Kigali area experiencing significant growth.

The target year for facility planning will be ten years after service starts. This project must avoid equipment being replaced before the facilities reach their service life once in service, and the ten year figure is consistent with recent projects for enhancing upper level system power transmission/distribution in metropolitan areas and cities, as well as other similar grant aid projects. Meanwhile, as this project is a grant aid project of urgent need, the target year for evaluating the project and its benefits will be three years after service start.

|                                     |  |
|-------------------------------------|--|
| Target year for project evaluation: | 2023 (Three years from start of service) |
| Target year for facility plan:      | 2030 (Ten years from start of service)   |

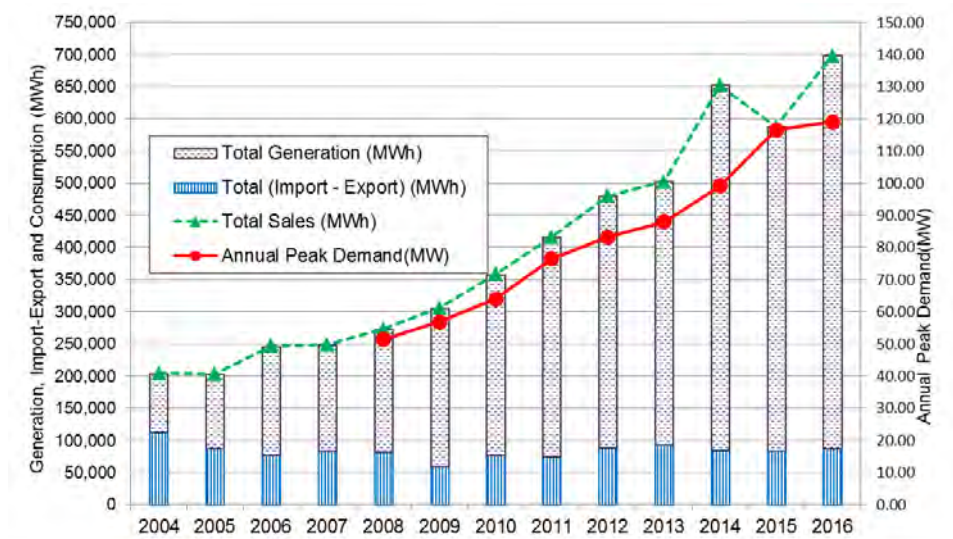
**2-2-2-2 Power System Analysis**

**(1) Electricity Supply-Demand Situation and Demand Forecast**

The power demand forecast in Rwanda studied in 2013 to 2014 under the Project for Preparation of Electricity Development Plan for Sustainable Geothermal Energy Development in Rwanda (hereinafter referred to as “Electricity & Geothermal MP”) has been mutually agreed. The electricity supply-demand situation and the nationwide power demand forecast which was studied under Electricity & Geothermal MP are summarized below, and the demand forecast for the central zone in which Kigali city accounts for the majority of demand.

## 1) Electricity Supply-Demand Situation

Since 2008, power supply in Rwanda has shown a year-on-year increase of approx. 10%, with power supply in 2016 totaling 697,632 MWh. Electricity sales in 2016 were 540,553 MWh. The disparity between 697,632 MWh and 540,553 MWh was accounted for by an approx.23% power loss.



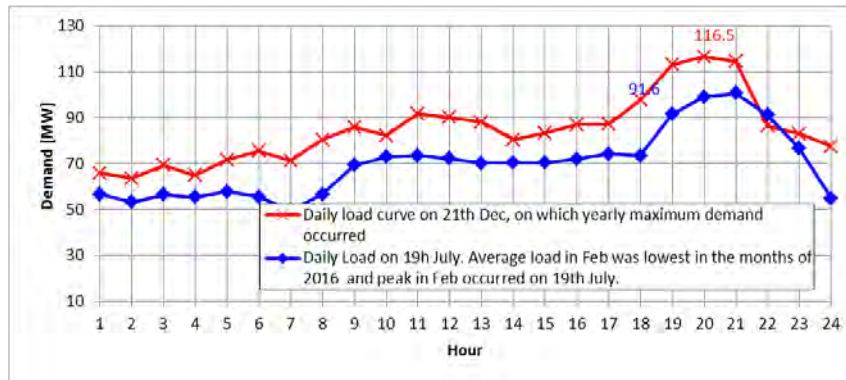
Source: Prepared by JICA Study Team based on JICA Report of Electricity & Geothermal MP

Figure 2-2-2-2.1 Transition of yearly supply-demand

The composition of power sources for power supply in Rwanda in recent years is accounted for by: hydro-power of approx. 47.9 %, including import from Rusizi 1 and Rusizi 2; methane gas – power of approx. 29.9%, including Kivu watt which started operation in 2015; diesel power of approx. 9.2%; and solar, etc. of approx. 2%. The ratio for diesel power generation that requires expensive fuel is gradually decreasing, utilizing domestic resources.

In the same way as power supply, annual maximum demand in Rwanda shows a particularly large rise after 2008. In 2017, a maximum demand of 119.07 MW was recorded.

Figure 2-2-2-2.2 shows the daily load curve on 21<sup>st</sup> December, when the maximum power demand for 2016 was recorded, as well the load curve on 19th July, when the maximum power demand for July, the month showing the smallest monthly power supply, was recorded. On the both days, power demand was maximum during the period from 19:00 to 21:00, when electricity consumed for lighting at households reaches peak demand.



Source: JICA Survey Team

Figure 2-2-2-2.2 Daily load curves

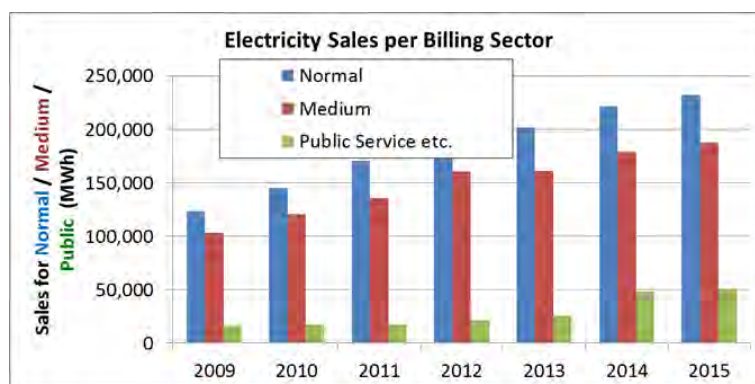
### 1) Status of Electricity Sales

Electricity sales is now categorized in three billing sectors below:

- The Normal Customer covers general households
- The Medium Customers covers industrial and commercial facilities
- The Public Service (&Diplomat) Customer includes public facilities such as government offices, public hospitals and schools, as well as embassies

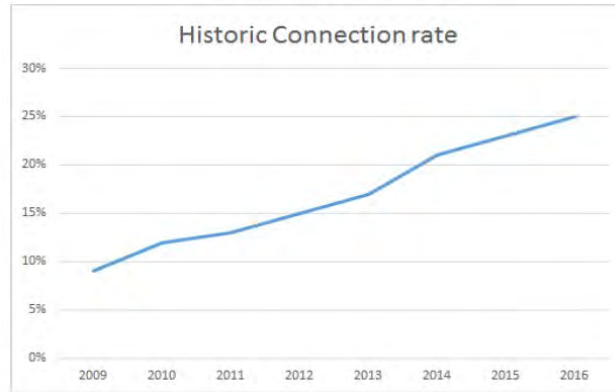
Of the 2015 electricity sales, the Normal Customer accounted for 49.4%, and the Medium Customer and the Public Service Customer 39.9% and 10.7%, respectively.

Figure 2-2-2-2.3 shows the change in the electricity sales and number of customers during 2009 – 2015 for the three billing sectors. The electricity sales have increased for all the sectors. And Figure 2-2-2-2.4 shows the trend of customer with access to grid electricity in 2009 to 2016. According to REG (former EWSA), this large increase was due to the electrification in the rural areas promoted by the national government and EWSA.



Source: Prepared by JICA Study Team based on JICA Report of Electricity & Geothermal MP

Figure 2-2-2-2.3 Change in electricity sales and No. of customers by billing sector

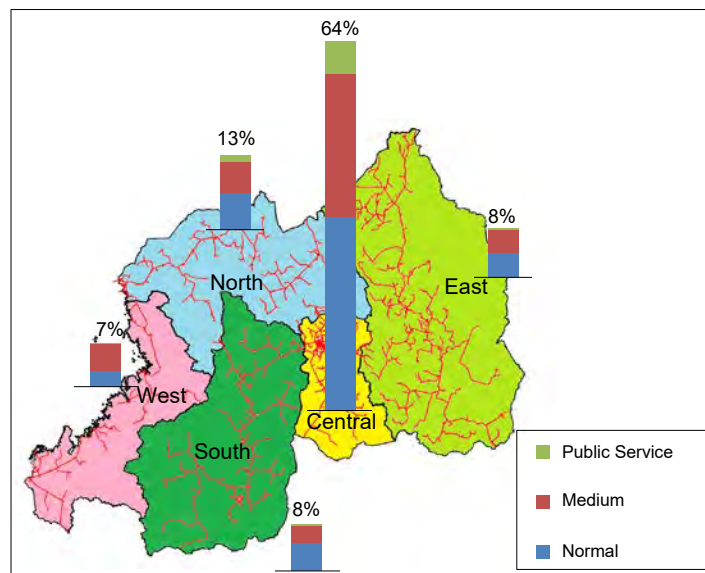


Source: Rural Electrification Strategy Ministry of Infrastructure June 2016

Figure 2-2-2-2.4 Percentage of the population with grid access

## 2) Power Consumption by Zone

The trend in power consumption by zone is shown in Figure 2-2-2-2.5. The zones were established based on the method REG (former EWSA) uses to plan the rural electrification (originally created by Sofreco, a contractor of EWSA) and the country was divided into East, West, South, North and Central to correspond to groups of Medium Voltage Lines. The power consumption in the Central zone (Kigali City and Bugesera district) is the largest, consuming 64% of the country's electricity while other zones use about 10% each. In the West zone with cement and beer factories, the rate of power use by the Medium Customer is greater than other zones.



Source: JICA Report of Electricity & Geothermal MP

Figure 2-2-3-2.5 Electricity sales by zone and billing sector

## 3) Power Demand Forecast Nationwide

Two approaches were taken for different billing sectors to forecast power demand.

The first approach was for the Normal Customer such as households, and used a bottom-up method (a product of the future number of customers and specific consumption). Upon forecasting, the rural electrification plan of REG (former EWSA) was given thorough consideration.

The second approach was for the Medium Customer that includes industrial and commercial facilities and the Public Service Customer, and used a macroscopic method. This method creates a power demand model (approximate formula) based on the correlation between the historical economic and social indicators and power demand, and forecasts the future power demand by entering the future economic and social growth into the model.

The main premises for each forecast scenario are shown in Table 2-2-2-2.1.

Table 2-2-2-2.1 Main premises for each case

| Case  | High Case   | Medium Case   | Low Case    | (Reference) Extreme High Case |
|---|-------------|---------------|-------------|-------------------------------|
| <b>Normal Customer</b>                            | <b>High</b> | <b>Medium</b> | <b>Low</b>  | <b>High</b>                   |
| Electrification Rate in 2017/18                   | 48%         | 42%           | 35%         | 48%                           |
| <b>Medium Customer</b>                            | <b>High</b> | <b>Medium</b> | <b>Low</b>  | <b>Extreme High</b>           |
| GDP Growth Rate                                   | 8.5 %       | 7.5%          | 6.5%        | 11.5%                         |
| Specific Large Scale Consumers load to be on-grid | 70 %        | 50%           | 20%         | 100%                          |
| <b>Public Service Customer</b>                    | <b>Base</b> | <b>Base</b>   | <b>Base</b> | <b>Extreme High</b>           |
| GDP Growth Rate                                   | 7.5 %       | 7.5 %         | 7.5 %       | 11.5 %                        |

Source: JICA Report of Electricity & Geothermal MP

Where, the electrification rate for the high case is 48 % which is the target value in 2017/2018 of Energy Sector Strategic Plan (ESSP) issued in 2014, and ones for the medium and low cases are 42 % and 35 % respectively in case of the target unachieved. The GDP growth rate is based on the value of IMF who estimates Rwanda's GDP growth rate for the next 5 years to be 7.5 % per year in the "Rwanda Seventh Review Under the Policy Support Instrument, Request for a Three-Year Policy Support Instrument and Cancellation of Current Policy Support Instrument" (November 2013). Since there is no data forecasting the long-term GDP growth issued by the government or other agencies, GDP growth scenarios were created for the next 20 years for the forecasting purposes, including the high case with the growth rate of +1.0 %, the low case with -1.0 %, and the extreme high case which adopted 11.5 % per year, the GDP growth target of the government listed in EDPRS2.

The forecasted load was corrected based on the information regarding the Large-scale Customers which are now undergoing rapid development compared to Rwanda's economic growth rate up and cannot be understood through the macro forecast. Those of which are listed in Table 2-2-2-2.2 and the scenarios considered are in Table 2-2-2-2.3.

Table 2-2-2-2.2 Large-scale Customer Data extracted for correction

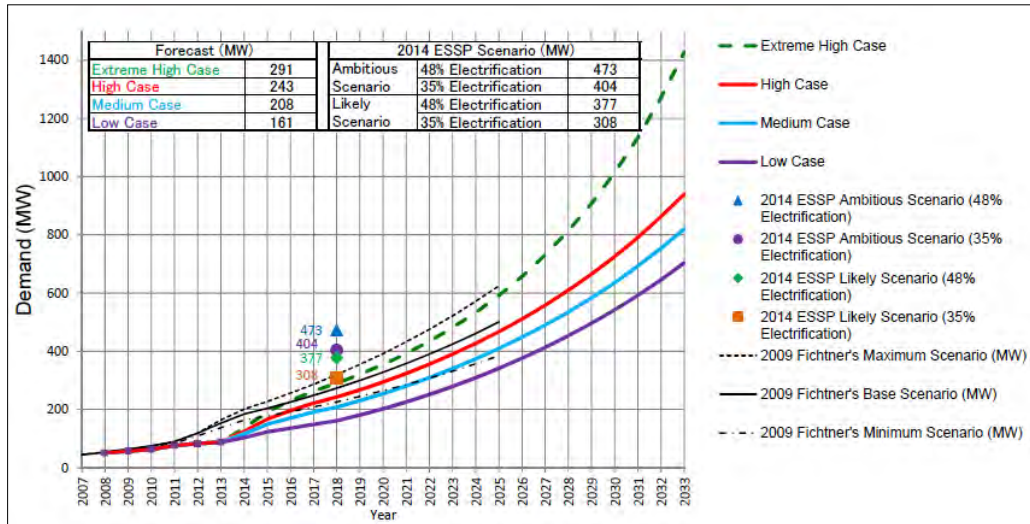
| Load name                        | Year | Demand MW | 2014 | 2015 | 2016 | 2017 | 2018 | Load necessary to be added on Demand Model as Large Scale Consumers (Yes=1 or No=0) |
|----------------------------------|------|-----------|------|------|------|------|------|---|
| Cimerwa                          | 2014 | 15        | 15   | 0    | 0    | 0    | 0    | 1   |
| Bugesera Steel Industrial Park   | 2014 | 10        | 10   | 0    | 0    | 0    | 0    | 1   |
| Bugesera Industrial Park         | 2015 | 5         | 0    | 5    | 0    | 0    | 0    | 1   |
| Bugesera Industrial Park         | 2016 | 5         | 0    | 0    | 5    | 0    | 0    | 1   |
| Bugesera Industrial Park         | 2017 | 5         | 0    | 0    | 0    | 5    | 0    | 1   |
| Rwamagana Ind Park (Steelwa)     | 2015 | 8         | 0    | 8    | 0    | 0    | 0    | 1   |
| Rwamagana Ind Park (AKS Steel)   | 2015 | 8         | 0    | 8    | 0    | 0    | 0    | 1   |
| Rwamagana Ind Park               | 2016 | 5         | 0    | 0    | 2    | 0    | 0    | 1   |
| Rwamagana Ind Park               | 2017 | 5         | 0    | 0    | 0    | 2    | 0    | 1   |
| Rwamagana Ind Park               | 2018 | 5         | 0    | 0    | 0    | 0    | 2    | 1   |
| Airport                          | 2016 | 3         | 0    | 0    | 3    | 0    | 0    | 1   |
| Airport                          | 2017 | 3         | 0    | 0    | 0    | 3    | 0    | 1   |
| Rutongo Mine                     | 2015 | 8         | 0    | 8    | 0    | 0    | 0    | 1   |
| Bugarama Ind Park                | 2016 | 5         | 0    | 0    | 5    | 0    | 0    | 1   |
| Huye Ind Park                    | 2016 | 2         | 0    | 0    | 2    | 0    | 0    | 1   |
| Rusizi Industrial Park           | 2015 | 2         | 0    | 2    | 0    | 0    | 0    | 1   |
| Nyabihu Ind Park                 | 2016 | 2         | 0    | 0    | 2    | 0    | 0    | 1   |
| Gahanga Sport Stadium            | 2016 | 2         | 0    | 0    | 2    | 0    | 0    | 1   |
| SEZ Free zone Kigali             | 2015 | 2         | 0    | 2    | 0    | 0    | 0    | 1   |
| SEZ Free zone Kigali             | 2016 | 2         | 0    | 0    | 2    | 0    | 0    | 1   |
| SEZ Free zone Kigali             | 2017 | 2         | 0    | 0    | 0    | 2    | 0    | 1   |
| SEZ Free zone Kigali             | 2018 | 2         | 0    | 0    | 0    | 0    | 2    | 1   |
| ICC (Convention centre)          | 2014 | 6.5       | 6.5  | 0    | 0    | 0    | 0    | 1   |
| Irrigation load Mpanga Sector    | 2015 | 2         | 0    | 1    | 1    | 0    | 0    | 0   |
| Irrigation load Mahama Sector    | 2016 | 4.8       | 0    | 0    | 4.8  | 0    | 0    | 0   |
| Irrigation load Rusumo Falls     | 2017 | 3.4       | 0    | 0    | 0    | 3.4  | 0    | 0   |
| Irrigation load Mugesera Sector  | 2015 | 1         | 0    | 1    | 0    | 0    | 0    | 0   |
| Irrigation load Matimba Sector   | 2014 | 0.3       | 0.3  | 0    | 0    | 0    | 0    | 0   |
| Irrigation load Kabare Sector    |      | 0.486     | 0    | 0    | 0    | 0    | 0    | 0   |
| Irrigation load Kamabuye Sector  |      | 6         | 0    | 0    | 0    | 0    | 0    | 0   |
| Irrigation load Kibilizi Sector  |      | 0.325     | 0    | 0    | 0    | 0    | 0    | 0   |
| Irrigation load Masaka Sector    |      | 0.469     | 0    | 0    | 0    | 0    | 0    | 0   |
| Irrigation load Nasho Sector     |      | 0.84      | 0    | 0    | 0    | 0    | 0    | 0   |
| Irrigation load Ndego Sector     |      | 0.726     | 0    | 0    | 0    | 0    | 0    | 0   |
| Irrigation load Ngeruka Sector   |      | 1.2       | 0    | 0    | 0    | 0    | 0    | 0   |
| Irrigation load Nyamugari Sector |      | 3.45      | 0    | 0    | 0    | 0    | 0    | 0   |
| Loads for Mines1                 |      | 11.8      | 0    | 0    | 0    | 0    | 0    | 0   |
| Loads for Mines2                 |      | 11.8      | 0    | 0    | 0    | 0    | 0    | 0   |
| Loads for Mines3                 |      | 11.8      | 0    | 0    | 0    | 0    | 0    | 0   |
| Loads for Mines4                 |      | 11.8      | 0    | 0    | 0    | 0    | 0    | 0   |
| Nyabihu Tea Factory              | 2016 | 1         | 0    | 0    | 1    | 0    | 0    | 0   |
| Rubaya Tea Factory               | 2016 | 1         | 0    | 0    | 1    | 0    | 0    | 0   |
| SORWATHE Tea Factory             | 2016 | 1         | 0    | 0    | 1    | 0    | 0    | 0   |
| Mulindi Tea Factory              | 2016 | 1         | 0    | 0    | 1    | 0    | 0    | 0   |
| Mata Tea Factory                 | 2016 | 2         | 0    | 0    | 2    | 0    | 0    | 0   |
| Nshili Kivu Tea Factory          | 2016 | 1         | 0    | 0    | 1    | 0    | 0    | 0   |
| Pfunda Tea Factory               | 2016 | 3         | 0    | 0    | 3    | 0    | 0    | 0   |
| Gisovu Tea Factory               | 2016 | 3         | 0    | 0    | 3    | 0    | 0    | 0   |
| Gisakura Tea Factory             | 2016 | 3         | 0    | 0    | 3    | 0    | 0    | 0   |
| Kitabi Tea Factory               | 2016 | 3         | 0    | 0    | 3    | 0    | 0    | 0   |
| Shagasha Tea Factory             | 2016 | 3         | 0    | 0    | 3    | 0    | 0    | 0   |
| Karongi Tea Factory              | 2016 | 2         | 0    | 0    | 2    | 0    | 0    | 0   |
| Mushubi Tea Factory              | 2016 | 2         | 0    | 0    | 2    | 0    | 0    | 0   |
| Gatare Tea Factory               | 2017 | 2         | 0    | 0    | 0    | 2    | 0    | 0   |
| Rutsiro Tea Factory              | 2017 | 3.8       | 0    | 0    | 0    | 3.8  | 0    | 0   |
| Muganza-Kivu Tea Factory         | 2017 | 3.8       | 0    | 0    | 0    | 3.8  | 0    | 0   |
| Karumbi New tea site             | 2017 | 3.8       | 0    | 0    | 0    | 3.8  | 0    | 0   |
| Sovu new Tea site                | 2018 | 3.8       | 0    | 0    | 0    | 0    | 3.8  | 0   |
| Rugabano new tea site            | 2018 | 3.8       | 0    | 0    | 0    | 0    | 3.8  | 0   |
| Munini new tea site              | 2017 | 3.8       | 0    | 0    | 0    | 3.8  | 0    | 0   |
| Kibeho new tea site              | 2018 | 3.8       | 0    | 0    | 0    | 0    | 3.8  | 0   |

Source: JICA Report of Electricity &amp; Geothermal MP

Table 2-2-2-2.3 Large-scale Customer development scenarios

| Bulk Load Scenario (Country-Level) |  | 2014        | 2015        | 2016        | 2017        | 2018        |
|------------------------------------|--|-------------|-------------|-------------|-------------|-------------|
| <b>Case Scenario</b>               |  | <b>2014</b> | <b>2015</b> | <b>2016</b> | <b>2017</b> | <b>2018</b> |
| <b>Extreme High Case</b>           | <b>100%</b> to be installed as scheduled                         | 31.5        | 33          | 23          | 12          | 4           |
| <b>High Case</b>                   | <b>70%</b> to be installed, comparing with the original schedule | 22.1        | 23.1        | 16.1        | 8.4         | 2.8         |
| <b>Medium Case</b>                 |  | 15.8        | 16.5        | 11.5        | 6.0         | 2.0         |
| <b>Low Case</b>                    |  | 6.3         | 6.6         | 4.6         | 2.4         | 0.8         |

Source: JICA Report of Electricity &amp; Geothermal MP



Source: JICA Report of Electricity & Geothermal MP

Figure 2-2-2-2.6 Demand forecast comparison with the existing ones

#### 4) Power Demand Forecast Allocated to Zones

The high case demand was used to divide the country-level load by five zones of East, West, South, North and Central for further studies for the development plan in the project of Electricity & Geothermal MP.

For the Normal Customer, the demand is calculated by multiplying the future number of customers by Specific consumption scenario for each zone based on the Combined Design Report of Electricity Access Rollout Program by Sofreco. Next for the Medium Customer, of 2013 electricity sale, 57% is sold in Kigali City and 43% is sold outside of the city; however, 20 years later after the development of local regions, the electricity sold in Kigali City is forecasted to be 47% and that outside 53%, with 10% shift from the city to outside the city. For the division of regional electricity sales by zones (East, West, South, North and Central), calculations were done by referring to their respective share from 2013. As for the Public Service Customer, the calculations were done in the same manner as those for the Medium Customer. In other words, in 2013, 83% of the power in the country is sold in Kigali City and 17% was sold outside of the city; however 20 years later after the development of the local regions, 73% is forecasted to be sold in Kigali City and 27% outside, indicating 10% shift in sales. The electricity sold was divided to each zone in the same manner by referring to their respective share from 2013.

#### 5) Demand Forecast of Central Zone including Kigali City

As mentioned above, the high case forecasted demand was allocated to five zones of East, South, North and Central in the studies of Electricity & Geothermal MP. The demand of Central zone including Kigali City which is deeply related to the Project was forecasted in three high, medium and low cases by extracting from the forecasted results of Electricity & Geothermal MP. The results are listed in Table 2-2-2-2.4 and the comparison between nation and central zone is



shown in Figure 2-2-2-2.7.

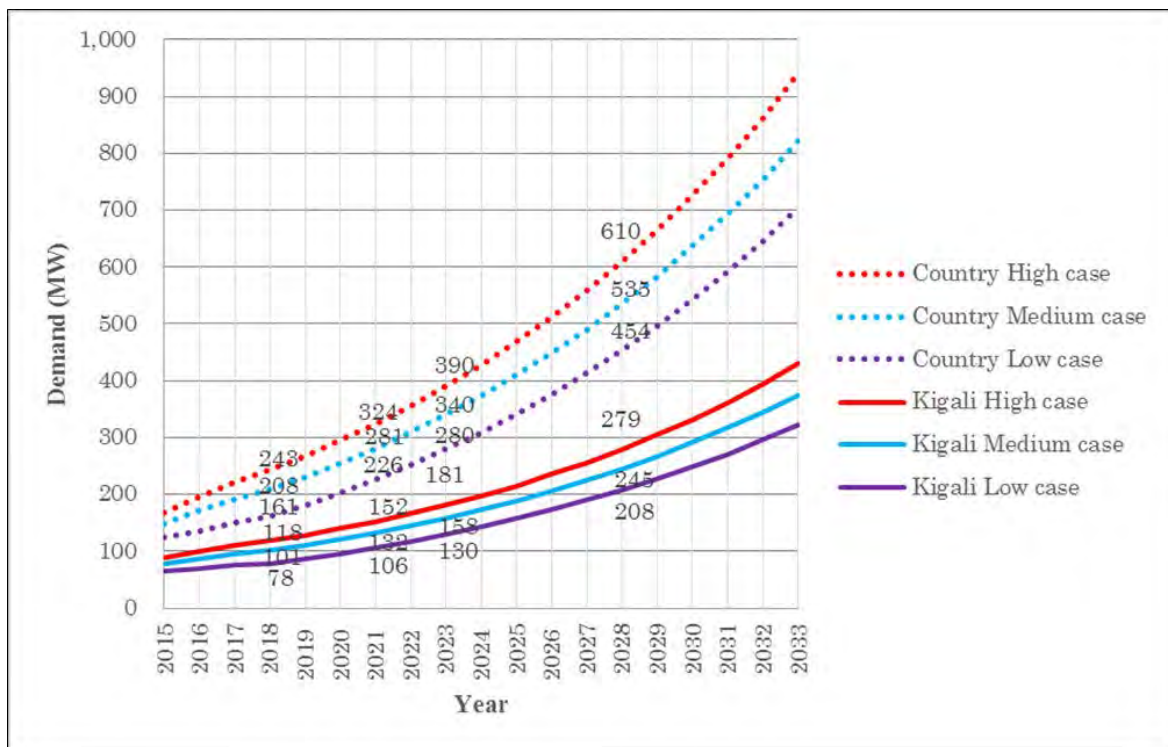
Table 2-2-2-2.4 Demand forecast of central zone

(Unit: MW)

| Year        | 2015 | 2016 | 2017 | 2018 | 2019 | 2020 | 2021 | 2022 | 2023 | 2024 |
|-------------|------|------|------|------|------|------|------|------|------|------|
| High case   | 88   | 99   | 111  | 118  | 128  | 140  | 152  | 166  | 181  | 197  |
| Medium case | 79   | 86   | 96   | 101  | 111  | 121  | 132  | 144  | 158  | 173  |
| Low case    | 65   | 69   | 75   | 78   | 87   | 96   | 106  | 117  | 130  | 143  |
| Year        | 2025 | 2026 | 2027 | 2028 | 2029 | 2030 | 2031 | 2032 | 2033 | 2034 |
| High case   | 215  | 235  | 256  | 279  | 305  | 332  | 362  | 395  | 430  |      |
| Medium case | 189  | 206  | 225  | 245  | 267  | 291  | 317  | 345  | 375  |      |
| Low case    | 157  | 173  | 190  | 208  | 227  | 248  | 271  | 296  | 322  |      |

Source: JICA Study Team

The corresponding years to yellow colored cells in Table 2-2-2-2.4 show the supply limits with existing distribution transformers, and ones to thin red colored cells indicate the supply limits with transformers which include planned by EDCL for strengthening of the distribution network. (Refer to next (2) explanation)



Source: Prepared by JICA Study Team based on JICA Report of Electricity & Geothermal MP

Figure 2-2-2-2.7 Demand forecast comparison between country and central zone

## (1) Capacity of Distribution Transformer in Central Zone

### 1) Capacity of Existing Distribution Transformer

In order to supply electricity to distribution network sufficiently, it is necessary to install greater capacity of distribution transformers than the demand. The total capacity of distribution transformers at present in the central zone, where Kigali city accounts for main demand, is 105 MVA. It is approximately 100 MW supply capability when the power factor assumed 0.95, which is almost average value of actual loads at present, and if the capacity compares to the value forecasted in Table 2-2-2-2.5, the supply limit of the transformers will reach in 2020 in the low case. Therefore, it can be seen that planned reinforcement is essential immediately. This is only if the load on the distribution lines has been shared commensurate with each substation transformer capacity, and about the necessity of separate reinforcement is described later in the next section (3) of power system analysis.

Table 2-2-2-2.5 Capacity of existing distribution transformers

| Substation     | Tr. Capacity (MVA) | Quantity | Total Tr. Capacity (MVA) | Voltage ratio (kV)                |
|----------------|--------------------|----------|--------------------------|-----------------------------------|
| Gikondo        | 15                 | 3        | 45                       | 110/15                            |
| Jabana         | 10                 | 2        | 20                       | 110/15                            |
| Birembo        | 20                 | 1        | 20                       | 110/15                            |
| Gasogi         | 10                 | 1        | 10                       | 110/15                            |
| Mt. Kigali     | 10                 | 1        | 10                       | 110/30 (10MVA)<br>and 30/15(5MVA) |
| Total Capacity |                    |          | <b>105</b>               | <b>MVA</b>                        |

Source: Investigated EUCL facilities by JICA Study Team

### 2) Reinforcement Plan of Distribution Transformers

There is a grid reinforcement plan in EDCL based on the report of “Review of Grid Strengthening Projects For 2014 -2018” which was studied by WB support and the Kigali ring project that will construct new transmission lines from existing Jabana substation to Gahanga substation (to be constructed newly) through Mont Kigali substation (to be reinforced) under the support of EU. Those are the main strengthening plan in Kigali city and taking into consideration of those projects in the report, the planned configuration of transformers is as mentioned in Table 2-2-2-2.6.

Table 2-2-2-2.6 Capacity of distribution transformers after completion of reinforcement

| Substation     | Tr. Capacity (MVA) | Quantity | Total Tr. Capacity (MVA) | Voltage ratio (kV)                  | Supported by |
|----------------|--------------------|----------|--------------------------|-------------------------------------|--------------|
| Gikondo        | 15                 | 3        | 45                       | 110/15                              |              |
| Jabana         | 10                 | 2        | 20                       | 110/15                              |              |
| Birembo        | 20                 | 2        | 40                       | 110/15                              | EU           |
| Mt. Kigali     | 20                 | 2        | 40                       | 110/30 (20MVA)<br>and 110/15(20MVA) | EU           |
| Ndera          | 20                 | 2        | 40                       | 110/15                              | JICA         |
| Gasogi         | 15                 | 2        | 30                       | 110/15                              | JICA         |
| Gahanga        | 20                 | 1        | 20                       | 110/15                              | EU           |
| Total Capacity |                    |          | <b>235</b>               | <b>MVA</b>                          |              |

Source: Prepared by JICA Study Team based on Review of Grid Strengthening Projects for 2014 -2018

The orange colored portions in Table 2-2-2-2.6 are the ones for the reinforcement projects as mentioned in the report, and the projects are being designed or underway of which name of donors are indicated in right columns. The construction plan of Nyabugogo and Muhima substation as described in "Review of Grid strengthening Projects for 2014-2018" has already canceled, therefore the reinforcement plan was excluded from above table.

Even though all transformers listed in Table 2-2-2-2.6 are reinforced including the ones of donors undecided, total capacity of the transformers will be 235 MVA, it would be 223.3 MW when the load power factor assumed 0.95 as same as mentioned before. This capacity 223.3 MW can supply until 2025 in the high case and 2028 in the low case according to the demand forecast in the Table 2-2-2-2.4, so that the continuous development planning and its execution should be surely needed.

## (2) Power System Analysis

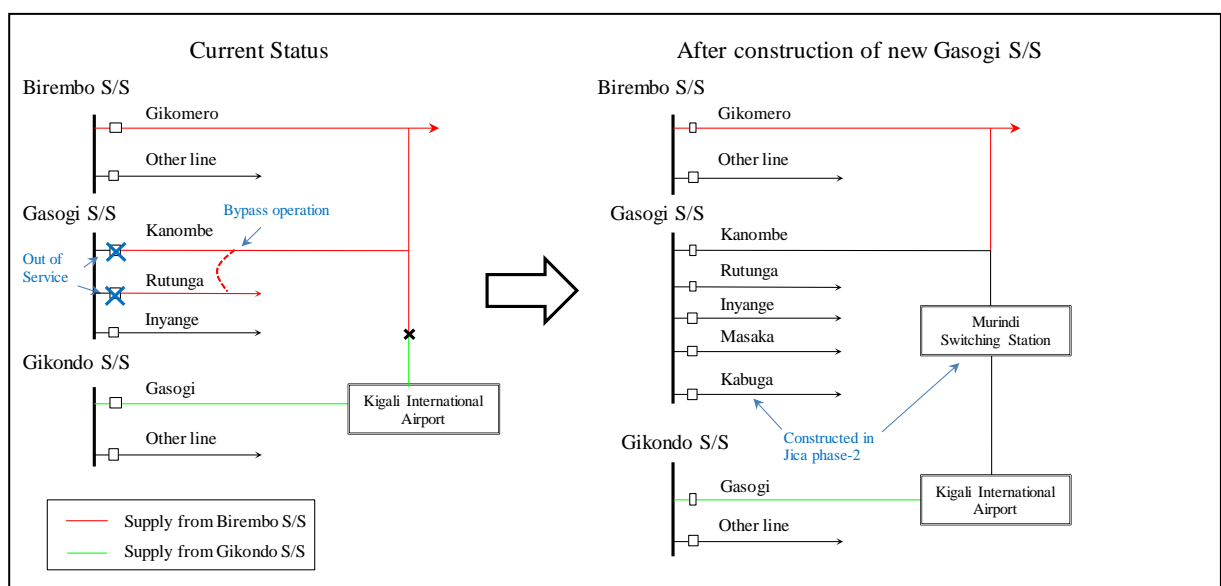
It is said that the consideration of development necessity in terms of distribution transformers capacity in the above (2) is a kind of broad power system analysis, in addition it was studied utilizing an application software for the power system analysis to verify the specification of facilities to be supplied in the network. Specifically, two kinds of calculation, that is a power flow calculation and a fault current calculation, were made entering the data collected during the site survey into the power system analysis software ETAP.

As the component of the Project is mainly composed of new Gasogi substation and Transmission line between Jabana and Birembo substation, the model building of system analysis is mainly central zone. However, Operation of the Kigali northern ring network (newly constructed transmission line Rulindo to Musha substation through Gabilo substation) under development by EUCL will be started in 2018. Above development has large influence to the power system of Kigali city, hence the northern ring network shall be included in range of power system analysis.

The power flows from outside Kigali, like existing power stations and ones through 220 kV



- Existing Gasogi substation equipped three distribution lines, but due to the failure of circuit breaker, currently only one feeder is activate. By the reinforcement of Gasogi substation, load allocation from Birembo and Gikondo is shifted to Gasogi feeders.
- Power supply to Kabuga switching station from Gasogi substation will be started in 2018 under JICA phase-2 project. Load allocation around kabuga area shall be considered. and
- Power supply to Murindi switching station from Gasogi substation will be started in 2018 under JICA phase-2 project. Load allocation shall be considered as well. The Murindi switching station is responsible for the dedicated line to Kigali international airport.



Source: Jica Survey Team

Figure 2-2-2-2.9 Current status of distribution from Gasogi Substation

Table 2-2-2.7 Load demand allocation to substations

【High case】

(Unit: MW)

| High case             | 2017<br>(Apr. act) | 2018 | 2019 | 2020 | 2021  | 2022 | 2023 | 2024 | 2025 | 2026 | 2027 | 2028 | 2029 | 2030 | 2031 | 2032 | 2033  |       |
|-----------------------|--------------------|------|------|------|-------|------|------|------|------|------|------|------|------|------|------|------|-------|-------|
| Gikondo SS            | 25.67              | 30.6 | 33.4 | 36.4 | 25.1% | 39.7 | 43.4 | 47.3 | 51.7 | 56.5 | 61.7 | 67.3 | 73.5 | 80.2 | 87.5 | 95.4 | 104.1 | 113.5 |
| Jabana SS             | 19.78              | 24.4 | 26.6 | 29.0 | 20.0% | 31.6 | 34.5 | 37.7 | 41.2 | 45.0 | 49.1 | 53.6 | 58.5 | 63.9 | 69.7 | 76.0 | 82.9  | 90.4  |
| Birembo SS            | 15.10              | 16.1 | 17.6 | 17.7 | 12.2% | 19.3 | 21.1 | 23.0 | 25.1 | 27.4 | 30.0 | 32.7 | 35.7 | 39.0 | 42.5 | 46.4 | 50.6  | 55.2  |
| Gasogi SS             | 2.69               | 7.7  | 8.4  | 11.2 | 7.7%  | 12.2 | 13.3 | 14.6 | 15.9 | 17.4 | 19.0 | 20.7 | 22.6 | 24.7 | 26.9 | 29.3 | 32.0  | 34.9  |
| Mont Kigali SS(15kV)  | 3.41               | 3.7  | 4.0  | 4.3  | 3.0%  | 4.7  | 5.1  | 5.6  | 6.1  | 6.7  | 7.3  | 7.9  | 8.7  | 9.5  | 10.3 | 11.3 | 12.3  | 13.4  |
| Mont Kigali SS(30kV)  | 6.242              | 10.5 | 11.4 | 12.5 | 8.6%  | 13.6 | 14.9 | 16.3 | 17.8 | 19.4 | 21.2 | 23.1 | 25.2 | 27.5 | 30.0 | 32.8 | 35.7  | 39.0  |
| Mont Kigali SS(Total) | 9.65               | 14.2 | 15.4 | 16.8 | 11.6% | 18.3 | 20.0 | 21.8 | 23.9 | 26.1 | 28.4 | 31.1 | 33.9 | 37.0 | 40.4 | 44.0 | 48.0  | 52.4  |
| Ndera SS              |                    | 13.7 | 14.6 | 15.9 | 11.0% | 17.3 | 18.9 | 20.7 | 22.6 | 24.7 | 26.9 | 29.4 | 32.1 | 35.0 | 38.2 | 41.7 | 45.4  | 49.6  |
| Gahanga SS            |                    | 3.8  | 4.1  | 4.5  | 3.1%  | 4.9  | 5.4  | 5.8  | 6.4  | 7.0  | 7.6  | 8.3  | 9.1  | 9.9  | 10.8 | 11.8 | 12.9  | 14.0  |
| Rlima SS              |                    | 11.5 | 12.5 | 13.6 | 9.4%  | 14.8 | 16.2 | 17.7 | 19.3 | 21.1 | 23.0 | 25.1 | 27.4 | 29.9 | 32.7 | 35.6 | 38.8  | 42.4  |
| Central Zone Load     | 72.89              | 122  | 133  | 145  |       | 158  | 173  | 189  | 206  | 225  | 246  | 268  | 293  | 319  | 348  | 380  | 415   | 452   |
| Musha SS              | 3.13               | 20.9 | 22.8 | 24.9 | 57.0% | 27.1 | 29.5 | 32.1 | 34.8 | 37.8 | 40.9 | 44.4 | 48.1 | 52.1 | 56.4 | 61.1 | 66.2  | 71.7  |
| Kharondo SS           | 6.14               | 9.3  | 10.0 | 10.9 | 25.0% | 11.9 | 12.9 | 14.1 | 15.3 | 16.6 | 18.0 | 19.5 | 21.1 | 22.8 | 24.7 | 26.8 | 29.0  | 31.4  |
| Rwinkwavu SS          | 0.93               | 3.3  | 3.6  | 3.9  | 9.0%  | 4.3  | 4.7  | 5.1  | 5.5  | 6.0  | 6.5  | 7.0  | 7.6  | 8.2  | 8.9  | 9.6  | 10.4  | 11.3  |
| + Kirehe SS load      |                    | 3.3  | 3.6  | 3.9  | 9.0%  | 4.3  | 4.7  | 5.1  | 5.5  | 6.0  | 6.5  | 7.0  | 7.6  | 8.2  | 8.9  | 9.6  | 10.4  | 11.3  |
| East Zone Load        | 10.2               | 37   | 40   | 44   |       | 48   | 52   | 56   | 61   | 66   | 72   | 78   | 84   | 91   | 99   | 107  | 116   | 126   |

【Medium Case】

(Unit: MW)

| Medium case           | 2017  | 2018 | 2019 | 2020 | 2021  | 2022 | 2023 | 2024 | 2025 | 2026 | 2027 | 2028 | 2029 | 2030 | 2031 | 2032 | 2033 |      |
|-----------------------|-------|------|------|------|-------|------|------|------|------|------|------|------|------|------|------|------|------|------|
| Gikondo SS            | 25.67 | 26.2 | 28.7 | 31.5 | 25.1% | 34.5 | 37.7 | 41.3 | 45.2 | 49.5 | 54.1 | 59.1 | 64.5 | 70.3 | 76.7 | 83.5 | 91.0 | 99.0 |
| Jabana SS             | 19.78 | 20.9 | 22.9 | 25.1 | 20.0% | 27.5 | 30.1 | 32.9 | 36.0 | 39.4 | 43.1 | 47.1 | 51.4 | 56.0 | 61.1 | 66.6 | 72.5 | 78.9 |
| Birembo SS            | 15.10 | 13.8 | 15.1 | 15.3 | 12.2% | 16.7 | 18.3 | 20.1 | 22.0 | 24.0 | 26.3 | 28.7 | 31.3 | 34.2 | 37.3 | 40.6 | 44.2 | 48.1 |
| Gasogi SS             | 2.69  | 6.6  | 7.2  | 9.7  | 7.7%  | 10.6 | 11.6 | 12.7 | 13.9 | 15.2 | 16.6 | 18.2 | 19.8 | 21.6 | 23.6 | 25.7 | 28.0 | 30.5 |
| Mont Kigali SS(15kV)  | 3.41  | 3.1  | 3.4  | 3.7  | 3.0%  | 4.1  | 4.5  | 4.9  | 5.3  | 5.8  | 6.4  | 7.0  | 7.6  | 8.3  | 9.0  | 9.9  | 10.7 | 11.7 |
| Mont Kigali SS(30kV)  | 6.24  | 9.0  | 9.8  | 10.8 | 8.6%  | 11.8 | 13.0 | 14.2 | 15.5 | 17.0 | 18.6 | 20.3 | 22.1 | 24.2 | 26.3 | 28.7 | 31.2 | 34.0 |
| Mont Kigali SS(Total) | 9.65  | 12.1 | 13.2 | 14.5 | 11.6% | 15.9 | 17.4 | 19.1 | 20.9 | 22.8 | 24.9 | 27.2 | 29.7 | 32.4 | 35.4 | 38.5 | 42.0 | 45.7 |
| Ndera SS              |       | 11.5 | 13.3 | 13.7 | 11.0% | 15.0 | 16.5 | 18.0 | 19.7 | 21.6 | 23.6 | 25.8 | 28.2 | 30.7 | 33.5 | 36.5 | 39.7 | 43.2 |
| Gahanga SS            |       | 3.2  | 3.5  | 3.9  | 3.1%  | 4.3  | 4.7  | 5.1  | 5.6  | 6.1  | 6.7  | 7.3  | 8.0  | 8.7  | 9.5  | 10.3 | 11.2 | 12.2 |
| Rlima SS              |       | 9.8  | 10.8 | 11.7 | 9.4%  | 12.9 | 14.1 | 15.4 | 16.9 | 18.5 | 20.2 | 22.0 | 24.1 | 26.3 | 28.6 | 31.2 | 34.0 | 37.0 |
| Central Zone Load     | 72.89 | 105  | 114  | 125  |       | 137  | 150  | 165  | 180  | 197  | 215  | 235  | 257  | 280  | 305  | 333  | 362  | 394  |
| Musha SS              | 3.13  | 18.0 | 19.6 | 21.5 | 57.0% | 23.5 | 25.7 | 28.0 | 30.4 | 33.1 | 35.9 | 38.9 | 42.2 | 45.7 | 49.4 | 53.5 | 57.8 | 62.5 |
| Kharondo SS           | 6.14  | 7.9  | 8.6  | 9.4  | 25.0% | 10.3 | 11.3 | 12.3 | 13.4 | 14.5 | 15.7 | 17.1 | 18.5 | 20.0 | 21.7 | 23.5 | 25.4 | 27.4 |
| Rwinkwavu SS          | 0.93  | 2.8  | 3.1  | 3.4  | 9.0%  | 3.7  | 4.1  | 4.4  | 4.8  | 5.2  | 5.7  | 6.1  | 6.7  | 7.2  | 7.8  | 8.4  | 9.1  | 9.9  |
| + Kirehe SS load      |       | 2.8  | 3.1  | 3.4  | 9.0%  | 3.7  | 4.1  | 4.4  | 4.8  | 5.2  | 5.7  | 6.1  | 6.7  | 7.2  | 7.8  | 8.4  | 9.1  | 9.9  |
| East Zone Load        | 10.2  | 31   | 34   | 38   |       | 41   | 45   | 49   | 53   | 58   | 63   | 68   | 74   | 80   | 87   | 94   | 101  | 110  |

【Low Case】

(Unit: MW)

| Low case              | 2017  | 2018 | 2019 | 2020 | 2021  | 2022 | 2023 | 2024 | 2025 | 2026 | 2027 | 2028 | 2029 | 2030 | 2031 | 2032 | 2033 |      |
|-----------------------|-------|------|------|------|-------|------|------|------|------|------|------|------|------|------|------|------|------|------|
| Gikondo SS            | 25.7  | 20.3 | 22.6 | 25.0 | 25.1% | 27.7 | 30.7 | 33.9 | 37.4 | 41.3 | 45.4 | 49.8 | 54.6 | 59.8 | 65.4 | 71.4 | 77.9 | 84.9 |
| Jabana SS             | 19.8  | 16.2 | 18.0 | 19.9 | 20.0% | 22.1 | 24.5 | 27.0 | 29.8 | 32.9 | 36.2 | 39.7 | 43.5 | 47.7 | 52.1 | 56.9 | 62.1 | 67.7 |
| Birembo SS            | 15.1  | 10.7 | 11.9 | 12.2 | 12.2% | 13.5 | 14.9 | 16.5 | 18.2 | 20.1 | 22.1 | 24.2 | 26.6 | 29.1 | 31.8 | 34.7 | 37.9 | 41.3 |
| Gasogi SS             | 2.7   | 5.1  | 5.7  | 7.7  | 7.7%  | 8.5  | 9.4  | 10.4 | 11.5 | 12.7 | 14.0 | 15.3 | 16.8 | 18.4 | 20.1 | 22.0 | 24.0 | 26.1 |
| Mont Kigali SS(15kV)  | 3.4   | 2.4  | 2.7  | 3.0  | 3.0%  | 3.3  | 3.6  | 4.0  | 4.4  | 4.9  | 5.4  | 5.9  | 6.4  | 7.1  | 7.7  | 8.4  | 9.2  | 10.0 |
| Mont Kigali SS(30kV)  | 6.2   | 7.0  | 7.7  | 8.6  | 8.6%  | 9.5  | 10.5 | 11.7 | 12.9 | 14.2 | 15.6 | 17.1 | 18.8 | 20.5 | 22.5 | 24.5 | 26.8 | 29.2 |
| Mont Kigali SS(Total) | 9.7   | 9.4  | 10.4 | 11.5 | 11.6% | 12.8 | 14.2 | 15.7 | 17.3 | 19.0 | 20.9 | 23.0 | 25.2 | 27.6 | 30.2 | 33.0 | 36.0 | 39.2 |
| Ndera SS              |       | 8.9  | 9.9  | 10.9 | 11.0% | 12.1 | 13.4 | 14.8 | 16.3 | 18.0 | 19.8 | 21.8 | 23.9 | 26.1 | 28.6 | 31.2 | 34.0 | 37.1 |
| Gahanga SS            |       | 2.5  | 2.8  | 3.1  | 3.1%  | 3.4  | 3.8  | 4.2  | 4.6  | 5.1  | 5.6  | 6.2  | 6.7  | 7.4  | 8.1  | 8.8  | 9.6  | 10.5 |
| Rlima SS              |       | 7.6  | 8.4  | 9.3  | 9.4%  | 10.4 | 11.5 | 12.7 | 14.0 | 15.4 | 16.9 | 18.6 | 20.4 | 22.3 | 24.4 | 26.7 | 29.1 | 31.7 |
| Central Zone Load     | 72.89 | 81   | 90   | 100  |       | 111  | 122  | 135  | 149  | 164  | 181  | 199  | 218  | 238  | 261  | 285  | 311  | 338  |
| Musha SS              | 3.13  | 14.1 | 14.8 | 17.1 | 57.0% | 18.9 | 20.9 | 23.0 | 25.2 | 27.6 | 30.1 | 32.8 | 35.7 | 38.8 | 42.2 | 45.7 | 49.5 | 53.6 |
| Kharondo SS           | 6.14  | 6.2  | 7.7  | 7.5  | 25.0% | 8.3  | 9.2  | 10.1 | 11.1 | 12.1 | 13.2 | 14.4 | 15.7 | 17.0 | 18.5 | 20.1 | 21.7 | 23.5 |
| Rwinkwavu SS          | 0.93  | 2.2  | 2.3  | 2.7  | 9.0%  | 3.0  | 3.3  | 3.6  | 4.0  | 4.4  | 4.8  | 5.2  | 5.6  | 6.1  | 6.7  | 7.2  | 7.8  | 8.5  |
| + Kirehe SS load      |       | 2.2  | 2.3  | 2.7  | 9.0%  | 3.0  | 3.3  | 3.6  | 4.0  | 4.4  | 4.8  | 5.2  | 5.6  | 6.1  | 6.7  | 7.2  | 7.8  | 8.5  |
| East Zone Load        | 10.20 | 24   | 27   | 30   |       | 33   | 37   | 40   | 44   | 48   | 53   | 58   | 63   | 68   | 74   | 80   | 87   | 94   |

Source: JICA Study Team

## 2) Preconditions of Power System Analysis

Power system analysis that are power flow calculation and fault current calculation was conducted under the preconditions below:

- Calculation model was configured in accordance with the area description in Fig. 2-2-2-2.8, and power generation capacity that is supplied from outside the model shall be sufficiently presence or developed appropriately.
- The two projects of Kigali ring transmission lines and substations construction, and Rulindo substation modification and 110kV transmission line ring construction (from Rulindo SS to Musha SS through Gabilo SS) shall be completed until 2018. Considering for the survey results by interviewing to EDCL, Transmission line operation is modeled by following configuration.
  - The transmission line circuit breaker between Gabilo substation and the Musha substation is normal open operation (loop off operation)
- Main power source from outside of the model will be flown from the 220 kV network, so that Shango substation which connected to international connection line from Uganda and Tanzania shall be major power supply station to Kigali area. However, with regard to the Shango substation, since the construction contractor has bankrupted during the procurement of facilities and civil foundation works of substation and currently in the process of re-bidding for installation work, thus we assumed that the start of operation date is 2020.
- Accordingly, existing 110 kV transmission network was assumed to supply power to Kigali area to remain about actual capacity of 2017.
- Power flow calculation is conducted at the peak load of the year for analysis.
- Network voltage range is 95 % to 105 % in normal operation.
- Power factor of load is assumed as 0.95 in consideration of average value of actual operation data in 2016
- Since exact value of three phase short circuit capacity of outside simulation model required for the calculation is not able to obtain in view of near future international network connection with neighboring countries, the following premises were made for the sake of safety.
- Three phase short circuit capacity of 220 kV Shango substation bus is equivalent to the rated breaking current of 220 kV circuit breaker in Shango substation.
- For 110 kV network, bus of the nearest substation located outside of the model, which is interconnected to the model network, is infinite bus for short circuit calculation (For example, Rulindo substation 110 kV bus is infinite bus in case the contraction power source connects

to Jabana substation in the model) and the short circuit capacity of contraction power source was decided considering some margin, taking into account of impedance of the transmission line from the infinite bus defined above to the model.

### 3) Power Flow Calculation Results

Upon the power flow calculations, it is confirmed that the facilities to be supplied for new Gasogi substation under the Project are appropriate in terms of capacity and maintaining of voltage under the normal operation for ten years from the starting operation.

However, it was found that several transmission lines and substation for central and east zones have to be reinforced to meet increasing demand for preventing overload and/or low voltage operation. The required reinforcements are summarized in Table 2-2-2-2.8 below.

Table 2-2-2-2.8 Reinforcements plan for central and east zone as required

| Required Year  | Facilities to be reinforced  | Reason  |
|----------------|--|---|
| 2018 or before | <b>Musha SS</b><br>30 MVA 110/15 kV Transformer (first expansion)  | To supply mainly Rwamagana industrial park (to avoid overload of the operating transformer)   |
| 2018           | <b>Ndera SS</b><br>20 MVA 110/15 kV Transformer  | To supply for Kigali special Economic Zone(KSEZ)  |
| 2018           | <b>Mont Kigali SS</b><br>20 MVA 110/30 kV Transformer<br>20 MVA 110/15 kV Transformer  | To supply increasing distribution network load (under the support of EU)  |
| 2018           | <b>Gahanga SS</b><br>20 MVA 110/15 kV Transformer  | To supply increasing distribution network load (under the support of EU)  |
| 2018           | <b>Ndera Diesel PS (KSEZ)</b><br>10 MW   | To supply increasing distribution network load  |
| 2018           | <b>Birembo Diesel PS</b><br>10 MW  | To supply increasing distribution network load  |
| 2018           | <b>Kabarondo SS</b><br>10 MVA 110/30 kV Transformer (first expansion)  | To supply increasing distribution network load (to avoid overload of the operating transformer)   |
| 2019           | Loop operation on Kigali north ring<br>Close operation of circuit breaker for 110 kV transmission line between <b>Gabilo</b> and <b>Musha SS</b> | To compensate voltage drop in east area network (temporary correspondence before capacitor installation)  |
| 2020           | <b>New Gasogi SS</b><br>15 MVA 110/15 kV Transformer   | To supply increasing distribution network load  |
| 2020           | <b>Shango SS</b><br>93.8 MVA 220/110 kV Transformer  | To supply power of imported and from power stations outside Kigali area such as Uganda, etc. to Kigali area   |
| 2020           | <b>Jabana SS</b><br>30 MVA 110/15 kV Transformer (first expansion)   | To supply increasing distribution network load (to avoid overload of the operating transformers)<br><i>When 30 MVA transformer is installed additionally in parallel with existing ones, short circuit capacity may exceeds 15 kV circuit breaker capability. Countermeasures have to be carefully studied such as replacement of SWGR, 15 kV bus coupler breaker always open operation, etc.</i> |



| Required Year | Facilities to be reinforced  | Reason   |
|---------------|--|--|
| 2021          | <b>Musha SS</b><br>5 Mvar x 2 15 kV Capacitor bank   | To compensate voltage drop in east area network  |
| 2021          | <b>Kabarondo SS</b><br>3 Mvar x 2 30 kV Capacitor bank   | To compensate voltage drop in east area network  |
| 2021          | <b>Birembo SS</b><br>20 MVA 110/15 kV Transformer (first expansion)  | To supply increasing distribution network load (to avoid overload of the operating transformers)   |
| 2022          | <b>Gikondo SS</b><br>60 MVA 110/15 kV Transformer (first expansion)  | To supply increasing distribution network load (to avoid overload of the operating transformers)<br><i>When 60 MVA transformer is installed additionally in parallel with existing ones, short circuit capacity may exceeds 15 kV circuit breaker capability. Countermeasures have to be carefully studied such as replacement of SWGR, 15 kV bus coupler breaker always open operation, etc.</i>  |
| 2024          | Conductor replacement of 110 kV transmission line from <b>Birembo SS to Ndera SS</b><br>ACSR 157/25(single) to ACSR 240/40 (double)  | To strengthen power supply capability and to compensate voltage drop in eastern part of Kigali.<br><i>A part of the transmission line between Birembo and Ndera SS will be newly established in accordance with the construction of Ndera SS. But the planned capacity of KSEZ power plant has been changed from 50 MW to 10MW, Which cause overload situation of above transmission line in 2029. Therefore transmission line between Birembo and Ndera SS shall be reinforced.</i> |
| 2024          | <b>Musha SS</b><br>30 MVA 110/15 kV Transformer (Second expansion)   | To supply increasing distribution network load (to avoid overload of the operating transformer)  |
| 2025          | <b>Jabana SS</b><br>30 MVA 110/15 kV Transformer (Second expansion)  | To supply increasing distribution network load (to avoid overload of the operating transformer)  |
| 2025          | <b>Mont Kigali SS</b><br>20 MVA 110/30 kV Transformer (First expansion)  | To supply increasing distribution network load (to avoid overload of the operating transformer)  |
| 2025          | <b>Shango SS</b><br>150 MVA 220/110 kV Transformer (First Expansion)   | To supply increasing power of imported and from power stations outside Kigali area such as Uganda, etc. to Kigali area   |
| 2026          | Conductor replacement of 110 kV transmission line from <b>Jabana SS to Birembo SS</b><br>ACSR 157/25 (single) to ACSR 240/40(double) | To strengthen power supply capability to western part of Kigali from 220 kV network( to avoid overload operation of transmission line)   |
| 2027          | Conductor replacement of 110 kV transmission line from <b>Ndera SS to Gasogi SS</b><br>ACSR 157/25 (single) to ACSR 240/40 (double)  | To strengthen power supply capability and to compensate voltage drop in eastern part of Kigali.<br><i>A part of the transmission line between Ndera and Gasogi SS will be newly established in accordance with the construction of Ndera SS. But the planned capacity of KSEZ power plant has been changed from 50 MW to 10MW, Which cause overload situation of above transmission line in 2029. Therefore transmission line between Ndera and Gasogi SS shall be reinforced.</i>   |
| 2028          | Conductor replacement of 110 kV transmission line from <b>Gasogi SS to Musha SS</b>  | To compensate voltage drop in east area network, and to avoid overload operation of transmission line  |

| Required Year | Facilities to be reinforced   | Reason   |
|---------------|---|--|
|               | ACSR 157/25 (single) to ACSR 240/40 (double)                          |  |
| 2028          | <b>Rwinkwavu SS</b><br>1 Mvar and 5 Mvar 15 kV Capacitor bank         | To compensate voltage drop in east area network  |
| 2029          | <b>Birembo SS</b><br>20 MVA 110/15 kV Transformer (second expansion)  | To supply increasing distribution network load (to avoid overload of the operating transformer)                            |
| 2030          | <b>Shango SS</b><br>150 MVA 220/110 kV Transformer (second expansion) | To strengthen power supply capability to Kigali load from 220 kV network (to avoid overload of the operating transformers) |

Source: JICA Study Team

Figure 2-2-2-2.10 shows the load flow calculation results of 2023 when the Project supplied facilities has been operated for three years on the single line diagram, and Figure 2-2-2-2.11 shows the ones of 2030 after ten years operation of the facilities. These calculations are carried out under conditions that the reinforcement plans listed in Table 2-2-2-2.8 are conducted.

As shown in the Table 2-2-2-2.8, the present network in Rwanda is so weak for forthcoming future load and it is necessary to reinforce transmission lines and substations to accommodate increasing forecasted load accordingly. At the existing Gasogi substation, it is said to be highly urgent reinforcement plan because of the forecasted demand load in 2020 exceeds existing transformer capacity. Also, the loads of Gikondo and Birembo is allocated to ones of new Gasogi substation, which become an important distribution substation in the future. In addition, since new Gasogi substation is positioned as an interconnection substation in the 110 kV Kigali ring network, the implementation of this reinforcement plan of the power supply in Kigali city contribute to improvement of stability and efficiency.

The required year of facilities mentioned above is based on the high case of the demand forecast, however, it can be delayed approximately two years in the medium case and four years in the low case.

If the Project is not executed,

- It is impossible to meet the increasing demand of the area timely for electricity supply.
- Some long distance distribution lines, which are planned to changeover to new Gasogi substation partially, due to heavy load than current loads will make difficult to maintain voltage within allowable range.
- As for 110 kV transmission line between Jabana and Birembo substation, it is a main transmission line that transmits power from Shango to the central part of Kigali through Birembo substation. However more than 50 years have been passed since it's construction, and collapse accident has occurred in recent years. Thus assumed that the strength of support structure and the foundation is deteriorated. Hence urgent reinforcement of Jabana – Birembo transmission line is required.

Therefore, the Project is positioned to play a great important role for stable power supply to Kigali area in Rwanda.

#### 4) Fault Current Calculation Results

The three phase short circuit current was calculated at each substation bus in the model used for the load flow analysis under the conditions described in 2) above. The calculation was made with the required reinforcements listed in Table 2-2-2-2.8 for respective year. The calculation results of three phase short circuit current at buses of new Gasogi substation and of major substations are shown in Table 2-2-2-2.9 below. Figure 2-2-2-2.12 shows the three phase short circuit current for each substation bus in the single line diagram in 2030. The detailed calculation results are shown in Attachment – 9.

Table 2-2-2-2.9 Three phase short circuit current

(Unit: kA)

|                               |           | 2020 | 2025 | 2030 | Rated breaking current of circuit breaker |
|-------------------------------|-----------|------|------|------|---|
| New Gasogi SS                 | 110kV bus | 9.5  | 9.9  | 15.9 | 31.5 (planned)                            |
|                               | 15kV bus  | 6.7  | 12.1 | 13.3 | 25 (planned)                              |
| Ndera SS<br>(for reference)   | 110kV bus | 12.0 | 14.1 | 20.0 | 31.5                                      |
|                               | 15kV bus  | 9.1  | 16.8 | 18.3 | 25  |
| Gikondo SS<br>(for reference) | 110kV bus | 14.1 | 15.0 | 18.6 | 31.5                                      |
|                               | 15kV bus  | 20.4 | 34.7 | 38.2 | 25  |
| Jabana SS<br>(for reference)  | 110kV bus | 16.9 | 19.1 | 23.0 | 31.5                                      |
|                               | 15kV bus  | 19.9 | 28.4 | 30.2 | 25  |
| Birembo SS<br>(for reference) | 110kV bus | 16.4 | 21.1 | 28.7 | 40  |
|                               | 15kV bus  | 8.5  | 16.1 | 23.9 | 25  |

Source: JICA Study Team

It is predicted that when the existing Gikondo and Jabana substation will be reinforced, the short circuit capacity at 15 kV bus exceeds their interrupting capability of 15 kV circuit breaker. Accordingly countermeasures have to be carefully studied such as replacement of the switchgear with upgraded one, 15 kV bus coupler breaker normally open operation, etc.

Figure 2-2-2.10 Load Flow Calculation results in 2023 (after 3 years)

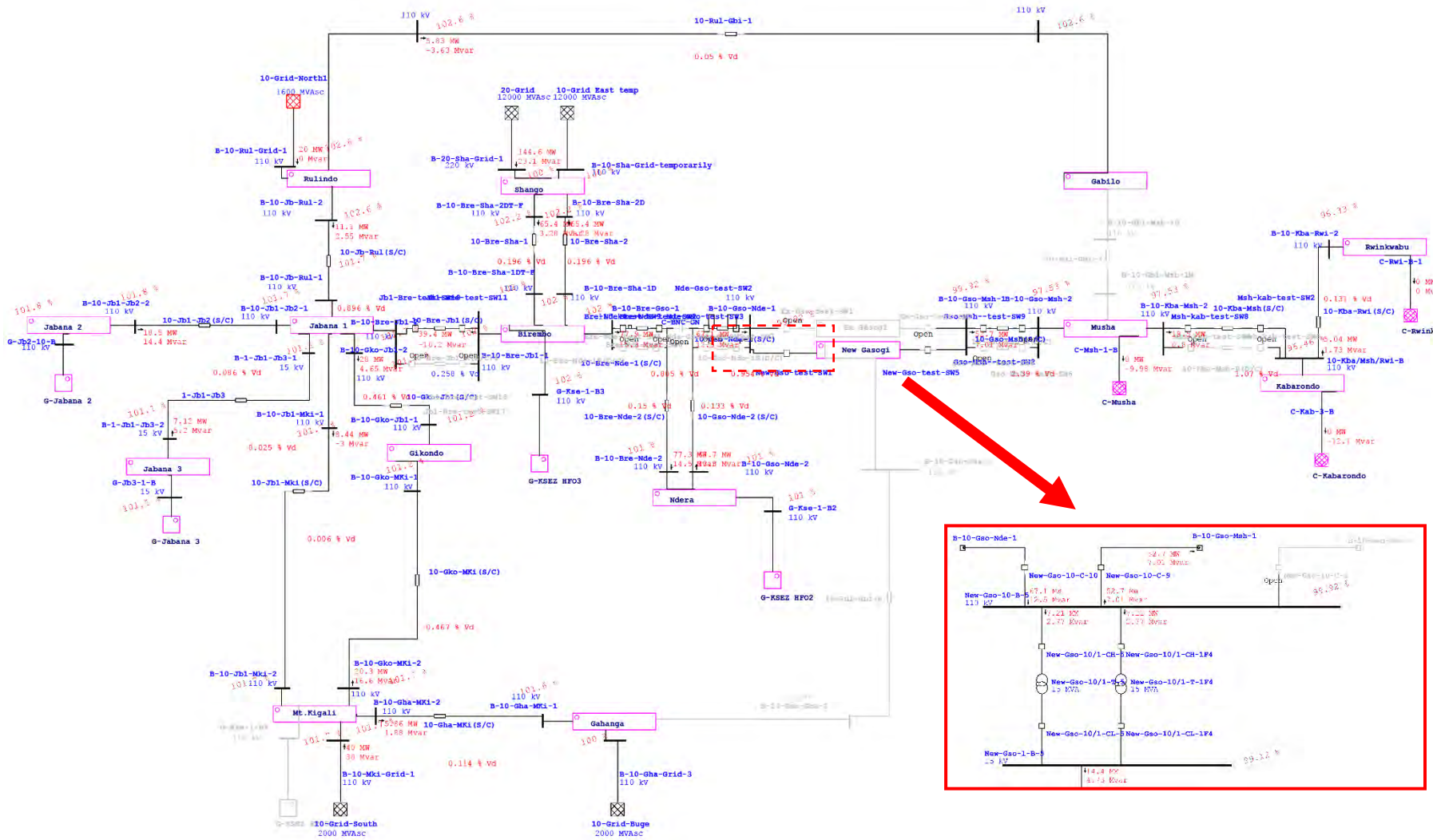
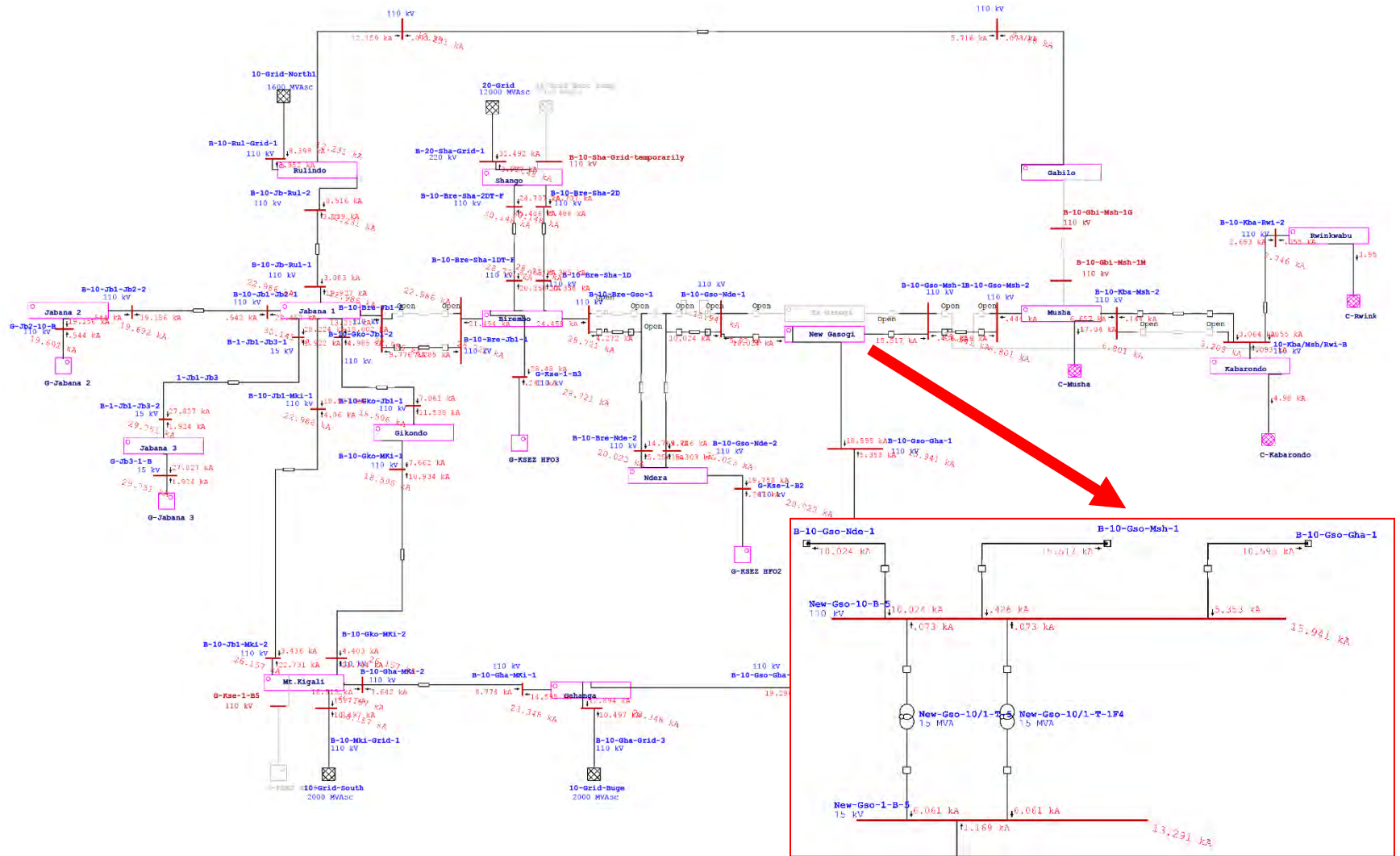




Figure 2-2-2.12 Three phase short circuit current calculation results in 2030 (after 10 years operation)



### 2-2-2-3 Overall Plan

#### (1) Design Conditions

##### 1) Weather conditions

Weather conditions applicable to designs for substation facilities and buildings facilities and foundations are as shown in Table 2-2-2-3.1, for transmission and distribution line design conditions are shown in table 2-2-2-4.5.

Table 2-2-2-3.1 Design Conditions (Weather)

| Area                  |         | Kigali city             |
|-----------------------|---------|-------------------------|
| Altitude              |         | Not higher than 2,000 m |
| Ambient temperature   | Maximum | 40 degree C             |
|                       | Minimum | 5 degree C              |
|                       | Average | 20 degree C             |
| Maximum Wind Velocity |         | 30 m/s                  |
| Annual Rainfall       |         | 1,450 mm                |
| Seismic Factor        |         | Horizontal 0.10 G       |
| Soil bearing capacity |         | Depend on Soil survey   |

Source: JICA study team

##### 2) System voltage

110 kV system : 110 kV +/- 10%

15 kV system : 15 kV +/- 10%

##### 3) System frequency

50 Hz +/- 0.5 Hz (49.5 – 50 – 50.5 Hz)

##### 4) System short circuit current

According to Section 2-2-3-2 “Power System Analysis”, the following short circuit current is considered.

110 kV system : 31.5 kA

15 kV system : 25 kA

##### 5) System earthing

110 kV system : Solidly grounding

15 kV system : Grounding through Earthing transformers

Note; According to EDCL, the vector group of 110/15 kV transformers, which are procured from now on within Kigali city, should be of Star-Delta, not Star-Star as previous 110/15 kV transformers. Thus, 15 kV system shall be grounded through Earthing transformers, connected directly with 110/15 kV transformer secondary. In addition, earthing transformers are able to have secondary winding for station power supply. Accordingly, station service transformers are not supplied in this project.

## **6) Insulation Level**

Level-1, Light of IEC standard (IEC 60815)

## **(2) Applicable Standards and Units Used**

Substation systems and transmission and distribution facilities are generally designed in accordance with IEC standards, JEC standards or equivalent standards. International system of Units (SI units) should be used.

### **2-2-2-4 Outline of the Basic Plan**

As mentioned in Table 2-1-2.1, the specification of the main components are indicated as follows.

#### **(1) New Gasogi Substation (New Construction)**

##### **1) Basic concept**

- New 110/15 kV substation should be constructed at the north side of the existing Gasogi substation. The existing equipment and materials in Gasogi substation are not utilized except that three (3) panels of 15 kV switchgear should be relocated, which were supplied and installed by JICA phase II project “Project for Improvement of Substations and Distribution Network Phase II in the Republic of RWANDA” should be relocated.
- The existing 110 kV transmission line between Ndera and Musha is separated into two at the existing Gasogi substation.
- Conventional type 110 kV outdoor switchgear equipment is installed in 110 kV switchyard of new Gasogi substation. Single busbar configuration should be applied to 110 kV system. 110 kV switchgear is consisting of two bays of Incoming feeders and two bays of Transformer feeders. Open space for three bays of Incoming feeder should be considered for future transmission lines from Gahanga substation (under construction by EU fund) and from Kigali city to east area.
- Two sets of 15 MVA transformer are installed and parallel operation of two transformers shall be conducted. The connection of the transformers should be of overhead conductors on 110 kV side and cables on 15 kV side, respectively. The provisions shall be made on the radiators for cooling fans for future ONAF cooling (oil-immersed, air-forced cooled) in order to increase the transformer capacity up to 20 MVA.
- SF<sub>6</sub> gas insulated type 15 kV switchgear should be supplied with single busbar system installed in the control building. The rated voltage of 15 kV system shall be of 36 kV in consideration of the interchangeability of the equipment, since the distribution voltage of the whole country is 30 kV, although it is 15 kV in Kigali city.
- Substation SCADA system is employed in the substation to have monitoring and control the substation equipment. In addition, the operation of the equipment should be done at National Electricity Control Center (NECC in Gikondo substation) through optical fiber network in the country.



- Server and Client (Workstation HMI) with bay control unit (BCU) system for control and supervising of the whole substation
- Remote terminal unit (RTU) or gateway system for communication with the existing National Electricity Control Center (NECC) SCADA system (ABB RTU 560 or equivalent)
- Entire earthing system in the substation should be considered. Lightning protection of 110 kV switchgear and 15 MVA transformers should be done by overhead grounding wires.
- At the time of cut-in of the 110 kV existing transmission line to new Gasogi substation, approximate 9 days shutdown is necessary. See SG-05 “Switchover Procedure for New Gasogi SS”, as attached.

Details are shown in the preliminary drawings for new Gasogi substation below and Attachment-8.

- SS-01 : Single Line Diagram
- SS-02 : Arrangement Drawing (Plan) of 110 kV Switchyard
- SS-03 : Arrangement Drawing of Equipment in Control Building
- SS-04 : Control System Diagram

## 2) Planned details for substation equipment

Equipment and materials to be supplied by the Japanese side for new Gasogi substation is given in Tables 2-2-2-4.1.

Table 2-2-2-4.1 Equipment List supplied by Japanese side in new Gasogi Substation

| No. | Equipment                                   | Specifications  | Q'ty    |
|-----|---|---|---------|
| (1) |   |   | 2 units |
| -1  | 110/15 kV Transformer                       |   |         |
|     | - Applied standards                         | IEC, JIS, JEC, JEC or equivalent  |         |
|     | - Type                                      | Outdoor, oil immersed, core type with conservator                       |         |
|     | - Rated capacity                            | 15 MVA  |         |
|     | - Rated primary voltage                     | 110 kV  |         |
|     | - Rated secondary voltage                   | 15 kV   |         |
|     | - Rated frequency                           | 50 Hz   |         |
|     | - Number of phase                           | 3   |         |
|     | - Tap changer                               |   |         |
|     | - Type                                      | Vacuum bulb type, On-load tap changer (OLTC)                            |         |
|     | - Tap voltage                               | 110 kV +/- 16%  |         |
|     | - Number of taps                            | +/- 13 Taps (27 Taps)   |         |
|     | - Step voltage                              | 1.23%   |         |
|     | - Output of tap position indication         | For local and remote indication, for parallel operation of Transformers |         |
|     | - Cooling                                   | ONAN  |         |
|     | - Vector group                              | YNd11   |         |
|     | - % Impedance                               | Approximately 9 - 10%   |         |
|     | - Rated lightning impulse withstand voltage | 110 kV : 650 kV or more<br>15 kV : 95 kV or more                        |         |

| No. | Equipment   | Specifications  | Q'ty    |
|-----|---|---|---------|
|     | <ul style="list-style-type: none"> <li>- Rated power frequency withstand voltage (1 min.)</li> <li>- Bushing type current transformers</li> <li>- Neutral grounding system</li> <br/> <li>- Connections</li> <br/> <li>- Color</li> <li>- Accessories</li> <br/> <li>- Particular conditions</li> <li>- Lightning arresters</li> <li>- Provisions for ONAF</li> <li>- Parallel Operations</li> <li>- Oil Pit</li> <li>- Connection to Earthing transformers</li> </ul>  | <p>110 kV : 275 kV or more<br/> 15 kV : 38 kV or more</p> <p>110 kV Neutral : 38 kV, 200/1 A, class 5P20</p> <p>110 kV : Solidly grounding<br/> 15 kV : Grounding through Earthing transformers</p> <p>110 kV : Overhead conductors<br/> 15 kV : Cable connection (2 x 185 mm<sup>2</sup> or bigger/phase)</p> <p>RAL 7033</p> <p>Insulation oil, Cable duct for 15 kV cables, 15 kV Lightning arresters (LA) with counters (LA to be installed in the cable ducts), Buchholz relay with alarm contact, LTC oil flow relay, Oil level gauge with alarm contact, Oil temperature indicator with alarm contact, Winding temperature indicators with alarm contact, Oil and Winding temperature elements for remote indication, Pressure relief device with alarm contact, Dehydrating breathers, Ladder for maintenance, Handle for LTC operation, and all other necessary accessories and fittings</p> <p>Lightning arresters shall be installed at both HV and LV sides.</p> <p>The provisions shall be made on the radiators for cooling fans for future ONAF cooling (oil-immersed, air-forced cooled) in order to increase the transformer capacity up to 20 MVA.</p> <p>A parallel operation of the transformers shall be conducted.</p> <p>An oil pit with the capacity of 120% of the total oil volume of the Transformer shall be designed under each transformer.</p> <p>Direct 15 kV cable connection to each Earthing transformer from 15 MVA transformer secondary</p> |         |
| -2  | <p>Earthing Transformer</p> <ul style="list-style-type: none"> <li>- Applied standards</li> <li>- Type</li> <li>- Rated capacity <ul style="list-style-type: none"> <li>- Rated continuous capacity</li> <li>- Short time capacity (5 sec.)</li> </ul> </li> <li>- Rated primary voltage</li> <li>- Rated secondary voltage</li> <li>- Rated frequency</li> <li>- Number of phase</li> <li>- Cooling</li> <li>- Vector group</li> <li>- Rated lightning impulse withstand Voltage</li> <li>- Rated power frequency withstand voltage (1 min.)</li> <li>- Bushing type current transformers</li> </ul> | <p>IEC, JIS, JEC, JEC or equivalent</p> <p>Outdoor, oil immersed, core type</p> <p>250 kVA (The capacity should be confirmed at the time implementation by the Contractor)</p> <p>9,093 kVA (1,050 A)</p> <p>15 kV +/- 2*2.5%</p> <p>400-230 V</p> <p>50 Hz</p> <p>3</p> <p>ONAN</p> <p>ZNyn11</p> <p>15 kV : 95 kV or more</p> <p>15 kV : 38 kV or more</p> <p>15 kV Neutral : 1,200/1 A, class 5P20</p>   | 2 units |

|     |  |   |       |
|-----|--|---|-------|
| (2) | <p>110 kV Switchgear equipment (outdoor)</p> <ul style="list-style-type: none"> <li>- Applied standards</li> <li>- Busbars <ul style="list-style-type: none"> <li>- Materials</li> <li>- Short time capacity (5 sec.)</li> </ul> </li> <li>- Quantity</li> </ul>   | <p>IEC, JIS, JEC, JEM or equivalent<br/> Single busbar system<br/> Aluminum pipes<br/> 1,250 A</p> <p>a) Transmission line bays: 2 sets<br/> 1 set comprising of;-<br/> - Disconnecting switch (DS) (for busbar side)<br/> - Circuit breaker (CB)<br/> - Current transformers (CT)<br/> - DS with Earthing switch (ES) (for line side)<br/> - Voltage transformers (VT)<br/> - Lightning arresters (LA)</p> <p>b) Transformer bays: 2sets<br/> 1 set comprising of;-<br/> - Disconnecting switch (DS) (for busbar side)<br/> - Circuit breaker (CB)<br/> - Current transformers (CT)<br/> - Lightning arresters (LA)</p> <p>c) 110 kV Busbar: 1 set<br/> -Voltage transformers (for 3 phases)</p> | 1 lot |
|     | <p>Common specifications</p> <ul style="list-style-type: none"> <li>- Rated voltage</li> <li>- Rated current</li> <li>- Rated interrupting current</li> <li>- Rated short-time withstand current</li> <li>- Rated lightning impulse withstand voltage</li> <li>- Rated power frequency withstand voltage (1 min.)</li> <li>- Creepage distance (for insulator)</li> <li>- Accessory</li> </ul>   | <p>145 kV</p> <p>Busbar : 1,250 A<br/> Transmission line bay : 1,250 A<br/> Transformer bay : 1,250 A</p> <p>31.5 kA<br/> 31.5 kA (2 sec.)<br/> 650 kV</p> <p>275 kV</p> <p>16 mm/kV or longer</p> <p>Space heater, indoor light, key on door, support structure, necessary material to be fitted</p>   |       |
|     | <p>Equipment specifications</p> <ul style="list-style-type: none"> <li>➤ Circuit Breaker (CB) <ul style="list-style-type: none"> <li>- Type</li> <li>- Rated current</li> <li>- Rated interrupting current</li> <li>- Rated interrupting time</li> <li>- Operating duty</li> <li>- Control voltage</li> <li>- Accessories</li> <li>- Particular condition</li> </ul> </li> <li>➤ Disconnecting Switch (DS) <ul style="list-style-type: none"> <li>- Type</li> <li>- Rated current</li> <li>- Control voltage</li> <li>- Accessories</li> <li>- Particular condition</li> </ul> </li> </ul> | <p>Outdoor, Live tank type, three phase, GCB<br/> 3,150 A or more<br/> 31.5 kA or more<br/> Less than 3 cycles<br/> O-0.3 sec.-CO-3 min.-CO<br/> 110 V DC<br/> Local operation box, Operation counters, Spring charge handle<br/> CB for transmission lines shall be equipped with single phase auto reclosing function</p> <p>Outdoor, three phase, Horizontal double-break or single-break type<br/> 1,250 A<br/> 110 V DC<br/> Operation handle for opening and closing<br/> 110 kV Earthing Switch shall be equipped with the</p>   |       |

|     |   |   |       |
|-----|---|---|-------|
|     | <ul style="list-style-type: none"> <li>➤ Current Transformer (CT) <ul style="list-style-type: none"> <li>- Type</li> <li>- Transmission line bays</li> <li>- Transformer bays</li> </ul> </li> <li>➤ Voltage Transformer (VT) <ul style="list-style-type: none"> <li>- Type</li> <li>- Ratings</li> </ul> </li> <li>➤ Lightning Arrester (LA) <ul style="list-style-type: none"> <li>- Type</li> <li>- Transmission line bays</li> <li>- Transformer bays</li> <li>- Accessories</li> </ul> </li> <li>➤ Others <ul style="list-style-type: none"> <li>- 110 kV busbar</li> <li>- Conductors for bays</li> <li>- Supporting insulators</li> <li>- Dead-end tower</li> <li>- Supporting structures</li> <li>- Others</li> </ul> </li> </ul> | <p>line side DS on each transmission line bay.<br/>145 kV Earthing Switch; 145 kV, 31.5 kA or more</p> <p>Outdoor, Insulator type, single phase<br/>200-400/1/1/1 A, class 0.5/5P20/5P20<br/>120-240/1/1/1 A, class 0.5/5P20/5P20</p> <p>Outdoor, Insulator type, single phase<br/>110/√3 kV / 110/√3 V / 110/3 V, class 1T/3G, 200 VA/200 VA</p> <p>Outdoor, single phase, Zinc metal oxide type<br/>120 kV, 10 kA<br/>120 kV, 10 kA<br/>Surge counter in each phase</p> <p>Aluminum pipes* (1,250 A or more)<br/>* Aluminum pipes shall be installed for all future bays.<br/>2 bays for transmission lines and 2 bays for transformers<br/>For main busbars and all bays<br/>For three bays (Ndera, Musha and future Gahanga bays)<br/>Steel materials, Hot-dipped galvanized<br/>For Busbars, GCBs, DSs, CTs, VTs, LAs and others<br/>Steel materials, Hot-dipped galvanized<br/>Steel towers for grounding wires, Grounding wires (GSW55mm<sup>2</sup>), Lighting fixtures for 110 kV outdoor switchyard and other necessary materials</p> |       |
| (3) | <p>15 kV Switchgear (GIS)</p> <ul style="list-style-type: none"> <li>- Applied standards</li> <li>- Type</li> <li>- Busbar configuration <ul style="list-style-type: none"> <li>- Rated current</li> </ul> </li> <li>- Control and protection</li> <li>- Quantity</li> </ul> <hr/> <ul style="list-style-type: none"> <li>- Rated voltage</li> <li>- Rated frequency</li> <li>- Rated current</li> <li>- Rated short-time withstand current</li> <li>- Rated lightning impulse withstand voltage</li> <li>- Rated power frequency withstand voltage (1 min.)</li> <li>- Circuit Breaker (CB) <ul style="list-style-type: none"> <li>- Type</li> <li>- Rated interrupting current</li> <li>- Auto-reclosing</li> </ul> </li> </ul>         | <p>IEC, JIS, JEC, JEM or equivalent<br/>Indoor type, SF<sub>6</sub> gas insulated metal clad switchgear<br/>Single busbar system<br/>1,250 A or more<br/>Bay control unit (BCU) type<br/>- 15 MVA transformer panel : 2 panels<br/>- 15 kV feeder panel : 5 panels (including 1 x spare panel)<br/>- Voltage transformer panel : 1 panel<br/>- Busbar connection panel : 1 panel</p> <p>36 kV<br/>50 Hz<br/>- Busbar : 1,250 A or more<br/>- 15 MVA transformer bays : 1,250 A or more<br/>- 15 kV feeder bays : 1,250 A or more<br/>- Busbar connection panel : 1,250 A or more<br/>25 kA (3 sec.)<br/>170 kV<br/>70 kV<br/>GCB with DS and ES<br/>25 kA or more<br/>3 phase reclosing</p>   | 1 lot |

|     |  |   |       |
|-----|--|---|-------|
|     | <ul style="list-style-type: none"> <li>- Operating Duty</li> <li>- Control voltage</li> <li>- Current transformers <ul style="list-style-type: none"> <li>- 15 MVA transformer bays</li> <li>- 15 kV feeder bays</li> </ul> </li> <li>- Voltage transformers</li> <li>- Protection</li> </ul>  | <p>O-0.3 sec.-CO-3 min.-CO<br/>110 V DC and 230 V AC</p> <p>1,000-2,000/1/1/1 A, class 0.5/5P20/5P20<br/>400-800/1/1/1 A, class 0.5/5P20/5P20<br/>200-400/1/1/1 A, class 0.5/5P20/5P20<br/>15/√3 kV/110/√3 V, class1.0</p> <p>Overcurrent, Grounding overcurrent and other protections</p>  |       |
| (4) | <p>Control and protection system</p> <p>-</p> <p>-1 110 kV transmission line bays</p> <ul style="list-style-type: none"> <li>- Bay control unit</li> <li>- Protection</li> </ul> <p>-2 15 MVA transformer</p> <ul style="list-style-type: none"> <li>- Bay control unit</li> <li>- Voltage regulating control</li> <li>- Protection</li> </ul> <p>-3 15 kV Switchgear</p> <ul style="list-style-type: none"> <li>- Bay control unit</li> </ul> | <p>Note; The number of panels may depend on the control and protection system which is applied by the Contractor.</p> <p>ABB made REF670 or equivalent<br/>AREVA made P545 or equivalent<br/>Main : Current differential protection system<br/>Back-up : Impedance relay system/Overcurrent protection system</p> <p>ABB made RET670 or equivalent<br/>Control of 15 MVA Transformer On-load tap changer (including Parallel operation control)<br/>Main : Transformer differential protection system<br/>Back-up : Overcurrent protection system</p> <p>- 15 MVA transformer : 2 circuits<br/>- 15 kV Feeder : 7 circuits</p>  | 1 lot |
| (5) | <p>SCADA system</p> <ul style="list-style-type: none"> <li>- Applied Standards</li> <li>- Components <ul style="list-style-type: none"> <li>- Substation data control panel</li> </ul> </li> <li>- SCADA system</li> <li>- Workstation for Control and Monitoring</li> </ul>   | <p>IEC 61850 and other IEC standards</p> <ul style="list-style-type: none"> <li>- The data of all equipment such as 110/15 kV switchgear, control and protection devices, power supply units, etc. in the substation should be collected in the panel.</li> <li>- Control Voltage : 110 V DC</li> <li>- Control and monitoring of the substation should be done using the data in the Substation data control panel through Control and monitoring server installed in the Control room.</li> <li>- Control Voltage : 110 V DC</li> <li>- 2 sets of Operator's Work station (Display, keyboard, mouse , printer and others)</li> <li>- Optical fiber cable, LAN cable and other necessary materials</li> <li>- 230 V AC (Uninterruptible power supply)</li> </ul> | 1 lot |
| (6) | <p>Communication Equipment</p> <ul style="list-style-type: none"> <li>- Applied Standards</li> <li>- Components <ul style="list-style-type: none"> <li>- Multiplexer</li> </ul> </li> <li>- Telephone System</li> </ul>  | <p>IEC standards</p> <ul style="list-style-type: none"> <li>- Existing system ( ECI made NPT-1200) or equivalent</li> <li>- Optical fiber cables and its splicing boxes, Router for Internet, and other necessary materials for their installation</li> <li>- IP PBX (with 4 sets of telephone)</li> </ul>  |       |

|     |   |  |       |
|-----|---|--|-------|
|     |   | - A Router should be installed to enable Internet activities.<br>- 48 V DC and 230 V AC (UPS)  |       |
| (7) | Station Power Supply System<br>Common Requirement |  | 1 lot |
|     | - Applied Standards                               | IEC, JIS, JEC, JEM or equivalent   |       |
|     | - Components and Quantity                         | 400-230 V AC system : 1 set<br>110 V DC system : 1 set<br>48 V DC system : 1 set<br>UPS System : 1 set   |       |
| -1  | AC power supply system                            |  |       |
|     | - AC distribution panel                           |  |       |
|     | - Type  | Indoor use, metal enclosed self-standing type  |       |
|     | - Rated voltage                                   | 400-230 V AC (Secondary circuit of Earthing transformers)  |       |
|     | - System  | Three (3) phases, four (4) wires   |       |
|     | - Incoming feeder                                 | 2 x MCCBs with mechanical interlock  |       |
|     | - Supply feeders                                  | MCCBs with auxiliary contact for alarm<br>Note ; More than 20% of spare feeder circuits with MCCBs shall be provided.  |       |
| -2  | DC supply system                                  |  |       |
|     | - 110 V DC system                                 |  |       |
|     | - Battery charger                                 |  |       |
|     | Type  | Indoor use, metal enclosed self-standing type,<br>Thyristor rectification system, Duplicate charger system (2 sets of 100% capacity charger, Dumpless transfer system) |       |
|     | Rated voltage                                     | 110 V DC   |       |
|     | Battery charger                                   | - Input voltage : 400-230 V AC<br>- Output voltage : 110 V DC +/- 3 V  |       |
|     | - Battery   |  |       |
|     | Type  | Valve regulated lead acid (VRLA) type or equivalent  |       |
|     | Capacity  | 300 Ah/10 Hr (The capacity should be verified at the time of implementation)   |       |
|     | - 110 V DC Distribution panel                     |  |       |
|     | Type  | Indoor use, metal enclosed self-standing type  |       |
|     | Supply feeders                                    | MCCBs with auxiliary contact for alarm<br>Note ; More than 20% of spare feeder circuits with MCCBs shall be provided.  |       |
|     | - DC 48 V System                                  |  |       |
|     | - Battery charger                                 |  |       |
|     | Type  | Indoor use, metal enclosed self-standing type,<br>Thyristor rectification system, Single charger system  |       |
|     | Rated voltage                                     | - Input voltage : 400-230 V AC<br>- Output voltage : 48 V DC +/- 3 V   |       |
|     | - Battery   |  |       |
|     | Type  | Valve regulated lead acid (VRLA) type or equivalent  |       |
|     | Capacity  | 100 Ah/10 Hr (The capacity should be verified at the time of implementation)   |       |
|     | - 48 V DC Distribution panel                      |  |       |
|     | Type  | Indoor use, metal enclosed self-standing type  |       |
|     | Supply feeders                                    | MCCBs with auxiliary contact for alarm<br>Note ; More than 20% of spare feeder circuits with MCCBs shall be provided.  |       |
| -3  | - Uninterruptible Power Supply (UPS)              |  |       |
|     | - Type  | Indoor use, metal enclosed self-standing type,<br>Inverter type or equivalent<br>100% continuous output, dumpless change-over in                                       |       |

|      |   |  |                               |
|------|---|--|-------------------------------|
|      | <ul style="list-style-type: none"> <li>- Rated voltage</li> <li>- Back-up time</li> <li>- Distribution panel for UPS <ul style="list-style-type: none"> <li>- Type</li> </ul> </li> <li>- Rated output voltage</li> <li>- Supply feeders</li> </ul>   | <p>case of AC or DC input failure</p> <ul style="list-style-type: none"> <li>- Input voltage : 230 V AC and 110 V DC</li> <li>- Output Voltage : 230 V AC +/- 5%</li> </ul> <p>One hour continuous output at the time of DC supply only</p> <p>Indoor use, metal enclosed self-standing type<br/>(The power supply circuit may be fitted inside UPS panel)</p> <p>230 V AC single phase</p> <p>MCCBs with auxiliary contact for alarm</p> <p>More than 20% of spare feeder circuits with MCCBs shall be provided.</p>  |                               |
| (8)  | <p>15 kV Cables and associated materials</p> <p>-1 15kV Power Cable</p> <ul style="list-style-type: none"> <li>- Applied Standards</li> <li>- Type</li> </ul> <p>- Conductors</p> <p>- Cable sealing end</p> <p>15kV Distribution Cable</p> <ul style="list-style-type: none"> <li>- Rated voltage</li> <li>- Size</li> </ul> <p>-2 15 kV Lightning Arrester</p> <ul style="list-style-type: none"> <li>- Applied standards</li> <li>- Type</li> <li>- Rated voltage</li> <li>- Rated discharge current</li> <li>- Accessories</li> </ul> | <p>IEC, JIS, JEC, JEC or equivalent</p> <p>Cross-linked Polyethylene insulated PVC sheathed cable, Triplex type, three core type or single core type cable</p> <p>Steel armored cables for direct burial case</p> <p>Compacted copper stranded</p> <p>Outdoor use : Heat shrinkable type</p> <p>Indoor use : Heat shrinkable type or Prefabricated type</p> <p>18/30 kV</p> <p>1c-240 mm<sup>2</sup></p> <p>IEC, JEC, JIS, JEC or equivalent</p> <p>Outdoor use, Metal oxide gapless type, single phase</p> <p>15 kV</p> <p>10 kA</p> <p>Fitting materials</p> | <p>1 lot</p> <p>18 phases</p> |
| (9)  | <p>-1 Other materials</p> <p>Cabling materials</p> <p>-2 Low voltage cables</p> <ul style="list-style-type: none"> <li>- 600 V power cables</li> </ul> <p>- Control cables</p>  | <p>Steel conduits (G,C), PVC pipes (VP), Flexible pipes (FEP) or equivalent</p> <p>Steel made ladder type racks with hot dipped galvanized or equivalent</p> <ul style="list-style-type: none"> <li>- 600 V cross linked polyethylene insulated poly vinyl sheathed cable (XLPE/PVC) or equivalent.</li> <li>- 600 V cross linked polyethylene insulated tape armored poly vinyl sheathed cable (XLPE/TAZV/PVC) or equivalent.</li> </ul> <p>Poly vinyl insulated, poly vinyl sheathed cable with electrically shield (CVV-S) or equivalent</p>                | <p>1 lot</p>                  |
| (10) | <p>Substation earthing system</p> <ul style="list-style-type: none"> <li>➤ Earthing system</li> <li>➤ Earthing resistance</li> <li>➤ Earthing materials <ul style="list-style-type: none"> <li>- Earthing conductors and wires</li> </ul> </li> <li>- Earthing rods</li> <li>- Connection materials</li> </ul>  | <p>For substation entire earthing consisting of mesh and/or earthing rods</p> <p>Less than 1 ohm</p> <p>Stranded bare copper wire (A) for underground and PVC insulated wires (IV) for above ground, or equivalent</p> <p>Coupling type copper clad steel rods or equivalent (if used)</p> <p>T type compressed connectors or bolted type</p>  |                               |

|  |   |   |  |
|--|---|---|--|
|  | <ul style="list-style-type: none"> <li>➤ Towers for grounding wires</li> <li>➤ Other materials</li> </ul> | connectors or equivalent<br>2 towers<br>Connection materials for earthing system, terminals for earthing system, lightning rods and other necessary materials |  |
|--|---|---|--|

### 3) Substation building and ancillary facility construction plans

The new Substation building shall be constructed at the new site located nearby the existing site of the diesel power plant. The area of the new Project site is approximately 8,500 square meters, and the length of the Project site are approximately maximum 80 meters in the east-west direction and approximately maximum 110 meters in the north-south direction, and the shape of the Project site is a rectangle. In addition, the elevation are approximately 1,640 meters at the south of the Project site, approximately 1,650 meters at the north of the Project site, and so that there are 10 meters level difference, the site leveling shall be keep from 1,644 meters to be flat land which has approximately 5,300 square meters area. The new access road shall be constructed to reach to the public road.

One Substation building and the foundation for the transformer facilities such as 15/0.4kV Transformer, Bus Structure, Lightning Arrester, Current Transformer, Current Voltage Transformer, Disconnection Switch, Circuit Breaker, 110/15kV Transformer, Lightning Pole, Gantry Structure, Rain water drainages, Cable pits, Septic tank, and etc. shall be constructed.

The main Substation building plans are follows:

Substation building : 1-story, reinforced concrete structure, floor area approx. 360 square meters

The main features and construction plans of the facilities are follows:

Table 2-2-2-4.2 Substation building

| FL | Room                   | Area                  | Equipment/Specification                                     |
|----|------------------------|-----------------------|---|
| GF | Switchgear Room        | 90.0 m <sup>2</sup>   | Light Fittings, Cable Pit, Air-condition,                   |
|    | Control Room           | 54.0 m <sup>2</sup>   | Light Fittings, Air-condition, Cable Pit                    |
|    | Battery Room           | 36.0 m <sup>2</sup>   | Light Fittings, Cable Pit, Sink, Air-condition,             |
|    | Telecom Room           | 9.60 m <sup>2</sup>   | Light Fittings  |
|    | Office                 | 36.0 m <sup>2</sup>   | Light Fittings  |
|    | Meeting Room           | 14.4 m <sup>2</sup>   | Light Fittings  |
|    | Kitchen                | 8.0 m <sup>2</sup>    | Light Fittings, Ventilation, Sink                           |
|    | Toilet and Shower Room | 16.0 m <sup>2</sup>   | Light Fittings, Ventilation, Toilet, Wash basin, Shower set |
|    | Care Taker Rom         | 16.0 m <sup>2</sup>   | Light Fittings,   |
|    | Corridor               | 72.0 m <sup>2</sup>   | Light Fittings  |
|    | Storage                | 8.0 m <sup>2</sup>    | Light Fittings  |
|    | Total                  | 360.00 m <sup>2</sup> |   |

The main exterior finishing schedule is follows:



Table 2-2-2-4.3 Exterior Finishing Schedule

| Facility            | Item       | Specification                                     |
|---------------------|------------|---|
| Substation building | Roof (1)   | Asphalt membrane waterproofing, Cover concrete    |
|                     | Roof (2)   | Asphalt membrane waterproofing, Cover concrete    |
|                     | Wall       | Concrete brock and Paint finish with mortar layer |
|                     | Windows    | Aluminum Window                                   |
|                     | Doors      | Steel Door and Wooden door                        |
|                     | Down spout | Vinyl pipe  |
|                     | Roof Drain | Cast Iron   |

The main interior finishing schedule is follows:

Table 2-2-2-4.4 Interior Finishing Schedule

| FL | Room                   | Floor                                     | Wall  | Ceiling                                   |
|----|------------------------|---|---|---|
| GF | Switchgear Room        | Ceramic tile 300x300<br>With mortar layer | Emulsion paint based on<br>the Concrete brock wall<br>with mortar layer | Emulsion paint on the<br>exposed concrete |
|    | Control Room           |   |   |   |
|    | Battery Room           |   |   |   |
|    | Care take Room         |   |   |   |
|    | Telecom Room           | Ceramic tile 300x300<br>With mortar layer | Emulsion paint based on<br>the Concrete brock wall<br>with mortar layer |   |
|    | Office                 |   |   |   |
|    | Meeting Room           |   |   |   |
|    | Kitchen room           |   |   |   |
|    | Toilet and Shower Room |   |   |   |
|    | Storage                |   |   |   |
|    | Corridor               |   |   |   |

**(2) 110 kV Transmission Line (New Construction)**

**1) Planning**

To divert the existing 110 kV Line to new GASOGI substation which shall be newly constructed in this Project.

Scope of work is to demolish existing No.217 tower, construct No.217A and No.217B towers. and connect to BILEMBO substation and MUSHA substation.

**2) Design conditions**

Table 2-2-2-4.5 Natural Conditions

| ITEM                               | REQUIRED DEWIGN CONDITION |
|------------------------------------|---------------------------|
| Altitude                           | Below 2000 m              |
| Conductor Temperature              | (Celsius)                 |
| - Minimum Temperature              | 5 degree                  |
| - Everyday Temperature (EDS)       | 25degree                  |
| - Maximum Temperature              | 80 degree                 |
| - Temperature for ground clearance | 50 degree                 |
| Wind Velocity                      | 30m/s                     |
| Wind Pressure                      |                           |
| - Conductor & Ground Wire          | 56.3 kg/m <sup>2</sup>    |

|                            |                                       |
|----------------------------|---------------------------------------|
| - Steel Tower              | 163.1 kg/m <sup>2</sup>               |
| Bearing Capacity of Ground | According to the sub soil test result |

Table 2-2-2-4.6 Electrical Conditions

| ITEM                                   | REQUIRED DESIGN CONDITION                              |
|--|--|
| Standard Span                          | 400 m  |
| Wind Span                              | 400 m  |
| Vertical Load                          | $\Sigma \text{Tan}\delta = \pm 0.15$                   |
| Circuit                                | Single Circuit   |
| Right of Way                           | 15 m width   |
| Required Ground Clearance              | Normal : 7m<br>Water Ditch : 10m<br>Road Crossing : 8m |
| Effective Shield Angle of Ground Wire  | 30 degree  |
| Minimum Creepage Distance of Insulator | 280 mm   |
| Salinity Attached Amount of Insulator  | 0.063mg/cm <sup>2</sup>                                |

### 3) Facility Plan

Facility plan for 110 kV transmission line is shown as below.

Table 2-2-2-4.7 Facility plan for 110 kV transmission line

| No  | Item                 | Specification                                | Quantity  |
|-----|----------------------|--|-----------|
| TL1 | TOWER                |  |           |
| -1  | Dead End Tower       | Diversion tower at New Gasogi Substation     | 2 units   |
|     | - Style              | Horizontal layout                            |           |
|     | - Type               | Steel lattice                                |           |
|     | - Material           | Hot rolled Steel, Zinc coat galvanized       |           |
|     | - Safety Factor      | Tower body : 1.0. Arm : 1.2                  |           |
|     | - Foundation Design  | Pad and Chimney or Mat, Reinforced Concrete. |           |
|     | - Shield angle       | 30 deg                                       |           |
| -2  | Gantry Tower         | Three (3) Span at New Gasogi Substation      | 1 units   |
|     | - Style              | Gantry                                       |           |
|     | - Type               | Steel lattice, conductor horizontal layout,  |           |
|     | - Material           | Hot rolled Steel, Zinc coat galvanized       |           |
|     | - Safety Factor      | Tower body : 1.0                             |           |
|     | - Foundation Design  | Pad and Chimney, Reinforced Concrete         |           |
|     | - Shield angle       | 30 degree                                    |           |
| TL2 | CONDUCTOR            |  |           |
| -1  | Conductor            | Three(3) phase, single circuit single bundle | 0.20 km   |
|     | - Type               | Aluminum Conductor Steel Reinforced (ACSR)   | Per phase |
|     | - Standard           | DIN, ASTM or Equivalent                      |           |
|     | - Size               | 240/40mm <sup>2</sup>                        |           |
| -2  | Overhead Ground Wire | Double phase                                 | 0.20km    |
|     | - Type               | Optical Ground Wire(OPGW), Aluminum-clad     | Per phase |
|     | - Standard           | DIN, ASTM or Equivalent                      |           |
|     | - Size               | 100mm <sup>2</sup>                           |           |
|     | - Optical fiber      | 24 fibers                                    |           |

| No  | Item                   | Specification                     | Quantity |
|-----|------------------------|-----------------------------------|----------|
| TL3 | INSULATOR              |                                   |          |
| -1  | Insulator              |                                   | 1 lot    |
|     | - Type                 | Disc type, ball & socket          |          |
|     | - Standard             | IEC60383-1                        |          |
|     | - Material • Color     | Porcelain • Brown                 |          |
|     | - Creepage distance    | Minimum 280mm                     |          |
|     | - Q'ty of Insulator    | 9 units/phase (Minimum)           |          |
| TL4 | Optical Fiber Splicing |                                   |          |
| -1  | Splice Box             |                                   | 1 lot    |
|     | - 24 cores             | 24 cores                          |          |
|     | - Type                 | Outdoor, Water Proof, Tower mount |          |

### (3) 15 kV Distribution line (New)

#### 1) Planning

Two (2) new lines shall be constructed as below.

- 1) From New GASOGI substation to the existing dead end tower at Nyagasambu  
Approx. 11.5 km, single circuit
- 2) From New GASOGI substation to the existing tower at MASAKA Hospital  
Approx. 8.5 km, single circuit
  - For both new lines, auto recloser shall be mounted on the connecting tower to the existing tower in order to facilitate to open/close to existing line.
  - Line routes are mainly designed to utilize the existing road passing through the hill side (mostly unpaved) for the purpose of transportation materials. Facilities to connect low voltage distribution lines are not included in this supply.
- 3) From New GASOGI substation to the existing tower at Gasogi substation  
Approx. 0.1 km, single circuit

Basically, towers to be used are already designed at Phase-2 project of “IMPROVEMENT of SUBSTATIONS and DISTRIBUTION NETWORK”. But, Auto recloser mounted tower and heavy angle tower which excess the horizontal angle of 50 degrees shall be newly designed.

#### 2) Design Conditions

The natural conditions are shown in the Table 2-2-2-4.5. The Electrical design conditions are shown in the Table 2-2-2-4.8.

Table 2-2-2-4.8 Electrical Conditions

| ITEM          | REQUIRED DESIGN CONDITION             |
|---------------|---------------------------------------|
| Standard Span | 250m                                  |
| Wind Span     | 250m                                  |
| Vertical Load | $\Sigma \text{Tan} \delta = \pm 0.15$ |
| Circuit       | Single Circuit                        |
| Right of Way  | 10m width                             |

|  |  |
|--|--|
| Required Ground Clearance              | Normal : 7m<br>Water ditch : 10m<br>Road Crossing : 8m |
| Effective Shield Angle of Ground Wire  | 30 degree  |
| Minimum Creepage Distance of Insulator | 280 mm   |
| Salinity Attached Amount of Insulator  | 0.063mg/cm <sup>2</sup>                                |

### 3) Facility Plan

Facility plan for 15 kV transmission line is shown as below.

Table 2-2-2-4.9 Facility plan for 15 kV transmission line

| No     | Item  | Specification   | Quantity   |
|--------|---|---|--|
| DL1    | TOWER   | Single Circuit  |  |
| -<br>1 | Suspension<br>Tower;15-TA1<br>- Style<br>- Type<br>- Material<br>- Safety Factor<br>- Foundation Design<br>- Shield Angle   | At Straight line within 2 degrees<br>Steel lattice tower.<br>Triangle layout<br>Hot rolled Steel, Zinc coat galvanized<br>Tower body : 1.0. Arm : 1.2<br>Pad and Chimney, Reinforced Concrete<br>30 degrees   | 9 units  |
| -2     | Tension Tower:<br>15-TB1<br>15-TD1<br>15-TL1<br><br>15-TD1D<br>15-TD2D<br>- Style<br>- Type<br>- Material<br>- Safety Factor<br>- Foundation Design<br>- Shield Angle | Horizontal Angle 0-30 degrees<br>Horizontal Angle 0-50 degrees<br>Long Span 500 m<br>Horizontal Angle 0-3 degrees<br>Horizontal Angle 70-110 degrees<br>Horizontal Angle 50-130 degrees<br>Steel lattice tower.<br>Triangle layout<br>Hot rolled Steel, Zinc coat galvanized<br>Tower body : 1.0. Arm : 1.2<br>Pad and Chimney, Reinforced Concrete<br>30 degrees | 20 units<br>15 units<br>19 units<br><br>2 units<br>2 units |
| -3     | Suspension Pole:15-PA1<br>- Style<br>- Type<br>- Material<br>- Safety Factor<br>- Foundation Design<br>-<br>- Shield Angle  | Suspension, Round steel, Split<br>Triangle layout, Single circuit<br>Zinc coat galvanized Steel<br>Tower body : 1.0. Arm : 1.2<br>Pad and Chimney or cylinder type,<br>Reinforced Concrete<br>30 degrees  | 30 units   |
| -4     | Tension Pole:15-PB1<br>- Style<br>- Type<br>- Material<br>- Safety Factor<br>- Foundation Design<br>-<br>- Shield Angle   | Tension, Round steel, Split<br>Triangle layout, Single circuit<br>Zinc coat galvanized Steel<br>Tower body : 1.0. Arm : 1.2<br>Pad and Chimney or cylinder type,<br>Reinforced Concrete<br>30 degrees   | 13 units   |

|      |   |   |                       |
|------|---|---|-----------------------|
| L-2  | CONDUCTOR   |   |                       |
| -1   | Conductor<br>- Type<br>- Standard<br>- Size   | Three(3) phase, single circuit single bundle<br>Aluminum Conductor Steel Reinforced (ACSR)<br>DIN, ASTM or Equivalent<br>120/20mm <sup>2</sup>                  | ≈ 20km<br>Per phase   |
| -2   | Ground Wire-1<br>- Type<br>- Standard<br>- Size<br>- Fiber Core                                     | Optical Ground Wire (OPGW), Aluminum-clad<br>DIN, ASTM or Equivalent<br>50mm <sup>2</sup><br>24 cores   | ≈ 8.5km<br>Per phase  |
| -3   | Ground Wire-1<br>- Type<br>- Standard<br>- Size   | Galvanized Steel Wire (GSW)<br>DIN, ASTM or Equivalent<br>50mm <sup>2</sup>   | ≈ 11.5km<br>Per phase |
| DL-3 | INSULATOR   |   |                       |
|      | Insulator<br>- Type<br>- Standard<br>- Material•Color<br>- Creepage distance<br>- Q'ty of Insulator | Disc type, ball & socket<br>IEC60383-1<br>Porcelain•Brown<br>Minimum 280mm<br>4 units/phase (Minimum)   | 1 lot                 |
| DL-4 | POWER CABLE   |   |                       |
| -1   | Cable<br>- Insulation<br>- Standard<br>- Conductor<br>- Core<br>- Size<br>- Armor                   | 30kV, XLPE<br>IEC-60502<br>Plain annealed copper strand<br>Single Core<br>240mm <sup>2</sup><br>Aluminum wire   | 1 lot                 |
| -2   | Terminal<br>- Type  | Heat shrinkable, Outdoor type   | 1 lot                 |
| DL-5 | Optical Fiber Splicing  |   |                       |
|      | Splice Box<br>- 24 cores<br>Type  | 24 cores<br>Outdoor, Water Proof, Tower mount   | 1 lot                 |
| DL-6 | Auto re-closer  |   |                       |
|      | - Type<br>- Standard<br>- Accessories   | Outdoor, Tower mount<br>Vacuum Circuit Breaker, Horizontal Layout<br>3 phase, 36kV, 630A, 12.5kA<br>Control Box , Mechanical emergency stop ,<br>Operation Pole | 1 lot                 |
| DL-7 | Section Switch  |   |                       |
|      | Section Switch<br>- Type  | Tower mount, Water proof  | 1 lot                 |

### 2-2-3 Outline Design Drawings

The project outline design drawings are given in Appendix-6.

## **2-2-4 Implementation Plan**

### **2-2-4-1 Implementation Policy**

As the project will be implemented based on the Japan grant aid cooperative framework, it will be approved by the Japanese Government and commence after an Exchange of Notes (E/N) between the two countries and a Grant Agreement (G/A) between JICA and Rwanda are exchanged. Basic policy and special considerations needed if the project is implemented are given below.

#### **(1) Project Implementing Body**

The supervisory responsible agency for implementing the project on the Rwanda side is the MININFRA. The project implementing body responsible for O&M after the facilities go into service is EUCL. So that the project will progress smoothly, MININFRA, EDCL and EUCL must appoint project representatives to stay in close contact and negotiate with the Japanese consultant and contractor.

The appointed EDCL project representative must explain project details sufficiently to MININFRA and EDCL project staff and project area residents so that they will cooperate with project implementation.

#### **(2) Consultant**

Japanese consultants will enter a design and supervision agreement with EDCL to procure and install equipment for the project, and produce detailed design and supervise construction work related to the project. Along with drafting tender documents, consultants will handle bidding on behalf of EDCL, the project implementing body.

#### **(3) Contractor**

In accordance with Japan grant aid framework, independent Japanese contractors selected by Rwanda through open bidding will build, procure and install equipment for the project.

Contractors will need to continue supplying spare parts, support for failures, and other services after the project is completed, and as such must give due consideration to a post-delivery communication and coordination for equipment and facilities.

#### **(4) Need for Dispatching Engineers**

This project is complex, combining construction of substations with civil engineering, construction and installation of substation facilities in Gasogi area, as well as construction work on approximately 0.2 km of 110 kV transmission line and 20 km of 15 kV distribution lines. Construction will also require coordination with EUCL, which manages the operation of the transmission/ distribution facilities which need to be linked. With the majority of the work being done concurrently, it is essential that foremen familiar with the Japanese grant aid system be dispatched from Japan to keep management and site guidance for the whole works consistent in

terms of scheduling, quality, finished forms and safety management.

#### **2-2-4-2 Implementation Conditions**

##### **(1) Rwanda Construction Conditions and Technology Transfers**

As explained in Section 2-2-1-4 above, there are multiple general construction and electrical contractors in the Kigali areas which can accept orders for laborers, transportation vehicles and construction equipment within Rwanda, as well as facility and transmission line construction work for the project. However, dispatching Japanese engineers is essential in terms of schedule management, quality control and safety management.

##### **(2) Using Local Equipment and Materials**

While aggregate, cement, rebar and other materials for use in foundation work must be managed for quality and timely delivery, there is much precedent showing that these materials can be procured locally, as well as examples of locally procured material. Thus, in the interest of developing local industries, equipment can be procured locally is to be used to the extent possible when formulating the construction plan. However, as Rwanda relies on imports for the substation facilities and power transmission equipment needed for the project, such equipment will be procured in Japan or another country.

##### **(3) Safety Measures**

With Rwanda having relatively few safety problems and the project being in an urban area, the area has good access and will be easy to monitor. Still, work after sunset is to be avoided, and sufficient care must be taken to prevent equipment theft and ensure the safety of construction staff.

##### **(4) Tax Exemption**

The Rwandan exemption procedure (including VAT) for equipment and materials procured for the Project is as follows: 1) the Contractor requests EDCL to exempt the materials, 2) EDCL requests the Ministry of Finance to issue a tax exemption letter via MININFRA, 3) the Ministry of Finance issues the tax exemption letter to customs, with a tax exemption letter to customs, with a copy issued to MININFRA and the Contractor. When procured equipment and materials arrive at port in Tanzania and Kenya, the Contractor is required to attach the above copy of the tax exemption letter with the given shipping documents to be submitted to customs for the tax exemption. Care must be taken that tax exemption delays do not impact project progress.

#### **2-2-4-3 Scope of Works**

The Japanese side will procure, install, test and adjust the 110 kV substation, 110 kV transmission lines and 15 kV distribution lines for the project in the Japanese and Rwanda construction scopes and perform the necessary civil engineering work. The Rwanda side will be responsible for site acquisition

of the substations, removal of the 110 and 15 kV distribution lines, etc.

#### **2-2-4-4 Consultant Supervision**

According to Japan's grant aid system, consultants are to form a project team consistent with the final design and construction supervision based on the spirit of the basic design and smoothly completes the work. This project requires complex work on the substation facilities and transmission lines, with many connections to the existing substation facilities and monitoring based on on-site coordination with EDCL and EUCL. As such, the consultant is to station at least one engineer on site to handle overall schedule management, quality control, progress control and safety control during the construction supervision stage. Other engineers will also be dispatched to manage contractor progress with equipment installation, commissioning and adjustments, delivery testing and other work. As necessary, a domestic expert is to witness factory inspections and pre-shipment inspections for equipment manufactured domestically, and also supervise to prevent problems after unloading equipment at the site.

##### **(1) Basic Policy for Construction Management**

As basic policy, consultants are to supervise progress such that the work is completed within the given construction period. Along with ensuring equipment is delivered on time up to the quality and finished forms given in the agreement, they are to supervise and advise contractors so that they can perform the work safely at the site. The following are the main points to be kept in mind for construction supervision.

##### **(2) Schedule Management**

Consultant management staff will compare actual progress against the work schedule planned at time of contract monthly and weekly so that contractors will keep the delivery schedule given in the contract. If they interpret work to be behind schedule, they will warn contractors and request them to submit and implement plans to get back on schedule, and guide contractors so they can complete the work and deliver equipment within the contract construction period. The following items will be compared between work schedule and project progress:

- Work progress - progress of equipment and material manufacturing and site civil engineering and construction
- Equipment and material transport to site – equipment and materials for substation, power transmission equipment, civil engineering and construction
- Temporary works and readiness of construction machinery
- Productivity and actual numbers of engineers, skilled workers, laborers and other workers



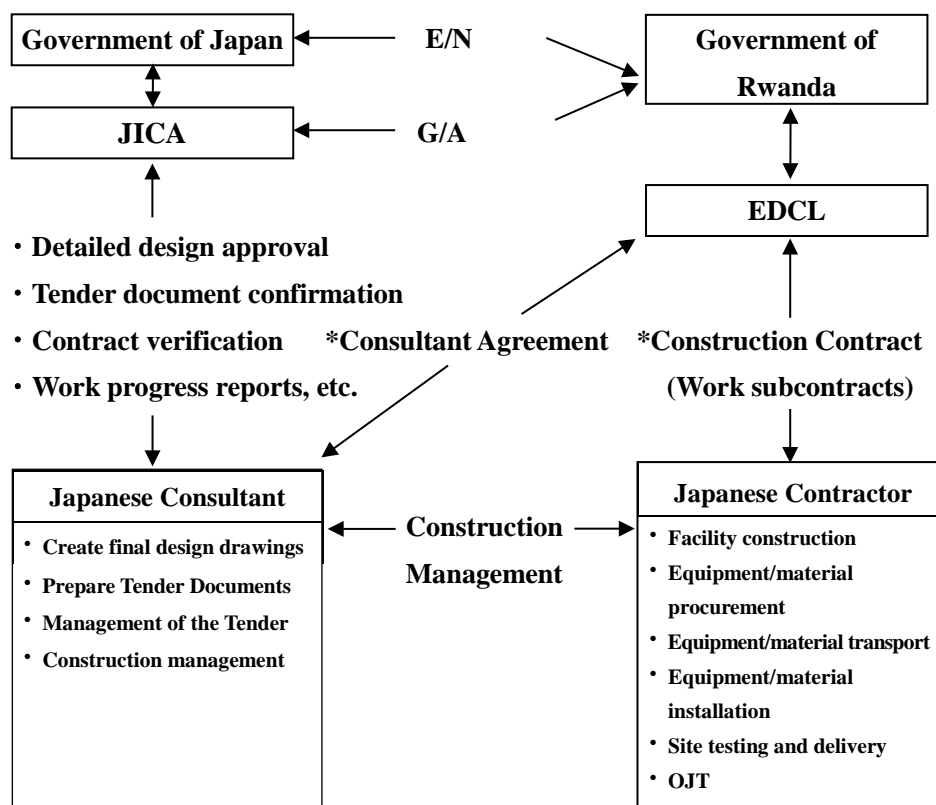
**(3) Quality and Work Progress Control**

Consultant supervisory staff will consult and work together with the contractor's representative, and manage work safely to prevent any occupational accidents on the site during the construction period or accidents involving third parties. The following actions are to be taken in terms of site safety management:

- Establish safety management regulations and select a safety manager
- Prevent disasters through regular inspection of construction machinery
- Decide a service route for transport machinery and other work vehicles, and ensure safe driving
- Strictly insist workers take advantage of worker benefits and take leave

**(4) Overall Relationships concerning Project Implementation**

Role correlations for the project, including those during construction supervision, are as shown in Figure 2-2-4-4.1.



\*JICA shall verify Consultant Agreement and Construction Contract

Figure 2-2-4-4.1 Project Relation Diagram

**(5) Construction Managers**

The contractor will procure and deliver equipment and materials for new substation construction

work on the existing substation grounds and 110 kV transmission line work, as well as the related civil engineering work. Further, they will subcontract local Rwanda contractors to perform the work. Accordingly, the contractor is required to ensure subcontractors fully comply with the work schedule, quality, finished form and safety measures given in the work contract. To accomplish this, contractors will deploy engineers with experience in similar overseas work to guide and advise local contractors.

Given the scale and details of the substation facility and transmission line work for this project, contractors will preferably station at least the number of engineers given in Table 2-2-4-4.1.

Table 2-2-4-4.1 Engineers to be dispatched by the Contractor

| Title of engineers                     | Number of engineers | Responsibilities   | Dispatch period                                     |
|--|---------------------|--|---|
| Inspector 1                            | 1                   | Confirmation and verification of shop drawings for Transmission equipment, pre-shipping inspection, equipment test, etc.   | Drawing approval period                             |
| Inspector 2                            | 1                   | Confirmation and verification of shop drawings for Substation equipment, pre-shipping inspection, equipment test, etc.   | Drawing approval period                             |
| Local procurement supervisor 1         | 1                   | Supervision of all installation works, coordination with related agency, acquisition of approval, equipment and materials procurement management after customs clearance procedures, labor management, accounting, security management | Throughout the construction and installation period |
| Local procurement supervisor 2         | 1                   | Supervision of equipment material for Transmission/distribution, coordination with related agency, acquisition of approval, labor management, accounting, security management  | Transmission line works period                      |
| Local procurement supervisor assistant | 1                   | Assistance to the Local procurement supervisor   | Throughout the construction and installation period |

#### 2-2-4-5 Quality Control Plan

Consultant construction supervisory staffs are to supervise and verify that the contractors are maintaining quality, construction and installed forms for equipment procured for the project up to the quality and finished forms given in the contract documents, including technical specifications and detailed design drawings. Staff will request contractors to correct, change or revise the work if quality or finished form is in danger of being compromised.

- 1) Verify fabrication drawings and specifications for equipment
- 2) Witness factory inspections for equipment or verify inspections
- 3) Verify packaging, transportation and temporary placements on site
- 4) Verify working drawings and installation manual procedures for equipment
- 5) Verify equipment commissioning, adjustment, testing and inspection reports
- 6) Supervise site installation of equipment and witness commissioning, adjustments, tests and inspections
- 7) Verify equipment working drawings, fabrication drawings, and finished forms

- 8) Verify construction drawings, fabrication drawings, and on-site progress

#### **2-2-4-6 Procurement Plan**

As the equipment and materials for the substation facilities to be procured and installed in the project are not manufactured in Rwanda, the substation, switchboard and other power distribution facilities for Rwanda will be procured from mostly European and Japanese sources. While Indian and Chinese products have recently started being introduced into REG substation facilities, Japanese and European equipment are more reliable.

Rwanda companies such as EUCL, the company who will handle O&M after the project facilities enter service, hold Japanese products in particularly high regard. Japanese substation and power transmission/distribution equipment procured in past Japanese grant aid projects is still operating soundly after more than 10 years in service, contributing to this opinion. REG has also come to rely on the benefits of the high quality and follow-up service of Japanese manufacturers throughout the O&M process. Thus, the implementing body REG strongly desire Japanese products to be used for key project equipment.

Given the above, the suppliers for equipment and materials used in this project are as follows.

##### **(1) Locally Procured Equipment and Materials**

Construction equipment/materials: Cement, sand, concrete aggregate, concrete roadblocks, brick, rebar, wood, gasoline, diesel, construction vehicles, cranes, trailers and other temporary work equipment/materials

##### **(2) Equipment and Materials Procured in Japan**

###### **1) Substation Facility Equipment and Materials**

110/15 kV Transformers, DC equipment, etc.

###### **2) Transmission Line Equipment and Materials**

110 kV Transmission and 15 kV Distribution line equipment and materials: insulator, steel materials, etc.

###### **3) Equipment and materials to be procured from Japan or other DAC and ASEAN countries**

110 kV switchgears, 15 kV switchgears, 15kV cables, etc.

#### **2-2-4-7 Operational Guidance Plan**

As basic policy, a trainer from the manufacturer will give guidance on initial operation and O&M methods for the equipment procured in the project before the work is completed as OJT and in accordance with the O&M manuals. To keep this guidance plan progressing smoothly, REG (especially EUCL) must appoint a full-time engineer to attend the OJT and keep close contact with Japanese consultants and contractors. The appointed REG engineer must build up the skill level of

staff unable to attend and work to improve REG maintenance abilities. Also, specialist manufacturer engineers of moderate skill level are needed for substation facility operations as well as adjustments and testing for transmission line equipment, so local contractors cannot be used. Engineers must be sent from Japan to fulfill these roles and handle quality control, technical guidance and schedule management.

**2-2-4-8 Implementation Schedule**

Based on the Japan’s Grant Aid Scheme, the Project implementation schedule is given in Figure 2-2-4-8.1.

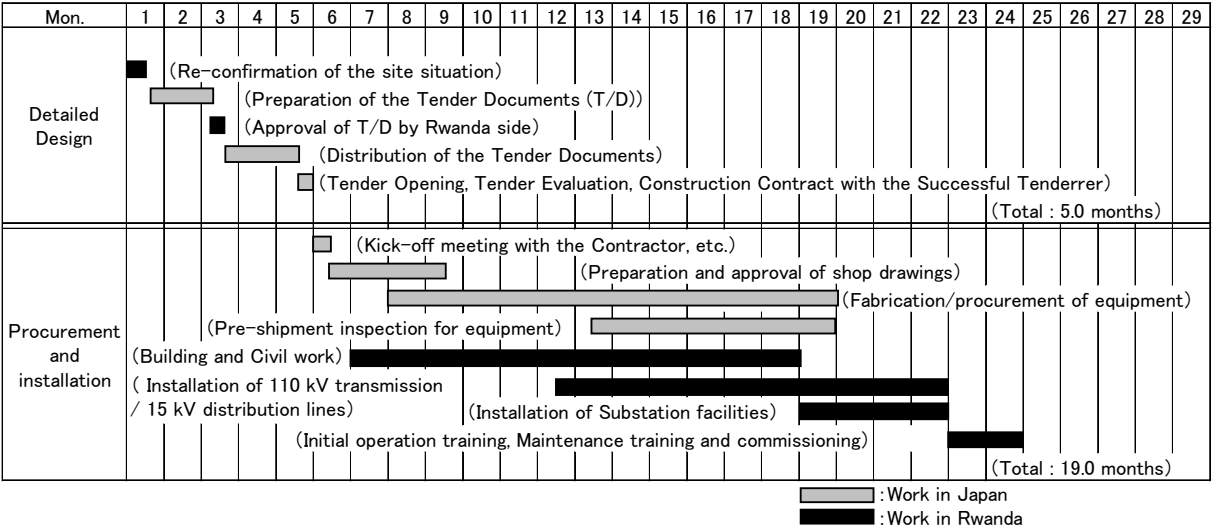


Figure 2-2-4-8.1 Project Implementation Schedule

**2-3 Obligations of Recipient Country**

Detailed scopes for the Japanese and Rwanda sides are as shown in Table 2-3.1.

Table 2-3.1 Undertakings to be covered by Japan and Rwanda

| No.                      | Work Items   | Japan Side |              | Rwanda Side |              |
|--------------------------|--|------------|--------------|-------------|--------------|
|                          |  | Provision  | Installation | Provision   | Installation |
| General                  |  |            |              |             |              |
| (1)                      | Access road to the project sites                           |            |              | ●           | ●            |
| (2)                      | Temporary storage yard for equipment and materials         |            |              | ●           | ●            |
| 1. New Gasogi Substation |  |            |              |             |              |
| (1)                      | Land acquisition, cutting trees and clearance of obstacles |            |              | ●           | ●            |
| (2)                      | Site leveling (Land development)                           | ●          | ●            |             |              |
| (3)                      | Gate and fence   |            |              | ●           | ●            |
| (4)                      | Road and parking lot in the site                           | ●          | ●            |             |              |

| No.  | Work Items   | Japan Side |              | Rwanda Side |              |
|------|--|------------|--------------|-------------|--------------|
|      |  | Provision  | Installation | Provision   | Installation |
| (5)  | Building work of the substation (including control room, support structure, steel gantry, foundations and other related work for building)                                     | •          | •            |             |              |
| (6)  | 110 kV switchgear  | •          | •            |             |              |
| (7)  | 15 MVA 110/15 kV transformers  | •          | •            |             |              |
| (8)  | 250 kVA earthing transformers  | •          | •            |             |              |
| (9)  | 15 kV switchgear   | •          | •            |             |              |
| (10) | Substation control and protection equipment  | •          | •            |             |              |
| (11) | 110 V DC battery and charger   | •          | •            |             |              |
| (12) | 48 V DC battery and charger  | •          | •            |             |              |
| (13) | 230 V AC Uninterruptible Power Supply (UPS)  | •          | •            |             |              |
| (14) | Communication equipment including RTU and/or Substation data panel and SDH equipment   | •          | •            |             |              |
| (15) | 15kV cables between transformers and switchgear  | •          | •            |             |              |
| (16) | Outgoing 15 kV Cables (from 15 kV switchgear to first pole of distribution lines)  | •          | •            |             |              |
| (17) | Protection Relay setting confirmation and change of the substations where the transmission lines from New Gasogi substation to be interconnected (Ndera and Musha substations) |            |              |             | •            |
| (18) | Spare parts for substation   | •          |              |             |              |
| (19) | Maintenance tools for substation   | •          |              |             |              |
| (20) | Technical training for equipment   |            | •            |             |              |
| 2    | 110 kV Transmission line (Switchover to New Gasogi)  |            |              |             |              |
| (1)  | Land acquisition, cutting trees and clearance of obstacles   |            |              | •           | •            |
| (2)  | Site leveling and tree cutting work within the 110 kV transmission line Right Of Way   |            |              |             | •            |
| (3)  | Gate and Fence   |            |              | •           | •            |
| (4)  | Dead end heavy angle steel towers and foundations  | •          | •            |             |              |
| (5)  | Overhead conductor   | •          | •            |             |              |
| (6)  | Overhead grounding wire (including OPGW)   | •          | •            |             |              |
| (7)  | Connection box for OPGW  | •          | •            |             |              |
| (8)  | Power outage   |            |              |             | •            |
| (9)  | Removal work of the existing conductor, grounding wire, accessories, steel tower and foundation etc.   |            |              |             | •            |

| No. | Work Items  | Japan Side |              | Rwanda Side |              |
|-----|---|------------|--------------|-------------|--------------|
|     |   | Provision  | Installation | Provision   | Installation |
| 3.  | 15 kV Distribution Line (D/L)   |            |              |             |              |
| (1) | Land acquisition  |            |              | ●           |              |
| (2) | Tree cutting and removing obstacle  |            |              |             | ●            |
| (3) | Power outage  |            |              |             | ●            |
| (4) | Replacement or reconnection of the existing lines   |            |              | ●           | ●            |
| (5) | Steel towers and foundations  | ●          | ●            |             |              |
| (6) | Overhead conductor  | ●          | ●            |             |              |
| (7) | Overhead grounding wire (including OPGW)  | ●          | ●            |             |              |
| (8) | Switching device  | ●          | ●            |             |              |
| 4.  | NECC SCADA System   |            |              |             |              |
| (1) | Modification of SCADA System of NECC and Network Management system for accommodation of new Gasogi substation |            |              | ●           | ●            |

Notes: Item with sign “●” indicate the country of parties responsible.

## 2-4 Project Operation Plan

### 2-4-1 Basic Plan

Proper O&M for the transmission and substation facilities, as well as preservation of their surrounding environments, are essential to improving consumer trust in power supply in the project area and steady power supply management. As such, appropriate preventative maintenance is recommended to reduce the rate of facility accidents and improve trust, safety and efficiency levels. Particularly, the main transformers supplied at new Gasogi substation have the vector group “YNd11” which is different from the ones (YNyn0) for Ndera substation of JICA phase II project. It means that the phase angle of 15 kV voltage between both substations is different each other. Thus, in order to avoid an electrical accident, the power outage of the feeders is mandatory for exchange of the feeders from both substation.

The basic concepts for transmission and substation facility maintenance are shown in Figure 2-4-1.1. Prevention must be the focus for maintenance of equipment and facilities procured, installed and built for the project.

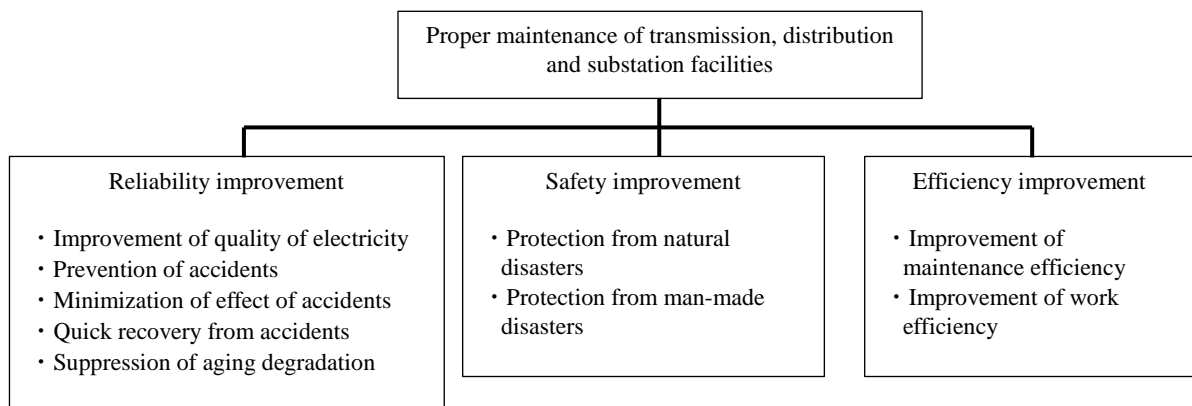


Figure 2-4-1.1 Basic Concepts for Substation, Transmission and Distribution Facility Maintenance

In the project, engineers dispatched by the Japanese contractor are planned to train local engineers in O&M for the substation and transmission facilities during installation and the testing and adjustment periods. The fruits of this OJT can be fully reaped by also having the Japanese side furnish the necessary spare parts, tools for testing and maintenance, and O&M manuals, and establishing an O&M system after services have started.

Note here that EUCL, who will handle O&M for the facilities provided in the project, possess personnel with sufficient skill in electrical power and the organizational structure to deploy staff exclusively to the site.

As for special training for substation facilities such as switchgear, communication system and SCADA system, etc., engineers dispatched by the Japanese contractor are planned to train local engineers, after completion of the installation works.

## 2-4-2 Operation and Maintenance Structure

### 2-4-2-1 Routine Inspection for Substation Facilities and Periodic Inspection Items

The standard regular inspection items for the substation facilities to be procured and installed in the project are given in Table 2-4-2-1.1. As given in the table, inspections for the above facilities are classified as follows;

- 1) Daily inspections, which involve a sensory check to detect abnormal heat, sounds and smells from the equipment,
- 2) Regular inspections, which check equipment for loose bolts, surface dirt or damage on insulation and other energized parts, not checked on daily inspections, and
- 3) Detailed inspections, which include functional checks of interlock mechanisms between devices, and precision maintenance of instrumentation.

In general, regular inspections are conducted once every one to two years, and detailed inspections are conducted once every four years. Switchboard internal fuses, metering, relays and other components with deteriorating performance, reduced insulation, contact wear or characteristic changes, should be

replaced as appropriate on regular and detailed inspections upon confirming component qualities and frequency of use.

Table 2-4-2-1.1 Inspection Items for Standard Facility Equipment

| Inspection Items                    | Details of Inspection (Method)                               | Daily | Regular | Detailed |
|-------------------------------------|--|-------|---------|----------|
| Visual Appearance                   | State of switch indicators and display lights                | ○     | ○       |          |
|                                     | Abnormal noise and/or smells                                 | ○     | ○       |          |
|                                     | Overheat and discoloration of terminal                       | ○     | ○       |          |
|                                     | Cracking, damage or staining of bushings and porcelain       | ○     | ○       |          |
|                                     | Rust on mounting cases, frame, etc.                          | ○     | ○       |          |
|                                     | Abnormal heat (temperature gauge)                            | ○     | ○       |          |
|                                     | Clamping of bushing terminal (mechanically checked)          | ○     | ○       |          |
| Operating Devices and Control Panel | Display conditions on measuring instruments                  | ○     | ○       | ○        |
|                                     | Indication on operation counters                             |       | ○       | ○        |
|                                     | Dampness, rust or staining on operation box or panel         |       | ○       | ○        |
|                                     | Refilling oil, cleaning                                      |       | ○       | ○        |
|                                     | Clamping of distributing terminals                           | ○     | ○       | ○        |
|                                     | Confirmation of switching display status                     |       | ○       | ○        |
|                                     | Air or oil leaks   |       | ○       | ○        |
|                                     | Confirmation of pressures (air, etc.) before/after operation |       | ○       | ○        |
|                                     | Confirmation of operation meter                              |       | ○       | ○        |
|                                     | Rust, deformation and/or damage on springs (maintenance)     | ○     | ○       | ○        |
|                                     | Abnormalities of tightening pins                             |       | ○       | ○        |
|                                     | Inspection of auxiliary switches and relays (maintenance)    |       | ○       | ○        |
|                                     | Inspection of DC control power source                        | ○     |         |          |
| Measurement and Test                | Measurement of insulating resistance                         |       | ○       | ○        |
|                                     | Measurement of contact resistance                            |       |         | ○        |
|                                     | Breakage of heater wires                                     |       | ○       | ○        |
|                                     | Operation test of relay                                      |       | ○       | ○        |

### 2-4-2-2 Routine Inspection for Transmission Lines and Periodic Inspection Items

In maintaining 110 kV transmission and 15kV distribution lines, the most important services provided to consumers are routine inspection patrols of facilities for accidents, damage and breakage, and immediate repair of detected problem areas. Preventive measures are also needed, such as trimming trees when they are threatening to come in contact with the power lines and cause grounding faults or other problems. Below are the main points which should be checked for during routine patrols:

- 1) Distribution line severance
- 2) Insulator damage
- 3) Contact between lines and trees or other obstructions
- 4) Tower damage
- 5) Tilted towers

### 2-4-3 Spare Parts Procurement Plan

#### 2-4-3-1 Spare Parts

Spare parts should be selected on the basis of parts which wear and deteriorate with daily operations



and must be replaced regularly. The following spare parts are procured for the project, fulfilling quantities needed for one year.

- 1) Transformers including consumables
- 2) 110 kV Switchgear
- 3) 15 kV Switchgear
- 4) Control and Protection including SCADA consumables
- 5) Station power supply
- 6) Communication

### 2-4-3-2 Spare parts procurement plan

The Japanese side plans to procure the minimum required standard spare parts including consumables for one year for the project. These items are given in Table 2-4-3-2.1. Meanwhile, Rwanda side is responsible for preparing a budget for purchasing necessary replacement parts after one year of the completion of the project.

Table 2-4-3-2.1 Lists of Spare Parts

(pc: piece)

| No.       | Name of Spare Parts  | Unit | Quantity   |
|-----------|--|------|------------|
|           |  |      | New Gasogi |
| <b>1.</b> | <b>Transformers</b>  |      |            |
| 1.1       | 15 MVA Transformer   |      |            |
| (1)       | Gaskets (complete set)                                     | set  | 1          |
| (2)       | Buchholz relay set   | set  | 1          |
| (3)       | Oil temperature indicator (main tank and conservator)      | pc   | 1 each     |
| (4)       | Oil level indicator (main tank and conservator)            | pc   | 1 each     |
| 1.2       | Earthing transformer                                       |      |            |
| (1)       | Oil temperature indicator                                  | pc   | 1          |
|           |  |      |            |
| <b>2.</b> | <b>110 kV Switchgear</b>                                   |      |            |
| 2.1       | Circuit Breaker  |      |            |
| (1)       | Closing coil   | set  | 2          |
| (2)       | Tripping coil  | set  | 2          |
| 2.2       | Disconnecting Switch (DS)                                  |      |            |
| (1)       | Fixed and moving contact (3 phase set for DS)              | set  | 2          |
| (2)       | Fixed and moving contact (3 phase set for Earthing switch) | set  | 1          |
|           |  |      |            |
| <b>3.</b> | <b>15 kV Switchgear equipment</b>                          |      |            |
| (1)       | Closing coil   | pc   | 1          |
| (2)       | Tripping coil  | pc   | 1          |

| No.       | Name of Spare Parts  | Unit | Quantity   |
|-----------|--|------|------------|
|           |  |      | New Gasogi |
| (3)       | Vacuum bulbs complete with necessary accessories for replacement (for three phase) (each type) | set  | 1 each     |
| (4)       | Isolating main terminals (for three phase) (each type), if applied.                            | set  | 1 each     |
| (5)       | Fuse (each type)   | %    | 100        |
| (6)       | Meter (each type)  | pc   | 1 each     |
| (7)       | Auxiliary relay (each type)  | pc   | 1 each     |
| (8)       | Necessary accessories for 15 kV cable termination  | set  | 1          |
|           |  |      |            |
| <b>4.</b> | <b>Control and Protection</b>  |      |            |
| (1)       | Protection relay (each type)   | pc   | 1 each     |
| (2)       | Bay control unit (each type)   | pc   | 1 each     |
| (3)       | Fuse (each type)   | %    | 100        |
| (4)       | Meter (each type)  | pc   | 1 each     |
| (5)       | Auxiliary relay (each type)  | pc   | 1 each     |
| (6)       | Control and selector switch, if any (each type)  | pc   | 1 each     |
|           |  |      |            |
| <b>5.</b> | <b>Station Power Supply</b>  |      |            |
| 5.1       | AC Distribution Board  |      |            |
| (1)       | MCCB (each type)   | pc   | 1 each     |
| (2)       | Indicating lamp, if any (each type)  | %    | 100        |
| (3)       | Fuse (each type)   | %    | 100        |
| (4)       | Meter (each type)  | pc   | 1 each     |
| 5.2       | DC Distribution Board  |      |            |
| (1)       | MCCB (each type)   | pc   | 1 each     |
| (2)       | Indicating lamp, if any (each type)  | %    | 100        |
| (3)       | Fuse (each type)   | %    | 100        |
| (4)       | Meter (each type)  | pc   | 1 each     |
| 5.3       | Battery and Charger  |      |            |
| (1)       | Battery (110 and 48 V DC)  | cell | 2 each     |
| (2)       | Electrolyte (20 liter/tank)  | tank | 1          |
| (3)       | Control card and diode module or equivalent (each type)  | pc   | 1 each     |
| (4)       | Indicating lamp, if any (each type)  | %    | 100        |
| (5)       | Fuse (each type)   | %    | 100        |
| (6)       | Meter (each type)  | pc   | 1 each     |
| 5.4       | Uninterruptible power supply system  |      |            |
| (1)       | Battery  | pc   | 2          |

| No.       | Name of Spare Parts                                 | Unit | Quantity   |
|-----------|---|------|------------|
|           |   |      | New Gasogi |
| (2)       | Pulse generator or equivalent (each type, if any)   | pc   | 1 each     |
| (3)       | Thyristor stack or module (each type, if any)       | pc   | 1 each     |
| (4)       | MCCB (each type)                                    | pc   | 1 each     |
| (5)       | Indication lamp (each type)                         | %    | 100        |
| (6)       | Fuse (each type)                                    | %    | 100        |
| (7)       | Meter (each type)                                   | pc   | 1 each     |
|           |   |      |            |
| <b>6.</b> | <b>Communication</b>                                |      |            |
| (1)       | RTU card or NPT-1200 communication card (each type) | pc   | 1 each     |
| (2)       | Cards for IP Media Gateway (each type)              | pc   | 1 each     |

Table 2-4-3-2.2 Lists of Consumables

| No.       | Name of Consumables         | Unit | Quantity   |
|-----------|-----------------------------|------|------------|
|           |                             |      | New Gasogi |
| <b>1.</b> | <b>Transformers</b>         |      |            |
| 1.1       | 15 MVA Transformer          |      |            |
| (1)       | Silica gel for Breathers    | %    | 200        |
| 1.2       | Earthing transformer        |      |            |
| (1)       | Silica gel for Breathers    | %    | 200        |
|           |                             |      |            |
| <b>2.</b> | <b>SCADA system</b>         |      |            |
| (1)       | Ink for Printer (each type) | year | 1 each     |
| (2)       | LAN cable(each type)        | pc   | 1 each     |

Earthing rod (for three phases) with 4.5 m long is procured as necessary maintenance tool for proper maintenance of 110 kV switchyard which is newly installed in new Gasogi substation. (Table 2-4-3-2.3)

Table 2-4-3-2.3 Lists of Maintenance Tools

| No.       | Name of Maintenance Tools                         | Unit      | Quantity   |
|-----------|---|-----------|------------|
|           |   |           | New Gasogi |
| <b>1.</b> | <b>Earthing rod (for three phases, 4.5m long)</b> | <b>PC</b> | <b>1</b>   |

## 2-5 Project Cost Estimation

### 2-5-1 Initial Cost Estimation

#### (1) Costs to be borne by the Rwanda side

**861,000 US\$ (approximately 96.5 million yen)**

Rwanda itemized details and their amounts are as given below:

- 1) RAP Compensation and Expense for land preparation: 183,000 US\$ (20,500,000 JPY)
- 2) Expenses for stockyard: 40,000 US\$ (4,500,000 JPY)
- 3) Expenses for Procurement and Installation of equipment related to SCADA system  
550,000 US\$ (66,100,000 JPY)
- 4) Expenses for Demolish work of 110 kV towers at Gasogi Substation  
10,000 US\$ (1,100,000 JPY)
- 5) Contingency (10 % : Payment of bank commission based on banking, etc.):  
78,000 US\$ (8,800,000 JPY)

#### (2) Estimation criteria

- 1) Time of estimation: July 2017
- 2) Exchange rate:  
1 US\$ = 112.09 JPY (TTS average from April 2017 to June 2017)  
1 EURO = 123.76 JPY (TTS average from April 2017 to June 2017)
- 3) Construction/procurement period: Periods for detailed design, equipment procurement and installation are as shown in the construction schedule.
- 4) Other: This project is implemented according to the Japan's Grant Aid Scheme.

### 2-5-2 Operation and Maintenance Cost

Gikondo office and Kanombe office maintain existing substations, transmission and distribution lines in the Project area. These offices shall also maintain the new substation, transmission and distribution lines of the Project after they are provided. The new substation shall be manned, also needing new appointments. EUCL shall support the new transmission and distribution lines under present conditions.

Also note that the spare parts and consumables given in Table 2-4-3-2.1 must be stocked at all times in order to operate the new substation properly. This shall require regional offices to budget roughly 0.2 million US dollars (1% of equipment costs) if necessary. Costs for repair and maintenance of EUCL was 3.9 million US dollars in 2016, and the budget shall cover the O&M costs for the new substation of the Project.

## **CHAPTER 3    PROJECT EVALUATION**

## **Chapter 3 Project Evaluation**

### **3-1 Preconditions**

Concerning the preconditions for the Project implementation such as compensation for relocation of local residents, land acquisition for substations, securing of storage space for equipment and materials, securing of access roads and work areas for 110 kV transmission and 15 kV distribution lines, removal of trees and crops from the route of 15 kV distribution lines and obtainment of environmental approval for the Project implementation, there is no outstanding issue in the Project implementation, as Rwanda side has already started necessary procedures and has experience with a similar Japan's Grant Aid Project for power transmission, distribution and substation system. However, Rwanda side shall conduct following tasks by the time of commencement of the Project.

- (1) It is necessary to ensure that compensation will be provided to and consent will be obtained from the local residents who will be affected by the construction of substations, 110 kV transmission and 15 kV distribution lines in the Project.
- (2) It is necessary to ensure that Road reserve for 15 kV distribution line route will be secured and the land use permit will be obtained from Kigali city and the land owners.

### **3-2 Necessary Inputs by the Recipient Country**

#### **(1) Before work commencement**

- To do land preparation work and leveling work before notice of tender openings. Necessary lands are as follows;
  - (1) New Gasogi Substation
  - (2) 110kV transmission line; Approx. 0.2 km
  - (3) 15kV distribution line (North Route): Approx. 11.5 km
  - (4) 15kV distribution line (South Route): Approx. 8.5 km
  - (5) Necessary access road for constructing all transmission and distribution lines
- To obtain ownership permission for the 110/15 kV substation site from public institutions.
- To obtain permission from related authorities for Road reserve for 15 kV distribution lines to go across the roads.
- To resettle occupants in accordance with the resettlement plan prepared at the stage of the survey in smooth manner, if necessary.

#### **(2) During the construction period**

- To schedule both power and communication network shutdown required for construction works of the Project, and carry out in timely manner. The Rwanda side shall also manage any issue concerning the shutdown including related procedures, and compensation to and grievances from customers.

- To modify the NECC SCADA system and the Optical Network Management System to accommodate New Gasogi substation.
- To provide the setting list of protection relays related to the Project for coordination of setting values with new relays to be supplied under the Project. The setting value change at the substations where the transmission lines connected from New Gasogi substation shall be conducted by the Rwanda side including necessary tests and their records shall be presented to Japan side.
- To secure a temporary storage yard of approximately 5,000 m<sup>2</sup> near the Project site during the construction period of the Project.
- To implement Environmental Management Plan and mitigation measures prepared through the environmental assessment and monitor environmental and social impacts caused by the Project with an adaptive management approach.
- To construct fences and gates at the project sites.
- To construct fences and gates at the project sites in accordance with the layout and arrangement of the equipment and facilities of the Project.
- To dismantle the existing 110 kV towers in order to implement the Project.

**(3) After work completion and start of service**

- To monitor environmental and social impacts during the operation with an adaptive management approach.

**3-3 Important Assumptions**

The external conditions assumed for the project to achieve and sustain its results are as follows:

**(1) For overall goal**

- National policy on regional electrification does not change.
- The government and economy remain stable.

**(2) For project objectives**

- O&M is performed on a continuous basis.
- Fees are continuously collected, and government support continues.
- Facility security is maintained.

**(3) For expected outcomes**

- Power generation facilities produce sufficient power.

- The O&M plan is implemented.
- Residents (or the government) can cover the connection fees and electricity charges.

### 3-4 Project Evaluation

#### 3-4-1 Relevance

As shown below, relevance for this cooperation project is judged to be high as it helps to achieve Rwandan national energy and power policies and benefits the public facilities and poor residents in a target area.

##### (1) Urgency

Power will be developed mainly as follows:

- 1) Capacity to supply power demand maintained
- 2) Supply reliability (reducing power downtime, etc.) improved by ensuring reserve supply capacity
- 3) Power quality improved by improving power system structure, etc.

Of the above points, 1) is the most urgent as it is an underlying factor in stable power supply.

Power from New Gasogi substation through 110 kV transmission line is mainly supplied to Kigali city. Operation of New Gasogi substation is planning to be April, 2020, but early operation is necessary because the demand of Birembo substation is increasing rapidly.

##### (2) Benefit

Electric power is absolutely essential as energy for the self-reliant, sustainable socioeconomic growth of a nation. Particularly in capital areas, which hold government agencies and head offices of the companies which support the national economy, power development projects are one of the most important of economic infrastructure development in helping to establish a secure, efficient power distribution network.

The Project is to improve electric power distribution in Kigali city in Rwanda as it faces a serious power system problem caused by supply capacity shortage due to recent rapid economic growth. The enhancement of supply capacity of power distribution facilities, which is currently insufficient, is a fundamental solution to the loss of opportunity gain due to disrupted supply and thus it is highly beneficial.

The facility capacity of the Project accounts for 10 percent of total facility capacity in the target year for project evaluation in 2023, as shown in the below formula.

$$\text{(Project facility 30 MVA)} \div \text{(Project facility 30 MVA + existing facility 280 MVA)} = \text{approx. 10\%}$$

The power distribution facility to be developed in the Project is expected to supply 10 percent of



the power to assist socioeconomic activities in Kigali city in the target year for project evaluation in 2023. The Project will benefit approx. 10 percent of economic activities in the area, which is very high in terms of cost-benefit ratio for the amount of aid.

### **(3) Operation and Maintenance Capabilities**

Despite its struggles with large-scale capital investments such as the current cooperation project, REG does have a certain level of technical capacity in system operations and has steadily handled O&M for the national power transmission network.

As Rwanda has already introduced power facilities such as 110/15 kV substations and the skills required for operation methods, system protection functionality and other O&M issues do not greatly exceed the technical levels for equipment used that has been used in the country, although internal structure of the switchgear and other equipment to be introduced may differ from that of traditional ones.

As such, manufacturer technicians will be used for O&M technology transfers, offering guidance on initial and standard operation based on the characteristics, features and specifications of the equipment. Assuming that the technology transfer of differing operation methods for each delivering manufacturer goes smoothly, there should be no issues in terms of O&M capabilities on the Rwandan side for the delivered equipment.

### **(4) Project to Contribute to Upper-Level Plans**

Rwanda formulated ENERGY SECTOR STRATEGIC PLAN 2012/13-2017/18 in October 2014. For the development plan, the new Ndera substation in the Project, with the capacity of 30 MVA, is deemed to be essential for achieving the upper-level plan. It is estimated to contribute approximately 10 % of the overall distribution facility capacity in Kigali city ( $=30 \text{ MVA (project facility capacity)} \div 310 \text{ MVA (total facility capacity in Kigali city)}$ ) in the target year for project evaluation in 2023.

### **(5) Consistency with Japan's Grant Aid Policy**

The contents and schedule of the Project are achievable in the scheme of a Grant Aid Project as major equipment will be sourced from Japan and the Project will be completed within the timeframe of the E/N. Therefore, the Project can be implemented with no special difficulty.

#### **3-4-2 Effectiveness**

The impacts expected from the implementation of the Project are as follows.

## (1) Quantitative Impacts

Table 3-4-2.1 Quantitative Impacts

| Outcome Indicator  | Base Value<br>(2017 Current Value) | Target Value (2023)<br>(3 years after the completion of the Project) |                  |
|--|------------------------------------|--|------------------|
|  |                                    | Without the Project  | With the Project |
| 1. 110 kV Transformer facility capacity of Gasogi substation (MVA) <sup>*1</sup>           | 10 MVA                             | 30 MVA   | 30 MVA           |
| 2. Annual Electricity Supply from Gasogi substation at the sending end (MWh) <sup>*2</sup> | 13,469 MWh                         | 57,159 MWh   | 86,724 MWh       |
| 3. Transformer load factor in Gikondo substation (%) <sup>*3</sup>                         | 56%                                | 81~99%   | 75~91%           |
| 4. Transformer load factor in Birembo substation (%) <sup>*3</sup>                         | 79%                                | 58~109%  | 50~94%           |

\*1 Indicate facility capacity of Gasogi substation. (included New Gasogi substation)

\*2 Indicate 15 kV evacuated power from Gasogi substation. (included New Gasogi substation)

\*3 Described as an indicator after distribution load allocated. (Maximum demand / Facility capacity)

## (2) Qualitative Impacts (Whole Project)

The following table shows impacts of each component of the Project.

Table 3-4-2.2 Qualitative Impacts (Whole Project)

| Present Status and Problems   | Project Countermeasures<br>(Grant Aid Project)   | Extent of Project Effects and Improvement  |
|---|--|--|
| 1. The power demand in Gasogi area has been rapidly increasing, but the present capacity of power transformer is not sufficient and aging. It is a major cause of the unstable power supply and transmission and distribution network loss. | Procurement and installation of the following equipment:<br><b>1. 110 kV Substation equipment</b><br><ul style="list-style-type: none"> <li>• 30 MVA= 15 MVA × 2 banks</li> </ul> <b>2. 110 kV Transmission and 15 kV distribution equipment</b><br><ul style="list-style-type: none"> <li>• 110 kV overhead line (Approx. 0.2 km)</li> <li>• 15 kV overhead line (Approx. 20 km)</li> </ul> | Stable power supply will revitalize the industries and economic activities in Kigali and improve stable operation of public welfare facilities and healthcare services as well as the living environment of local residents. |

## **APPENDICES**

## **1. Member List of the Study Team**

## 1. Member List of the Study Team

### (1) First Field Survey

| Name              | Assignment   | Organization                             |
|-------------------|--|--|
| Tsunenari SOYAMA  | Vice Team Leader   | Japan International Corporation Agency   |
| Makoto ABE        | Chief Consultant/<br>Transmission and Distribution<br>Planning | Yachiyo Engineering Co., Ltd.            |
| Kenji SAKEMURA    | Substation Facilities  | West Japan Engineering Consultants, Inc. |
| Seiji SATO        | Substation Facilities-2  | West Japan Engineering Consultants, Inc. |
| Taro NAKAMURA     | Power Flow Analysis/<br>Protection Control                     | West Japan Engineering Consultants, Inc. |
| Michio ISHIGAMORI | Transmission and Distribution<br>Facilities                    | Yachiyo Engineering Co., Ltd.            |
| Kyohei KUROHANE   | Equipment Planning/ Cost<br>Estimation                         | Yachiyo Engineering Co., Ltd.            |
| Hisayuki YAMAMOTO | Facility Planning/<br>Cost Estimation                          | Yachiyo Engineering Co., Ltd.            |
| Akihiro OSADA     | Social and Environmental<br>Considerations                     | Yachiyo Engineering Co., Ltd.            |

### (2) Second Field Survey

| Name             | Assignment   | Organization                             |
|------------------|--|--|
| Tsunenari SOYAMA | Vice Team Leader   | Japan International Corporation Agency   |
| Makoto ABE       | Chief Consultant/<br>Transmission and Distribution<br>Planning | Yachiyo Engineering Co., Ltd.            |
| Kenji SAKEMURA   | Substation Facilities  | West Japan Engineering Consultants, Inc. |
| Kyohei KUROHANE  | Equipment Planning/ Cost<br>Estimation                         | Yachiyo Engineering Co., Ltd.            |

## **2. Study Schedule**

## 2. Study Schedule

### (1) First Field Survey (May to July in 2017)

| No. | Date   | Day  | Contents of Survey   |   |  | Accommodation  |  |
|-----|--------|------|--|---|--|--|--|
|     |        |      | JICA Member  | Consultants   |  |  |  |
|     |        |      |  | Chief consultant Group/Transmission and Distribution Group<br>(Abe, Ishigamori, Kurohane )  | Substation Group<br>(Sakemura, Sato, Yamamoto)   |  | Environmental & Social Considerations Group<br>(Osada) |
| 1   | May 26 | Fri. | <ul style="list-style-type: none"> <li>Trip { Addis Ababa →Kigali 00:45 by ET821 }</li> </ul>  | <ul style="list-style-type: none"> <li>Sakemura, Nakamura, Sato Trip{ Fukuoka 21:05→Incheon 22:35 by KE-782 }</li> <li>Sakemura, Nakamura, Sato Trip { Incheon 1:20→Doha 4:50 by QR-859 }</li> <li>Other members Trip { Narita 22:20→Doha 3:50 by QR-807 }</li> </ul>   |  | Flight   |  |
| 2   | May 27 | Sat. | <ul style="list-style-type: none"> <li>Documentation</li> </ul>  | <ul style="list-style-type: none"> <li>Trip { Doha 7:55→Kigali 14:30 by QR-1387 }</li> </ul>  |  | Kigali   |  |
| 3   | May 28 | Sun. | <ul style="list-style-type: none"> <li>Site Survey</li> </ul>  |   |  | Osada: Flight<br>Kigali  |  |
| 4   | May 29 | Mon. | <ul style="list-style-type: none"> <li>Courtesy call to JICA Rwanda Office, Explanation and discussion of the schedule of the field survey and project contents</li> <li>Courtesy call to Embassy of Japan (EoJ)</li> <li>Courtesy call to Ministry of Infrastructure and Rwanda Energy Group, Explanation and discussion of the schedule of IC/R, the field survey and project contents</li> <li>Explanation and discussion of the facilities on Rwanda side, the methodology of the site survey, etc. with MININFRA and REG</li> </ul> |   |  | Kigali   |  |
| 5   | May 30 | Tue. | <ul style="list-style-type: none"> <li>Submission and discussion of the draft M/D</li> <li>Explanation of the Grant scheme, obligations of Rwanda side and overall plan, etc.</li> <li>Site Survey</li> </ul>  |   |  | Kigali   |  |
| 6   | May 31 | Wed. | <ul style="list-style-type: none"> <li>Discussion of the draft M/D</li> <li>Explanation of the Grant scheme, obligations of Rwanda side and overall plan, etc.</li> <li>Visit to the other donors and the relative agencies</li> </ul>   | <ul style="list-style-type: none"> <li>Meeting with REG</li> <li>Site Survey (Gasogi substation, survey for environmental current situation, etc.)</li> </ul>   |  | Kigali   |  |
| 7   | Jun. 1 | Thu. | <ul style="list-style-type: none"> <li>Signing of the M/D (MININFRA and REG)</li> <li>Report to EoJ and JICA Rwanda office</li> </ul>  | <ul style="list-style-type: none"> <li>Meeting with REG</li> <li>Site Survey (110 kV Transmission line and 15 kV Distribution line Route)</li> <li>Meeting with local contractors on topographic &amp; geological investigation and Environmental &amp; Social Considerations</li> <li>Market survey of equipment and material</li> </ul> |  | Kigali   |  |
| 8   | Jun. 2 | Fri. | <ul style="list-style-type: none"> <li>Trip { Kigali 15:30→Doha 23:59 by QR-1388 }</li> </ul>  | <ul style="list-style-type: none"> <li>Meeting with REG</li> <li>Signing Meeting with local contractors on topographic &amp; geological investigation and Environmental &amp; Social Considerations</li> <li>Confirmation of specifications on existing facilities</li> <li>Market survey of equipment and material</li> </ul>            |  | JICA : Flight<br>Kigali  |  |
| 9   | Jun. 3 | Sat. | <ul style="list-style-type: none"> <li>Trip { Doha 2:35→Narita 18:40 by QR-806 }</li> </ul>  | <ul style="list-style-type: none"> <li>Team discussions, arrangement of collected data</li> </ul>   | <ul style="list-style-type: none"> <li>Sakemura Trip { Kigali 15:30→Doha 23:59 by QR-1388 }</li> </ul>   | <ul style="list-style-type: none"> <li>Osada Trip { Narita 22:20→Doha 3:50 by QR-807 }</li> </ul>  | Sakemura: Flight<br>Kigali                             |
| 10  | Jun. 4 | Sun. |  | <ul style="list-style-type: none"> <li>Team discussions, arrangement of collected data</li> </ul>   | <ul style="list-style-type: none"> <li>Sakemura Trip { Doha 2:30→Incheon 17:05 by QR-858 }</li> <li>Sakemura Trip { Incheon 18:35→Fukuoka 19:55 by KE-781 }</li> </ul> | <ul style="list-style-type: none"> <li>Osada Trip { Doha 7:55→Kigali 14:30 by QR-1387 }</li> </ul> | Kigali   |
| 11  | Jun. 5 | Mon. |  | <ul style="list-style-type: none"> <li>Site Survey (New Gasogi substation)</li> <li>Route Survey for 110kV Transmission line and 15kV Distribution line</li> </ul>  |  | Kigali   |  |
| 12  | Jun. 6 | Tue. |  | <ul style="list-style-type: none"> <li>Site Survey (New Gasogi substation)</li> <li>Route Survey for 110kV Transmission line and 15kV Distribution line</li> </ul>  |  | Kigali   |  |
| 13  | Jun. 7 | Wed. |  | <ul style="list-style-type: none"> <li>Site Survey (New Gasogi substation)</li> <li>Route Survey for 110kV Transmission line and 15kV Distribution line</li> </ul>  |  | Kigali   |  |

| No. | Date    | Day  | Contents of Survey |  |   | Accommodation  |  |
|-----|---------|------|--------------------|--|---|--|--|
|     |         |      | JICA Member        | Consultants  |   |  |  |
|     |         |      |                    | Chief consultant Group / Transmission and Distribution Group<br>(Abe, Ishigamori, Kurohane )   | Substation Group<br>(Sakemura, Sato, Yamamoto)  |  | Environmental & Social Considerations Group<br>(Osada) |
| 14  | Jun. 8  | Thu. |                    | <ul style="list-style-type: none"> <li>Site Survey (New Gasogi substation)</li> <li>Route Survey for 110kV Transmission line and 15kV Distribution line</li> </ul>   | Kigali  |  |  |
| 15  | Jun. 9  | Fri. |                    | <ul style="list-style-type: none"> <li>Site Survey (New Gasogi substation)</li> <li>Route Survey for 110kV Transmission line and 15kV Distribution line</li> </ul>   | Kigali  |  |  |
| 16  | Jun. 10 | Sat. |                    | <ul style="list-style-type: none"> <li>Team discussions, arrangement of collected data</li> </ul>  | Kigali  |  |  |
| 17  | Jun. 11 | Sun. |                    | <ul style="list-style-type: none"> <li>Team discussions, arrangement of collected data</li> </ul>  | Kigali  |  |  |
| 18  | Jun. 12 | Mon. |                    | <ul style="list-style-type: none"> <li>Site Survey (New Gasogi substation)</li> <li>Route Survey for 110kV Transmission line and 15kV Distribution line</li> </ul>   | Kigali  |  |  |
| 19  | Jun. 13 | Tue. |                    | <ul style="list-style-type: none"> <li>Site Survey (New Gasogi substation)</li> <li>Route Survey for 110kV Transmission line and 15kV Distribution line</li> </ul>   | Kigali  |  |  |
| 20  | Jun. 14 | Wed. |                    | <ul style="list-style-type: none"> <li>Data Collection of National Development Plan and Socioeconomic conditions</li> <li>Visit to MININFRA and survey of power sector structural reform</li> <li>Survey of power supply and demand (MININFRA)</li> <li>Survey of balance of payments and tariff</li> </ul>  | Kigali  |  |  |
| 21  | Jun. 15 | Thu. |                    | <ul style="list-style-type: none"> <li>Preparation of Field Report</li> <li>Team discussions, arrangement of collected data</li> </ul>   | Kigali  |  |  |
| 22  | Jun. 16 | Fri. |                    | <ul style="list-style-type: none"> <li>Preparation of Field Report</li> <li>Data collection of Supplementary material, etc.</li> <li>Market survey of equipment and material, survey of customs clearance</li> <li>Survey of port and transportation route</li> </ul>  | <ul style="list-style-type: none"> <li>Sakemura Trip { Fukuoka 21:05→Incheon 22:35 by KE-782 }</li> <li>Sakemura Trip { Incheon 1:20→Doha 4:50 by QR-859 }</li> </ul> | <ul style="list-style-type: none"> <li>Preparation of Field Report</li> <li>Data collection of Supplementary material, etc.</li> </ul> | Sakemura: Flight<br>Kigali                             |
| 23  | Jun. 17 | Sat. |                    | <ul style="list-style-type: none"> <li>Site survey (Supplementary survey)</li> </ul>   | <ul style="list-style-type: none"> <li>Sakemura Trip { Doha 7:55→Kigali 14:30 by QR-1387 }</li> </ul>   | <ul style="list-style-type: none"> <li>Site survey (Supplementary survey)</li> </ul>   | Kigali   |
| 24  | Jun. 18 | Sun. |                    | <ul style="list-style-type: none"> <li>Preparation of Field Report</li> <li>Team discussions, arrangement of collected data</li> </ul>   |   |  | Kigali   |
| 25  | Jun. 19 | Mon. |                    | <ul style="list-style-type: none"> <li>Preparation of Field Report</li> <li>Data collection of Supplementary material, etc.</li> <li>Obtaining the survey report on topographic &amp; geological investigation</li> <li>Market survey (Local contractor, etc.)</li> </ul>  |   |  | Kigali   |
| 26  | Jun. 20 | Tue. |                    | <ul style="list-style-type: none"> <li>Submission, explanation and discussion of Field Report to MININFRA and REG</li> </ul>   |   |  | Kigali   |
| 27  | Jun. 21 | Wed. |                    | <ul style="list-style-type: none"> <li>Submission, explanation and discussion of Field Report to MININFRA and REG</li> </ul>   |   |  | Kigali   |
| 28  | Jun. 22 | Thu. |                    | <ul style="list-style-type: none"> <li>Submission, explanation and discussion of Field Report to MININFRA and REG</li> <li>Report to EoJ and JICA Rwanda office</li> </ul>   |   |  | Kigali   |
| 29  | Jun. 23 | Fri. |                    | <ul style="list-style-type: none"> <li>Trip { Kigali 15:30→Doha 23:59 by QR-1388 }</li> </ul>  |   |  | Kigali   |
| 30  | Jun. 24 | Sat. |                    | <ul style="list-style-type: none"> <li>Follow-up for local subcontractor (Environmental &amp; Social Considerations)</li> <li>Nakamura, Sato Trip { Doha 2:30→Incheon 17:05 by QR-858 }</li> <li>Nakamura, Sato Trip { Incheon 18:35→Fukuoka 19:55 by KE-781 }</li> <li>Abe, Ishigamori, Yamamoto, Kurohane Trip { Doha 2:35→Narita 18:40 by QR-806 }</li> </ul> |   |  | Flight<br>Osada:Kigali                                 |
| 31  | Jun. 25 | Sun. |                    |  |   | <ul style="list-style-type: none"> <li>Arrangement of collected data</li> </ul>  | Osada: Kigali  |
| 32  | Jun. 26 | Mon. |                    |  |   | <ul style="list-style-type: none"> <li>Follow-up for local subcontractor (Environmental &amp; Social Considerations)</li> </ul>        | Osada: Kigali  |



| No. | Date    | Day  | Contents of Survey |  |   | Accommodation |
|-----|---------|------|--------------------|--|---|---------------|
|     |         |      | JICA Member        | Consultants  |   |               |
|     |         |      |                    | Chief consultant Group / Transmission and Distribution Group<br>(Abe, Ishigamori, Kurohane ) | Substation Group<br>(Sakemura, Sato, Yamamoto)                              |               |
| 33  | Jun. 27 | Tue. |                    |  | ● Follow-up for local subcontractor (Environmental & Social Considerations) | Osada: Kigali |
| 34  | Jun. 28 | Wed. |                    |  | ● Follow-up for local subcontractor (Environmental & Social Considerations) | Osada: Kigali |
| 35  | Jun. 29 | Thu. |                    |  | ● Follow-up for local subcontractor (Environmental & Social Considerations) | Osada: Kigali |
| 36  | Jun. 30 | Fri. |                    |  | ● Follow-up for local subcontractor (Environmental & Social Considerations) | Osada: Kigali |
| 37  | Jul 1   | Sat. |                    |  | ● Osada Trip { Kigali 15:30→Doha 23:59 by QR-1388 }                         | Osada: Flight |
| 38  | Jul 2   | Sun. |                    |  | ● Osada Trip { Doha 2:35→Narita 18:40 by QR-806 }                           | -             |

(2) Second Field Survey (December in 2017)

| No | Date    | Day  | Contents of Survey |   | Accommodation |
|----|---------|------|--------------------|---|---------------|
|    |         |      | JICA Members       | Consultants   |               |
| 1  | Dec. 9  | Sat. |                    | ● Trip { Narita 22:20→Doha 3:50 by QR-807 }   | Flight        |
| 2  | Dec. 10 | Sun. |                    | ● Trip { Doha 7:55→Kigali 14:30 by QR-1387 }  | Kigali        |
| 3  | Dec. 11 | Mon. |                    | <ul style="list-style-type: none"> <li>● Courtesy call and explanation of the Preparatory Survey Report to JICA Rwanda Office and EOJ</li> <li>● Courtesy call and submission/explanation of the Preparatory Survey Report to MININFRA and REG</li> <li>● Confirmation of Environmental &amp; Social Consideration with Rwanda Environment Management Agency (REMA) and MININFRA</li> </ul> | Kigali        |
| 4  | Dec. 12 | Tue. |                    | <ul style="list-style-type: none"> <li>● Submission/explanation of the Preparatory Survey Report to MININFRA and REG</li> <li>● Explanation of and discussion on the draft Technical Specifications</li> </ul>  | Kigali        |
| 5  | Dec. 13 | Wed. |                    | <ul style="list-style-type: none"> <li>● Submission/explanation of the Preparatory Survey Report to MININFRA and REG</li> <li>● Explanation of and discussion on the draft Technical Specifications</li> </ul>  | Kigali        |
| 6  | Dec. 14 | Thu. |                    | <ul style="list-style-type: none"> <li>● Submission/explanation of the Preparatory Survey Report to MININFRA and REG</li> <li>● Explanation of and discussion on the draft Technical Specifications</li> </ul>  | Kigali        |
| 7  | Dec. 15 | Fri. |                    | <ul style="list-style-type: none"> <li>● Explanation of and discussion on the draft M/D with MININFRA and REG</li> <li>● Signing of the M/D</li> <li>● Report to JICA Rwanda Office</li> </ul>  | Kigali        |
| 8  | Dec. 16 | Sat. |                    | ● Trip { Kigali 15:00→Doha 23:59 by QR-1388 }   | Flight        |
| 9  | Dec. 17 | Sun. |                    | ● Trip { Doha 2:35→Narita 18:40 by QR-806 }   | -             |

【Remarks】 (Alphabetical order)

EoJ : Embassy of Japan  
JICA : Japan International Cooperation Agency  
MININFRA : Ministry of Infrastructure  
REMA : Rwanda Environment Management Agency  
REG : Rwanda Energy Group

### **3. List of Parties Concerned in the Recipient Country**

### **3. List of Parties Concerned in the Recipient Country**

#### **Ministry of Infrastructure (MININFRA)**

|                        |                     |
|------------------------|---------------------|
| Mr. Christian Rwakunda | Permanent Secretary |
| Mr. Tom Rwahama        | E-SWAP Coordinator  |
| Mr. Peace Kaliisa      | Donor Coordinator   |

#### **Electrical Development Corporation Limited (EDCL)**

|                             |   |
|-----------------------------|---|
| Mr. Kamangi Emmanuel        | Managing Director                           |
| Mr. Nshuti Yves             | Director of Energy Planning                 |
| Mr. Kalung Fredrick         | Chief Engineer / Design and Standardization |
| Mr. Gasana Alain            | Project Design and Studies Specialist       |
| Mr. Tuyisenge Philbert      | Power Systems Planning Specialist           |
| Mr. Mihigo Eric             | Research & Development Manager              |
| Mr. Habineza Jean Damascene | Project Design and Studies Specialist       |
| Mr. Karanganwa Papias       | Environmental Specialist                    |
| Ms. Nyinawamwiza Petronille | Sociologist                                 |

#### **Electrical Utility Corporation Limited (EUCL)**

|                         |  |
|-------------------------|--|
| Maj. Jean Claude Kalisa | Managing Director                                |
| Mr. Gakwavu Claver      | Director, Planning                               |
| Mr. Kobus van zyl       | Project Engineering Electrical                   |
| Mr. Aimable Nsanzimana  | Senior Engineer generation planning and dispatch |

#### **Rwanda Development Board (RDB)**

|                    |   |
|--------------------|---|
| Mr. Sezibera Alain | Environmental Impact Assessment Officer |
|--------------------|---|

#### **Rwanda Utilities Regulatory Authority (RURA)**

|                    |                             |
|--------------------|-----------------------------|
| Mr. Alexis Mutware | Head of Electricity Section |
|--------------------|-----------------------------|

#### **JICA Rwanda Office**

|                          |  |
|--------------------------|--|
| Hiroyuki TAKADA          | Chief Representative                                 |
| Tomonori NAGASE          | Senior Resident Representative                       |
| Takashi OKUYAMA          | Project Formulation Advisor                          |
| Mr. Plaude Nkunzwenimana | Program Officer in Charge of Economic Infrastructure |

## **4. Minutes of Discussions**

## 4. Minutes of Discussions

### 4.1 First Field Survey

#### Minutes of Discussions on the Preparatory Survey for the Project for Improvement of Substations and Distribution Network Phase 3 in the Republic of Rwanda

In response to the request from the Government of the Republic of Rwanda (hereinafter referred to as “Rwanda”), Japan International Cooperation Agency (hereinafter referred to as “JICA”) dispatched the Preparatory Survey Team for the Outline Design (hereinafter referred to as “the Team”) of the Project for Improvement of Substations and Distribution Network Phase 3 (hereinafter referred to as “the Project”) to Rwanda, headed by Tsunenari SOYAMA, Deputy Director of Energy and Mining Group, Industrial Development and Public Policy Department, JICA, from 26th May to 30<sup>th</sup> June, 2017. The Team held a series of discussions with the officials of the Government of Rwanda (hereinafter referred to as “the Rwandan side” in the beginning of the survey. In the course of the discussions, both sides have confirmed the main items described in the attached sheets.

Kigali, the Republic of Rwanda 1<sup>st</sup> June, 2017



**Mr. Tsunenari SOYAMA**

Leader

Preparatory Survey Team

Japan International Cooperation Agency

Japan

**Mr. Caleb RWAMUGANZA**

Permanent Secretary

Ministry of Finance and

Economic Planning

**Mr. Christian Rwakunda**

Permanent Secretary

Ministry of Infrastructure

the Republic of Rwanda

**Mr. Emmanuel Kamanzi**

Managing Director

Energy Development Corporation Limited

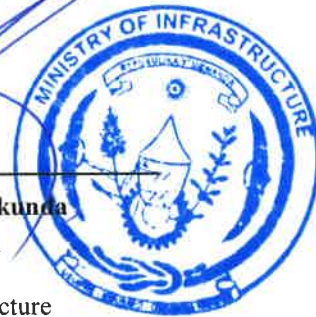
Rwanda Energy Group.

**Maj. Jean Claude Kalisa**

Managing Director

Energy Utility Corporation Limited

Rwanda Energy Group



## ATTACHMENT

### 1. Objective of the Project

The objective of the Project is to upgrade and expand the substation as well as associated power transmission and distribution facilities in Kigali city (New Gasogi Substation with related transmission and distribution line) thereby contributing to stabilizing the power supply with higher efficiency in Kigali City.

### 2. Title of the Preparatory Survey

Both sides confirmed the title of the Preparatory Survey as “the Preparatory Survey for the Project for Improvement of Substations and Distribution Network Phase 3”.

### 3. Project site

Both sides confirmed that the proposed Project site is in Kigali, which is shown in Annex 1.

### 4. Responsible authority for the Project

Both sides confirmed the authorities responsible for the Project are as follows:

- 4.1 The Energy Development Corporation Limited (hereinafter referred to as “EDCL”) will be the executing agency for the Project (hereinafter referred to as “the Executing Agency”). The Executing Agency shall coordinate with all the relevant authorities to ensure smooth implementation of the Project and ensure that the undertakings for the Project shall be managed by relevant authorities properly and on time.

When the Project is completed, the facilities will be handed over to the Energy Utility Corporation Limited (hereinafter referred to as “EUCL”) for the operation and the maintenance. The organization charts are shown in Annex 2.

- 4.2 The line ministry of the Executing Agency is the Ministry of Infrastructure (hereinafter referred to as “MININFRA”). The MININFRA shall be responsible for supervising the Executing Agency on behalf of the Government of Rwanda.

### 5. Items requested by the Government of Rwanda

- 5.1 Both sides confirmed that the requested items are as follows:

(A) Procurement and Installation

110 kV/15 kV Transformer (for New Gasogi Substation): 15 MVA x 2 Units

110 kV Transmission Line (for New Gasogi Substation): Approx. 0.2 km

15 kV Distribution Line (in Gasogi, Ndera sector): 2 routes x 10 km  
110 kV Transmission Line (between Birembo and Jabana Substation): Approx.  
7.2 km

(B) Procurement

Maintenance Tools for the Equipment to be procured

Spare parts for the Equipment to be procured

(C) Construction

Installation of Transformers, Gantries, Towers for 110 kV Transmission Line, etc.

One (1) Control Building of New Gasogi Substation

5.2 JICA will assess the feasibility of the above requested items through the survey and once the content of the draft report are accepted by the Rwandan side, JICA will report the findings to the Government of Japan. The final scope of the Project will be decided by the Government of Japan.

6. Procedures and Basic Principles of Japanese Grant

6.1 The Rwandan side agreed that the procedures and basic principles of Japanese Grant as described in Annex 3 shall be applied to the Project.

As for the monitoring of the implementation of the Project, JICA requires the Rwandan side to submit the Project Monitoring Report, the form of which is attached as Annex 4.

6.2 The Rwandan side agreed to take the necessary measures, as described in Annex 5, for smooth implementation of the Project. The contents of the Annex 5 will be elaborated and refined during the Preparatory Survey and be agreed in the mission dispatched for explanation of the Draft Preparatory Survey Report.

The contents of Annex 5 will be updated as the Preparatory Survey progresses, and eventually, will be used as an attachment to the Grant Agreement.

7. Schedule of the Survey

7.1 The Team will proceed with further survey in Rwanda until 30<sup>th</sup> June 2017.

7.2 JICA will prepare a draft Preparatory Survey Report in English and dispatch a mission to Rwanda in order to explain its contents in November 2017.

7.3 If the contents of the draft Preparatory Survey Report is accepted and the undertakings for the Project are fully agreed by the Rwandan side, JICA will finalize the Preparatory Survey Report and send it to Rwanda in March 2018.

7.4 The above schedule is tentative and subject to change.



## 8. Environmental and Social Considerations

- 8.1 The Rwandan side confirmed to give due environmental and social considerations before and during implementation, and after completion of the Project, in accordance with the JICA Guidelines for Environmental and Social Considerations (April, 2010: hereinafter referred to as “JICA Guidelines”) as well as laws and regulations in Rwanda.
- 8.2 The Project is categorized as “B” from the following considerations:  
The Project neither locates in a sensitive area, nor has characteristics, nor falls into sensitive sectors under JICA Guidelines, and its potential adverse impacts on the environment are not likely to be significant.
- 8.3 The Rwandan side agreed to make necessary arrangements with relevant governmental organizations in order to secure funding for and execution of the above environmental matters in a timely manner as required for smooth execution of the Project.
- 8.4 The Rwandan side confirmed to conduct the necessary procedures concerning the environmental assessment (including stakeholder meetings, budget allocation, Environmental Impact Assessment (EIA)/ Initial Environmental Examination (IEE) and information disclosure, etc.). The Rwandan side shall obtain the Environmental Certificate approved by Rwanda Development Board. The Rwandan side explained that it is required to get financial approval for the Project to implement EIA, RAP, and IEE. Therefore, the Certificate will be submitted to JICA three (3) month after the Approval of the Project by the Japanese Government.
- 8.5 For the Project that has potential to result in involuntary resettlement, the Rwandan side confirmed to prepare a Resettlement Action Plan (RAP)/Abbreviated Resettlement Action Plan (ARAP) and make it available to the public. In addition, the Rwandan side confirmed to provide the affected people with sufficient compensation and/or support in accordance with RAP/ARAP, which is consistent with JICA Guidelines for Environmental and Social Considerations (April, 2010), in a timely manner.

## 9. Other Relevant Issues

### 9.1 Status of the Survey

The Team explained that the purpose of the Survey is to collect necessary information for evaluating the relevance, appropriateness and urgency of the Project and for analyzing power system in Kigali, and also to identify the issues to

be cleared for implementation of the Project. The Rwandan side has agreed to share all necessary information and data with the Team.

#### 9.2 Coordination among relevant Development Partners and agencies

The Team requested the Rwandan side to ensure coordination among relevant development partners and agencies for smooth implementation of the Project and the Rwandan side has agreed to it.

#### 9.3 Counterpart Personnel

The Team requested the Rwandan side that necessary number of counterpart personnel shall be assigned to the Team and necessary arrangements with related organizations be made during the Survey in Rwanda. The Rwandan side has agreed to it.

#### 9.4 Office Space

The Team requested the Rwandan side that necessary arrangement of office space for the Team during the Survey in Rwanda. The Rwandan side agreed to arrange it.

#### 9.5 Questionnaire

The Rwandan side shall answer to the Questionnaire submitted by the Team in English with relevant documents by 5<sup>th</sup> June.

#### 9.6 Additional proposal on Transmission reinforcement

EDCL proposed to reinforce capacity of the 110 kV transmission line between Birembo and Jabana Substations because of the increase of the load in the area to enable efficient power flow from Jabana to Gasogi via Birembo. Both sides agreed to include the item to the list of requests as item 5.1 (A) for necessary assessment.

#### 9.7 Undertakings to be taken by the Rwandan side

The Team requested the Rwandan side to secure the land and to take necessary procedures defined in Rwanda to obtain land title for New Gasogi Substation and 15 kV distribution line and 110 kV transmission line between Birembo and Jabana Substation right of way including resettlement action plan if required. The securing the land is necessary three (3) months after the Approval of the Project by the Japanese Government. The Rwandan side agreed to close contract with the land owner and make payment to keep above mentioned deadline.

#### 9.8 Delivery of the land for the Project for Improvement of Substations and Distribution Network Phase 2.

JICA requested the information on the current status of the land delivery for the Project for Improvement of Substations and Distribution Network Phase 2. The Rwandan side replied that the delivery of the land is expected to be done by 9th June 2017.

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Annex 1 Proposed Project Site

Annex 2 Organization Chart

Annex 3 Japanese Grant

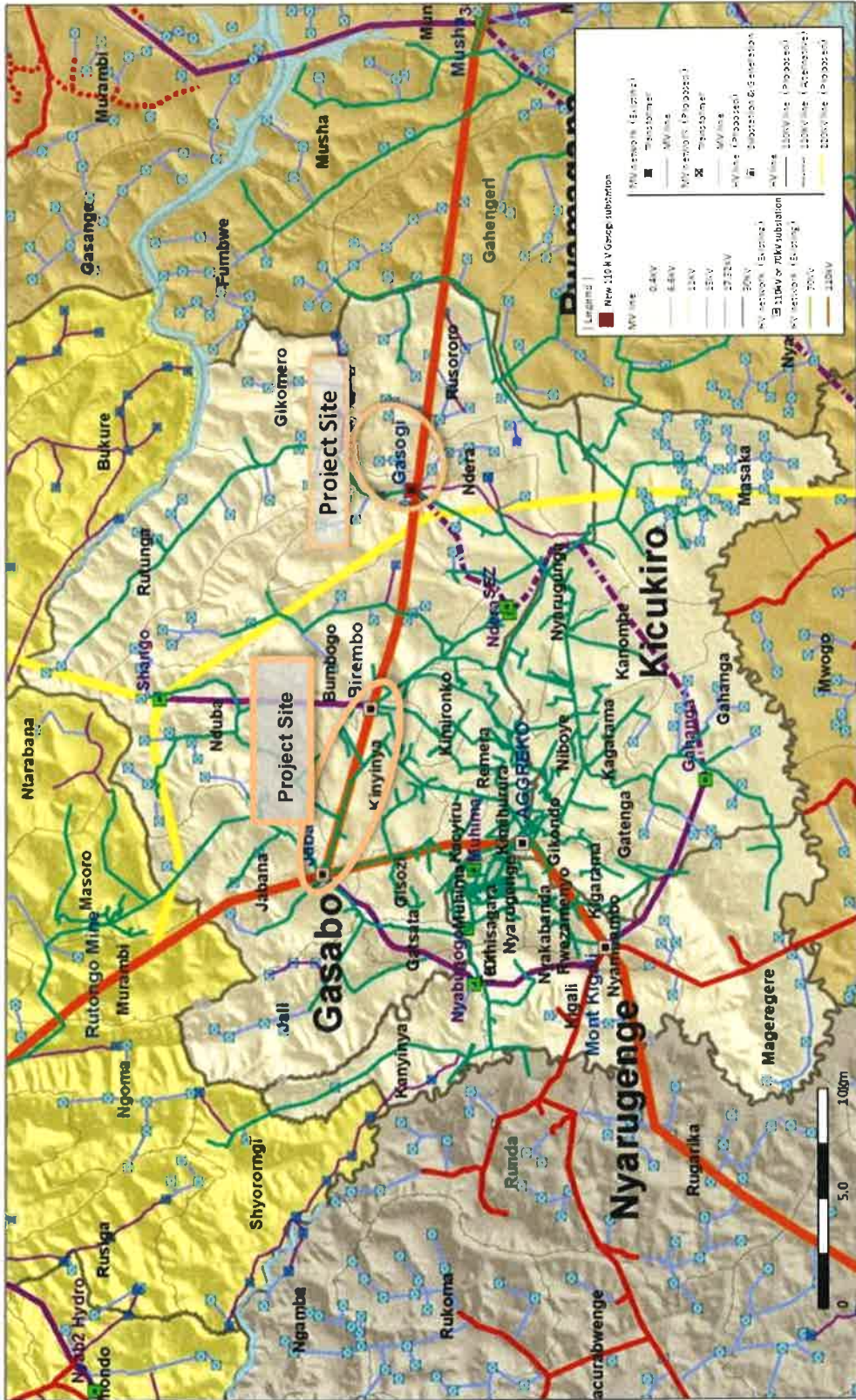
    Procedures of Japanese Grant

    Financial Flow of Japanese Grant (A/P Type)

Annex 4 Project Monitoring Report (template)

Annex 5 Major Undertakings to be taken by the Government of Rwanda

Annex 1 Proposed Project Site



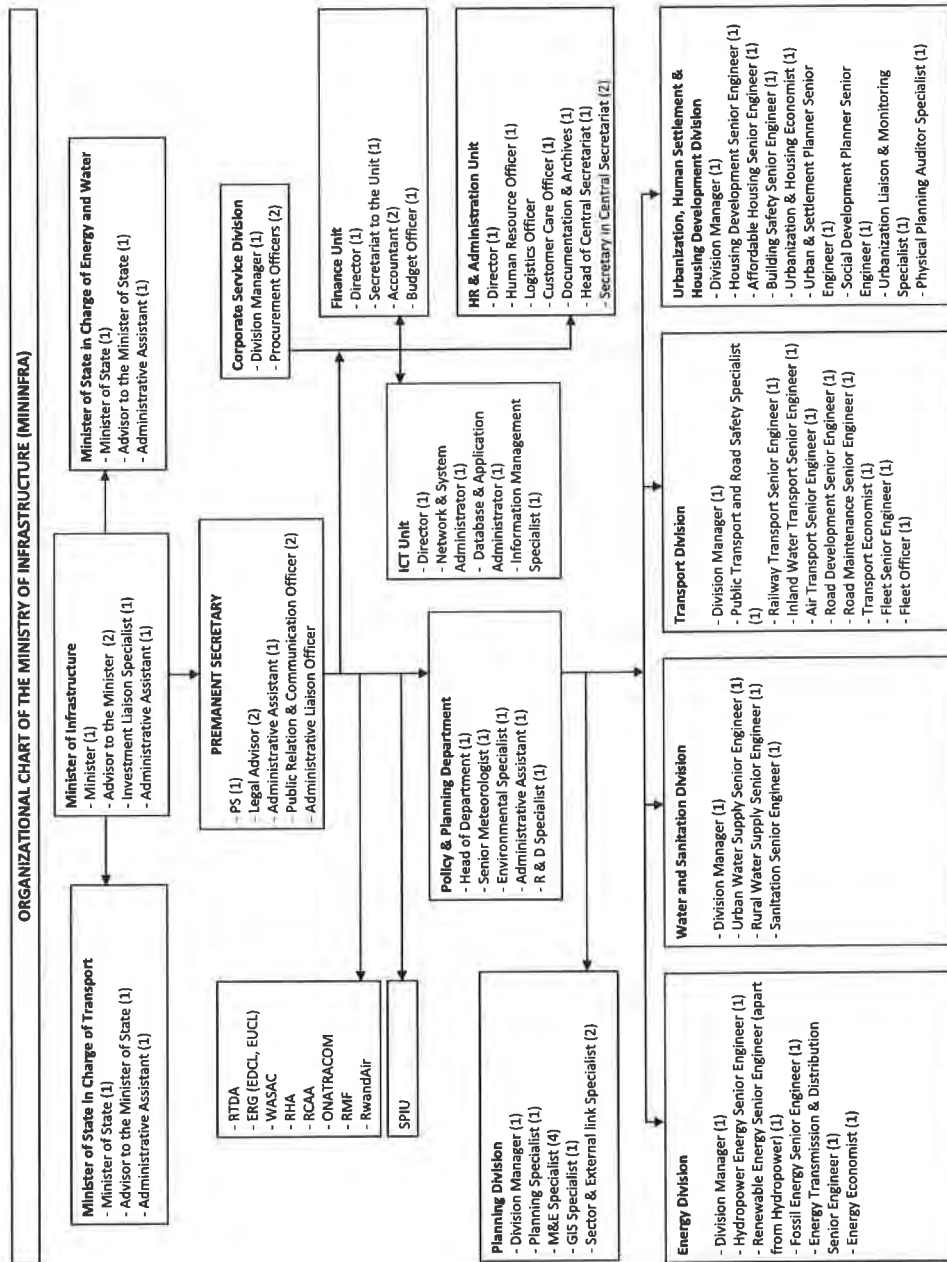
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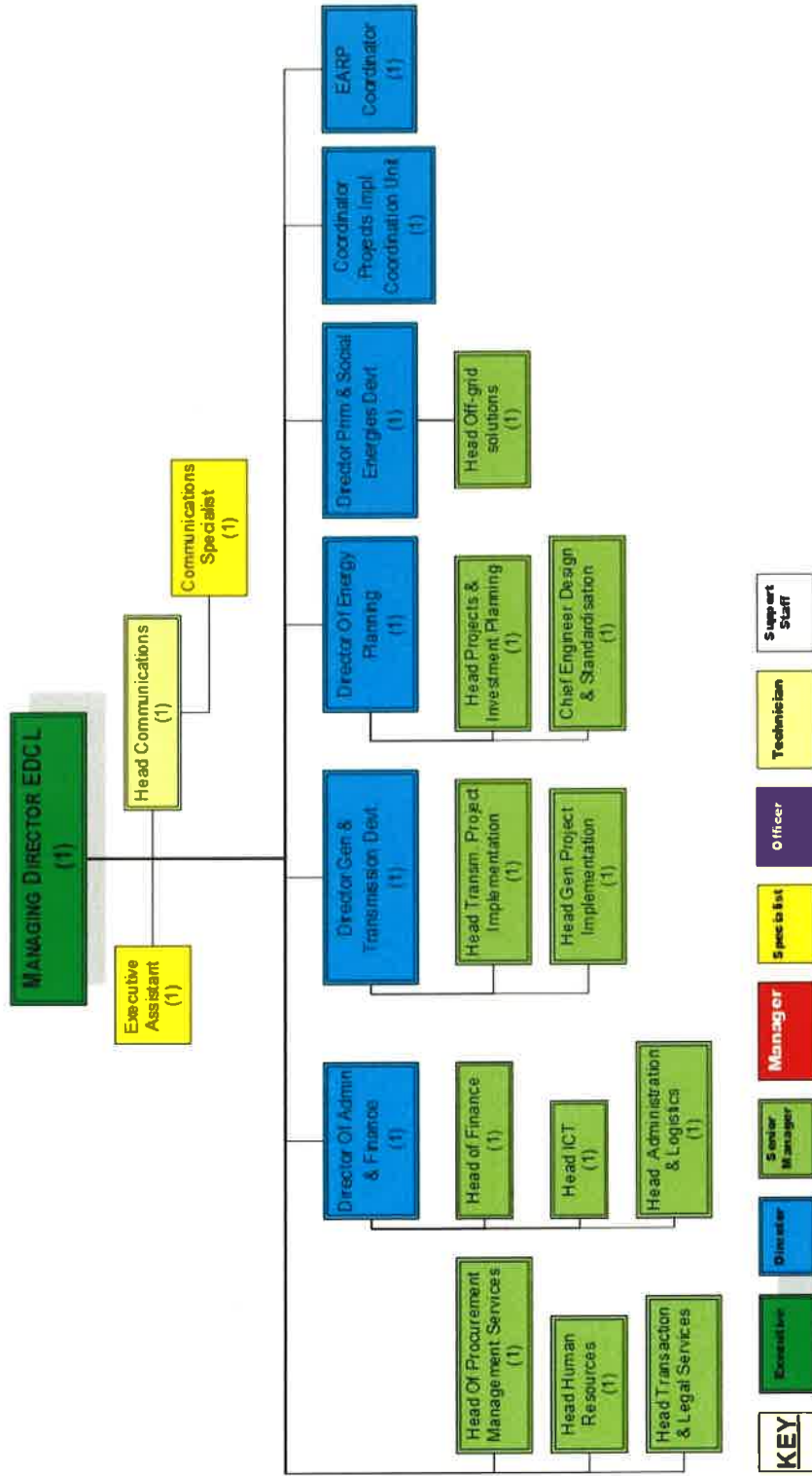
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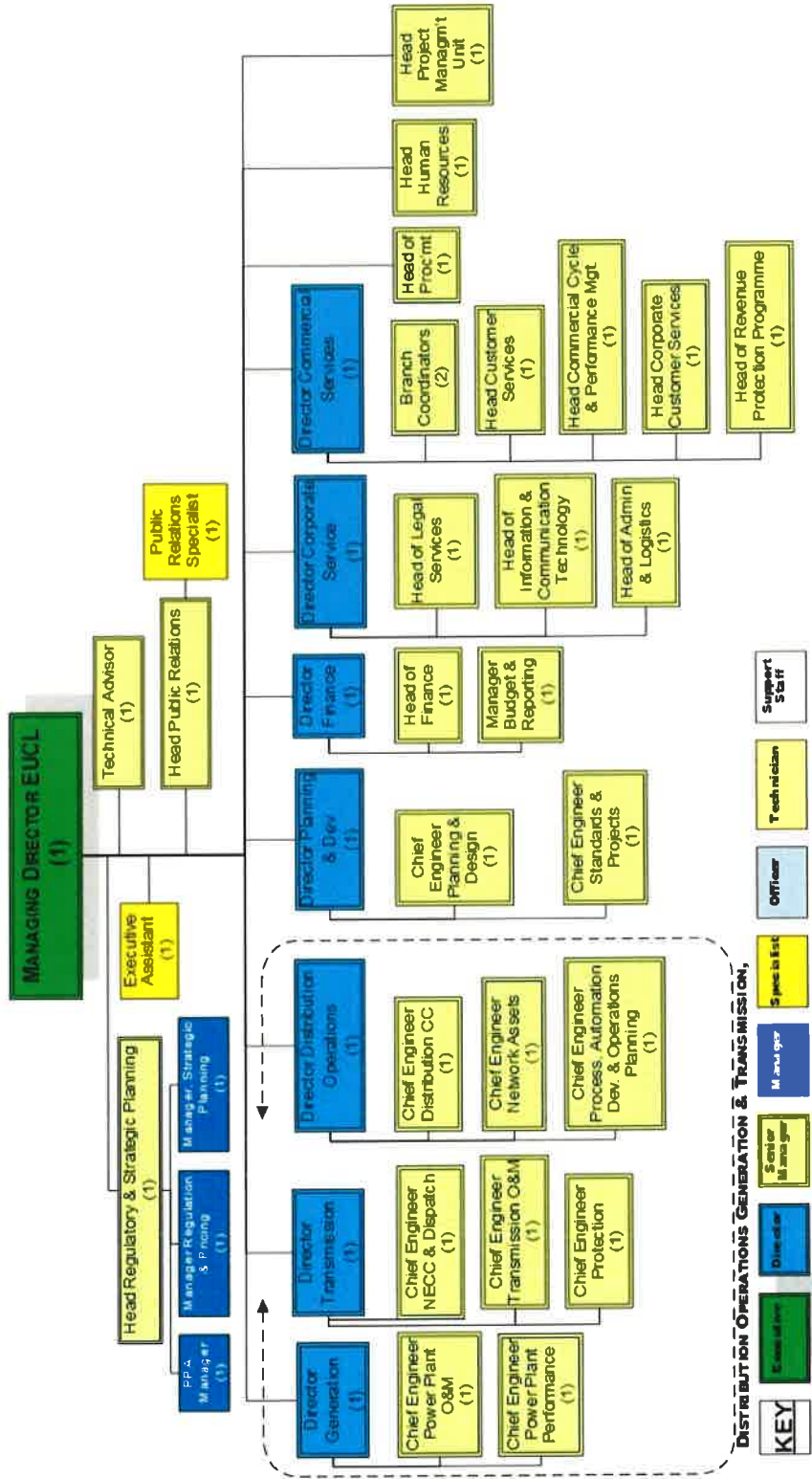
Annex 2 Organization Chart  
[MININFRA Organization Structure]



[EDCL Organization Structure (updated in 2017)]



[EUCL Organization Structure (updated in 2017)]



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## Annex 3 Japanese Grant

### JAPANESE GRANT

The Japanese Grant is non-reimbursable fund provided to a recipient country (hereinafter referred to as “the Recipient”) to purchase the products and/or services (engineering services and transportation of the products, etc.) for its economic and social development in accordance with the relevant laws and regulations of Japan. Followings are the basic features of the project grants operated by JICA (hereinafter referred to as “Project Grants”).

#### 1. Procedures of Project Grants

Project Grants are conducted through following procedures (See “PROCEDURES OF JAPANESE GRANT” for details):

(1) Preparation

- The Preparatory Survey (hereinafter referred to as “the Survey”) conducted by JICA

(2) Appraisal

-Appraisal by the government of Japan (hereinafter referred to as “GOJ”) and JICA, and Approval by the Japanese Cabinet

(3) Implementation

Exchange of Notes

-The Notes exchanged between the GOJ and the government of the Recipient

Grant Agreement (hereinafter referred to as “the G/A”)

-Agreement concluded between JICA and the Recipient

Banking Arrangement (hereinafter referred to as “the B/A”)

-Opening of bank account by the Recipient in a bank in Japan (hereinafter referred to as "the Bank") to receive the grant

Construction works/procurement

-Implementation of the project (hereinafter referred to as “the Project”) on the basis of the G/A

(4) Ex-post Monitoring and Evaluation

-Monitoring and evaluation at post-implementation stage

#### 2. Preparatory Survey

(1) Contents of the Survey



The aim of the Survey is to provide basic documents necessary for the appraisal of the the Project made by the GOJ and JICA. The contents of the Survey are as follows:

- Confirmation of the background, objectives, and benefits of the Project and also institutional capacity of relevant agencies of the Recipient necessary for the implementation of the Project.
- Evaluation of the feasibility of the Project to be implemented under the Japanese Grant from a technical, financial, social and economic point of view.
- Confirmation of items agreed between both parties concerning the basic concept of the Project.
- Preparation of an outline design of the Project.
- Estimation of costs of the Project.
- Confirmation of Environmental and Social Considerations

The contents of the original request by the Recipient are not necessarily approved in their initial form. The Outline Design of the Project is confirmed based on the guidelines of the Japanese Grant.

JICA requests the Recipient to take measures necessary to achieve 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 executing agency of the Project. Therefore, the contents of the Project are confirmed by all relevant organizations of the Recipient based on the Minutes of Discussions.

## (2) Selection of Consultants

For smooth implementation of the Survey, JICA contracts with (a) consulting firm(s). JICA selects (a) firm(s) based on proposals submitted by interested firms.

## (3) Result of the Survey

JICA reviews the report on the results of the Survey and recommends the GOJ to appraise the implementation of the Project after confirming the feasibility of the Project.

### 3. Basic Principles of Project Grants

## (1) Implementation Stage

### 1) The E/N and the G/A

After the Project is approved by the Cabinet of Japan, the Exchange of Notes (hereinafter referred to as "the E/N") will be signed between the GOJ and the Government of the Recipient to make a pledge for assistance, which is followed by the conclusion of the G/A between JICA and the Recipient to define the necessary articles, in accordance with the E/N, to implement the Project, such as conditions of disbursement, responsibilities of the Recipient, and procurement conditions. The terms and conditions generally applicable to the Japanese Grant are stipulated in the "General Terms and Conditions for Japanese Grant (January 2016)."

### 2) Banking Arrangements (B/A) (See "Financial Flow of Japanese Grant (A/P Type)" for details)

- a) The Recipient shall open an account or shall cause its designated authority to open an account under the name of the Recipient in the Bank, in principle. JICA will disburse the Japanese Grant in Japanese yen for the Recipient to cover the obligations incurred by the Recipient under the verified contracts.
- b) The Japanese Grant will be disbursed when payment requests are submitted by the Bank to JICA under an Authorization to Pay (A/P) issued by the Recipient.

### 3) Procurement Procedure

The products and/or services necessary for the implementation of the Project shall be procured in accordance with JICA's procurement guidelines as stipulated in the G/A.

### 4) Selection of Consultants

In order to maintain technical consistency, the consulting firm(s) which conducted the Survey will be recommended by JICA to the Recipient to continue to work on the Project's implementation after the E/N and G/A.

### 5) Eligible source country

In using the Japanese Grant disbursed by JICA for the purchase of products and/or services, the eligible source countries of such products and/or services shall be Japan and/or the Recipient. The Japanese Grant may be used for the purchase of the products and/or services of a third country as eligible, if necessary, taking into account the quality, competitiveness and economic rationality of products and/or services necessary for achieving the objective of the Project. However, the prime contractors, namely, constructing and procurement firms, and the prime consulting firm, which enter into contracts with the Recipient, are limited to "Japanese nationals", in principle.

### 6) Contracts and Concurrence by JICA

The Recipient will conclude contracts denominated in Japanese yen with Japanese nationals. Those contracts shall be concurred by JICA in order to be verified as eligible for using the Japanese Grant.

## 7) Monitoring

The Recipient is required to take their initiative to carefully monitor the progress of the Project in order to ensure its smooth implementation as part of their responsibility in the G/A, and to regularly report to JICA about its status by using the Project Monitoring Report (PMR).

## 8) Safety Measures

The Recipient must ensure that the safety is highly observed during the implementation of the Project.

## 9) Construction Quality Control Meeting

Construction Quality Control Meeting (hereinafter referred to as the "Meeting") will be held for quality assurance and smooth implementation of the Works at each stage of the Works. The member of the Meeting will be composed by the Recipient (or executing agency), the Consultant, the Contractor and JICA. The functions of the Meeting are as followings:

- a) Sharing information on the objective, concept and conditions of design from the Contractor, before start of construction.
- b) Discussing the issues affecting the Works such as modification of the design, test, inspection, safety control and the Client's obligation, during of construction.

## (2) Ex-post Monitoring and Evaluation Stage

- 1) After the project completion, JICA will continue to keep in close contact with the Recipient in order to monitor that the outputs of the Project is used and maintained properly to attain its expected outcomes.
- 2) In principle, JICA will conduct ex-post evaluation of the Project after three years from the completion. It is required for the Recipient to furnish any necessary information as JICA may reasonably request.

## (3) Others

- 1) Environmental and Social Considerations

The Recipient shall carefully consider environmental and social impacts by the Project and must comply with the environmental regulations of the Recipient and JICA Guidelines for Environmental and Social Considerations (April, 2010).

2) Major undertakings to be taken by the Government of the Recipient

For the smooth and proper implementation of the Project, the Recipient is required to undertake necessary measures including land acquisition, and bear an advising commission of the A/P and payment commissions paid to the Bank as agreed with the GOJ and/or JICA. The Government of the Recipient shall ensure that customs duties, internal taxes and other fiscal levies which may be imposed in the Recipient with respect to the purchase of the Products and/or the Services be exempted or be borne by its designated authority without using the Grant and its accrued interest, since the grant fund comes from the Japanese taxpayers.

3) Proper Use

The Recipient is required to maintain and use properly and effectively the products and/or services under the Project (including the facilities constructed and the equipment purchased), to assign staff necessary for this operation and maintenance and to bear all the expenses other than those covered by the Japanese Grant.

4) Export and Re-export

The products purchased under the Japanese Grant should not be exported or re-exported from the Recipient.



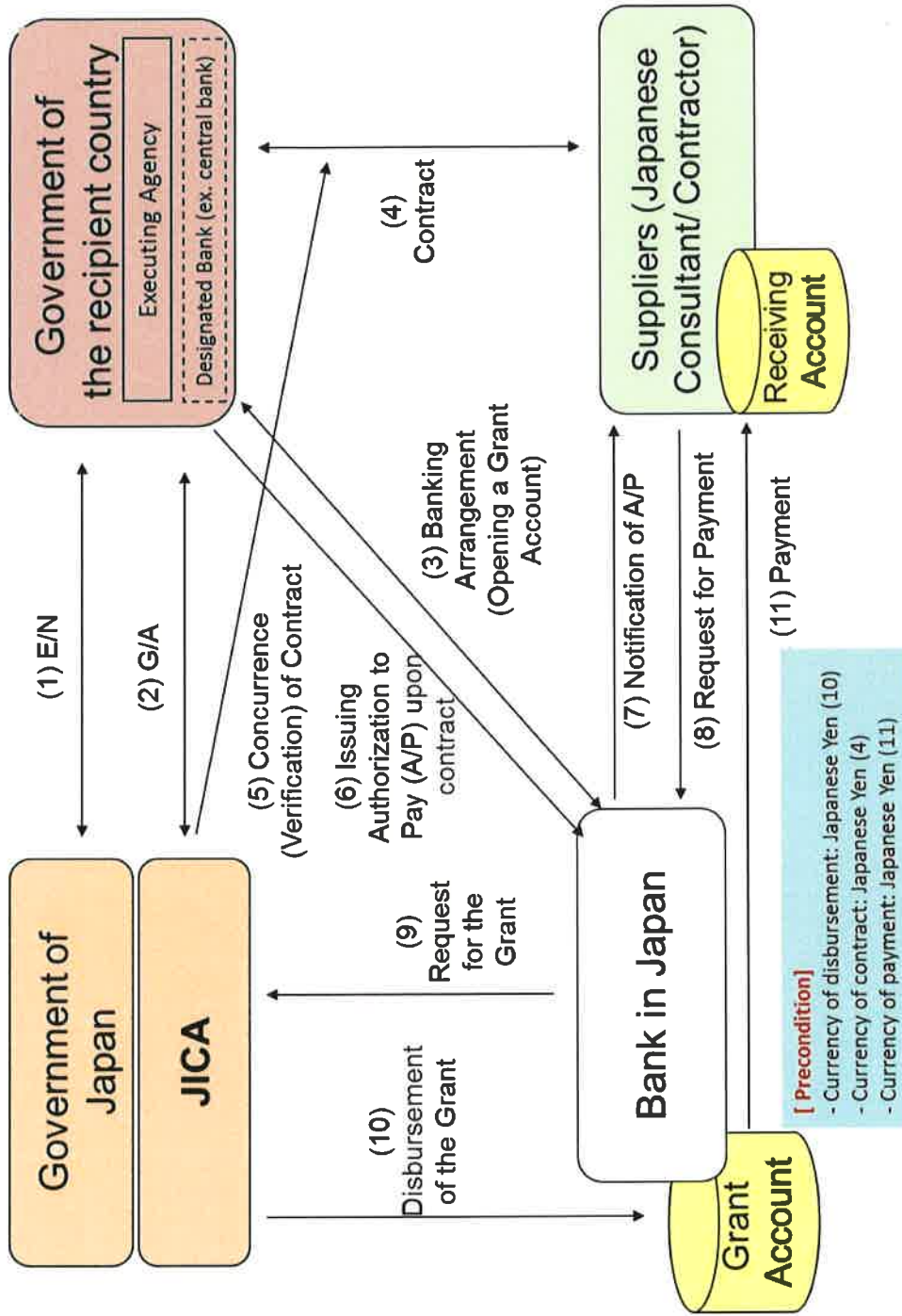
## PROCEDURES OF JAPANESE GRANT

| Stage                              | Procedures   | Remarks  | Recipient Government | Japanese Government | JICA    | Consultants | Contractors | Agent Bank |
|------------------------------------|--|--|----------------------|---------------------|---------|-------------|-------------|------------|
| Official Request                   | Request for grants through diplomatic channel  | Request shall be submitted before appraisal stage.   | x                    | x                   |         |             |             |            |
| 1. Preparation                     | (1) Preparatory Survey<br>Preparation of outline design and cost estimate                                  |  | x                    |                     | x       | x           |             |            |
| 2. Appraisal                       | (2) Preparatory Survey<br>Explanation of draft outline design, including cost estimate, undertakings, etc. |  | x                    |                     | x       | x           |             |            |
|                                    | (3) Agreement on conditions for implementation   | Conditions will be explained with the draft notes (E/N) and Grant Agreement (G/A) which will be signed before approval by Japanese government. | x                    | x (E/N)             | x (G/A) |             |             |            |
|                                    | (4) Approval by the Japanese cabinet   |  |                      | x                   |         |             |             |            |
| 3. Implementation                  | (5) Exchange of Notes (E/N)  |  | x                    | x                   |         |             |             |            |
|                                    | (6) Signing of Grant Agreement (G/A)   |  | x                    |                     | x       |             |             |            |
|                                    | (7) Banking Arrangement (B/A)  | Need to be informed to JICA  | x                    |                     |         |             |             | x          |
|                                    | (8) Contracting with consultant and issuance of Authorization to Pay (A/P)                                 | Concurrence by JICA is required  | x                    |                     |         | x           |             | x          |
|                                    | (9) Detail design (D/D)  |  | x                    |                     |         | x           |             |            |
|                                    | (10) Preparation of bidding documents  | Concurrence by JICA is required  | x                    |                     |         | x           |             |            |
|                                    | (11) Bidding   | Concurrence by JICA is required  | x                    |                     |         | x           | x           |            |
|                                    | (12) Contracting with contractor/supplier and issuance of A/P  | Concurrence by JICA is required  | x                    |                     |         |             | x           | x          |
|                                    | (13) Construction works/procurement  | Concurrence by JICA is required for major modification of design and amendment of contracts.   | x                    |                     |         | x           | x           |            |
|                                    | (14) Completion certificate  |  | x                    |                     |         | x           | x           |            |
| 4. Ex-post monitoring & evaluation | (15) Ex-post monitoring  | To be implemented generally after 1, 3, 10 years of completion, subject to change  | x                    |                     | x       |             |             |            |
|                                    | (16) Ex-post evaluation  | To be implemented basically after 3 years of completion  | x                    |                     | x       |             |             |            |

notes:

1. Project Monitoring Report and Report for Project Completion shall be submitted to JICA as agreed in the G/A
2. Concurrence by JICA is required for allocation of grant for remaining amount and/or contingencies as agreed in the G/A.

# Financial Flow of Japanese Grant (A/P Type)



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|                               |  |
|-------------------------------|--|
| <b>1: Project Description</b> |  |
|-------------------------------|--|

**1-1 Project Objective**

|  |
|--|
|  |
|--|

**1-2 Project Rationale**

- Higher-level objectives to which the project contributes (national/regional/sectoral policies and strategies)
- Situation of the target groups to which the project addresses

|  |
|--|
|  |
|--|

**1-3 Indicators for measurement of “Effectiveness”**

| Quantitative indicators to measure the attainment of project objectives |                     |                   |
|---|---------------------|-------------------|
| Indicators  | Original (Yr      ) | Target (Yr      ) |
|   |                     |                   |
|   |                     |                   |
|   |                     |                   |
| Qualitative indicators to measure the attainment of project objectives  |                     |                   |
|   |                     |                   |

|                                  |
|----------------------------------|
| <b>2: Details of the Project</b> |
|----------------------------------|

**2-1 Location**

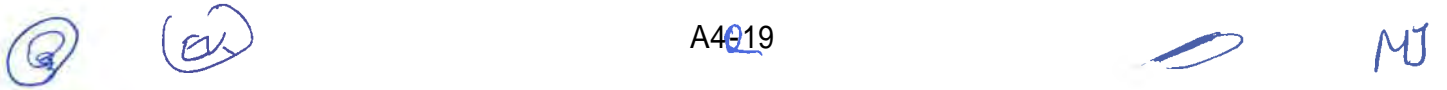
| Components | Original<br><i>(proposed in the outline design)</i> | Actual |
|------------|---|--------|
| 1.         |   |        |
|            |   |        |

**2-2 Scope of the work**

| Components | Original*<br><i>(proposed in the outline design)</i> | Actual* |
|------------|--|---------|
| 1.         |  |         |
|            |  |         |
|            |  |         |

Reasons for modification of scope (if any).

|       |
|-------|
| (PMR) |
|-------|





**2-3 Implementation Schedule**

| Items | Original                                |   | Actual |
|-------|---|---|--------|
|       | <i>(proposed in the outline design)</i> | <i>(at the time of signing the Grant Agreement)</i> |        |
|       |   |   |        |

Reasons for any changes of the schedule, and their effects on the project (if any)

|  |
|--|
|  |
|--|

**2-4 Obligations by the Recipient**

**2-4-1 Progress of Specific Obligations**

See Attachment 2.

**2-4-2 Activities**

See Attachment 3.

**2-4-3 Report on RD**

See Attachment 11.

**2-5 Project Cost**

**2-5-1 Cost borne by the Grant(Confidential until the Bidding)**

| Components |   |  | Cost<br>(Million Yen)  |        |
|------------|---|--|--|--------|
|            | Original<br><i>(proposed in the outline design)</i> | Actual<br><i>(in case of any modification)</i> | Original <sup>1),2)</sup><br><i>(proposed in the outline design)</i> | Actual |
|            | 1.  |  |  |        |
|            |   |  |  |        |
|            |   |  |  |        |
| Total      |   |  |  |        |

Note: 1) Date of estimation:

2) Exchange rate: 1 US Dollar = Yen

**2-5-2 Cost borne by the Recipient**

| Components |   |  | Cost<br>(1,000 Taka)   |        |
|------------|---|--|--|--------|
|            | Original<br><i>(proposed in the outline design)</i> | Actual<br><i>(in case of any modification)</i> | Original <sup>1),2)</sup><br><i>(proposed in the outline design)</i> | Actual |
|            | 1.  |  |  |        |
|            |   |  |  |        |
|            |   |  |  |        |

Note: 1) Date of estimation:



2) Exchange rate: 1 US Dollar =

Reasons for the remarkable gaps between the original and actual cost, and the countermeasures (if any)

(PMR)

**2-6 Executing Agency**

- Organization's role, financial position, capacity, cost recovery etc,
- Organization Chart including the unit in charge of the implementation and number of employees.

**Original** (at the time of outline design)

name:

role:

financial situation:

institutional and organizational arrangement (organogram):

human resources (number and ability of staff):

**Actual** (PMR)

**2-7 Environmental and Social Impacts**

- The results of environmental monitoring based on Attachment 5 (in accordance with Schedule 4 of the Grant Agreement).
- The results of social monitoring based on in Attachment 5 (in accordance with Schedule 4 of the Grant Agreement).
- Disclosed information related to results of environmental and social monitoring to local stakeholders (whenever applicable).

**3: Operation and Maintenance (O&M)**

**3-1 Physical Arrangement**

- Plan for O&M (number and skills of the staff in the responsible division or section, availability of manuals and guidelines, availability of spareparts, etc.)

**Original** (at the time of outline design)

**Actual** (PMR)

**3-2 Budgetary Arrangement**

- Required O&M cost and actual budget allocation for O&M

**Original** (at the time of outline design)

**Actual** (PMR)

#### 4: Potential Risks and Mitigation Measures

- Potential risks which may affect the project implementation, attainment of objectives, sustainability
- Mitigation measures corresponding to the potential risks

##### Assessment of Potential Risks *(at the time of outline design)*

| Potential Risks                            | Assessment                                       |
|--|--|
| 1. (Description of Risk)                   | Probability: High/Moderate/Low                   |
|  | Impact: High/Moderate/Low                        |
|  | Analysis of Probability and Impact:              |
|  |  |
|  | Mitigation Measures:                             |
|  |  |
|  | Action required during the implementation stage: |
| 2. (Description of Risk)                   | Probability: High/Moderate/Low                   |
|  | Impact: High/Moderate/Low                        |
|  | Analysis of Probability and Impact:              |
|  |  |
|  | Mitigation Measures:                             |
|  |  |
|  | Action required during the implementation stage: |
| 3. (Description of Risk)                   | Probability: High/Moderate/Low                   |
|  | Impact: High/Moderate/Low                        |
|  | Analysis of Probability and Impact:              |
|  |  |
|  | Mitigation Measures:                             |
|  |  |
|  | Action required during the implementation stage: |
| Contingency Plan (if applicable):          |  |
| Actual Situation and Countermeasures (PMR) |  |

**5: Evaluation and Monitoring Plan (after the work completion)**

**5-1 Overall evaluation**

Please describe your overall evaluation on the project.

**5-2 Lessons Learnt and Recommendations**

Please raise any lessons learned from the project experience, which might be valuable for the future assistance or similar type of projects, as well as any recommendations, which might be beneficial for better realization of the project effect, impact and assurance of sustainability.

**5-3 Monitoring Plan of the Indicators for Post-Evaluation**

Please describe monitoring methods, section(s)/department(s) in charge of monitoring, frequency, the term to monitor the indicators stipulated in 1-3.

Q

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Attachment

1. Project Location Map
  2. Specific obligations of the Recipient which will not be funded with the Grant
  3. Monthly Report submitted by the Consultant
- Appendix - Photocopy of Contractor's Progress Report (if any)
- Consultant Member List
  - Contractor's Main Staff List
4. Check list for the Contract (including Record of Amendment of the Contract/Agreement and Schedule of Payment)
  5. Environmental Monitoring Form / Social Monitoring Form
  6. Monitoring sheet on price of specified materials (Quarterly)
  7. Report on Proportion of Procurement (Recipient Country, Japan and Third Countries) (PMR (final) only)
  8. Pictures (by JPEG style by CD-R) (PMR (final) only)
  9. Equipment List (PMR (final) only)
  10. Drawing (PMR (final) only)
  11. Report on RD (After project)

### Annex 5 Major Undertakings to be taken by the Government of Rwanda

| No. | Items  | To be covered by Grant Aid | To be covered by Recipient Side |
|-----|--|----------------------------|---------------------------------|
| 1   | to secure lots of land necessary for the implementation of the Project and to clear the sites;   |                            | ●                               |
| 2   | To construct the following facilities  |                            |                                 |
|     | 1) The building  | ●                          |                                 |
|     | 2) The gates and fences in and around the site   |                            | ●                               |
|     | 3) The parking lot   | ●                          |                                 |
|     | 4) The road within the site  | ●                          |                                 |
|     | 5) The road outside the site (including Access road)   |                            | ●                               |
| 3   | To provide facilities for distribution of electricity, water supply and drainage and other incidental facilities necessary for the implementation of the Project outside the sites   |                            |                                 |
|     | 1) Electricity   |                            |                                 |
|     | a. The distributing power line to the site   |                            | ●                               |
|     | b. The drop wiring and internal wiring within the site   | ●                          |                                 |
|     | c. The main circuit breaker and transformer  | ●                          |                                 |
|     | 2) Water Supply  |                            |                                 |
|     | a. The city water distribution main to the site  |                            | ●                               |
|     | b. The supply system within the site (receiving and elevated tanks)  | ●                          |                                 |
|     | 3) Drainage  |                            |                                 |
|     | a. The city drainage main (for storm sewer and others to the site)   |                            | ●                               |
|     | b. The drainage system (for toilet sewer, common waste, storm drainage and others) within the site   | ●                          |                                 |
|     | 4) Gas Supply  |                            |                                 |
|     | a. The city gas main to the site   |                            | ●                               |
|     | b. The gas supply system within the site   | ●                          |                                 |
|     | 5) Telephone System  |                            |                                 |
|     | a. The telephone trunk line to the main distribution frame/panel (MDF) of the building   |                            | ●                               |
|     | b. The MDF and the extension after the frame/panel   | ●                          |                                 |
|     | 6) Furniture and Equipment   |                            |                                 |
|     | a. General furniture   |                            | ●                               |
|     | b. Project equipment   | ●                          |                                 |
| 4   | To ensure prompt unloading and customs clearance of the products at ports of disembarkation in the recipient country and to assist internal transportation of the products   |                            |                                 |
|     | 1) Marine (Air) transportation of the Products from Japan to the recipient country   | ●                          |                                 |
|     | 2) Tax exemption and custom clearance of the Products at the port of disembarkation  |                            | ●                               |
|     | 3) Internal transportation from the port of disembarkation to the project site   | ●                          |                                 |
| 5   | To ensure that customs duties, internal taxes and other fiscal levies which may be imposed in the recipient country with respect to the purchase of the products and the services be exempted  |                            | ●                               |
| 6   | To accord Japanese nationals whose services may be required in connection with the supply of the products and the services such facilities as may be necessary for their entry into the recipient country and stay therein for the performance of their work |                            | ●                               |
| 7   | To ensure that the Facilities and the products be maintained and used properly and effectively for the implementation of the Project   |                            | ●                               |
| 8   | To bear all the expenses, other than those covered by the Grant, necessary for the implementation of the Project   |                            | ●                               |
| 9   | To bear the following commissions paid to the Japanese bank for banking services based upon the B/A  |                            |                                 |
|     | 1) Advising commission of A/P  |                            | ●                               |
|     | 2) Payment commission  |                            | ●                               |
| 10  | To give due environmental and social consideration in the implementation of the Project.   |                            | ●                               |

## 4.2 Second Field Survey

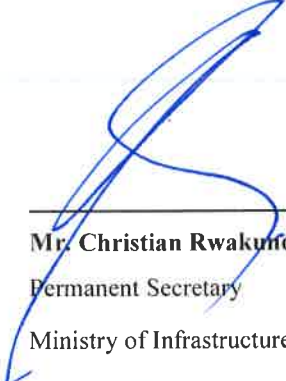

### Minutes of Discussions on the Preparatory Survey for the Project for Improvement of Substations and Distribution Network Phase 3 in the Republic of Rwanda (Explanation on Draft Preparatory Survey Report)


With reference to the minutes of discussions signed between the Rwandan Authorities and the Japan International Cooperation Agency (hereinafter referred to as "JICA") on 1<sup>st</sup> June, 2017 and in response to the request from the Government of the Republic of Rwanda (hereinafter referred to as "Rwanda") dated 14th September 2016, JICA dispatched the Preparatory Survey Team (hereinafter referred to as "the Team") for the explanation of Draft Preparatory Survey Report (hereinafter referred to as "the Draft Report") for the Project for Improvement of Substations and Distribution Network Phase 3 in the Republic of Rwanda (hereinafter referred to as "the Project"), headed by Mr. Tomonori NAGASE, Senior Representative, JICA Rwanda Office, from 11<sup>th</sup> December 2017 to 15th December, 2017.


As a result of the discussions, both sides agreed on the main items described in the attached sheets.

Kigali, 20<sup>th</sup> December, 2017

  
  
**Mr. Tomonori Nagase**  
Senior Representative  
Rwanda Office  
Japan International Cooperation Agency

  
  
**Mr. Christian Rwakufda**  
Permanent Secretary  
Ministry of Infrastructure  
The Republic of Rwanda

  
**Mr. Ronald Nkusi**  
Division Manager  
External Finance Division  
Ministry of Finance and  
Economic Planning  
The Republic of Rwanda

  
  
**Mr. Yves Nshuti**  
Acting Managing Director  
Energy Development Corporation Limited  
Rwanda Energy Group.

  
  
**Maj. Jean Claude Kalisa**  
Managing Director  
Energy Utility Corporation Limited  
Rwanda Energy Group.

## ATTACHMENT

### 1. Contents of the Draft Report

After the explanation of the contents of the Draft Report by the Team, the Rwandan side agreed to its contents.

### 2. Cost estimate

Both sides confirmed that the cost estimate described in the Draft Report and Annex 10 is provisional and will be examined further by the Government of Japan for its approval.

Both sides confirmed that the cost estimate including the contingency described in the Draft Report is provisional and will be examined further by the Government of Japan for its approval. The contingency would cover the additional cost against natural disaster, unexpected natural conditions, etc.

### 3. Confidentiality of the cost estimate and technical specifications

Both sides confirmed that the cost estimate and technical specifications in the Draft Report should never be duplicated or disclosed to any third parties until all the contracts under the Project are concluded.

### 4. Procedures and Basic Principles of Japanese Grant

The Rwandan side agreed that the procedures and basic principles of Japanese Grant as described in Annex 2 shall be applied to the Project. In addition, the Rwandan side agreed to take necessary measures according to the procedures.

### 5. Timeline for the project implementation

The Team explained to the Rwandan side that the expected timeline for the project implementation is as attached in Annex 3.

### 6. Expected outcomes and indicators

Both sides agreed that key indicators for expected outcomes are as follows. The Rwandan side will be responsible for the achievement of agreed key indicators targeted in year 2023 and shall monitor the progress based on those indicators.

[Quantitative indicators]

| Outcome Indicator  | Base Value<br>(2017 Current<br>Value) | Target Value(2023)<br>(3 years after the<br>completion of the<br>Project) |
|--|---------------------------------------|---|
| 1. Facility capacity of Transformers in Gasogi S/S (MVA) | 10MVA                                 | 30MVA   |

2



|   |           |           |
|---|-----------|-----------|
| 2. Annual Electricity Supply from Gasogi S/S(MWh) | 13,469MWh | 86,724MWh |
|---|-----------|-----------|

[Qualitative indicators]

| Present Status and Problems   | Project Countermeasures (Grant Aid Project)  | Extent of Project Effects and Improvement   |
|---|--|---|
| 1. The power demand in Gasogi area has been rapidly increasing, but the present capacity of power transformer is not sufficient and aging. It is a major cause of the unstable power supply and transmission and distribution network loss. | Procurement and installation of the following equipment:<br><b>1. 110 kV Substation equipment</b><br>• 30 MVA = 15 MVA × 2 banks<br><br><b>2. 110 kV Transmission and 15 kV distribution equipment</b><br>• 110 kV overhead line (Approx. 0.2 km)<br>• 15 kV overhead line (Approx. 20 km) | 1. Stable power supply will revitalize the industries and economic activities in Kigali and improve stable operation of public welfare facilities and healthcare services as well as the living environment of local residents.<br><br>2. The demand factors for Gikondo substation and Birembo substation will be decreased compare to the case without the Project. |

7. Undertakings of the Project

Both sides confirmed the undertakings of the Project as described in Annex 4. With regard to exemption of customs duties, internal taxes and other fiscal levies as stipulated in the “Item 4 During the Project Implementation” of Annex 4, both sides confirmed that such customs duties, internal taxes and other fiscal levies include VAT, commercial tax, income tax and corporate tax, which shall be clarified in the bid documents by the Executing Agency during the implementation stage of the Project.

The Rwandan side assured to take the necessary measures and coordination including allocation of the necessary budget which are preconditions of implementation of the Project. It is further agreed that the costs are indicative, i.e. at Outline Design level. More accurate costs will be calculated at the Detailed Design stage.

Both sides also confirmed that the Annex 4 will be used as an attachment of G/A.

8. Monitoring during the implementation

The Project will be monitored by the Executing Agency and reported to JICA by using the form of Project Monitoring Report (PMR) attached as Annex 5. The timing of submission of the PMR is described in Annex 4.

9. Project completion

Both sides confirmed that the project completes when all the facilities constructed and equipment procured by the grant are in operation. The completion of the Project will be reported to JICA promptly, but in any event not later than six months after completion of the Project.

2

10. Ex-Post Evaluation

JICA will conduct ex-post evaluation after three (3) years from the project completion, in principle, with respect to five evaluation criteria (Relevance, Effectiveness, Efficiency, Impact, Sustainability). The result of the evaluation will be publicized. The Rwandan side is required to provide necessary support for the data collection.

11. Items and measures to be considered for the smooth implementation of the Project

Both sides confirmed the items and measures to be considered for the smooth implementation of the Project were not raised in particular.

12. Schedule of the Study

JICA will finalize the Preparatory Survey Report based on the confirmed items. The report will be sent to the Rwandan side around April 2018.

13. Environmental and Social Considerations

13-1 General Issues

13-1-1 Environmental Guidelines and Environmental Category

The Team explained that 'JICA Guidelines for Environmental and Social Considerations (April 2010)' (hereinafter referred to as "the Guidelines") is applicable for the Project. The Project is categorized as B because the Project is neither located in a sensitive area, nor has its sensitive characteristics, further nor falls into sensitive sectors under the Guidelines, and its potential adverse impacts on the environment are not likely to be significant.

13-1-2 Environmental Checklist

The environmental and social considerations including major impacts and mitigation measures for the Project are summarized in the Environmental Checklist attached as Annex 6. Both sides confirmed that in case of major modification of the content of the Environmental Checklist, the Rwandan side shall submit the modified version to JICA in a timely manner.

13-2 Environmental Issues

13-2-1 Environmental Impact Assessment (EIA)

Both sides confirmed the EIA report has been approved by Rwanda Development Board in September 2017.

The Rwandan side agreed JICA's disclosure of provided EIA report on its website.

13-2-2 Environmental Management Plan and Environmental Monitoring Plan

Both sides confirmed Environmental Management Plan (EMP) and Environmental Monitoring Plan (EMoP) of the Project is as Annex 7, respectively. Both sides agreed that environmental

mitigation measures and monitoring shall be conducted based on the EMP and EMoP, which may be updated during the detailed design stage.

### 13-3 Social Issues

#### 13-3-1 Land Acquisition and Resettlement

Both sides confirmed the 33,333 m<sup>2</sup> of land would be acquired and 16 Households would be /affected due to the implementation of the Project.

Such land acquisition and resettlement shall be implemented based on the (Abbreviated) Resettlement Action Plan (RAP) as Annex 8 which was prepared in line with the Guidelines and authorized by the Rwandan side in May 2018.

### 13-4 Environmental and Social Monitoring

#### 13-4-1 Environmental Monitoring

Both sides agreed that the EDCL will submit results of environmental monitoring to JICA with PMR by using the monitoring form attached as Annex 9. The timing of submission of the monitoring form is described in Annex 4.

#### 13-4-2 Social Monitoring

Both sides confirmed that the EDCL will implement social monitoring about land acquisition and resettlement plan proposed in the RAP. The Rwandan side and the Team agreed that EDCL will submit results of social monitoring to JICA with PMR by using the monitoring form attached as Annex 9.

#### 13-4-3 Information Disclosure of Monitoring Results

Both sides confirmed that the Rwandan side will disclose results of environmental and social monitoring to local stakeholders in their field offices.

The Rwandan side agreed JICA will disclose results of environmental and social monitoring submitted by the Rwandan side as the monitoring forms attached as Annex 9 on its website.

## 14. Other Relevant Issues

### 14-1. Disclosure of Information

Both sides confirmed that the Preparatory Survey Report from which project cost is excluded will be disclosed to the public after completion of the Preparatory Survey. The comprehensive report including the project cost will be disclosed to the public after all the contracts under the Project are concluded.

Annex 1 Project Site

Annex 2 Japanese Grant

Annex 3 Project Implementation Schedule

Annex 4 Major Undertakings to be taken by the Government of Rwanda

Annex 5 Project Monitoring Report (template)

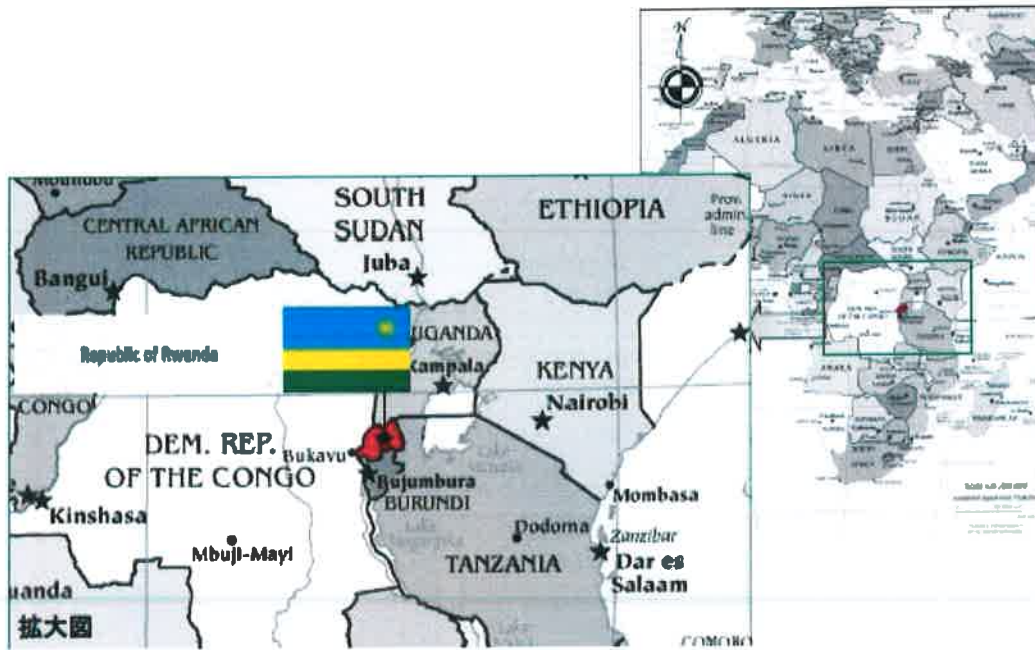
Annex 6 Environmental Check List

Annex 7 Environmental Management Plan/Environmental Monitoring Plan

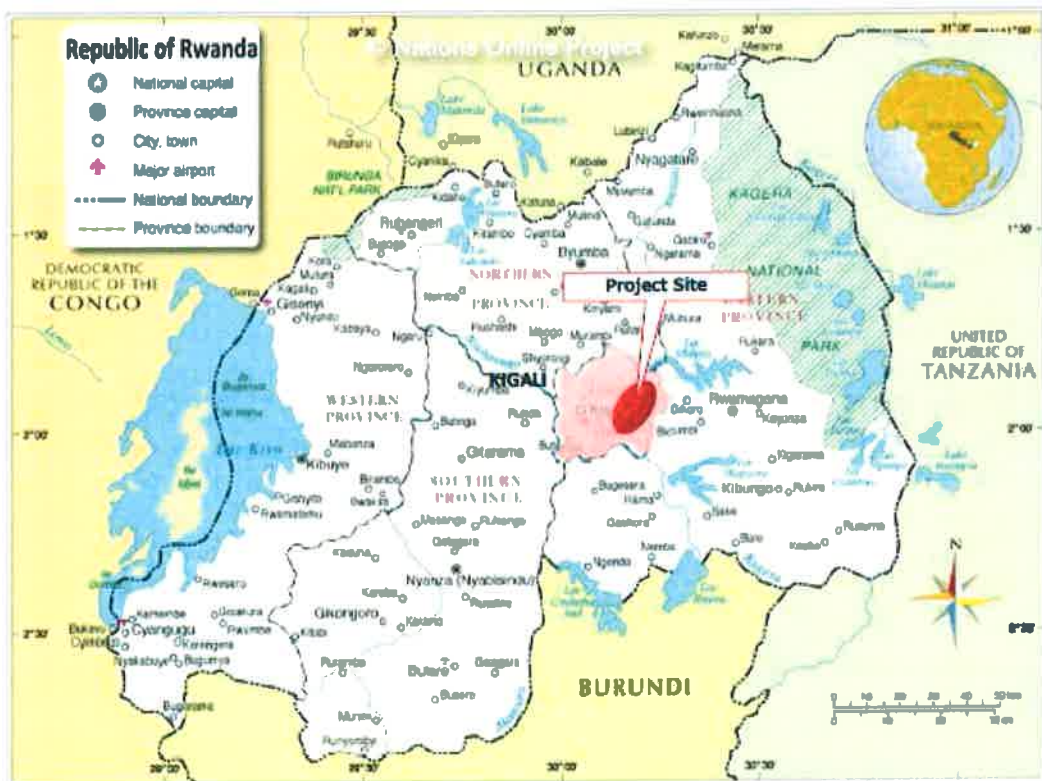
Annex 8 (Abbreviated) Resettlement Action Plan  
Annex 9 Environmental and Social Monitoring Form  
Annex 10 Project Cost Estimation

2

Annex 1 Project Site



■ Map of Africa



2

## Annex 2 Japanese Grant

### JAPANESE GRANT

The Japanese Grant is non-reimbursable fund provided to a recipient country (hereinafter referred to as “the Recipient”) to purchase the products and/or services (engineering services and transportation of the products, etc.) for its economic and social development in accordance with the relevant laws and regulations of Japan. Followings are the basic features of the project grants operated by JICA (hereinafter referred to as “Project Grants”).

#### 1. Procedures of Project Grants

Project Grants are conducted through following procedures (See “PROCEDURES OF JAPANESE GRANT” for details):

##### (1) Preparation

- The Preparatory Survey (hereinafter referred to as “the Survey”) conducted by JICA

##### (2) Appraisal

- Appraisal by the government of Japan (hereinafter referred to as “GOJ”) and JICA, and Approval by the Japanese Cabinet

##### (3) Implementation

Exchange of Notes

- The Notes exchanged between the GOJ and the government of the Recipient

Grant Agreement (hereinafter referred to as “the G/A”)

- Agreement concluded between JICA and the Recipient

Banking Arrangement (hereinafter referred to as “the B/A”)

- Opening of bank account by the Recipient in a bank in Japan (hereinafter referred to as “the Bank”) to receive the grant

Construction works/procurement

- Implementation of the project (hereinafter referred to as “the Project”) on the basis of the G/A

##### (4) Ex-post Monitoring and Evaluation

- Monitoring and evaluation at post-implementation stage

#### 2. Preparatory Survey

##### (1) Contents of the Survey

The aim of the Survey is to provide basic documents necessary for the appraisal of the the Project made by the GOJ and JICA. The contents of the Survey are as follows:

- Confirmation of the background, objectives, and benefits of the Project and also institutional capacity of relevant agencies of the Recipient necessary for the implementation of the Project.
- Evaluation of the feasibility of the Project to be implemented under the Japanese Grant from a technical, financial, social and economic point of view.
- Confirmation of items agreed between both parties concerning the basic concept of the Project.
- Preparation of an outline design of the Project.
- Estimation of costs of the Project.
- Confirmation of Environmental and Social Considerations

The contents of the original request by the Recipient are not necessarily approved in their initial form. The Outline Design of the Project is confirmed based on the guidelines of the Japanese Grant.

JICA requests the Recipient to take measures necessary to achieve 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 executing agency of the Project. Therefore, the contents of the Project are confirmed by all relevant organizations of the Recipient based on the Minutes of Discussions.

## (2) Selection of Consultants

For smooth implementation of the Survey, JICA contracts with (a) consulting firm(s). JICA selects (a) firm(s) based on proposals submitted by interested firms.

## (3) Result of the Survey

JICA reviews the report on the results of the Survey and recommends the GOJ to appraise the implementation of the Project after confirming the feasibility of the Project.

### 3. Basic Principles of Project Grants

2

## (1) Implementation Stage

### 1) The E/N and the G/A

After the Project is approved by the Cabinet of Japan, the Exchange of Notes (hereinafter referred to as "the E/N") will be signed between the GOJ and the Government of the Recipient to make a pledge for assistance, which is followed by the conclusion of the G/A between JICA and the Recipient to define the necessary articles, in accordance with the E/N, to implement the Project, such as conditions of disbursement, responsibilities of the Recipient, and procurement conditions. The terms and conditions generally applicable to the Japanese Grant are stipulated in the "General Terms and Conditions for Japanese Grant (January 2016)."

### 2) Banking Arrangements (B/A) (See "Financial Flow of Japanese Grant (A/P Type)" for details)

a) The Recipient shall open an account or shall cause its designated authority to open an account under the name of the Recipient in the Bank, in principle. JICA will disburse the Japanese Grant in Japanese yen for the Recipient to cover the obligations incurred by the Recipient under the verified contracts.

b) The Japanese Grant will be disbursed when payment requests are submitted by the Bank to JICA under an Authorization to Pay (A/P) issued by the Recipient.

### 3) Procurement Procedure

The products and/or services necessary for the implementation of the Project shall be procured in accordance with JICA's procurement guidelines as stipulated in the G/A.

### 4) Selection of Consultants

In order to maintain technical consistency, the consulting firm(s) which conducted the Survey will be recommended by JICA to the Recipient to continue to work on the Project's implementation after the E/N and G/A.

### 5) Eligible source country

In using the Japanese Grant disbursed by JICA for the purchase of products and/or services, the eligible source countries of such products and/or services shall be Japan and/or the Recipient. The Japanese Grant may be used for the purchase of the products and/or services of a third country as eligible, if necessary, taking into account the quality, competitiveness and economic rationality of products and/or services necessary for achieving the objective of the Project. However, the prime contractors, namely, constructing and procurement firms, and the prime consulting firm, which enter into contracts with the Recipient, are limited to "Japanese nationals", in principle.

### 6) Contracts and Concurrence by JICA

The Recipient will conclude contracts denominated in Japanese yen with Japanese nationals. Those contracts shall be concurred by JICA in order to be verified as eligible for using the Japanese Grant.

2



## 7) Monitoring

The Recipient is required to take their initiative to carefully monitor the progress of the Project in order to ensure its smooth implementation as part of their responsibility in the G/A, and to regularly report to JICA about its status by using the Project Monitoring Report (PMR).

## 8) Safety Measures

The Recipient must ensure that the safety is highly observed during the implementation of the Project.

## 9) Construction Quality Control Meeting

Construction Quality Control Meeting (hereinafter referred to as the "Meeting") will be held for quality assurance and smooth implementation of the Works at each stage of the Works. The member of the Meeting will be composed by the Recipient (or executing agency), the Consultant, the Contractor and JICA. The functions of the Meeting are as followings:

- a) Sharing information on the objective, concept and conditions of design from the Contractor, before start of construction.
- b) Discussing the issues affecting the Works such as modification of the design, test, inspection, safety control and the Client's obligation, during of construction.

## (2) Ex-post Monitoring and Evaluation Stage

- 1) After the project completion, JICA will continue to keep in close contact with the Recipient in order to monitor that the outputs of the Project is used and maintained properly to attain its expected outcomes.
- 2) In principle, JICA will conduct ex-post evaluation of the Project after three years from the completion. It is required for the Recipient to furnish any necessary information as JICA may reasonably request.

## (3) Others

- 1) Environmental and Social Considerations

2

The Recipient shall carefully consider environmental and social impacts by the Project and must comply with the environmental regulations of the Recipient and JICA Guidelines for Environmental and Social Considerations (April, 2010).

## 2) Major undertakings to be taken by the Government of the Recipient

For the smooth and proper implementation of the Project, the Recipient is required to undertake necessary measures including land acquisition, and bear an advising commission of the A/P and payment commissions paid to the Bank as agreed with the GOJ and/or JICA. The Government of the Recipient shall ensure that customs duties, internal taxes and other fiscal levies which may be imposed in the Recipient with respect to the purchase of the Products and/or the Services be exempted or be borne by its designated authority without using the Grant and its accrued interest, since the grant fund comes from the Japanese taxpayers.

## 3) Proper Use

The Recipient is required to maintain and use properly and effectively the products and/or services under the Project (including the facilities constructed and the equipment purchased), to assign staff necessary for this operation and maintenance and to bear all the expenses other than those covered by the Japanese Grant.

## 4) Export and Re-export

The products purchased under the Japanese Grant should not be exported or re-exported from the Recipient.

2

## PROCEDURES OF JAPANESE GRANT

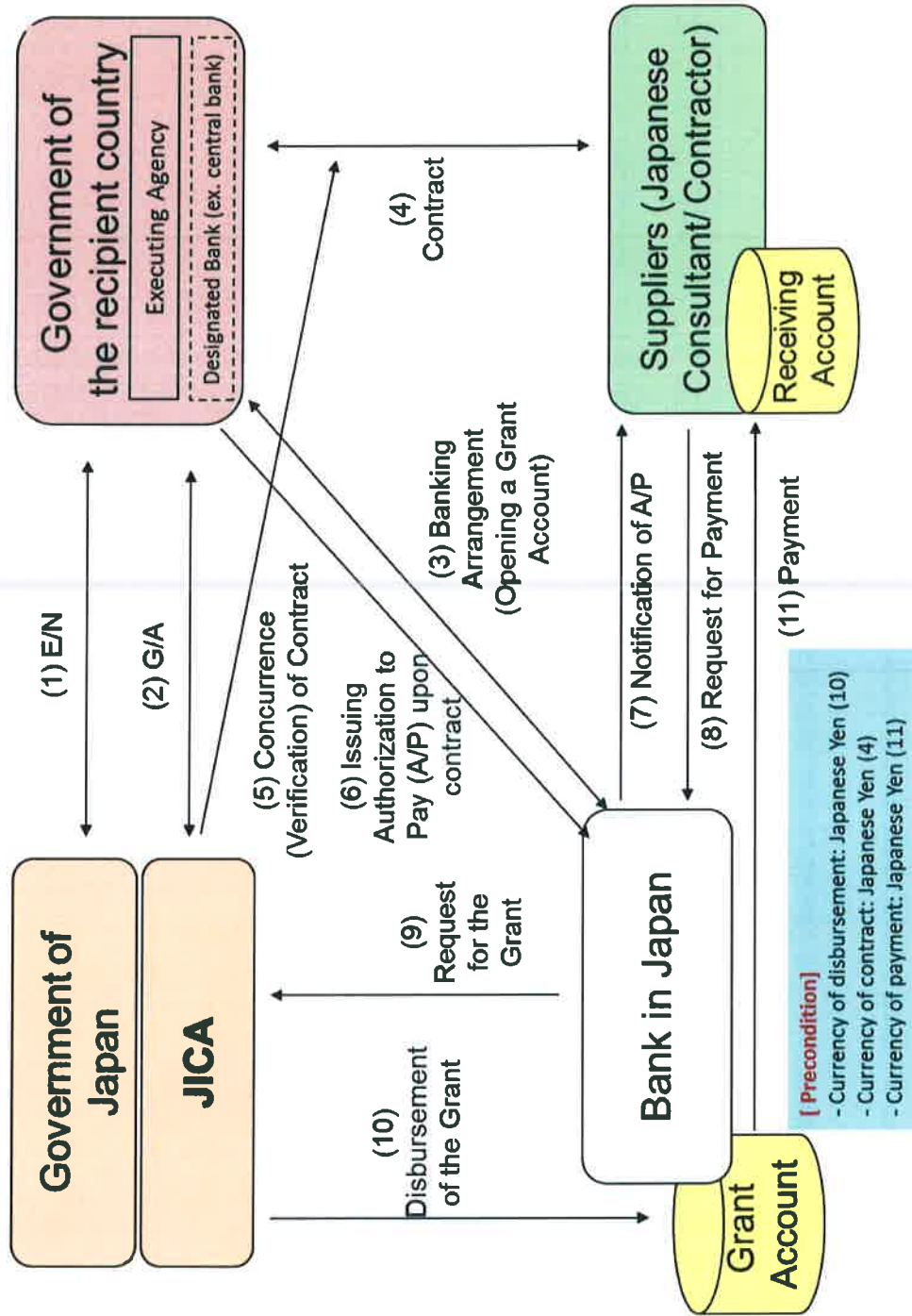
| Stage                              | Procedures   | Remarks   | Recipient Government | Japanese Government | JICA       | Consultants | Contractors | Agent Bank |
|------------------------------------|--|---|----------------------|---------------------|------------|-------------|-------------|------------|
| Official Request                   | Request for grants through diplomatic channel  | Request shall be submitted before appraisal stage.  | x                    | x                   |            |             |             |            |
| 1 Preparation                      | (1) Preparatory Survey<br>Preparation of outline design and cost estimate                                  |   | x                    |                     | x          | x           |             |            |
| 2. Appraisal                       | (2) Preparatory Survey<br>Explanation of draft outline design, including cost estimate, undertakings, etc. |   | x                    |                     | x          | x           |             |            |
|                                    | (3) Agreement on conditions for implementation   | Conditions will be explained with the draft notes (E/N) and Grant Agreement (G/A) which will be signed before approval by Japanese government | x                    | x<br>(E/N)          | x<br>(G/A) |             |             |            |
|                                    | (4) Approval by the Japanese cabinet   |   |                      | x                   |            |             |             |            |
| 3 Implementation                   | (5) Exchange of Notes (E/N)  |   | x                    | x                   |            |             |             |            |
|                                    | (6) Signing of Grant Agreement (G/A)   |   | x                    |                     | x          |             |             |            |
|                                    | (7) Banking Arrangement (B/A)  | Need to be informed to JICA   | x                    |                     |            |             |             | x          |
|                                    | (8) Contracting with consultant and issuance of Authorization to Pay (A/P)                                 | Concurrence by JICA is required   | x                    |                     |            | x           |             | x          |
|                                    | (9) Detail design (D/D)  |   | x                    |                     |            | x           |             |            |
|                                    | (10) Preparation of bidding documents  | Concurrence by JICA is required   | x                    |                     |            | x           |             |            |
|                                    | (11) Bidding   | Concurrence by JICA is required   | x                    |                     |            | x           | x           |            |
|                                    | (12) Contracting with contractor/supplier and issuance of A/P  | Concurrence by JICA is required   | x                    |                     |            |             | x           | x          |
|                                    | (13) Construction works/procurement  | Concurrence by JICA is required for major modification of design and amendment of contracts   | x                    |                     |            | x           | x           |            |
|                                    | (14) Completion certificate  |   | x                    |                     |            | x           | x           |            |
| 4. Ex-post monitoring & evaluation | (15) Ex-post monitoring  | To be implemented generally after 1, 3, 10 years of completion, subject to change   | x                    |                     | x          |             |             |            |
|                                    | (16) Ex-post evaluation  | To be implemented basically after 3 years of completion   | x                    |                     | x          |             |             |            |

notes:

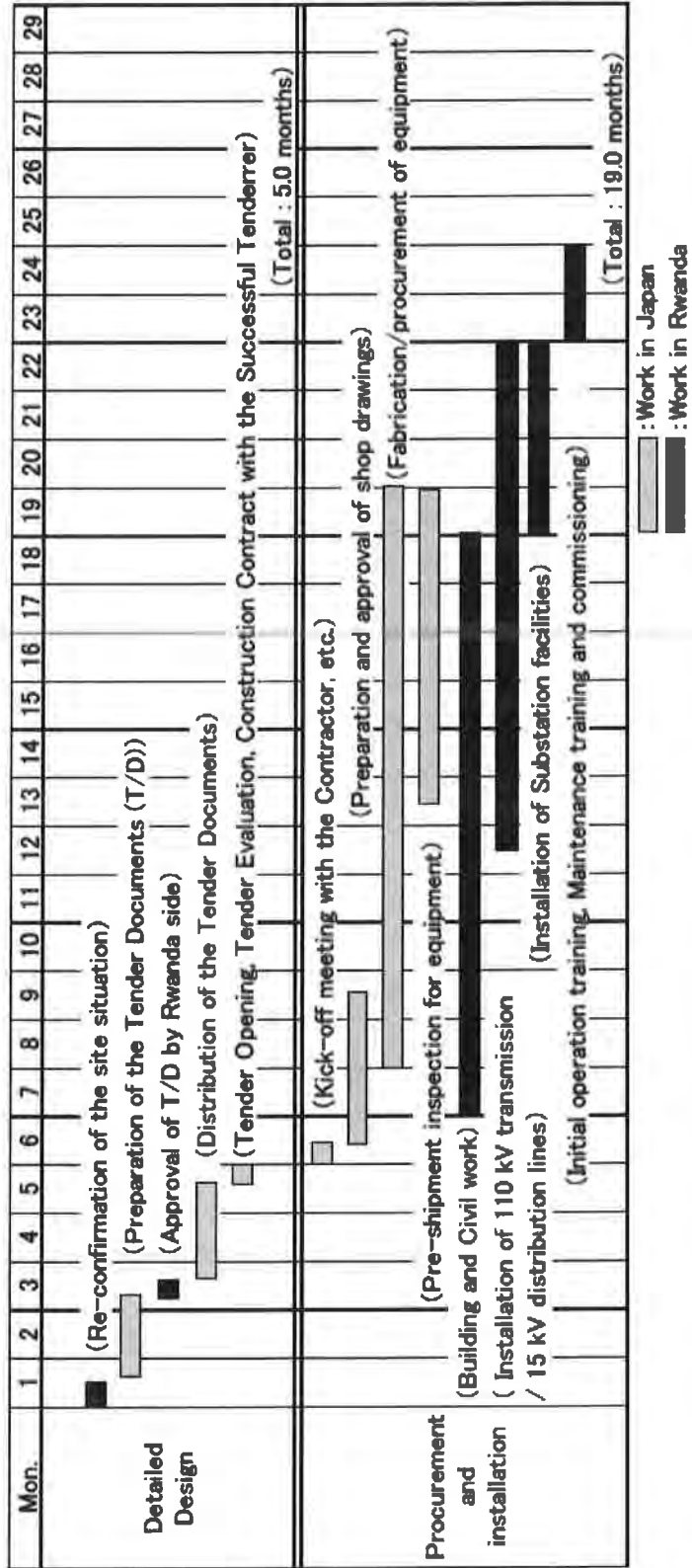
- 1 Project Monitoring Report and Report for Project Completion shall be submitted to JICA as agreed in the G/A.
- 2 Concurrence by JICA is required for allocation of grant for remaining amount and/or contingencies as agreed in the G/A

2

# Financial Flow of Japanese Grant (A/P Type)



Annex 3 Project Implementation Schedule



2

## Annex 4 Major Undertakings to be taken by the Government of Rwanda

### 1. Before the Tender

| No | Items   | Deadline                 | In charge | Cost (million USD) | Ref. |
|----|---|--------------------------|-----------|--------------------|------|
| 1  | To open Bank Account (Banking Arrangement: B/A)   | within 1 month after G/A | MINECOFIN |                    |      |
| 2  | To implement RAP and EIA  | Before notice of T/D     | EDCL      | 0.183              |      |
| 3  | To secure the following lands<br>(1) For New Gasogi Station<br>(2) For 110kV Transmission Line (0.2km)<br>(3) For 15kV Distribution Line –Route 1 (11.5km)<br>(4) For 15kV Distribution Line – Route 2 (8.5km)<br>(5) For 15kV Distribution Line – Route 3 (100m)<br>(6) For access road for constructing transmission and distribution lines | Before notice of T/D     | REG       |                    |      |
| 4  | To obtain permission from related authorities such as road, water, air-port, etc., for construction of 110kV transmission and 15kV distribution lines   | Before notice of T/D     | EDCL      |                    |      |

### 2. During the Project Implementation

| No | Items   | Deadline   | In charge    | Cost | Ref. |
|----|---|--|--------------|------|------|
| 1  | To bear the following commissions to a bank of Japan for the banking services based upon the B/A  | within 1 month after the signing of the contract |              |      |      |
|    | 1) Advising commission of A/P   | every payment                                    | MINECOFIN    |      |      |
|    | 2) Payment commission for A/P   | during the Project                               | MINECOFIN    |      |      |
| 2  | To ensure prompt unloading and customs clearance of the products at the port of disembarkation in recipient country and assist internal transportation of the products<br>(1) Tax exemption and customs clearance of the products at the port of disembarkation | during the Project                               | EDCL         |      |      |
| 3  | To accord Japanese nationals whose services may be requires in connection with the supply of the products and services such facilities as may be necessary for their entry into the recipient country and stay therein for the performance of their work        | during the Project                               | EDCL         |      |      |
| 4  | To ensure that customs duties, internal taxes and other fiscal levies which may be imposed in the recipient country with respect to the purchase of the Products and the Services to be exempted  | during the Project                               | MININFRA     |      |      |
| 5  | To bear all the expenses, other than those to be borne by the Grant Aid, necessary for construction of the facilities as well as for the transportation and installation of the equipment   | during the Project                               | EDCL         |      |      |
| 6  | To construct for the project sites the following facilities<br>(1) Gate and fences for New Gasogi S/S and 110kV connection area<br>(2) The road outside the site, if necessary  | during the Project                               | EDCL<br>EUCL |      |      |

| No | Items  | Deadline           | In charge    | Cost | Ref. |
|----|--|--------------------|--------------|------|------|
|    | (3) Guard house, if necessary  |                    |              |      |      |
| 7  | To prepare following incidental work for the New substation<br>(1) Electricity: the distribution power line to the site<br>(2) Water: the city water distribution main to the site<br>(3) Drainage: outside of the substation fence<br>(4) Furniture: office furniture | during the Project | EDCL<br>EUCL |      |      |
| 8  | To prepare measures necessary to obtain the following permits:<br>- Permits for installation work<br>- Permits to access to restricted areas   | during the Project | EDCL         |      |      |
| 9  | To Secure temporary storage yard for materials and equipment   | during the Project | EDCL<br>EUCL | 0.04 |      |
| 10 | To Secure access roads if necessary for the construction work, wayleaves and usage permissions for construction of 110kV transmission, and access to 15kV distribution lines   | during the Project | EDCL         |      |      |
| 11 | To transfer existing underground cables and pipes, and obtain acquisition of related permits (electricity, telephone, water, sewerage, etc.)   | during the Project | EDCL<br>EUCL |      |      |
| 12 | To obtain acquisition of permits for transportation if necessary   | during the Project | EDCL         |      |      |
| 13 | To prepare the places to dispose of surplus soil and waste water (the Contractor is responsible for transportation)  | during the Project | EDCL         |      |      |
| 14 | To dismantle the existing towers for 15 kV distribution nearby New Gasogi substation and existing 110kV T/L towers   | during the Project | EUCL         | 0.01 |      |
| 15 | To modify SCADA system and Optical Network Management System in NECC (in Gikondo S/S) to accommodate the New Gasogi substation   | during the Project | EUCL         | 0.55 |      |
| 16 | To provide support in case security issues arise   | during the Project | EDCL         |      |      |
| 17 | To do temporary dead-line work during the work (Response to and compensation for users of electricity in relation to outages inevitable for the work)  | during the Project | EUCL         |      |      |
| 18 | Announcement of outage plans to users of electricity during the work   | during the Project | EUCL         |      |      |
| 19 | To clear the 110kV connection area   | during the Project | EUCL         |      |      |
| 20 | To monitor environmental and social impacts caused by the Project with an adaptive management approach   | during the Project | EDCL         |      |      |

### 3. After the Project

| No | Items   | Deadline            | In charge | Cost | Ref. |
|----|---|---------------------|-----------|------|------|
| 1  | To monitor environmental and social impacts during the operation with an adaptive management approach | After completion of | EUCL      |      |      |

|  |  |                     |  |  |  |
|--|--|---------------------|--|--|--|
|  |  | the<br>construction |  |  |  |
|--|--|---------------------|--|--|--|

\* The cost estimates are provisional. This is subject to the approval of the Government of Japan.

\* 10% of the cost shall be prepared by the Government of Rwanda as the contingency.

2





|                               |  |
|-------------------------------|--|
| <b>1: Project Description</b> |  |
|-------------------------------|--|

**1-1 Project Objective**

|  |
|--|
|  |
|--|

**1-2 Project Rationale**

- Higher-level objectives to which the project contributes (national/regional/sectoral policies and strategies)
- Situation of the target groups to which the project addresses

|  |
|--|
|  |
|--|

**1-3 Indicators for measurement of “Effectiveness”**

| Quantitative indicators to measure the attainment of project objectives |                     |                   |
|---|---------------------|-------------------|
| Indicators  | Original (Yr      ) | Target (Yr      ) |
|   |                     |                   |
|   |                     |                   |
|   |                     |                   |
| Qualitative indicators to measure the attainment of project objectives  |                     |                   |
|   |                     |                   |

|                                  |
|----------------------------------|
| <b>2: Details of the Project</b> |
|----------------------------------|

**2-1 Location**

| Components | Original<br><i>(proposed in the outline design)</i> | Actual |
|------------|---|--------|
| 1.         |   |        |

**2-2 Scope of the work**

| Components | Original*<br><i>(proposed in the outline design)</i> | Actual* |
|------------|--|---------|
| 1.         |  |         |
|            |  |         |
|            |  |         |

Reasons for modification of scope (if any).

|              |
|--------------|
| <i>(PMR)</i> |
|--------------|

2

**2-3 Implementation Schedule**

| Items | Original                                |   | Actual |
|-------|---|---|--------|
|       | <i>(proposed in the outline design)</i> | <i>(at the time of signing the Grant Agreement)</i> |        |
|       |   |   |        |

Reasons for any changes of the schedule, and their effects on the project (if any)

|  |
|--|
|  |
|--|

**2-4 Obligations by the Recipient**

**2-4-1 Progress of Specific Obligations**

See Attachment 2.

**2-4-2 Activities**

See Attachment 3.

**2-4-3 Report on RD**

See Attachment 11.

**2-5 Project Cost**

**2-5-1 Cost borne by the Grant (Confidential until the Bidding)**

| Components |   |  | Cost (Million Yen)  |        |
|------------|---|--|---|--------|
|            | Original<br><i>(proposed in the outline design)</i> | Actual<br><i>(in case of any modification)</i> | Original <sup>1,2)</sup><br><i>(proposed in the outline design)</i> | Actual |
|            | 1.  |  |   |        |
|            |   |  |   |        |
| Total      |   |  |   |        |

Note: 1) Date of estimation:  
2) Exchange rate: 1 US Dollar = Yen

**2-5-2 Cost borne by the Recipient**

| Components |   |  | Cost (1,000 Taka)   |        |
|------------|---|--|---|--------|
|            | Original<br><i>(proposed in the outline design)</i> | Actual<br><i>(in case of any modification)</i> | Original <sup>1,2)</sup><br><i>(proposed in the outline design)</i> | Actual |
|            | 1.  |  |   |        |
|            |   |  |   |        |
|            |   |  |   |        |

Note: 1) Date of estimation:

2) Exchange rate: 1 US Dollar =

Reasons for the remarkable gaps between the original and actual cost, and the countermeasures (if any)

(PMR)

**2-6 Executing Agency**

- Organization's role, financial position, capacity, cost recovery etc,
- Organization Chart including the unit in charge of the implementation and number of employees.

**Original** (at the time of outline design)

name:

role:

financial situation:

institutional and organizational arrangement (organogram):

human resources (number and ability of staff):

**Actual** (PMR)

**2-7 Environmental and Social Impacts**

- The results of environmental monitoring based on Attachment 5 (in accordance with Schedule 4 of the Grant Agreement).
- The results of social monitoring based on in Attachment 5 (in accordance with Schedule 4 of the Grant Agreement).
- Disclosed information related to results of environmental and social monitoring to local stakeholders (whenever applicable).

**3: Operation and Maintenance (O&M)**

**3-1 Physical Arrangement**

- Plan for O&M (number and skills of the staff in the responsible division or section, availability of manuals and guidelines, availability of spareparts, etc.)

**Original** (at the time of outline design)

**Actual** (PMR)

**3-2 Budgetary Arrangement**

- Required O&M cost and actual budget allocation for O&M

**Original** (at the time of outline design)

**Actual** (PMR)

#### 4: Potential Risks and Mitigation Measures

- Potential risks which may affect the project implementation, attainment of objectives, sustainability
- Mitigation measures corresponding to the potential risks

##### Assessment of Potential Risks *(at the time of outline design)*

| Potential Risks                             | Assessment                                       |
|---|--|
| 1. (Description of Risk)                    | Probability: High/Moderate/Low                   |
|   | Impact: High/Moderate/Low                        |
|   | Analysis of Probability and Impact:              |
|   |  |
|   | Mitigation Measures:                             |
|   |  |
|   | Action required during the implementation stage: |
| 2. (Description of Risk)                    | Probability: High/Moderate/Low                   |
|   | Impact: High/Moderate/Low                        |
|   | Analysis of Probability and Impact:              |
|   |  |
|   | Mitigation Measures:                             |
|   |  |
|   | Action required during the implementation stage: |
| 3. (Description of Risk)                    | Probability: High/Moderate/Low                   |
|   | Impact: High/Moderate/Low                        |
|   | Analysis of Probability and Impact:              |
|   |  |
|   | Mitigation Measures:                             |
|   |  |
|   | Action required during the implementation stage: |
| <b>Actual Situation and Countermeasures</b> |  |
| (PMR)                                       |  |

[Empty box]

**5: Evaluation and Monitoring Plan (after the work completion)**

**5-1 Overall evaluation**

Please describe your overall evaluation on the project.

[Empty box for overall evaluation]

**5-2 Lessons Learnt and Recommendations**

Please raise any lessons learned from the project experience, which might be valuable for the future assistance or similar type of projects, as well as any recommendations, which might be beneficial for better realization of the project effect, impact and assurance of sustainability.

[Empty box for lessons learnt and recommendations]

**5-3 Monitoring Plan of the Indicators for Post-Evaluation**

Please describe monitoring methods, section(s)/department(s) in charge of monitoring, frequency, the term to monitor the indicators stipulated in 1-3.

[Empty box for monitoring plan of indicators]

2

Attachment

1. Project Location Map
  2. Specific obligations of the Recipient which will not be funded with the Grant
  3. Monthly Report submitted by the Consultant  
Appendix - Photocopy of Contractor's Progress Report (if any)
    - Consultant Member List
    - Contractor's Main Staff List
  4. Check list for the Contract (including Record of Amendment of the Contract/Agreement and Schedule of Payment)
  5. Environmental Monitoring Form / Social Monitoring Form
  6. Monitoring sheet on price of specified materials (Quarterly)
  7. Report on Proportion of Procurement (Recipient Country, Japan and Third Countries) (PMR (final )only)
  8. Pictures (by JPEG style by CD-R) (PMR (final)only)
  9. Equipment List (PMR (final )only)
  10. Drawing (PMR (final )only)
- Report on RD (After project)

Annex 6 Environmental Check List

| Category                  | Environmental Item                        | Main Check Items  | Yes: Y<br>No: N | Confirmation of Environmental Considerations (Reasons, Mitigation Measures)   |
|---------------------------|---|---|-----------------|---|
| 1 Permits and Explanation | (1) EIA and Environmental Permits         | (a) Have EIA reports been already prepared in official process?   | (a) Y           | (a)-(c) The EIA report has been approved on October 1, 2017. Conditions are general issues concerning the construction works and they are already addressed in the EIA report with mitigation measures and monitoring plan.<br>(d) No additional approval is required.  |
|                           |   | (b) Have EIA reports been approved by authorities of the host country's government?   | (b) Y           |   |
|                           |   | (c) Have EIA reports been unconditionally approved? If conditions are imposed on the approval of EIA reports, are the conditions satisfied?   | (c) Y           |   |
|                           |   | (d) In addition to the above approvals, have other required environmental permits been obtained from the appropriate regulatory authorities of the host country's government?   | (d) N           |   |
| 2 Pollution Control       | (2) Explanation to the Local Stakeholders | (a) Have contents of the project and the potential impacts been adequately explained to the Local stakeholders based on appropriate procedures, including information disclosure? Is understanding obtained from the Local stakeholders?  | (a) Y           | (a) In line with JICA guideline and local laws/regulations, stakeholder meetings were conducted.<br>(b) Main comments raised during meetings were reflected on the project design.  |
|                           |   | (b) Have the comment from the stakeholders (such as local residents) been reflected to the project design?  | (b) Y           |   |
|                           | (3) Examination of Alternatives           | (a) Have alternative plans of the project been examined with social and environmental considerations?   | (a) Y           |   |
| 3 Natural Environment     | (1) Water Quality                         | (a) Is there any possibility that soil runoff from the bare lands resulting from earthmoving activities, such as cutting and filling will cause water quality degradation in downstream water areas? If the water quality degradation is anticipated, are adequate measures considered? | (a) N           | (a) Alternative plans, including no-project option were examined. Different routes for the locations of the New Gasogi Substation were examined. The present project is most preferable in terms of lower impacts on natural, social and economic aspects<br>(a) There are no rivers or water areas around the project sites. |
|                           |   | (a) Is the project site located in protected areas designated by the country's laws or international treaties and conventions? Is there a possibility that the project will affect the protected areas?   | (a) N           | (a) The Project site is within Kigali City and there is no protected area nearby. The Project will not affect the protected area.   |
|                           | (2) Ecosystem                             | (a) Does the project site encompass primeval forests, tropical rain forests, ecologically valuable habitats (e.g., coral reefs,   | (a) N<br>(b) N  | (a) There is no forested area near the project site.<br>(b) There is no protected habitat of endangered species.  |



| Category              | Environmental Item         | Main Check Items   | Yes: Y<br>No: N                                     | Confirmation of Environmental Considerations (Reasons, Mitigation Measures)   |
|-----------------------|----------------------------|--|---|---|
|                       |                            | <p>mangroves, or tidal flats)?</p> <p>(b) Does the project site encompass the protected habitats of endangered species designated by the country's laws or international treaties and conventions?</p> <p>(c) If significant ecological impacts are anticipated, are adequate protection measures taken to reduce the impacts on the ecosystem?</p> <p>(d) Are adequate measures taken to prevent disruption of migration routes and habitat fragmentation of wildlife and livestock?</p> <p>(e) Is there any possibility that the project will cause the negative impacts, such as destruction of forest, poaching, desertification, reduction in wetland areas, and disturbance of ecosystem due to introduction of exotic (non-native invasive) species and pests? Are adequate measures for preventing such impacts considered?</p> <p>(f) In cases where the project site is located in undeveloped areas, is there any possibility that the new development will result in extensive loss of natural environments?</p> | <p>(c) N</p> <p>(d) N</p> <p>(e) N</p> <p>(f) N</p> | <p>(c) No significant ecological impact is anticipated.</p> <p>(d) No significant impacts are expected on habitat fragmentation and migration routes.</p> <p>(e) There is no such possibility as there is no important ecosystem near the project site. The project will not introduce non-native invasive species or pests.</p> <p>(f) The project site is within Kigali city, which is already developed.</p> |
| 3 Natural Environment | (3) Topography and Geology | <p>(a) Is there any soft ground on the route of power transmission and distribution lines that may cause slope failures or landslides? Are adequate measures considered to prevent slope failures or landslides, where needed?</p> <p>(b) Is there any possibility that civil works, such as cutting and filling will cause slope failures or landslides? Are adequate measures considered to prevent slope failures or landslides?</p> <p>(c) Is there a possibility that soil runoff will result from cut and fill areas, waste soil disposal sites, and borrow sites? Are adequate measures taken to prevent soil runoff?</p>   | <p>(a) N</p> <p>(b) Y</p> <p>(c) Y</p>              | <p>(a) There are no locations along the distribution lines which have risks of slope failure and land sliding. The protection measures such as installation of rain gutters will be conducted.</p> <p>(b)-(c) The slope of the new Gasogi Substation site is gentle and will not cause landslides. Since the soil is relatively hard, there are no risks of slope failure and landslides.</p>                   |
| 4 Social Environment  | (1) Resettlement           | <p>(a) Is involuntary resettlement caused by project implementation? If involuntary resettlement is caused, are efforts made to minimize the impacts caused by the</p>   | <p>(a) Y</p> <p>(b) Y</p> <p>(c) Y</p>              | <p>(a) 16 households (63 persons) will be displaced by the project. In addition, the loss of land, structures, crops and trees is predicted. The impacts by involuntary</p>   |

2

| Category | Environmental Item | Main Check Items   | Yes: Y<br>No: N  | Confirmation of Environmental Considerations (Reasons, Mitigation Measures)   |
|----------|--------------------|--|--|---|
|          |                    | <p>resettlement?</p> <p>(b) Is adequate explanation on compensation and resettlement assistance given to affected people prior to resettlement?</p> <p>(c) Is the resettlement plan, including compensation with full replacement costs, restoration of livelihoods and living standards developed based on socioeconomic studies on resettlement?</p> <p>(d) Are the compensations going to be paid prior to the resettlement?</p> <p>(e) Are the compensation policies prepared in document?</p> <p>(f) Does the resettlement plan pay particular attention to vulnerable groups or people, including women, children, the elderly, and people below the poverty line, ethnic minorities, and indigenous peoples?</p> <p>(g) Are agreements with the affected people obtained prior to resettlement?</p> <p>(h) Is the organizational framework established to properly implement resettlement? Are the capacity and budget secured to implement the plan?</p> <p>(i) Are any plans developed to monitor the impacts of resettlement?</p> <p>(j) Is the grievance redress mechanism established?</p> | <p>(d) Y</p> <p>(e) Y</p> <p>(f) Y</p> <p>(g) Y</p> <p>(h) Y</p> <p>(i) Y</p> <p>(j) Y</p> | <p>resettlement were minimized by selecting routes of distribution lines along the ROW of existing roads, where possible. Especially, the distribution line between the new Gasogi Substation and Masaka was supposed to pass a relatively dense residential area, so a route with less impact on resettlement was carefully examined.</p> <p>(b) Several stakeholder meetings were held prior to resettlement; explanation/clarification on compensation and livelihood restoration assistance was done toward the PAPs. The PAPs agreed upon it. As livelihood restoration programs, the priority for employment during the construction as skilled and unskilled workers will be given for the PAPs who will lose their income source. During the operation, the PAPs will be provided with employment opportunities as skilled and unskilled workers (for clearing trees within the ROW and access roads).</p> <p>(c) A census survey, socio-economic survey and asset inventory were conducted for all the PAPs, based on which ARAP was developed. APAP includes compensation at full replacement cost and livelihood restoration programs.</p> <p>(d) Compensation will be paid prior to the resettlement, which is also stipulated in Rwanda law. EDCL submits a payment order to MINECOFIN, and then MINECOFIN proceeds with the payment. After the payment, physical resettlement will be implemented.</p> <p>(e) Compensation policy was described in ARAP (including eligibility for compensation, entitlement matrix etc.).</p> <p>(f) According to the results of a census and socio-economic survey, one (1) PAH was a</p> |

2

| Category | Environmental Item        | Main Check Items   | Yes: Y<br>No: N                            | Confirmation of Environmental Considerations (Reasons, Mitigation Measures)  |
|----------|---------------------------|--|--|--|
|          |                           |  |  | <p>household headed by an elderly (over 80 years old). However, since it is not physically but economically displaced, livelihood restoration measures (direct economic assistance, medical insurance) will be conducted, according to the Vision 2020 Umurenge Programme (VUP).</p> <p>(g) An agreement with the PAPs will be obtained prior to resettlement. The PAPs were involved in the process of documentation and valuation of their assets. Once they are comfortable with the proposed property valuation, they will sign and seal the documents as a sign of agreement. Based on these documents, resettlement will be implemented.</p> <p>(h) EDCL is responsible for ARAP implementation. EDCL has two social safeguard officers who deal with resettlement and land acquisition. It was agreed that all the implementation of ARAP would be completed within 3 months after the approval of this project by Japanese Government (Field Report p 16 (signed on June 22, 2017 by JICA Study Team, EDCL and EUCL).</p> <p>(i) Monitoring of resettlement and land acquisition will be conducted on a monthly basis. A monitoring plan was developed in ARAP.</p> <p>(j) A grievance redress system was developed, with the combination of existing conflict resolution methods at community level and arbitration by the Court.</p> |
|          | (2) Living and Livelihood | <p>(a) Is there a possibility that the project will adversely affect the living conditions of inhabitants? Are adequate measures considered to reduce the impacts, if necessary?</p> <p>(b) Is there a possibility that diseases, including infectious diseases, such as HIV will be brought due to immigration of workers associated with the project? Are adequate</p> | <p>(a) Y<br/>(b) Y<br/>(c) Y<br/>(d) Y</p> | <p>(a) In addition to a small-scale involuntary resettlement, an economic displacement such as the loss of crops and agricultural land is expected. ARAP was developed and the loss will be compensated at full replacement cost.</p> <p>(b) The project site is located within Kigali City, and no</p>  |

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| Category             | Environmental Item                           | Main Check Items   | Yes: Y<br>No: N | Confirmation of Environmental Considerations (Reasons, Mitigation Measures)   |
|----------------------|--|--|-----------------|---|
| 4 Social Environment |  | <p>considerations given to public health, if necessary?</p> <p>(c) Is there any possibility that installation of structures, such as power line towers will cause radio interference? If any significant radio interference is anticipated, are adequate measures considered?</p> <p>(d) Are the compensations for transmission wires given in accordance with the domestic law?</p> |                 | <p>influx of population from outside of the project site is predicted.</p> <p>(c) The project will not cause radio interference.</p> <p>(d) Compensation under power lines will be paid according to the local laws and ARAP.</p> |
|                      | (3) Heritage                                 | (a) Is there a possibility that the project will damage the local archeological, historical, cultural, and religious heritage? Are adequate measures considered to protect these sites in accordance with the country's laws?  | (a) N           | (a) There is no such possibility as there is no heritage site.  |
|                      | (4) Landscape                                | (a) Is there a possibility that the project will adversely affect the local landscape? Are necessary measures taken?   | (a) N           | (a) The project will not affect the landscape. The area around the project site is already developed.   |
|                      | (5) Ethnic Minorities and Indigenous Peoples | (a) Are considerations given to reduce impacts on the culture and lifestyle of ethnic minorities and indigenous peoples?   | (a) N/<br>A     | (a) There are no ethnic minorities and indigenous people affected by the project.   |
|                      |  | (b) Are all of the rights of ethnic minorities and indigenous peoples in relation to land and resources respected?   | (b) N/<br>A     | (b) There are no ethnic minorities and indigenous people affected by the project.   |
|                      | (6) Working Conditions                       | (a) Is the project proponent not violating any laws and ordinances associated with the working conditions of the country which the project proponent should observe in the project?  | (a) N           | (a)-(d) EDCL observes all laws and ordinances associated with working conditions of the country, conducting necessary tangible and intangible safety measures   |
|                      |  | (b) Are tangible safety considerations in place for individuals involved in the project, such as the installation of safety equipment which prevents industrial accidents, and management of hazardous materials?  | (b) Y           |   |
|                      |  | (c) Are intangible measures being planned and implemented for individuals involved in the project, such as the establishment of a safety and health program, and safety training (including traffic safety and public health) for workers etc.?  | (c) Y           |   |
|                      |  | (d) Are appropriate measures taken to ensure that security guards involved in the project not to violate safety of other individuals involved, or local residents?   | (d) Y           |   |

| Category | Environmental Item                                       | Main Check Items  | Yes: Y<br>No: N | Confirmation of Environmental Considerations (Reasons, Mitigation Measures)   |
|----------|--|---|-----------------|---|
| 5 Others | (1) Impacts during Construction                          | (a) Are adequate measures considered to reduce impacts during construction (e.g., noise, vibrations, turbid water, dust, exhaust gases, and wastes)?  | (a) Y           | Based on the local laws and regulations, mitigation measures will be conducted. The expected impacts are noise, vibrations, dust, exhaust gas, waste and soil.<br><br>The project site is within Kigali City hence construction activities are not going to affect the natural environment or ecosystem. Since the construction is geographically limited and completed within short period, no impacts on surrounding environment are expected.<br><br>Construction activities may disturb the traffic around the site. EDCL requires the contractor to control traffic with collaboration with local police, securing the smooth traffic and safety around the project site. The power cuts will be informed to the surrounding communities and residents in advance. |
|          |  | (b) If construction activities adversely affect the natural environment (ecosystem), are adequate measures considered to reduce impacts?  | (b) Y           |   |
|          |  | (c) If construction activities adversely affect the social environment, are adequate measures considered to reduce impacts?   | (c) Y           |   |
| 6 Note   | (2) Monitoring   | (a) Does the proponent develop and implement monitoring program for the environmental items that are considered to have potential impacts?  | (a) Y           | (a)-(d) For the items with impacts, EDCL (planning and construction phases) and EUCL (operation phase) will be monitoring. Monitoring plan and responsible organizations were developed in the EIA report.  |
|          |  | (b) What are the items, methods and frequencies of the monitoring program?  | (b) Y           |   |
|          |  | (c) Does the proponent establish an adequate monitoring framework (organization, personnel, equipment, and adequate budget to sustain the monitoring framework)?  | (c) Y           |   |
|          |  | (d) Are any regulatory requirements pertaining to the monitoring report system identified, such as the format and frequency of reports from the proponent to the regulatory authorities?                    | (d) Y           |   |
| 6 Note   | Reference to Checklist of Other Sectors<br>Note on Using | (a) Where necessary, pertinent items described in the Road checklist should also be checked (e.g., projects including installation of electric transmission lines and/or electric distribution facilities). | (a) N/<br>A     | (a) There is no additional Environmental Items that may be affected.  |
|          |  | (a) If necessary, the impacts to transboundary or global issues should be confirmed, (e.g., the project includes factors that   | (a) N/<br>A     | (a) Since the construction is geographically limited and completed within short period, no impacts to   |

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| Category | Environmental Item      | Main Check Items  | Yes: Y<br>No: N | Confirmation of Environmental Considerations (Reasons, Mitigation Measures) |
|----------|-------------------------|---|-----------------|---|
|          | Environmental Checklist | may cause problems, such as transboundary waste treatment, acid rain, destruction of the ozone layer, or global warming). |                 | transboundary or global issues are expected.                                |

Annex 7 Environmental Management Plan/Environmental Monitoring Plan

| No                        | Item  | Methods  | Frequency   | Responsible body   |                   |
|---------------------------|---|--|---|--|-------------------|
| <b>Planning Phase</b>     |   |  |   |  |                   |
| 1                         | Involuntary Resettlement/ Land acquisition  | Compensation payment to bank accounts of PAPs                      | Counting the number of payment transaction to PAPs  | Monthly until completion of land acquisition (planned to be completed by May 2018) | EDCL              |
| <b>Construction Phase</b> |   |  |   |  |                   |
| 1                         | Land Use and Utilization of local resources | Work schedule and progress   | Work schedule                                       | Monthly during construction  | Contract or/ EDCL |
| 2                         | Existing social infrastructure and services | Rewiring of the existing line<br>Power cut                         | Confirming work plan<br>Confirming a power cut plan | During rewiring works<br>During construction                                       | Contract or/ EDCL |
| 3                         | Occupational health hazards                 | Workers with protective gear<br>Reports on accidents               | Site inspection<br>Confirming the reports           | Daily during construction  | Contract or/ EDCL |
| 4                         | Air pollution                               | Inspection certification of vehicle and heavy machineries          | Site inspection                                     | Daily during construction phase  | Contract or       |
| 5                         | Soil Pollution                              | PAHs, BTEX   | Soil sampling at the new Gasogi substation          | 3 times, before, during and after construction                                     | Contract or       |
| 6                         | Waste                                       | Waste management   | Site inspection                                     | Daily during construction phase  | EDCL              |
| 7                         | Noise/vibration                             | Inspection certification of vehicle and heavy machineries          | Site inspection                                     | Daily during construction phase  | Contract or       |
| <b>Operation Phase</b>    |   |  |   |  |                   |
| 1                         | Soil Pollution                              | PAHs, BTEX   | Soil sampling at the new Gasogi substation          | Annually   | EUCL              |
| 2                         | Accidents                                   | Climbing prevention measure at towers,<br>Fire prevention measures | Site inspection                                     | At commission and regular maintenance  | EUCL              |

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**Draft Report**  
**Abbreviated Resettlement Action Plan (ARAP)**  
**For**  
**The Preparatory survey on Improvement of substations and**  
**distribution network phase 3**

**Project Proponent:**

RWANDA ENERGY GROUP Ltd  
ENERGY DEVELOPMENT CORPORATION LIMITED (EDCL)  
KN82 ST 3, Nyarugenge District, Kigali City,  
P O Box 537 Kigali, RWANDA.

**Submitted to:**

RWANDA DEVELOPMENT BOARD (RDB)  
Investment Implementation Division  
Kigali, RWANDA.

**Consultant:**

Eco-Excellence Consultancy Ltd  
Po Box 3418 Kigali, RWANDA  
Office: Ubumwe House, Kimihurura  
Phone: +250788356191  
Email: mapetule1@gmail.com

**October 2017**



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## ACRONYMS

|        |   |
|--------|---|
| ARAP   | Abbreviated Resettlement Action Plan                |
| EDCL   | Energy Development Corporation Limited              |
| EDPRS: | Economic Development and Poverty Reduction Strategy |
| EUCL   | Energy Utility Corporation Limited                  |
| ESS:   | Environment and Social Safeguards                   |
| HIV:   | Human Immune Deficiency Virus                       |
| JICA:  | Japan International Cooperation Agency              |
| PAPs:  | Project Affected Persons                            |
| RAP:   | Resettlement Action Plan                            |
| REMA:  | Rwanda Environment Management Authority             |
| RMU:   | Ring Main Unit                                      |
| RoW:   | Right of Way  |
| RPF:   | Resettlement Policy Framework                       |
| Rwf:   | Rwandan Franc                                       |
| ToR:   | Terms of Reference                                  |

## EXECUTIVE SUMMARY

### INTRODUCTION

The Government of Rwanda (GoR), in its effort to sustain economic growth, has increased and stabilized the power production and distribution, hence reducing power shortages. GoR also exercises a strong leadership role in donor coordination and has begun to work with donors on a clearer division of labour by identifying areas of individual donor comparative advantage. In connection with the mentioned strategy, the Government of Rwanda through Energy Development Corporation Limited (EDCL) has embarked on a country-wide electricity distribution to realize the primary EDPRS target.

In response to the request from the GoR, Japan International Cooperation Agency (JICA), in consultation with the Government of Japan, decided to **conduct a Preparatory survey on the project for improvement of Substations and Distribution Network Phase 3.**

In order for JICA to meet its internal standards requirements and as a risk management approach, it applies the JICA Guidelines for environmental and social considerations and World Bank safeguard policies, specifically OP 4.12 "Involuntary resettlement" and OP 4.01 "Environmental assessment", for projects that are likely to have an environmental and social impact.

In this regard an Abbreviated Resettlement Action Plan (ARAP) has been prepared to ensure that the procedure for expropriation and resettlement is undertaken in accordance with the above social safeguards.

### THE PROJECT

The project for "improvement of substation and Distribution network phase 3" will comprise of the following components traversing the areas mentioned in the table below:

| No.      | Components   | Distance covered                      | District | Sector     | Cells      | Village       |
|----------|--|---------------------------------------|----------|------------|------------|---------------|
| 1        | New Gasogi substation  | 8,912m <sup>2</sup><br>(111.4m x 80m) | Gasabo   | Ndera      | Kibenga    | Burunga       |
| 2        | Single circuit 15kV distribution lines (DL) from the New Gasogi substation to Masaka connection point. (South Distribution line) | Approximately 8.5km                   | Gasabo   | Ndera      | Kibenga    | Burunga       |
|          |  |                                       |          |            | Cyaruzinge | Gashure       |
|          |  |                                       |          |            | Rudashya   | Ruhangare     |
|          |  |                                       |          |            |            | Munini        |
|          |  |                                       | Rusororo | Nyagahinga | Kacyinyaga |               |
|          |  |                                       |          |            | Gisharara  |               |
|          |  |                                       |          |            | Kabutare   |               |
| Kicukiro | Masaka   | Cyimo                                 | Kiyovu   |            |            |               |
| Murambi  |  |                                       |          |            |            |               |
| 3        | Single circuit 15kV distribution lines from the New Gasogi substation to Nyagasambu connection point (North Distribution line)   | Approximately 11.5km                  | Gasabo   | Ndera      | Kibenga    | Burunga       |
|          |  |                                       |          |            | Mukuyu     | Jurwe         |
|          |  |                                       |          | Gikomero   | Murambi    | Rugarama      |
|          |  |                                       |          |            | Munini     | Rudakabukirwa |
|          |  |                                       |          | Rusororo   | Mbandazi   | Karambo       |
|          |  |                                       |          |            | Kinyana    | Nyagasozi     |
|          |  |                                       |          |            |            | Kigabiro      |

|   |  |                   |           |          |            |            |
|---|--|-------------------|-----------|----------|------------|------------|
|   |  |                   | Rwamagana | Fumbwe   | Nyakagunga | Kirehe     |
|   |  |                   |           |          |            | Akabeza    |
|   |  |                   |           |          | Nyagasambu | Rambura    |
| 4 | Single circuit 110Kv transmission line (TL) between Jabana and Birembo substations | Approximately 7km | Kicukiro  | Jabana   | Kabuye     | Kabeza     |
|   |  |                   | Gasabo    | Kinyinya | Kagugu     | Giheka     |
|   |  |                   |           |          |            | Kagarama   |
|   |  |                   |           |          |            | Dusenyi    |
|   |  |                   |           |          | Murama     | Ngaruyinka |
|   |  |                   |           |          | Gasharu    | Kami       |
|   |  |                   |           |          |            | Agatare    |

The acquisition of land for these elements will result in physical and / or economic resettlement of households. As such this Abbreviated Resettlement Action Plan (ARAP) has been prepared in line with national law, JICA Environmental and Social considerations 2010 and World Bank OP 4.12.

#### ARAP METHODOLOGY

The concept for the project to “improve the substation and distribution network phase 3” was comprehended to include; the project objectives, activities and boundaries of the area of intervention.

- Based on the identified project boundaries, the affected people were informed of the project, its objectives, activities, boundaries and the extent of their property that will be lost to the project. This was done through a stakeholder engagement process during the period of 3<sup>rd</sup>- 21<sup>st</sup> July and again 9<sup>th</sup> October – 3<sup>rd</sup> November 2017.
- An asset inventory and valuation for property and/or assets likely to be lost was prepared and completed for the North and south distribution line routes in the period of 9<sup>th</sup> October- 3<sup>rd</sup> November 2017.
- An announcement was sent out through Public notice at the respective local Sectors and Cells and by radio communication of the dates on which the outcome of the asset inventory and valuation would be disclosed to the PAPs for verification and agreement. Dates set were from the 30<sup>th</sup> October- 3<sup>rd</sup> November 2017. The completed asset inventory was shared with the Project Affected People (PAP) and verified. The Cut-off date was established on the 3<sup>rd</sup> November 2017. From the date of agreement no additional developments (e.g. new structures, trees etc) would added to the agreed compensation. This process identified and documented the people eligible for compensation at full replacement value for losses due to the Project and prevents ineligible people from claiming compensation after the asset inventory exercise has been completed.
- The asset inventory and property valuation report was shared with the respective Sector levels and District authorities for approval before it was submitted to EDCL to begin the preparation process of compensation.
- A Socio-economic survey of Project Affected Households (PAH) was undertaken along with the asset inventory to save time. Its purpose was to understand number of PAPs and their current livelihoods before the loss of property and land.
- An ARAP and/ or LRP was prepared informed by the survey, asset inventory and property valuation. It was then disclosed to PAPs to ensure all their concerns were covered and any missed out captured in this disclosure. Public disclosure through the national newspaper will be done.
- Once the ARAP is approved then its implementation by EDCL will follow. The approved Asset inventory and valuation report is reviewed by EDCL, once approved, then through its finance

department, it is submitted to the Ministry of Finance and Economic Planning (MINECOFIN). MINECOFIN would then effect compensation payment to the account numbers of the PAP for property lost to the project based on recommendations of the ARAP. This shall be done with a period not exceeding 120 days from the cut-off date.

- During the compensation period, any grievances shall be handled by the existing grievance mechanism local structure but in attendance of EDCL and members of the consultant's team (where required).
- Monitoring and evaluation of the ARAP shall be undertaken alongside implementation of the plans to monitor their successes and deviations.

### **Monitoring Framework**

The monitoring plan shall comprise of three components:

- Performance monitoring; an internal management function allowing measurement of physical progress against milestones.
- Impact monitoring; to gauge the effectiveness of the ARAP and its implementation in meeting the needs of the affected people.
- Completion audit: to determine whether the measures outlined in this ARAP (and the supporting LRP) have been successful.

### **SOCIO-ECONOMIC BASELINE SURVEY**

The baseline aimed to survey 100% of the 114 PAH of the North distribution line and the New Gasogi substation areas (73 HH) and South (41HH) distribution line routes. However, 71 (97.26%) of PAH were surveyed along the North (New Gasogi- Nyagasambu) and 34 (82.93%) HH along the South (New Gasogi- Masaka) routes of the Distribution lines that were physically present or had representatives between October and November 2017 by the time of the study.

Regarding HH heads by age patterns, along the North route 97.26% (69 HH) are in the age range of 21-80 years, 1.56% (1 HH) of HH heads is above 80 years and therefore considered elderly and no HH headed by individuals who are less than 20 years. As for the South route, 85.37% (37 HH) are in the age range of 21-80 years, No HH heads is above 80 years or less than 20 years.

Along the North route, about 15% (11 of the Heads of HH) interviewed had no education level whatsoever, while over 79% (57 of the heads of HH) in the affected area have at least completed the primary level of education with 6.85% (5HH having attained tertiary education).

While along the South route, about 12% (5 of the Heads of HH) interviewed had no education level whatsoever, while 70.73% (29 of the heads of HH) in the affected area have at least completed the primary level of education with 19.51% (8HH having attained tertiary education). This indicates a substantial level of literacy within the affected area population, essential for PAH in understanding their entitlements and relevance of compliance to requirements for quick compensation.

In terms of employment status, along the North route, 61.64% of the PAH are farmers, 19.18% self-employed, 5.48% have salaried employment and 4.11% unemployed. While along the south route, 41.46% of the PAH are farmers, 31.71% self-employed, 7.32% have salaried employment and 2.44% unemployed.

Having such a high dependency on farming normally would have been an indication of the extent to which land acquisition might have an impact on the PAPs, however, since as a livelihood restoration initiative, it is proposed that land under the ROW of the power line can continue to be cultivated with an exception of planting trees and perennial crops that could interfere with power line, the project is not likely to have a negative impact as would have been if cultivation was not accepted.

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It was also important to know how many HH heads owned accounts in financial institutions (Banks, Savings and Credit Cooperatives (SACCOs) especially since all compensation payments would be done by bank transfer.

Along the North route, 80.82% (59HH) own accounts, 15.07% (11HH) do not own any form of accounts, while the South route, 80.49% (33HH) own accounts, 2.44% (1HH) do not own any form of accounts.

During the survey and asset inventory, those PAH who were found not own accounts were informed that compensation would only be done by bank/ financial institution transfer to account and therefore essential to own one

## RESETTLEMENT IMPACTS

The magnitude of displacement associated with the Project, as determined by the asset inventory is outlined in the table below.

### Magnitude of Displacement Caused by Land Acquisition

| Displacement  | Impact                | Unit | Magnitude of Displacement |          |          |          |           | Total      |
|---|-----------------------|------|---------------------------|----------|----------|----------|-----------|------------|
|   |                       |      | Gasabo                    |          |          | Kicukiro | Rwamagana |            |
|   |                       |      | Ndera                     | Gikomero | Rusororo | Masaka   | Fumbwe    |            |
| <b>North route (New Gasogi- Nyagasambu Distribution line)</b> |                       |      |                           |          |          |          |           |            |
| Loss of Residential Houses                                    | Physical Displacement | PAH  | 10                        | 3        | 1        | 0        | 0         | <b>14</b>  |
|   |                       | PAP  | 44                        | 12       | 1        | 0        | 0         | <b>57</b>  |
| Loss of Agricultural Land                                     | Economic Displacement | PAH  | 22                        | 9        | 11       | 0        | 3         | <b>45</b>  |
|   |                       | PAP  | 32                        | 27       | 31       | 0        | 12        | <b>102</b> |
| Loss of Crops/ Trees  |                       | PAH  | 13                        | 7        | 28       | 0        | 2         | <b>50</b>  |
|   |                       | PAP  | 30                        | 23       | 52       | 0        | 12        | <b>117</b> |
| Land owned by district  |                       |      | 0                         | 0        | 1        | 0        | 4         | <b>5</b>   |
| <b>South route (New Gasogi- Masaka Distribution line)</b>     |                       |      |                           |          |          |          |           |            |
| Loss of Residential Houses                                    | Physical Displacement | PAH  | 2                         | 0        | 0        | 0        | 0         | <b>2</b>   |
|   |                       | PAP  | 6                         | 0        | 0        | 0        | 0         | <b>6</b>   |
| Loss of Agricultural Land                                     | Economic Displacement | PAH  | 20                        | 0        | 6        | 1        | 0         | <b>26</b>  |
|   |                       | PAP  | 70                        | 0        | 15       | 5        | 0         | <b>90</b>  |
| Loss of Crops/ Trees  |                       | PAH  | 23                        | 0        | 5        | 1        | 0         | <b>28</b>  |
|   |                       | PAP  | 79                        | 0        | 11       | 5        | 0         | <b>95</b>  |
| Land owned by district  |                       |      | 1                         | 0        | 0        | 0        | 0         | <b>1</b>   |



The main impacts as a result of the Project are:

- Loss of houses resulting in physical displacement and loss of shelter.
- Loss of agricultural land resulting in loss of livelihoods as there is no land for crops and livestock the main sources of income.
- Loss of crops and trees resulting in loss of livelihoods and potential for food insecurity.
- Loss of waged employment for laborers on agricultural land although this is recognized to be minimal.

#### ELIGIBILITY AND ENTITLEMENTS

Based on the impacts outlined above an eligibility and entitlements matrix was developed which is summarized below.

**Summary Eligibility and Entitlements Matrix**

| Type of Loss   | Eligible Groups        | Entitlements   |
|--|------------------------|--|
| Houses   | Owner of the Structure | <ul style="list-style-type: none"> <li>• Cash compensation through PAPs accounts in financial institutions at full replacement cost for entire structure and other fixed assets without depreciation and addition 5% disruption fee as by expropriation law.</li> </ul> <p>And</p> <ul style="list-style-type: none"> <li>• The right to salvage materials from the displaced house.</li> </ul>  |
| Other Structures (kraals, livestock sheds, stores etc) | Owner of the Structure | <ul style="list-style-type: none"> <li>• Cash compensation through PAPs accounts in financial institutions at full replacement cost.</li> <li>• The right to salvage materials from the displaced house.</li> </ul>  |
| Land   | Land Owner             | <ul style="list-style-type: none"> <li>• Cash compensation at current market value (including all transaction fees) for affected land plus an additional 5% disruption fee. Payment through PAPs accounts in financial institutions</li> <li>• Priority for employment opportunities associated with the construction and erection of the New Gasogi Substation and towers.</li> <li>• Awareness training on saving and access to credit schemes so as to manage acquired cash compensation.</li> </ul>  |
| Seasonal Crops   | Crop Owners            | <ul style="list-style-type: none"> <li>• Seasonal crops may continue to be planted under the ROW even after erection of towers as long as they do not grow tall to interfere with the power lines.</li> </ul>  |
| Perennial Crops  | Crop Owners            | <ul style="list-style-type: none"> <li>• Cash compensation based on prices of such crops based on the age, size, area coverage and type of crop. Compensation will be paid:               <ul style="list-style-type: none"> <li>○ For owners of the land with lease land titles- payment will be made directly to their own accounts.</li> <li>○ For users of the land not owning the land: compensation payment will be made against the land owner but only released to the land owner on written agreement authenticated by local authority that he/she shall compensate the actual crop/tree owner or proof he has already compensated them.</li> </ul> </li> </ul> |
| Trees  | Tree Owner             | <ul style="list-style-type: none"> <li>• Cash compensation at replacement value based on type, age and productive value of affected trees. Compensation will be paid as</li> </ul>   |

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|  |           |   |
|--|-----------|---|
|  |           | <p>follows:</p> <ul style="list-style-type: none"> <li>○ For owners of the land: cash compensation to be paid directly into their accounts.</li> <li>○ For users of the land: cash compensation will be made against the land owner but only released to the land owner on written agreement authenticated by local authority that he/she shall compensate the actual crop/ tree owner or proof he has already compensated them.</li> </ul> |
| Waged Employment (Day Labourers & Traders) | Employees | <ul style="list-style-type: none"> <li>● Employment opportunities during the construction of the New Gasogi Substation and erection of towers for labourers and skilled tradesmen.</li> <li>● Traders will move their 'businesses' to suitable areas.</li> </ul>  |

### LIVELIHOOD RESTORATION

The LRP is designed to have two stages, i.e. *short term measures* during the construction of the New Gasogi substation and erection of towers and *long term measures* to achieve a sustainable livelihood for PAH. It should be noted that these measures are in addition to providing all PAH with their cash compensation for lost assets.

#### Short Term Measures:

- *Wage Based Livelihood Restoration:* As a positive initiative in restoring the PAPs source of income probably lost from agricultural land or any other source, it is proposed that PAP are given priority to be employed as unskilled and skilled labour during the erection of the distribution and transmission lines and new substation. EDCL shall inspect the contractor to ensure PAPs are given first priority at the time of construction.
- *Ongoing Cultivation of Expropriate Land:* PAH can continue to cultivate land under the ROW with seasonal crops but not perennial crops that could interfere with the power line.

#### Long Term Livelihood Restoration Measures:

- *Wage Based Livelihood Restoration:* EUCL will require skilled and unskilled people to work during the maintenance of the erected towers, the new substation and mostly clearing ROW of trees, bushes and access roads to the towers. It is proposed that PAPs are given priority for paid temporary employment for both skilled and unskilled roles.
- *Ongoing Cultivation of Expropriate Land:* PAH can continue to cultivate land under the ROW with seasonal crops but not perennial crops that could interfere with the power line.

### COST AND BUDGET

The total cost of compensation and estimated budget for resettlement and livelihood restoration implementation is shown below. This includes the cost of compensation and implementation of the ARAP including livelihood restoration and monitoring and evaluation activities.

| No | Item                             | Cost (Rwf)           |
|----|----------------------------------|----------------------|
| 1  | Compensation budget              | 141,271,129.2        |
| 2  | ARAP & LRP Implementation budget | 14,827,113           |
|    | <b>Total</b>                     | <b>156,098,242.2</b> |

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## CHAPTER 1: INTRODUCTION

### 3.1. PROJECT BACKGROUND

The Government of Rwanda (GoR), in its effort to sustain economic growth, has increased and stabilized the power production and distribution, hence reducing power shortages. GoR also exercises a strong leadership role in donor coordination and has begun to work with donors on a clearer division of labour by identifying areas of individual donor comparative advantage. In connection with the mentioned strategy, the Government of Rwanda through Energy Development Corporation Limited (EDCL) has embarked on a country-wide electricity distribution to realize the primary EDPRS target.

A number of development partners so far committed to support the program including; World Bank IDA, World Bank, African Development Bank, BADEA, OFID, Saudi Funds, Netherlands, Japan, and others.

In response to the request from the GoR, Japan International Cooperation Agency (JICA), in consultation with the Government of Japan, decided to conduct a Preparatory survey on the project for improvement of Substations and Distribution Network Phase 3.

In order for JICA to meet its internal standards requirements and as a risk management approach, it applies the JICA Guidelines for environmental and social considerations and World Bank safeguard policies, specifically OP 4.12 "Involuntary resettlement" and OP 4.01 "Environmental assessment", for projects that are likely to have an environmental and social impact.

In this regard an Abbreviated Resettlement Action Plan (ARAP) has been prepared to ensure that the procedure for expropriation and resettlement is undertaken in accordance with the above social safeguards.

### 3.2. OVERVIEW OF THE PROJECT

The main objective of this project is to increase access to electricity in Kigali and parts of Rwamagana District by:

- Constructing a new substation at Gasogi.
- Constructing a single circuit 15kV distribution lines (DL) from the New Gasogi substation to Masaka connection point.
- Constructing a single circuit 15kV distribution lines from the New Gasogi substation to Nyagasambu connection point.
- Reinforcement of the single circuit 110Kv transmission line (TL) between Jabana and Birembo substations.

The project will include the administrative districts indicated in Table 1 below:

**Table 1: Project Location Overview**

| No. | Components   | Distance covered                      | District | Sector | Cells      | Village |
|-----|--|---------------------------------------|----------|--------|------------|---------|
| 1   | New Gasogi substation  | 8,912m <sup>2</sup><br>(111.4m x 80m) | Gasabo   | Ndera  | Kibenga    | Burunga |
| 2   | Single circuit 15kV distribution lines (DL) from the New Gasogi substation | Approximately 8.5km                   | Gasabo   | Ndera  | Kibenga    | Burunga |
|     |  |                                       |          |        | Cyaruzinge | Gashure |
|     |  |                                       |          |        | Rudashya   | Gatare  |
|     |  |                                       |          |        | Ruhangare  |         |

|   |  |                      |           |          |                             |  |
|---|--|----------------------|-----------|----------|-----------------------------|--|
|   | to Masaka connection point. (South Distribution line)  |                      |           |          |                             | Munini<br>Kacyinyaga   |
|   |  |                      |           | Rusororo | Nyagahinga                  | Gisharara<br>Kabutare  |
|   |  |                      | Kicukiro  | Masaka   | Cyimo                       | Kiyovu<br>Murambi  |
| 3 | Single circuit 15kV distribution lines from the New Gasogi substation to Nyagasambu connection point (North Distribution line) | Approximately 11.5km | Gasabo    | Ndera    | Kibenga<br>Mukuyu           | Burunga<br>Jurwe   |
|   |  |                      |           | Gikomero | Murambi<br>Munini           | Rugarama<br>Rudakabukirwa                                      |
|   |  |                      |           | Rusororo | Mbandazi<br>Kinyana         | Karambo<br>Nyagasozu<br>Kigabiro                               |
|   |  |                      | Rwamagana | Fumbwe   | Nyakagunga<br>Nyagasambu    | Kirehe<br>Akabeza<br>Rambura                                   |
| 4 | Single circuit 110Kv transmission line (TL) between Jabana and Birembo substations   | Approximately 7km    | Kicukiro  | Jabana   | Kabuye                      | Kabeza   |
|   |  |                      | Gasabo    | Kinyinya | Kagugu<br>Murama<br>Gasharu | Giheka<br>Kagarama<br>Dusenyi<br>Ngaruyinka<br>Kami<br>Agatare |

### 3.3. PROJECT COMPONENTS REQUIRING LAND ACQUISITION AND RESETTLEMENT

This project requires expropriation of the following:

- 8,912m<sup>2</sup> for the New Gasogi substation.
- Area coverage at positions of towers along the 8.5km Right of Way (ROW) corridor for the Single circuit 15kV distribution lines (DL) from the New Gasogi substation to Masaka connection point. (South Distribution line).
- Area coverage at positions of towers along the 11.5km Right of Way (ROW) corridor for the Single circuit 15kV distribution lines (DL) from the New Gasogi substation to Nyagasambu connection point (North Distribution line).
- Area coverage at positions of towers along the 7km Right of Way (ROW) corridor for the 110Kv transmission line (TL) between Jabana and Birembo substations.

This project involves both physical and economic displacement of households, land, crops and trees as shown in Table 2. Physical displacement involves the loss of shelter and assets due to land acquisition for the Distribution and transmission network, while economic displacement involves the loss of means of livelihood from land acquisition i.e. the loss of agricultural land on which crops and trees are cultivated.

**Table 2: Magnitude of Displacement Caused by Land Acquisition**

| Displacement   | Impact                | Unit | Magnitude of Displacement |          |          |          |           | Total |
|--|-----------------------|------|---------------------------|----------|----------|----------|-----------|-------|
|  |                       |      | Gasabo                    |          |          | Kicukiro | Rwamagana |       |
|  |                       |      | Ndera                     | Gikomero | Rusororo | Masaka   | Fumbwe    |       |
| North route (New Gasogi- Nyagasambu Distribution line) |                       |      |                           |          |          |          |           |       |
| Loss of Residential Houses                             | Physical Displacement | PAH  | 10                        | 3        | 1        | 0        | 0         | 14    |
|  |                       | PAP  | 44                        | 12       | 1        | 0        | 0         | 57    |
| Loss of Agricultural Land                              | Economic Displacement | PAH  | 22                        | 9        | 11       | 0        | 3         | 45    |
|  |                       | PAP  | 32                        | 27       | 31       | 0        | 12        | 102   |
| Loss of Crops/ Trees                                   |                       | PAH  | 13                        | 7        | 28       | 0        | 2         | 50    |
|  |                       | PAP  | 30                        | 23       | 52       | 0        | 12        | 117   |
| Land owned by district                                 |                       |      | 0                         | 0        | 1        | 0        | 4         | 5     |
| South route (New Gasogi- Masaka Distribution line)     |                       |      |                           |          |          |          |           |       |
| Loss of Residential Houses                             | Physical Displacement | PAH  | 2                         | 0        | 0        | 0        | 0         | 2     |
|  |                       | PAP  | 6                         | 0        | 0        | 0        | 0         | 6     |
| Loss of Agricultural Land                              | Economic Displacement | PAH  | 20                        | 0        | 6        | 1        | 0         | 26    |
|  |                       | PAP  | 70                        | 0        | 15       | 5        | 0         | 90    |
| Loss of Crops/ Trees                                   |                       | PAH  | 23                        | 0        | 5        | 1        | 0         | 28    |
|  |                       | PAP  | 79                        | 0        | 11       | 5        | 0         | 95    |
| Land owned by district                                 |                       |      | 1                         | 0        | 0        | 0        | 0         | 1     |

### 3.4. METHODOLOGY OF THE LAND ACQUISITION PROCESS AND ARAP

- The concept for the project to “improve the substation and distribution network phase 3” was comprehended to include; the project objectives, activities and boundaries of the area of intervention.
- Based on the identified project boundaries, the affected people were informed of the project, its objectives, activities, boundaries and the extent of their property that will be lost to the project. This was done through a stakeholder engagement process during the period of 3<sup>rd</sup>- 21<sup>st</sup> July and again 9<sup>th</sup> October – 3<sup>rd</sup> November 2017.
- An asset inventory and valuation for property and/or assets likely to be lost was prepared and completed for the North and south distribution line routes in the period of 9<sup>th</sup> October- 3<sup>rd</sup> November 2017.
- An announcement was sent out through Public notice at the respective local Sectors and Cells and by radio communication of the dates on which the outcome of the asset inventory and valuation would be disclosed to the PAPs for verification and agreement. Dates set were from the 30<sup>th</sup> October- 3<sup>rd</sup> November 2017. The completed asset inventory was shared with the Project Affected People (PAP)

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and verified. The Cut-off date was established on the 3rd November 2017. From the date of agreement no additional developments (e.g. new structures, trees etc) would be added to the agreed compensation. This process identified and documented the people eligible for compensation at full replacement value for losses due to the Project and prevents ineligible people from claiming compensation after the asset inventory exercise has been completed.

- The asset inventory and property valuation report was shared with the respective Sector levels and District authorities for approval before it was submitted to EDCL to begin the preparation process of compensation.
- A Socio-economic survey of Project Affected Households (PAH) was undertaken along with the asset inventory to save time. Its purpose was to understand number of PAPs and their current livelihoods before the loss of property and land.
- An ARAP and/ or LRP was prepared informed by the survey, asset inventory and property valuation. It was then disclosed to PAPs to ensure all their concerns were covered and any missed out captured in this disclosure. Public disclosure through the national newspaper will be done.
- Once the ARAP was approved then its implementation by EDCL would follow. The approved Asset inventory and valuation report was reviewed by EDCL, once approved then through its finance department submitted to the Ministry of Finance and Economic Planning (MINECOFIN). MINECOFIN would then effect compensation payment to the account numbers of the PAP for property lost to the project based on recommendations of the ARAP. This shall be done with a period not exceeding 120 days from the cut-off date.
- During the compensation period, any grievances shall be handled by the existing grievance mechanism local structure but in attendance of EDCL and members of the consultant's team (where required).
- Monitoring and evaluation of the ARAP shall be undertaken alongside implementation of the plans to monitor their successes and deviations.

Some activities mentioned above and undertaken during preparation of the ARAP are discussed in a further detail below.

#### *Public consultation/ Stakeholders engagement*

One-on-one key informant interviews, cell and village-level discussions and Focus Group Discussions (FGDs) were undertaken to understand the extent of potential resettlement-related impacts of the Project's land acquisition process, as well as other relevant issues. The outcomes of these consultations were used to define the scope and strategy for the next stage of data collection. During the FGDs. Details of the public consultation meetings are discussed in *Chapter 13*. In each cell, the FGDs were held with: (i) local Government leaders; and (ii) the PAPs.

#### *Asset Inventory and Property Valuation*

This exercise required full support of local Government officials (i.e. district, sector, cell and village leaders) as well as land managers at district and sector levels. It also required mutual agreement of the PAPs in determining favorable compensation prices and also to ensure that the process of asset inventory and valuation is done smoothly without causing distress and insecurity in the areas of the proposed power line. Under the expropriation law, article 25 states that valuation of land and property shall be conducted in the presence of local administrative entities.

The inventory and valuation was done by a certified real property valuer as stipulated in the National expropriation law 2015.

PAPs were categorized in the following manner:

- **House owners** - these are the households (HHs) who were losing their houses to expropriation. Resettlement of houses shall occur for those right under the Right of Way (ROW) for the Distribution lines (DL) and for structures only at a minimum 5m vertical clearance from the lowest conductor for the Jabana- Birembo transmission line (TL)
- **Land owners** - these were household (HH) land owners of the portion the towers shall be erected and any remaining land deemed non-economical by virtue of the ROW. These HH included only those with legal land ownership documents.
- **Crop and tree owners** - these were HHs with perennial crops and trees with in the ROW likely to grow and interfere with the power line. Valuation was for annual crops since seasonal crops may be harvested prior to the land being taken. For land users (tenants not owning the land), compensation was written against the land owner. Compensation would be directed to the land owner and not the crop owner because payment is done by MINECOFIN, which only makes payments against land on which the crops exist. However, compensation would only be released to the land owner on written agreement with the local authority that he/she will compensate the actual crop/ tree owner. Records of land users (and associated owners) will be kept by the District so that these payments can be tracked to ensure all PAP receive due compensation. In the event of none payment of compensation to land users by land owners, land users will be able to raise grievances with the District.

In a number of cases, PAH overlapped in each of these categories. For example, a HH with a house, crops and trees on their land.

The detailed asset inventory and property valuation report links property to: individual owners with single identification IDs, their land plot numbers, phone numbers and financial institution account numbers.

#### *Additional Stakeholder Engagement*

Additional stakeholder engagement was undertaken with PAP to explain in greater detail the ARAP Process, activities they could undertake and to gather their feedback on the ARAP and its implementation. To save time Stakeholder engagement was done for both the ARAP and the ESIA. This is discussed in greater detail in Chapter 13.

## CHAPTER 2: RESETTLEMENT AS A RESULT OF THE PROJECT

JICA guidelines for environmental and social considerations 2010 and World Bank (WB) involuntary resettlement OP 4.12 requires that any acquisition of land that results in physical and / or economic displacement and resettlement of people should be avoided where possible. However, where such displacement and resettlement is unavoidable – that is – where alternative suitable project sites are not available or the cost of developing those sites is prohibitive – adverse resettlement impacts on affected individuals and communities should be minimized to the extent possible through sensitive project design, adjustments in the routing or siting of project facilities etc.

This section provides an overview of the Project that will result in displacement and resettlement, and how this displacement and resettlement is being minimized. Specifically, this section seeks to:

- Provide a brief Project description;
- Describe the scale and nature of the resettlement associated with the Project; and
- Outline alternatives considered during Project design to minimize resettlement.

### 2.1. PROJECT DESCRIPTION

The components of the proposed project comprised of:

*Table 3 Project components*

|   | Components  | Description                     |
|---|---|---------------------------------|
| 1 | Procurement of installation work  |                                 |
|   | 1.1 New Gasogi substation   |                                 |
|   | a) 110 kV/ 15 kV transformer  | 15MVA x 2 units<br>1 set        |
|   | b) 110Kv switch gear  | 1 set                           |
|   | c) 15Kv switch gear   | 1 set                           |
|   | d) Control and supervisory facilities   |                                 |
|   | 1.2 Distribution line   |                                 |
|   | a) 15 kV distribution line (Single circuit) from New Gasogi substation to Masaka connection point     | Approx. 8.5km<br>Approx. 11.5km |
|   | b) 15 kV distribution line (Single circuit) from New Gasogi substation to Nyagasambu connection point |                                 |
|   | 1.3 Reinforcement of Transmission line between Birembo and Jabana Substations                         |                                 |
|   | 1) 110 kV transmission line (Single circuit) from Birembo and Jabana Substation                       | Approx. 7.0km                   |
| 2 | Procurement Work  |                                 |
|   | 2.1 Maintenance tools for the equipment to be procured  | 1 lot                           |



|   |   |            |
|---|---|------------|
|   | 2.2 Spare parts for the equipment to be procured              | 1 lot      |
| 3 | Construction work   |            |
|   | 3.1 Installation of Gantries, Towers, etc.                    | 1 lot      |
|   | 3.2 Construction of Control building of New Gasogi Substation | 1 lot      |
|   | 3.3 Civil works   | 1 building |

The scope of the EIA study is limited to only section 1.1, 1.2 and 1.3.

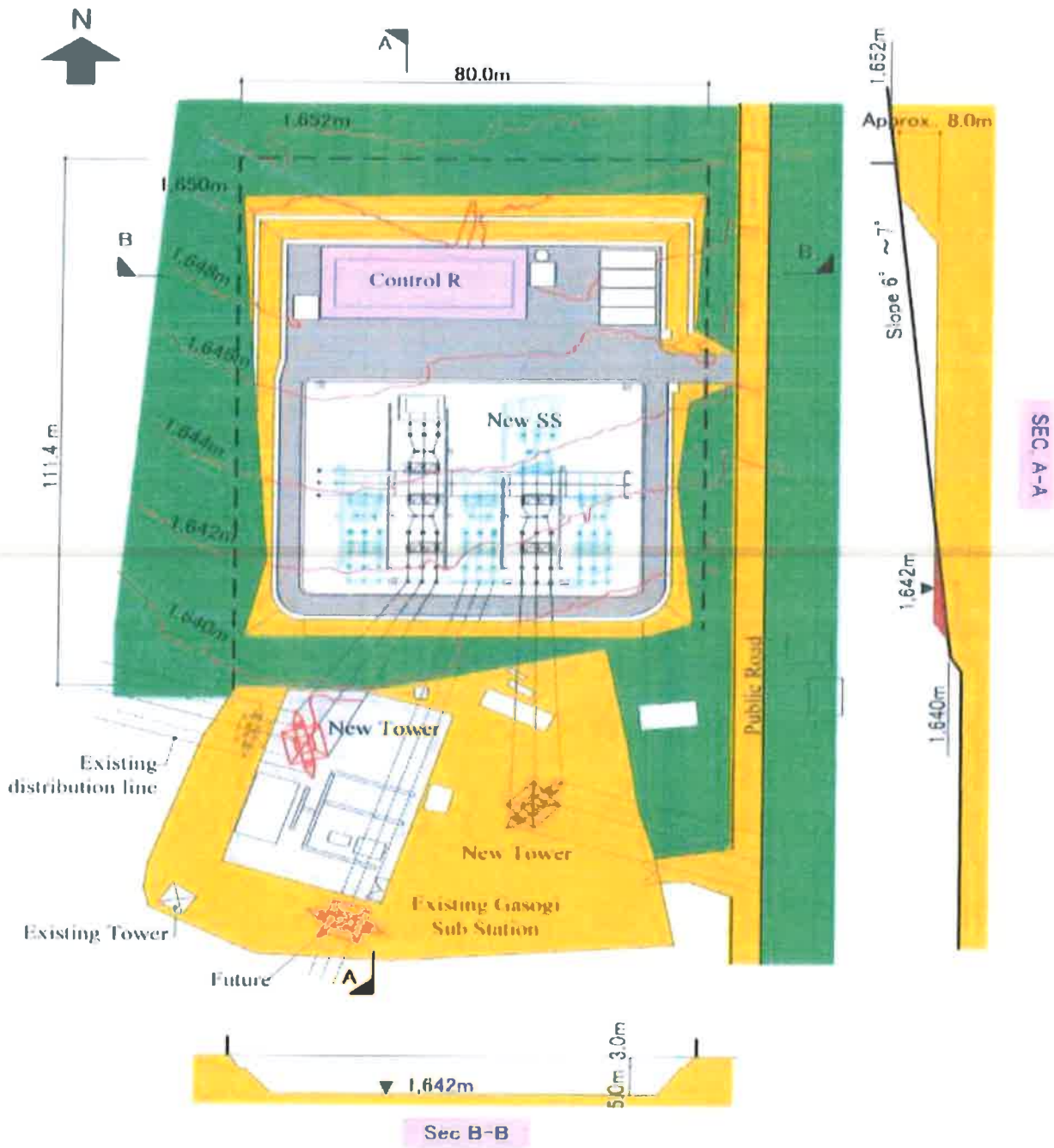
A site layout of the proposed new Gasogi substation is shown below;

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**New Gasogi Sub Station Layout plan**

Figure 1 New Gasogi substation site layout plan

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The project shall also involve tower erection and conductors for the distribution and transmission lines. An example of a tower type is shown in the figure below.

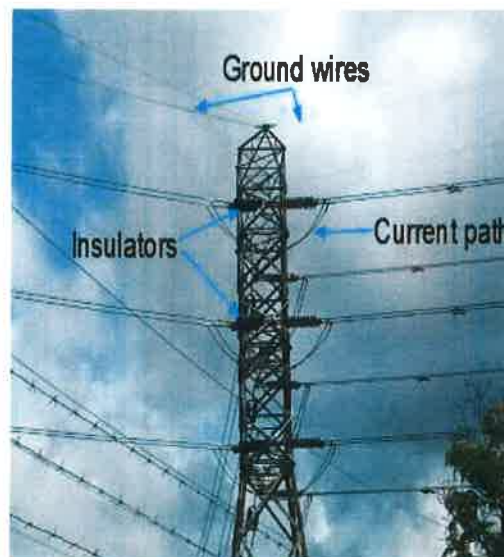
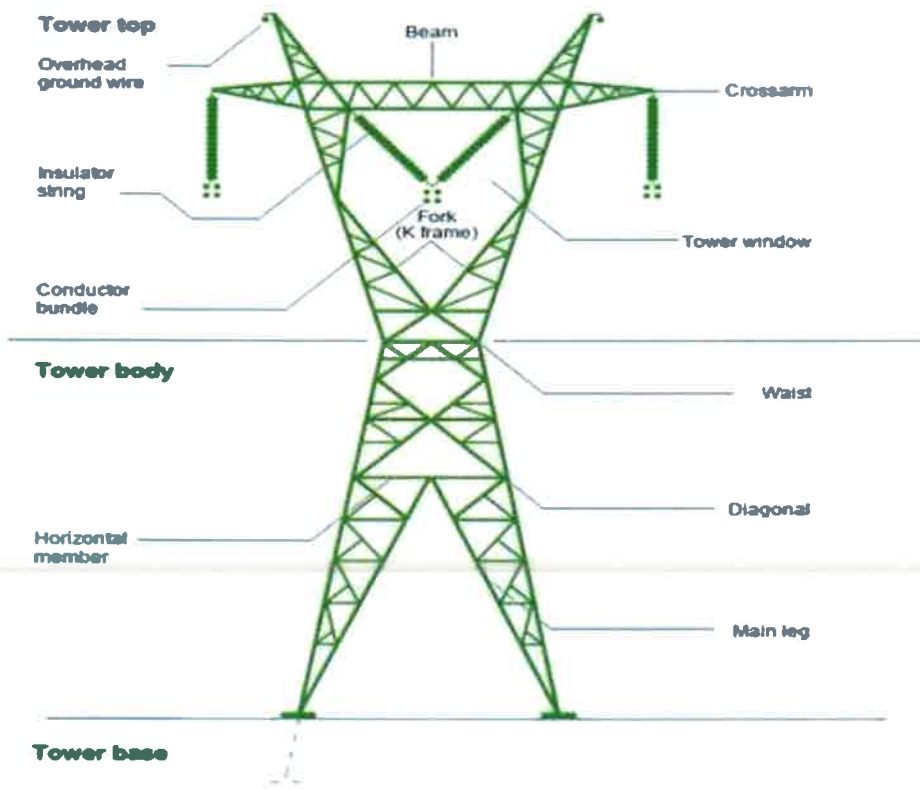


Figure 2 components of a tower

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The project covered three (3) districts; Gasabo, Kicukiro and Rwamagana districts. Line of route of the distribution and power lines demarcated by the connecting Angle points are indicated by the following maps.

### 15 Kv North and South Lines

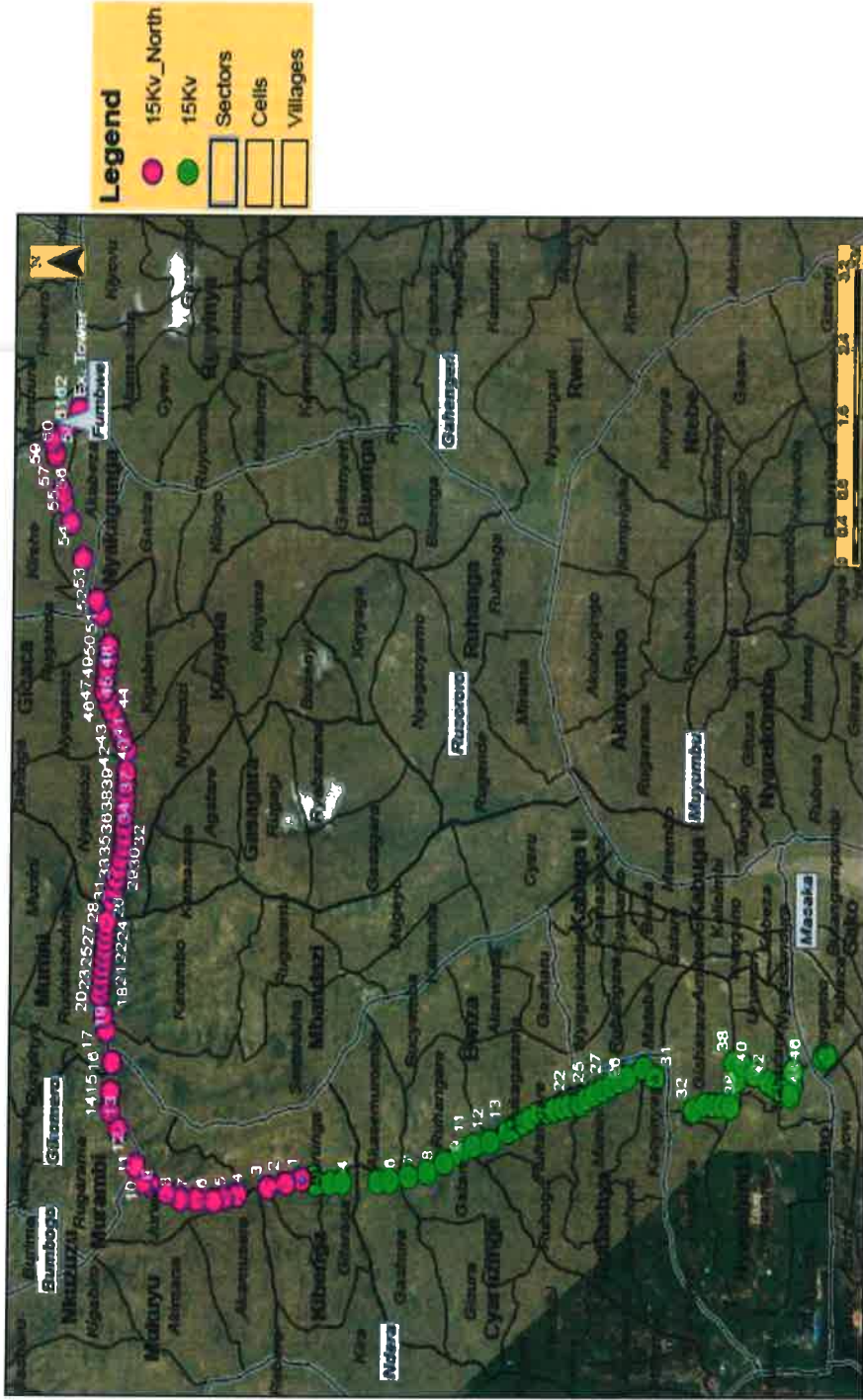


Figure 3 Distribution line from New Gasogi Substation to Nyagasambu (North route) and New Gasogi substation to Masaka Hospital connection point (South route)

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### Final 110 kV TL Route



Figure 4 Existing 110kV Transmission line from Jabana- Birembo substation

## 2.2. PROJECT INDUCED RESETTLEMENT

In order to establish a new Gasogi Substation, distribute power to Nyagasambu and Masaka connection points and rehabilitate the Jabana- Birembo Transmission lines, land would be acquired from communities along the ROW of these lines, resulting in physical and economic displacement.

For the structures, only residential houses were lost, no community structures (i.e. churches, community halls), commercial businesses, schools, health centres or local administration offices were displaced during the land acquisition.

The Table below highlights the magnitude of the impact, from the asset inventory, caused by the land acquisition.

**Table 4: Magnitude of Displacement Caused by Land Acquisition**

| Displacement   | Impact                | Unit | Magnitude of Displacement |          |          |          |           | Total |
|--|-----------------------|------|---------------------------|----------|----------|----------|-----------|-------|
|  |                       |      | Gasabo                    |          |          | Kicukiro | Rwamagana |       |
|  |                       |      | Ndera                     | Gikomero | Rusororo | Masaka   | Fumbwe    |       |
| North route (New Gasogi- Nyagasambu Distribution line) |                       |      |                           |          |          |          |           |       |
| Loss of Residential Houses                             | Physical Displacement | PAH  | 10                        | 3        | 1        | 0        | 0         | 14    |
|  |                       | PAP  | 44                        | 12       | 1        | 0        | 0         | 57    |
| Loss of Agricultural Land                              | Economic Displacement | PAH  | 22                        | 9        | 11       | 0        | 3         | 45    |
|  |                       | PAP  | 32                        | 27       | 31       | 0        | 12        | 102   |
| Loss of Crops/ Trees                                   | Economic Displacement | PAH  | 13                        | 7        | 28       | 0        | 2         | 50    |
|  |                       | PAP  | 30                        | 23       | 52       | 0        | 12        | 117   |
| Land owned by district                                 |                       |      | 0                         | 0        | 1        | 0        | 4         | 5     |
| South route (New Gasogi- Masaka Distribution line)     |                       |      |                           |          |          |          |           |       |
| Loss of Residential Houses                             | Physical Displacement | PAH  | 2                         | 0        | 0        | 0        | 0         | 2     |
|  |                       | PAP  | 6                         | 0        | 0        | 0        | 0         | 6     |
| Loss of Agricultural Land                              | Economic Displacement | PAH  | 20                        | 0        | 6        | 1        | 0         | 26    |
|  |                       | PAP  | 70                        | 0        | 15       | 5        | 0         | 90    |
| Loss of Crops/ Trees                                   | Economic Displacement | PAH  | 23                        | 0        | 5        | 1        | 0         | 28    |
|  |                       | PAP  | 79                        | 0        | 11       | 5        | 0         | 95    |
| Land owned by district                                 |                       |      | 1                         | 0        | 0        | 0        | 0         | 1     |

### 2.3. ANALYSIS OF ALTERNATIVES FOR MINIMISATION OF RESETTLEMENT

An analysis of alternative line routes was undertaken by the surveying and design team (PITRAD) through survey and mapping. At the end of this process, the lines of route chosen for this project were based on the following:

- New Gasogi substation.
- North route- 15kV Distribution line from New Gasogi substation to Nyagasambu existing Tower.
- South route- 15kV Distribution line from New Gasogi substation to Masaka existing Tower.
- Jabana- Birembo 110 kV Transmission line.

#### ***Alternative of New Gasogi substation***

Possible alternatives for the location of the sites for the construction of the New Gasogi substation were considered. After analysis, the selected site was retained on grounds that it was adjacent to the existing Gasogi substation which would simplify any transfer of technical equipment or connections. It would also be easier and cheaper to expropriate the land adjacent to the existing substation compared to any other area.

#### ***Alternative of Routes of the Distribution lines***

The chosen line of routes proposed were the shortest, with portions along the road reserves and would require less displacement of Households compared to other routes. The south route phase III was proposed along the phase II in order to benefit from the ROW of the phase II that way reducing the cost incurred in expropriation.

#### ***Alternative of routes of the Transmission line***

Replacing the existing transmission line from Jabana- Birembo was the cheapest and most optimal choice to achieve the rehabilitation of the transmission line with less resettlement cost.

#### ***No Project Alternative***

A No Project (Do nothing option) alternative if chosen, would primarily mean that the status quo will be maintained and in a sense any impacts (adverse) that come with the project will not occur. However the positive benefits will be forgone in terms of providing more access to electricity to the Kigali project intervention area population which would have in turn spurred and contributed to economic growth.

In particular if the “do nothing option” was considered, some benefits would be missed out such as:

- Increased electricity supply to, Ndera, Rusororo, Gikomero, Masaka and Fumbwe Sector areas.
- Increased electricity supply to Masaka Hospital.
- Businesses would not grow for lack of sufficient electricity, employment from these businesses and other related electricity dependent activities would not be realized.
- During the construction phase there would be no temporary employment opportunities for local contractors.

The “no project” alternative was there not considered as a viable option.

## CHAPTER 3: LEGAL FRAMEWORK

The land law of 2013 determines modalities of how land in Rwanda can be allocated, acquired, transferred, used and managed. It also establishes principles applied to rights recognized over land tenure in Rwanda.

This chapter underlines aspects relevant to the ARAP from the National Constitution, land law, expropriation law and relevant National regulations. It also discusses JICA guidelines for E&S considerations 2010, WB safeguard policy OP 4.12 requirements for the resettlement process to be complete and finally reveals a gap analysis of both national and international policies, recommending strategies of how such gaps can be closed.

### 3.1. RELEVANT LEGISLATION AND POLICIES IN RWANDA APPLYING TO THE PROJECT

#### 3.1.1. NATIONAL LAWS AND REGULATIONS

##### LAND LAW IN RWANDA

The Organic Law No.43/2013 of 16/06/2013 governing land in Rwanda determines modalities for allocating, acquisition, transfer, use and management of land in Rwanda. Under this law and relevant to this study are the definitions given to:

- **Land tenure** as the system by which land is held, describing the rights, responsibilities and restrictions that are attached to the land holder.
- **Expropriation:** an act of taking away an individuals' land by the State due to public interest in circumstances and procedures provided by law and subject to fair and prior compensation.

With reference to Article 4 of this law on equal right to land, it is stated that all forms of discrimination, such as that based on sex or origin, in relation to access to land and the enjoyment of real rights shall be prohibited. Every person who is in possession of land, acquired either in accordance with custom, or granted by a competent authority, or by purchase, is the recognized proprietor under an emphyteutic lease in accordance with the provisions of this law.

An emphyteutic lease is a long term lease of land from the Government by the title holder, in this case a period of 20 years, 49 years or 99 years, as stated in the land title lease document. Most of the land ownership documents are emphyteutic leases from the Government for a specific period and are renewable.

Any Rwandan citizen is entitled to be granted freehold title to land reserved for residential, industrial, commercial, social, cultural or scientific services. Freehold rights will apply only to developed land where infrastructure is erected and its extent will be strictly limited to the area of land that is necessary to support the authorized developments on the land and their amenity. Certifying that the land has been allocated or leased will be evidenced by a certificate of land registration issued by the registrar of land titles. The land owner will enjoy full rights to exploit his/her land in accordance with the provisions of this law and other laws.

The State recognizes the right to freely own land and will protect the land owner from being dispossessed of the land whether totally or partially, except in case of expropriation due to public interest. All buildings, crops and other works found on the land are achieved by the land owner using his/her own money or are otherwise are presumed to be his / hers. However, this does not prohibit another person from



owning buildings, crops and any other works on another person's land in accordance with procedures provided for by this law, other laws or in agreement with the land owner.

The Organic Land Law also provides two types of formal land tenure: full ownership/freehold and long term leasehold. Following the recent privatization of State owned lands, very few land users currently hold either type of land tenure. Therefore, the Organic Land Law recognizes existing rights, whether written or unwritten, under both civil law and customary practices through new national land tenure arrangements. Efforts were made under the Law (Article 7) to formalize land ownership, especially land acquired through customary means. For instance, rural populations with customary land rights have completed registration of their land through decentralized land institutions such as the District Land Bureau, Sector Land Committees and Cell Land Committees (Ministerial Order N° 001/2006 of 26/09/2006 Determining the Structure of Land Registers, the Responsibilities and the Functioning of the District Land Bureau).

All types of land tenure must be in compliance with the designated land use and environmental protection measures as outlined in the Land Use Master Plan (Organic Land law NO. 08/2005 of 14/07/2005, Article 6). The law also recognizes the private ownership of the land except the marshlands which are owned by the Government. In order to confirm this private ownership, the Government has completed registration of all lands and provided lease title to the owners. It is from the land titles that this study is able to understand category of land use for each Project Affected Person (PAP)/Displaced Person and also determine who the rightful land owner is, in the process of the asset inventory.

#### **NATIONAL LAW ON EXPROPRIATION IN PUBLIC INTEREST**

Based on Law No. 32/2015, relating to expropriation in the public interest, Article 3, only the Government will carry out expropriation, only in the public interest and with prior and just compensation. No person will hinder the implementation of the program of expropriation on the pretext of self-centred justifications. It also informs us that a person to be expropriated will be informed of the beginning of the process of the land survey and the inventory of the properties thereon.

Fair compensation will be determined through agreement between the expropriator and the person to be expropriated. The compensation may be monetary or an alternative land and a building equivalent to the determination of just monetary compensation.

In regard to asset inventory and valuation, Article 22 of the law states that land values and property prices should be consistent with the prevailing market rates as established by the Institute of Real Property Valuers in Rwanda.

The criteria for determining fair compensation, as stated in Article 28, is that without prejudice to other laws, the value of the land and property to be expropriated in the public interest will be calculated on the basis of their size, nature and location and the prevailing market rates. The compensation for disruption caused by expropriation to be paid to the expropriated person shall be equivalent to five percent (5%) of the total value of his/her property expropriated.

Contesting of assessed value can be done seven days after the approval of the valuation report. Any person contesting the assessed value will, at his/her own expense, engage the services of a valuer or a valuation firm recognized by the Institute of Real Property

Valuers in Rwanda to carry out a counter-assessment of the value as implied in Article 33.

Article 35 states that fair compensation can be paid in monetary form in the Rwandan currency or in any other form mutually agreed upon by the expropriator and the person to be expropriated. In order for the expropriation to be authorized, the fair compensation must be paid to the expropriated person before he/she relocates.

Article 36 states that the approved fair compensation will be paid within a period not exceeding one hundred and twenty (120) days from the day of its approval by the District or City of Kigali Council or the relevant Ministry. If fair compensation is not paid within the period, expropriation will become null and void unless otherwise agreed upon between the expropriator and the person to be expropriated.

Subsequent to receiving fair compensation, the expropriated person will have a period not exceeding one hundred and twenty (120) days to relocate. The person to be expropriated will not be allowed to plant crops that require more than one hundred and twenty days of growth before they can be harvested.

Any expropriator that retracts his/her project for expropriation in the public interest after the valuation of the property or fails to pay fair compensation within the period provided under Article 37 of this Law will be bound to pay compensation of five per cent (5%) of the agreed fair compensation.

Since the project involves land acquisition, the expropriation law is applied where land, houses, crops and other property could be compensated.

### **Guidelines on Right of Way (ROW) for Power lines**

Guidelines No. 01/GL/EL-EWS/RURA/2015 states that the Licensee shall obtain a ROW for a power line through an easement from the property owner or through purchasing the title ownership of the required land.

In the latter case, a landowner shall sell the strip or be expropriated of the land to the Licensee (licensed electric power) outright. RURA views the easement as a private agreement between two parties and would therefore not be directly involved, unless asked by one of the parties to provide an independent and unbiased response to practices that contravene these guidelines by any of the parties.

Easement is an agreement between the Licensee and the Landowner which grants a permanent right to the Licensee to cross or use land to build, maintain, operate and protect the power lines, while permitting the landowner to retain the general ownership and control of the land.

Regarding the ROW dimensions minimum horizontal Right-of-Way width requirement for overhead lines are elaborated in the table below. However, these dimensions may differ from values given in the table below for existing power lines or during special circumstances. Furthermore, when the power line parallels other existing infrastructure ROW such as roads, railroads, a lesser width may be required as part of the ROW of the existing infrastructure can often be combined with the ROW needed for the power line.

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The safety clearance distances to power lines shall comply with the following standards: (i) RS 474-1: 2011 for Power Installations exceeding 1kV a.c. – Part 1: Common rules; (ii). RS EAS 811-2: 2014 on Code of practice for safety of electrical installations; (iii) Any other relevant standards issued by the National Standards Bureau.

Expropriation of the ROW shall be conducted in accordance with the Law into force governing expropriation for public interest in Rwanda. The landowner shall subsequently hand over all the rights and responsibilities for the expropriated strip of land. Procedures for land acquisitions and land transfer shall comply with the domestic laws and regulations governing the matters.

**Table 5** Nationally acceptable Horizontal ROW for different voltage levels

| Voltage levels     | 0.4kV | 15kV< V<30kV | 110kV | 220kV | 400kV |
|--------------------|-------|--------------|-------|-------|-------|
| Horizontal ROW (m) | 3     | 12           | 25    | 30    | 50    |

*Note: The power lines shall be centered in the Right-of-Ways given in the table above.*

The ROW shall generally be clear of unauthorized structures that could interfere with a power line operation.

The guideline continues to state that relative to the features observed of any power line project area, some of the crucial acts forbidden under the ROW are to construct any building or structure or carry out cultivation, farming or any other activity within the ROW prior to the consent of the Licensee (i.e.REG).

However, derogation is in place stating that as long as minimum clearances from poles and conductors are maintained and with a prior written consent of the Licensee, the ROW can be used for certain activities such as yards, gardens, pastures and farming, recreational fields, streets, roads, driveways, parking lots, lakes, fences, drainage ditches, grading or any other activity that may not interfere with the line operation. Furthermore, temporary buildings or structures that are small and easily movable may be acceptable in the ROW with prior approval of the Licensee, provided that: (a) they are located away from the Licensee’ works and access roads and not directly beneath overhead conductors; (b) they are not habitable.

An exception to the above mentioned requirements for the ROW and based on the discussion held between RURA and EDCL on 21<sup>st</sup> June 2017 (*refer to JICA field report, 2017*), it was agreed and stated that the following criteria of resettlement and land acquisition are applied for reinforcement of the existing 110kV transmission line between Birembo and Jabana substation.

*Table 6 Right of way for existing transmission line Jabana- Birembo*

| No. | Items   | Right of Way (ROW), Criteria for land acquisition and resettlement  |
|-----|---|---|
| 1   | Right of Ways   | 110kV transmission line: <b>25m width(12.5m+12.5m)</b>  |
| 2   | Land acquisition  | Lands are required <b>only where towers will be erected.</b>  |
| 3   | Resettlement of structures lived or use by people such as houses, shops, etc. | A minimum vertical clearance from the lowest conductor to the top of structures is 5m. Structures within Right-of-way that do not meet the above minimum clearance, meaning the distance between the lowest conductor and the top of structures is less than 5m, are subject of resettlement. |
| 4   | Resettlement of trees   | All trees within the above Right of way must be removed.  |
| 5   | Resettlement of other objects   | Other objects within the above Right of way not meeting the minimum clearance (5m) will be evaluated based on social impacts and safety.  |

This is interpreted as such; that during asset inventory and valuation of property for compensation only land on which towers are built, habitable buildings under the power lines that do not meet the minimum vertical clearance, trees and perennial crops with in the corridor of the ROW that grow long and associated facilities like access roads to construction points will be eligible for compensation.

#### **ABUNZI POLICY FOR GRIEVANCE REDRESS**

The Abunzi are part of the organisational structure that implements the grievance mechanism. The National 2010 Abunzi Organic law states that at both the cell and sector levels, the Abunzi committee shall be composed of twelve people known for their integrity, who reside respectively in the concerned cell and sector and who are recognised for their ability to reconcile differences. These mediators are elected by the Cell Council and the Sector Council respectively for a renewable term of five years. Any grievance is assessed by these mediators in the presence of the affected person or representative of the affected community and the defendant. Abunzi meet weekly at the cell or sector offices to review and resolve these grievances. No more than 14 days will pass before response is given on the grievance. Written resolution declarations are prepared by the Secretary of the Abunzi and signed by everyone in attendance and sent to the cell leader for implementation. Response to the complaint is issued in writing to the complainant from the cell leader's office. If the response is not satisfactory to those affected the complaint can be taken to the Sector level and then District level and finally to courts of law in this chronological order.

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## SOCIAL PROTECTION UNDER VISION 2020 UMURENGE PROGRAMME (VUP)

VUP was used to accurately identify vulnerable groups and was proposed as part of the LRP for special assistance to vulnerable and/or poor groups.

The VUP aims to eradicate extreme poverty by 2020. This aim will eventually be achieved through acceleration in poverty reduction by achieving these key objectives:

- Realising the productive capacities of people and offering solutions adapted to their needs.
- Improving community livelihood assets (e.g. ecosystem rehabilitation) and ensuring their sustainable use.
- Increasing the targeting of social protection to the most vulnerable.

The VUP is organized around three components to implement client-based solutions and put money straight into the pockets of hard working Rwandans who participate in the VUP:

- Public works using community-based participatory approaches (e.g. Ubudehe) and are intended to build productive community assets. Since private land ownership is widespread in Rwanda, public works can take place on either public or private land (e.g. terracing). However, the case must be made that the assets benefit the community at large. When benefits are clear the community will have the incentive, or a vested interest, to maintain the community assets, thereby ensuring sustainability.
- Credit packages to tackle extreme poverty as well as to foster entrepreneurship and off-farm employment opportunities. These packages are designed to make the best possible use of scarce public resources, involve the private financial sector and provide people with incentives to improve their own productive capacities.
- Direct support to improve access to social services or to provide for landless householders that do not qualify for public works or credit packages, Such unconditional support seeks to expand health and education coverage as well as to encourage the development of “appropriate” skills, handicrafts or social service activities.

These three program components are not necessarily mutually exclusive. For instance, public works can be complemented with credit packages. In addition, a distinction is made between a household and members of the household. This is crucial as it includes women and youth, which represent important productive capacities but may not be heads of households. Hence, eligibility to these programs intends to address the concerns of women and the youth populations.

The program components are implemented through a set of projects that are designed and coordinated at district sector “Umurenge” level and implemented at cell “Umudugudu” level. Both program components and projects are linked to technical specialists in sector ministries who also provide the strategic direction and priorities as well as specific technical standards and policies. Eligibility of beneficiaries from the VUP:

- Public works are intended for adult women and men. This includes pregnant women during her first six months of pregnancy, lactating women after 10 months of giving birth and female heads of households. It excludes sick or mentally challenged people unable to undertake even light work, pregnant women in their

final trimester of pregnancy and lactating women in the first 10 months after child birth.

- Credit packages are intended for adult women and men. This includes pregnant women, lactating women and female heads of households. It excludes sick or mentally challenged people unable to undertake even light work. Restrictions apply for the landless unable to work who cannot generate income to pay back the loan
- Direct supports are intended for those unable to participate in public works and those without productive capacity to qualify for credit packages. It includes those who do not have sufficient and reliable support from their sons or daughters or remittances from relatives away from the village. Such individuals may include disabled persons, child headed households, marginalized persons, elders, lactating mothers in the first 10 months after birth, pregnant women in their last trimester, genocide survivors, persons living with HIV/AIDS, street children, widow headed households, refugees and returnees.

The criteria applied in determining who would be classified in the poor/vulnerable group and therefore eligible for the VUP support described above were:

- Category 1 of Ubudehe Program- Abatindinyakujya (Those living in abject poverty): This category of the population owns no property, lives by begging and is wholly dependent on others.
- Category 2 of Ubudehe Program- Abatindi (Very poor): This category of the population has poor housing, lives on a poor diet, depends on others and does not own land or livestock.
- Household headed by a person with disability classified under the category I a or II of the Ubudehe Program.
- Household headed by children under 19 yrs classified under the category I a or II of the Ubudehe Program.
- Household headed by an elderly person over 80 years old classified under category I or II of the Ubudehe Program.

### **3.1.2.INTERNATIONAL SAFEGUARDS**

#### **JICA Guidelines for Environmental and social considerations (2010)**

JICA, which is responsible for Official Development Assistance (ODA), plays a key role in contributing to sustainable development in developing countries. The inclusion of environmental and social costs in development costs and the social and institutional framework that makes such inclusion possible are crucial for sustainable development. Internalization and an institutional framework are requirements for measures regarding environmental and social considerations and JICA is required to have suitable consideration for environmental and social impacts.

The objectives of the guidelines are to encourage Project proponents to have appropriate consideration for environmental and social impacts, as well as to ensure that JICA's support for and examination of environmental and social considerations are conducted accordingly. In doing so, JICA recognizes the following seven principles to be very important: (i) wide range of Environmental and social (E&S) impacts must be addressed, (ii) Measures for E&S considerations must be implemented from an early stage to a monitoring stage, (iii) JICA is responsible for accountability when implementing cooperation projects, (iv) JICA asks stakeholders for their participation,

(v) JICA itself discloses information on E&S considerations in collaboration with project proponents, (vi) JICA makes efforts to enhance the comprehensive capacity of organizations and operations in order for project proponents, (vii) JICA addresses request of acceleration for the prompt implementation of projects while undertaking E&S considerations.

The guidelines cover five schemes: (1) Loan aid, (2) Grant aid (excluding projects executed through international organizations), (3) Preliminary studies of grant aid undertaken by Japan Ministry of Foreign Affairs (MOFA), (4) Technical cooperation for development planning, and (5) Technical cooperation projects.

The process of E&S consideration comprises of; (i) information disclosure, (ii) categorization of projects, (iii) impacts to be assessed, (iv) consultation with local stakeholders, (v) concern about social environment and human rights, (vi) Laws, regulations and standards of reference of host governments, (vii) advice of advisory committee for E&S considerations, (viii) decision making by JICA and (ix) ensuring appropriate implementation of and compliance with the guidelines.

Regarding categorization of projects, JICA classified projects into four categories.

- *Category A*- Such projects are likely to have significant adverse impacts on the environment and society. Projects with complicated or unprecedented impacts that are difficult to assess, or projects with a wide range of impacts or irreversible impacts, are also classified as Category A. These impacts may affect an area broader than the sites or facilities subject to physical construction. Category A, in principle, includes projects in sensitive sectors, projects that have characteristics that are liable to cause adverse environmental impacts, and projects located in or near sensitive areas
- *Category B*- Proposed projects are classified as Category B if their potential adverse impacts on the environment and society are less adverse than those of Category A projects. Generally, they are site-specific; few if any are irreversible; and in most cases, normal mitigation measures can be designed more readily.
- *Category C*- Proposed projects are classified as Category C if they are likely to have minimal or little adverse impact on the environment and society.
- *Category FI*- Proposed projects are classified as Category FI if they satisfy all of the following requirements: JICA's funding of projects is provided to a financial intermediary or executing agency.

Whereas one of the sensitive sectors identified for classification of a project as Category A is power transmission and distribution lines involving large-scale involuntary resettlement, large-scale logging, or submarine electrical cables, this particular project was observed to require large scale involuntary resettlement and its impacts are site specific, hence declassified to Category B but with recommendation of an EIA as instructed by Rwanda Development Board (RDB) (i.e. the National organ responsible for screening a project and determining whether or not an EIA is required and the extent of assessment).

JICA guidelines indicate impacts to be assessed with regard to E&S considerations to include; impacts on human health and safety, as well as on the natural environment, that are transmitted through air, water, soil, waste, accidents, water usage, climate change, ecosystems, fauna and flora, including trans-boundary or global scale impacts. These also include; social impacts, including migration of population and involuntary resettlement, local economy such as employment and livelihood, utilization of land and local resources, social institutions such as social capital and local decision-making institutions, existing social infrastructures and services, vulnerable social groups such as poor and indigenous peoples, equality of benefits and losses and equality in the development process, gender, children's rights, cultural heritage, local conflicts of interest, infectious diseases such as HIV/AIDS, and working conditions including occupational safety.

For critical impact such as involuntary resettlement, indigenous people, JICA guidelines desire that reference is made to World Bank (WB) safeguard policies. Regarding indigenous people, Rwanda does not have indigenous groups on grounds that it is a nation with a single/common culture, tribe, language and with a National constitution that recognises all Rwandans are born and remain equal in rights and freedom (*article 16 of Rwandan Constitution, 2015* and hence this safeguard is not applicable and not triggered.

The ARAP has gone further to consider the relevant WB safeguard triggered by land acquisition and resettlement from project activities.

## **RELEVANT WORLD BANK SAFEGUARD POLICIES**

### **Involuntary resettlement OP 4.12**

The key objectives of OP 4.12 are to:

- Avoid, and when avoidance is not possible, minimize displacement by exploring alternative project designs.
- Avoid forced eviction.
- Anticipate and avoid, or where avoidance is not possible, minimize adverse social and economic impacts from land acquisition or restrictions on land use by (i) providing compensation for loss of assets at replacement cost and (ii) ensuring that resettlement activities are implemented with appropriate disclosure of information, consultation and the informed participation of those affected.
- Improve or restore the livelihoods and standards of living of PAP.
- Improve living conditions among physically resettled people through the provision of adequate housing with security of tenure at resettlement sites.

OP 4.12 classifies PAP as persons: (i) who have formal legal rights to the land or assets they occupy or use; (ii) who do not have formal legal rights to land or assets, but have a claim to land that is recognized or recognizable under national law; or (iii) who have no recognizable legal right or claim to the land or assets they occupy or use. The census will establish the status of the PAP.



The scope of application of OP 4.12 applies to two types of displacement: (i) physical displacement and (ii) economic displacement resulting from the following types of land related transactions:

- Land rights acquired through expropriation.
- Land right acquired through negotiated settlements which could result in expropriation if negotiations failed.
- Project activities resulting in involuntary resettlement on land use or access to natural resources.
- Project activities requiring eviction of people occupying land without formal, traditional or recognizable usage rights.
- Restrictions on access to land or use of resources including communal and natural resources.

The general requirements of OP 4.12 are:

1. *Project Design* considers alternative designs to avoid or minimize physical or economic displacement as it balances its environmental, social and financial cost and benefits.
2. Where displacement is unavoidable, the displaced are *compensated at full replacement cost* and other assistance to improve or restore their livelihood. Full replacement defined as the market value of the asset plus transaction costs.
3. For land-based livelihoods, the first compensation option shall be land-based compensation. Where the expropriated land can only be taken after compensation is complete. Furthermore and where applicable, resettlement sites and moving allowances may be granted in addition to compensation. Opportunities to PAP will be availed for development benefits from project activities.
4. *Stakeholder engagement* of affected communities is essential in decision making process of resettlement and livelihood restoration. Relevant information regarding the compensation, livelihood restoration of the PAP shall be publically disclosed throughout the resettlement planning, implementation, monitoring and evaluation.
5. *Grievance mechanism* will be established at the development phase as a platform where concerns about compensation and relocation are raised by the PAP and such a concern is resolved by the agency acquiring the land or property.
6. *Resettlement and livelihood restoration planning and implementation*. A census will be carried out to collect appropriate socioeconomic baseline data to identify the persons who will be displaced by the project, determine who will be eligible for compensation and assistance and discourage ineligible persons, such as opportunistic settlers, from claiming benefits. In the absence of host government procedures, the client will establish a cut-off date for eligibility. Information regarding the cut-off date will be well documented and disseminated throughout the project area.

Displacement requirements are:

1. *Under Physical displacement* where it involves moving people to another location the client will (i) offer the displaced persons choices including adequate replacement housing with security of tenure or cash compensation and (ii) provide relocation assistance suited to the needs of each group of displaced persons. For new resettlement sites, improved living conditions must be seen, while relocating in preexisting communities and groups shall require their preferences. A Resettlement Action Plan shall be required to guide it.
  - a. For persons with legal rights of land or assets and those who do not have legal rights but have recognizable claim on land, the client will offer the choice of replacement property of equal or higher value, security of tenure, equivalent or

better characteristics, and advantages of location or cash compensation where appropriate.

- b. For persons who have no recognizable legal right or claim to land or assets they occupy or use, the client will offer them a choice of options for adequate housing with security of tenure so that they can resettle legally without having to face the risk of forced eviction or full replacement compensation where appropriate.
2. *Under Economic Displacement* resulting from land acquisition or restriction on land use, the displaced person will also be compensated at full replacement cost for lost assets or access.
- a. For affected commercial structures, compensation shall include the cost of reestablishing commercial activities elsewhere, for lost net income during the period of transition, and for the costs of the transfer and reinstallation of the plant, machinery, or other equipment.
  - b. For persons with legal rights of land or assets and those who do not have legal rights but have recognizable claim on land, replacement property of equal or greater value will be provided, or, where appropriate, cash compensation at full replacement cost.
  - c. For persons who have no recognizable legal right or claim to land or assets they occupy or use, will be compensated for lost assets other than land (such as crops and other improvements made to the land) at full replacement cost.

### 3.2. GAP ANALYSIS BETWEEN IFC PS 5 AND THE LAWS OF RWANDA

The following table compares differences between the laws/regulations of Rwanda related to expropriation and WB OP 4.12 Involuntary Resettlement. The announcement of the new expropriation law introduces a legal framework within which expropriation activities must be conducted, and above all, attempts to bring Rwandan Legislation more in line with international best practice requirements. Despite this, there are still some gaps between the National Rwandan legislation and the OP 4.12.

Table 7: Gap Analysis between OP 4.12 and Rwandan Law

| No | Issues   | OP 4.12   | Rwandan Law   | Gap between OP 4.12 & Rwandan Law   | Policies Applied to the Project to Close Gap   |
|----|--|---|---|---|--|
| 1. | Avoidance or minimization of project impacts at Project Design | Recommends avoidance, and when avoidance is not possible, minimization of displacement by exploring alternative project designs.  | No similar provisions are provided in the Rwandan National Law, however, it states that the affected persons shall be given fair and just compensation in Article 3 of the expropriation law  | Gap is mostly on avoidance, where the National law states that expropriation of land for public interest is regarded as inevitable.   | Alternatives analysis of project design options are discussed in Chapter 2.3, including the zero option analysis to avoid the project.   |
| 2. | Full replacement compensation                                  | When displacement cannot be avoided, the client will offer full replacement cost compensation to PAPs for loss of assets<br><br>Preference should be given to land-based resettlement strategies for displaced persons whose livelihoods are land-based.<br><br>Provide relocation assistance suited to | Compensation is calculated considering the size, nature and location and considering the prevailing market prices.<br><br>Compensation for disruption caused by expropriation to be paid to the expropriated person shall be equivalent to five percent (5%) of the total value of his/her property expropriated ( <i>Article 28 of the Expropriation</i> ) | A gap exists between full replacement cost and market prices in the National Law. National prices are based on Market price and district gazette for crops and trees, while houses are based on current construction material prices at time of valuation. What the National Law does not specifically include in the full replacement cost are transaction fees and any taxes. | The existing gap of transaction fees in addition to the market price to ensure full replacement cost and relocation assistance is covered in the 5% of the total value of property expropriated as cost for any disruption caused.<br><br>A Livelihood restoration plan (LRP) is proposed in this ARAP to close the gap. |

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| No | Issues  | OP 4.12  | Rwandan Law   | Gap between OP 4.12 & Rwandan Law   | Policies Applied to the Project to Close Gap         |
|----|---|--|---|---|--|
|    | the needs of each group of displaced persons. | <p>Law).<br/>Article 35 of the Expropriation Law provides for fair and just compensation and it stipulates that fair compensation can be paid in monetary form in the Rwandan currency or in any other form mutually agreed upon by the expropriator and the person to be expropriated. There is no explicit support for the transition period and livelihood restoration mentioned in the local laws.</p> | <p>No Gap on preference or choice of compensation.<br/><br/>No gap on relocation assistance since there is an addition 5% to the valued price to cover disruption caused.</p> | <p>Gap exists as no guidance on restoration of PAP livelihood is given in the Rwandan regulations.<br/><br/>The Rwandan legislation has no instructions on this matter.<br/>Gap exists.</p> | LRP has been proposed in the ARAP to cover this gap. |
| 3. | Livelihood restoration                        | When displacement cannot be avoided, the client will offer displaced communities and persons compensation for loss of assets at full   | There are no explicit provisions on livelihood restoration.   |   |  |

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| OP 4.12 |  | Rwandan Law   |  | Gap between OP 4.12 & Rwandan Law  |  | Policies Applied to the Project to Close Gap |  |
|---------|--|---|--|--|--|--|--|
| No      | Issues   | OP 4.12   | Rwandan Law  | Gap between OP 4.12 & Rwandan Law  | Policies Applied to the Project to Close Gap   |  |  |
|         |  | replacement cost and other assistance to help them improve or restore their standards of living or livelihoods.                           |  |  |  |  |  |
| 4.      | Compensation timing  | Compensation and other kinds of assistance must be provided prior to displacement.  | The Expropriation Law, Article 35 stated the fair compensation must be paid to the expropriated person before he or she relocates. Article 36 specifies a time frame of 120 days from the day of approval by the District or Kigali city council or relevant ministry. | No gap. Compensation will be provided prior to relocation.   | No gap hence no need to close gap.   |  |  |
| 5.      | Abbreviated Resettlement Action Plan (ARAP) or RAP and Livelihood Restoration Plan (LRP) | For projects that entail physical displacement, resettlement action plan (RAP or ARAP) must be prepared and made available to the public. | A procedure of expropriation is explained that includes valuation of property lost, compensation and stages of appeals for expropriated people that are not satisfied by the outcome of the expropriation.   | The Rwandan legislation is not clear on this matter of preparing a detailed RAP or LRP however, Government recognizes obligations by donors that require RAPs for such development projects. | To close this gap, an ARAP was prepared in accordance with the JICA E&S 2010 and WB OP 4.12 since both physical and economic displacement is experienced under this project. |  |  |

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| No | Issues   | OP 4.12   | Rwandan Law   | Gap between OP 4.12 & Rwandan Law   | Policies Applied to the Project to Close Gap   |
|----|--|---|---|---|--|
|    |  | While those subject to economic displacement require a LRP  |   |   |  |
| 6. | Public consultation/<br>Stakeholder engagement | In preparing a resettlement action plan, consultations must be held with the affected people and their communities based on sufficient information made available to them in advance. | Articles 10, 11 and 14 of the expropriation law 2015 refer to Consultative meetings with concerned populations living in the land affected, sensitizing them on the relevance of the project of expropriation in the public interest. | Whereas public dissemination is advised in the National Law, there are no specific guidelines for public participation of affected people in planning, implementation, and monitoring of RAP. | Consultations during the ESIA and RAP preparation were used as opportunities for the public to participate in RAP planning, implementation and monitoring.<br><br>Furthermore a stakeholder engagement plan was proposed in this ARAP for implementation during the project. |
| 7. | Grievance mechanism                            | Grievance mechanisms must be established for the affected people and their communities as   | The Expropriation Law Article 33 provides an appeal procedure for individuals dissatisfied  | No significant gap on grievance mechanism, however, the gap appears where the local law states that the   | To cover this gap on expenses on appeals, an appropriate and accessible grievance mechanism is in place following the existing local grievance structure to avoid duplication, as  |

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| OP 4.12 |   | Rwandan Law   |  | Gap between OP 4.12 & Rwandan Law   |             | Policies Applied to the Project to Close Gap   |  |
|---------|---|---|--|---|-------------|--|--|
| No      | Issues  | OP 4.12   | Rwandan Law  | OP 4.12   | Rwandan Law | Gap between OP 4.12 & Rwandan Law  | Policies Applied to the Project to Close Gap |
|         |   | early as possible in the development phase  | with the value of their compensation. It however requires the contesting person to hire and pay for a professional valuer.   | displaced person shall hire their own valuer at their own expense.  |             | elaborated in Chapter 10   |  |
| 8.      | Census, asset inventory, socio-economic survey and cut-off date | Affected people are to be identified and recorded as early as possible in order to establish their eligibility through an initial baseline survey (including population census that serves as an eligibility, asset inventory, and socioeconomic survey), preferably at the project identification stage, to prevent a subsequent influx of encroachers and others who wish to take advance of such benefits. | According to the Rwandan Expropriation Law, Article 21 the district shall approve the list of the persons to be expropriated which serves as a basis for drawing up an inventory of the property to be expropriated. | No gap in terms of conducting inventory. However, no socio-economic survey is obliged by government funded projects and the cut-off date is not clearly defined by the local law even though it appears to be the date the valuation report is completed and published. |             | To close the gap an ARAP includes; the socio-economic survey, census of the PAPs, an asset inventory and dates announced through public notices at each Sector and Cell offices and Radio communication for verification of the asset inventory and valuation outcomes on the 30 <sup>th</sup> October- 3 <sup>rd</sup> November 2017, from which a cut-off date was set for 3 <sup>rd</sup> November. |  |
| 9.      | Eligibility   | Eligibility of benefits includes, (i) the PAPs  | Article 26 of the Expropriation Law  | There is a gap. The Rwandan   |             | Gap could not be closed, only those with land lease title deeds can be   |  |

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| No  | Issues            | OP 4.12   | Rwandan Law  | Gap between OP 4.12 & Rwandan Law   | Policies Applied to the Project to Close Gap   |
|-----|-------------------|---|--|---|--|
|     |                   | who have formal legal rights to land (including customary and traditional land rights recognized under law), (ii) the PAPs who don't have formal legal rights to land at the time of census but have a claim to such land or assets and (iii) the PAPs who have no recognizable legal right to the land they are occupying. | considers only those that have land titles as the only ones eligible for compensation. People unlawfully occupying land or having developed activities on land shall not be compensated. | legislation does not recognize those displaced people with no formal legal rights to land but have a claim to it or those who have no recognizable right or claim to the land they are occupying. | compensated. This is policy by Ministry of finance and economic planning which is the only organ that authorizes payment for compensation on expropriation. A land lease title deed is the only proof recognized as reference for asset lost.<br>For those with property on land they are renting or care taking for the actual land owner, compensation was written against the land owner but would only be released to the land owner on written agreement authenticated by local authority that he/she shall compensate the actual crop/ tree owner. |
| 10. | Vulnerable groups | Particular attention must be paid to the needs of the vulnerable groups among those displaced, especially those below the poverty line, landless, elderly, women and children, ethnic minorities etc.   | No clear provision on the vulnerable groups among those displaced  | There is a gap. The Rwandan legislation does not contain provisions on this matter.   | Based on the baseline survey of affected communities any HH that might get into Category I and II vulnerable groups of the National Ubudehe categorization as a result of the Project activities, will be included in the National Social protection that includes; direct financial support monthly and for some public works for payment.  |
| 11  | Monitoring        | The client will   | Local legislation does   | There is a gap. The   | A monitoring and implementation  |

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| No | Issues         | OP 4.12   | Rwandan Law   | Gap between OP 4.12 & Rwandan Law                               | Policies Applied to the Project to Close Gap   |
|----|----------------|---|---|---|--|
|    | and evaluation | establish procedures to monitor and evaluate the implementation of a Resettlement Action Plan or Livelihood Restoration Plan. | not have any monitoring and evaluation requirement. | Rwandan legislation does not contain provisions on this matter. | <p>plan of the ARAP and LRP implementation has been.</p> <p>The success of the Project will require rigorous evaluation and corrective actions will need to be implemented where required.</p> |

## CHAPTER 4: BASELINE

### 4.1 SOCIAL STRUCTURE AND ORGANISATION

Local governance structure in Rwanda comprises of 4 Provinces and Kigali city. i.e. north, south, east and western provinces. Each province and the Kigali city comprises of a number of districts. Each district comprises of sectors, each sector comprises of cells and each cell comprises of villages. The project to improve substations and distribution network Phase III traverses through three (3) Districts. i.e. Gasabo, Kicukiro and Rwamagana.

### 4.2 HOUSEHOLDS IN AFFECTED AREA

The baseline aimed to survey 100% of the 114 PAH of the North distribution line and the New Gasogi substation areas (73 HH) and South (41HH) distribution line routes. However, 71 (97.26%) of PAH were surveyed along the North (New Gasogi-Nyagasambu) and 34 (82.93%) HH along the South (New Gasogi- Masaka) routes of the Distribution lines that were physically present or had representatives between October and November 2017 by the time of the study.

Along the North route, 2HH of the PAHs were not present or had no representatives to provide information of the asset ownership. Along the South route 7 HH were not present or had no representatives to provide information of the asset ownership.

Among those interviewed during the survey with representation at their possessions, there were 2 HH heads that were not responsive to the survey along the North route.

Table 7 below indicates the distribution of the PAH by District, sector, cell and village.

**Table 8: Surveyed Households**

| Districts   | Sector                   | Cell       | Village      | HH Count  | %             |
|---|--------------------------|------------|--------------|-----------|---------------|
| <b>North route (New Gasogi- Nyagasambu Distribution line)</b> |                          |            |              |           |               |
| Gasabo  | GIKOMERO                 | KAMUNINI   | RUDAKABUKIRA | 1         | 1.37          |
|   | GIKOMERO                 | MURAMBI    | RUGARAMA     | 11        | 15.07         |
|   | NDERA                    | KIBENGA    | BURUNGA      | 7         | 9.59          |
|   | NDERA                    | MUKUYU     | AKAMUSARE    | 1         | 1.37          |
|   | NDERA                    | MUKUYU     | JURWE        | 14        | 19.18         |
|   | RUSORORO                 | KINYANA    | KIGABIRO     | 12        | 16.44         |
|   | RUSORORO                 | KINYANA    | NYAGISOZI    | 15        | 20.55         |
|   | RUSORORO                 | MBANDAZI   | KARAMBO      | 8         | 10.96         |
| Rwamagana   | FUMBWE                   | NYAKAGUNGA | AKABEZA      | 1         | 1.37          |
|   | FUMBWE                   | NYAKAGUNGA | KIREHE       | 1         | 1.37          |
|   | FUMBWE                   | NYAKAGUNGA | NYAGASAMBU   | 2         | 2.74          |
|   | <b>Total affected HH</b> |            |              | <b>73</b> | <b>100.00</b> |
| <b>South route (New Gasogi- Masaka Distribution line)</b>     |                          |            |              |           |               |
| Kicukiro  | MASAKA                   | CYUGAMO    | MURAMBI      | 1         | 2.44          |
| Gasabo  | NDERA                    | CYARUZINGI | GASHURE      | 1         | 2.44          |
|   | NDERA                    | CYARUZINGI | GATARE       | 5         | 12.20         |
|   | NDERA                    | KIBENGA    | BURUNGA      | 7         | 17.07         |
|   | NDERA                    | RUDASHYA   | RUHANGARE    | 18        | 43.90         |
|   | RUSORORO                 | NYAGAHINGA | GISHARARA    | 5         | 12.20         |
|   | RUSORORO                 | NYAGAHINGA | KABUTARE     | 4         | 9.76          |
|   | <b>Total affected HH</b> |            |              | <b>41</b> | <b>100.00</b> |

Of the surveyed HH, along the North route 32.88% have female heads, while 67.12% have male heads and along the south route 46.34% have female heads, while 53.66% have male heads.

### 4.3 CROPS GROWN

At the time of the survey, crops grown ranged from seasonal to perennial crops. Common among the crops were; beans, bananas, maize, cassava and sweet potatoes. Perennial trees observed in the area were; avocado, pawpaw and mango trees. Planted forests of mostly eucalyptus covered portions along the ROW of the power line. It may suffice that PAH grow these crops largely for HH subsistence, with surplus production sold to middlemen from Kigali city.

### 4.4 LAND OCCUPANCY

Of the 73 HH along the North route distribution line 89.04% are owners of the land while, 6.85% are either hiring or care taking the land. The rest were not found and had no representatives to avail any information regarding land ownership at the time of the survey.

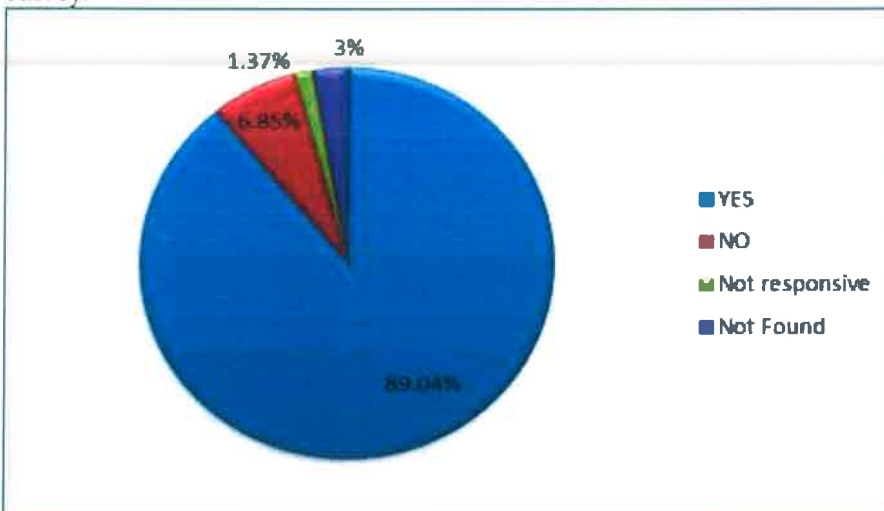
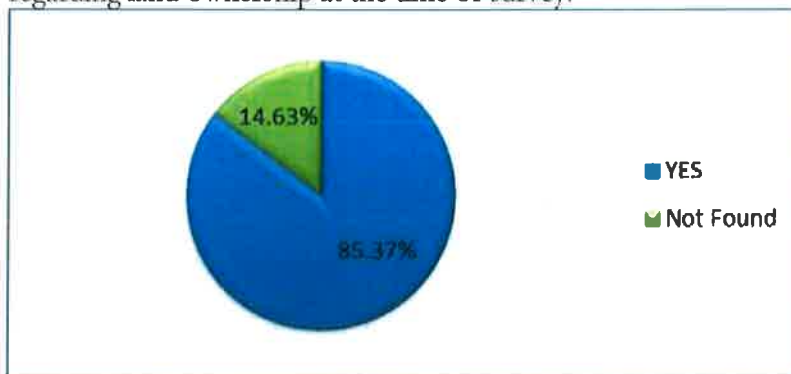


Figure 5: Land occupancy along the North distribution line route

While for the 41 HH along the South route distribution line 85.37% are owners of the land. The rest were not found and had no representatives to avail any information regarding land ownership at the time of survey.



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**Figure 6: Land occupancy along the South Distribution line route**

**4.5 DEMOGRAPHY**

The total PAH surveyed is distributed by age group as per Table 8 below. Regarding HH heads by age patterns, along the North route 97.26% (69 HH) are in the age range of 21-80 years, 1.56% (1 HH) of HH heads is above 80 years and therefore considered elderly and no HH headed by individuals who are less than 20 years. As for the South route, 85.37% (37 HH) are in the age range of 21-80 years, No HH heads is above 80 years or less than 20 years.

**Table 9: Age Distribution for Household heads (HHH)**

| Age group   | Number    | Percentage    |
|---|-----------|---------------|
| <b>North route (New Gasogi- Nyagasambu Distribution line)</b> |           |               |
| 0-20  | 0         | 0.00          |
| 21-30   | 11        | 15.07         |
| 31-40   | 20        | 27.40         |
| 41-50   | 13        | 17.81         |
| 51-60   | 15        | 20.55         |
| 61-70   | 7         | 9.59          |
| 71-80   | 2         | 2.74          |
| 81-90   | 1         | 1.37          |
| 90+   | 0         | 0.00          |
| Not found   | 2         | 2.74          |
| Not Responsive  | 2         | 2.74          |
| <b>Total population</b>                                       | <b>73</b> | <b>100.00</b> |
| <b>South route (New Gasogi- Masaka Distribution line)</b>     |           |               |
| 0-20  | 0         | 0.00          |
| 21-30   | 4         | 9.76          |
| 31-40   | 11        | 26.83         |
| 41-50   | 8         | 19.51         |
| 51-60   | 6         | 14.63         |
| 61-70   | 2         | 4.88          |
| 71-80   | 3         | 7.32          |
| 81-90   | 0         | 0.00          |
| 90+   | 0         | 0.00          |
| Not Found   | 7         | 17.07         |
| <b>Total population</b>                                       | <b>41</b> | <b>100.00</b> |

Based on these figures, only those above 80years were considered as likely to be placed in the vulnerable group and liable to any livelihood restoration assistance if any.

**4.6 EDUCATION STATUS**

Along the North route, about 15% (11 of the Heads of HH) interviewed had no education level whatsoever, while over 79% (57 of the heads of HH) in the affected area have at least completed the primary level of education with 6.85% (5HH having attained tertiary education), indicating a substantial level of literacy within the affected area population as shown in the table below.

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While along the South route, about 12% (5 of the Heads of HH) interviewed had no education level whatsoever, while 70.73% (29 of the heads of HH) in the affected area have at least completed the primary level of education with 19.51% (8HH having attained tertiary education), also indicating a substantial level of literacy within the affected area population as shown in the table below.

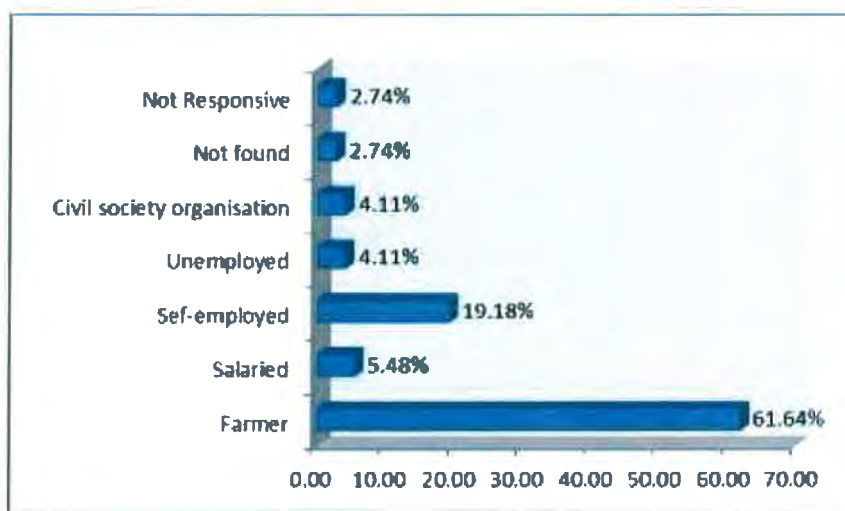
Such levels of literacy are essential for PAH in understanding their entitlements, references made during the valuation of their assets and compliance to requirements for quick compensation such as; accurate documentation of land lease titles, financial institution accounts, among the things required.

**Table 10: Education status of PAHs**

| Education Level   | Number    | Percentage    |
|---|-----------|---------------|
| <b>North route (New Gasogi- Nyagasambu Distribution line)</b> |           |               |
| No School   | 11        | 15.07         |
| Primary   | 38        | 52.05         |
| Secondary   | 15        | 20.55         |
| Tertiary  | 5         | 6.85          |
| Not found   | 2         | 2.74          |
| Not responsive  | 2         | 2.74          |
| <b>Total population</b>                                       | <b>73</b> | <b>100.00</b> |
| <b>South route (New Gasogi- Masaka Distribution line)</b>     |           |               |
| No School   | 5         | 12.20         |
| Primary   | 14        | 34.15         |
| Secondary   | 7         | 17.07         |
| Tertiary  | 8         | 19.51         |
| Not found   | 7         | 17.07         |
| <b>Total population</b>                                       | <b>41</b> | <b>100.00</b> |

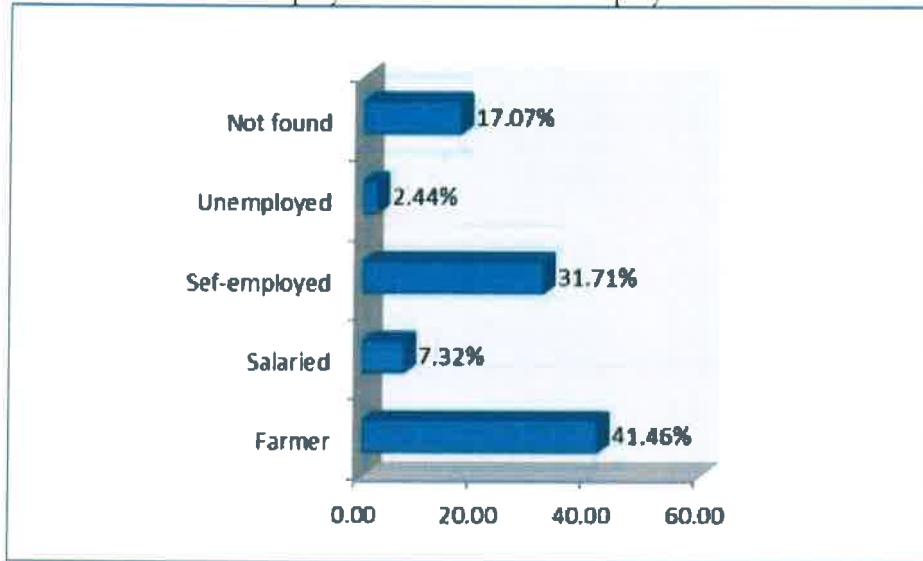
#### 4.7 EMPLOYMENT STATUS

Along the North route, 61.64% of the PAH are farmers, 19.18% self-employed, 5.48% have salaried employment and 4.11% unemployed.



**Figure 7: Primary Occupation of PAH along the North Distribution line**

While along the south route, 41.46% of the PAH are farmers, 31.71% self-employed, 7.32% have salaried employment and 2.44% unemployed.

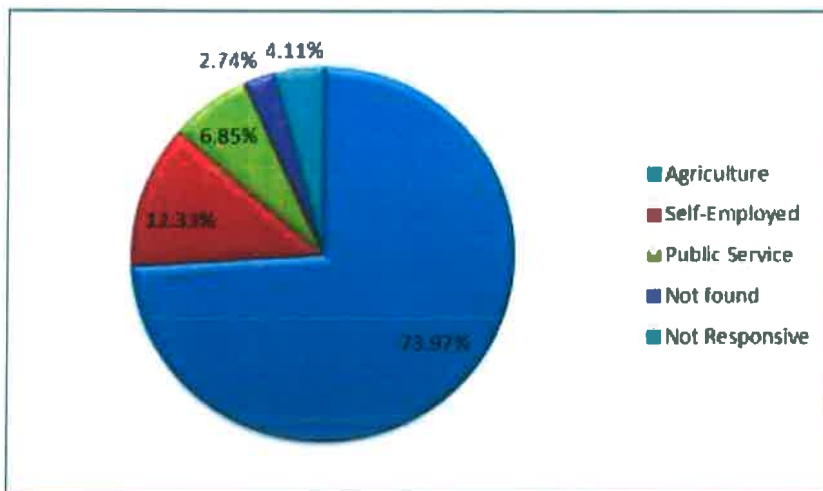


**Figure 8: Primary occupation of PAH along the South Distribution line**

Having such a high percentage of HH dependent on farming normally would have been an indication of the extent to which land acquisition might have an impact on the PAPHs, however, since it is proposed that as a livelihood restoration initiative that land under the ROW of the power line can continue to be cultivated with an exception of planting trees and perennial crops that could interfere with power line, the project is not likely to have a negative impact as would have been if cultivation was not accepted.

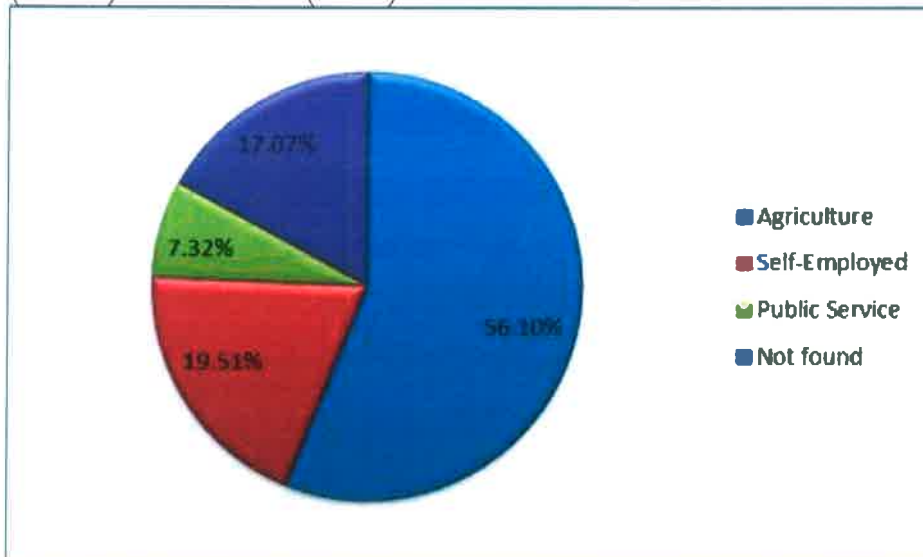
#### **4.8 INCOME SOURCES**

Along the North route, the majority of the population derive their household incomes from agriculture (73.97%). The second most common source of income for the households is from self-employment (12.33%). Public service (6.85%) is the least income source for the PAPHs.



**Figure 9: Households Sources of Income along the North route**

Though different from the north, the south route also has the majority of the population derive their household incomes from agriculture (56.10%). The second most common source of income for the households is from self-employment (19.51%). Public service (7.32%) is the least income source for the PAHs.



**Figure 10: Households sources of Income along the South route**

With the project acquiring portions of land from PAH largely dependent on agriculture as their income source, it seems right to avail alternative sources of income to PAPs during the construction and operation of the project as a livelihood restoration initiative. e.g. job opportunities during construction like casual labour, masonry, carpentry. This could act as a transfer of skills and eventually a transition from agricultural dependency to self-employment from acquired skills.

#### 4.9 EXPENDITURE LEVELS

The figure below from the survey demonstrates that along the North route, the HH expenditure levels in monetary range per month. 63% (46HH) spend a range of

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30,000-100,000Rwf/month, 28.77% (21HH) expend over 100,000Rwf/month, while 2.74% (2HH) spend less than 30,000Rwf/month.

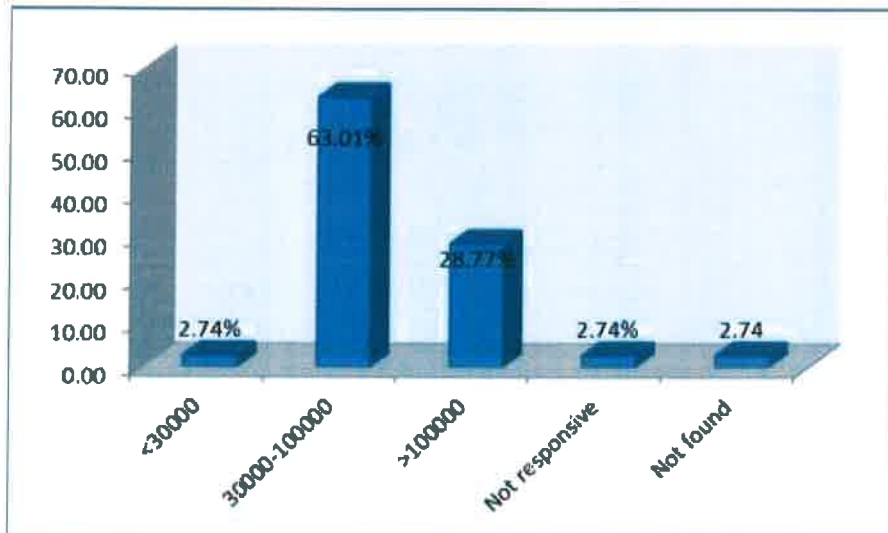


Figure 11: Extent of HH Expenditure along the North route

Along the south route, HH expenditure levels in monetary range per month. 48.78% (20HH) spend a range of 30,000-100,000Rwf/month, 31.71% (13HH) expend over 100,000Rwf/month, while 2.44% (1HH) spend less than 30,000Rwf/month.

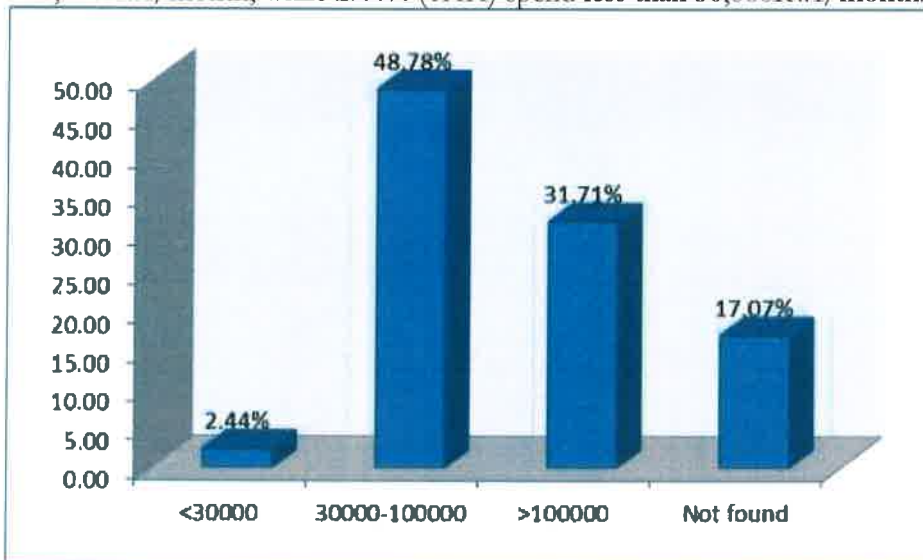


Figure 12: Extent of HH Expenditure along the South route

#### 4.10 FINANCIAL INSTITUTION ACCOUNT STATUS

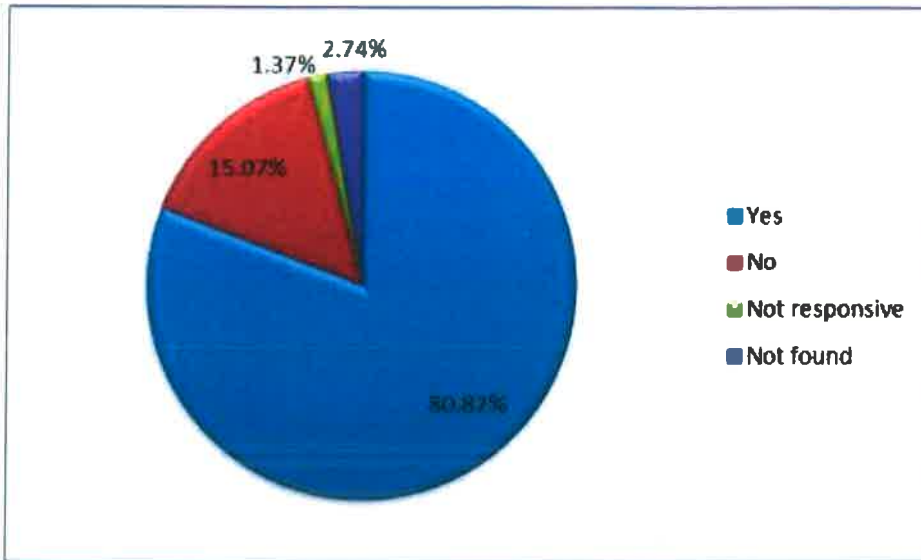
It was important to know how many HH heads owned accounts in financial institutions (Banks, Savings and Credit Cooperatives (SACCOs) especially since all compensation payments would be done by bank transfer.

Along the North route, 80.82% (59HH) own accounts, 15.07% (11HH) do not own any form of accounts.

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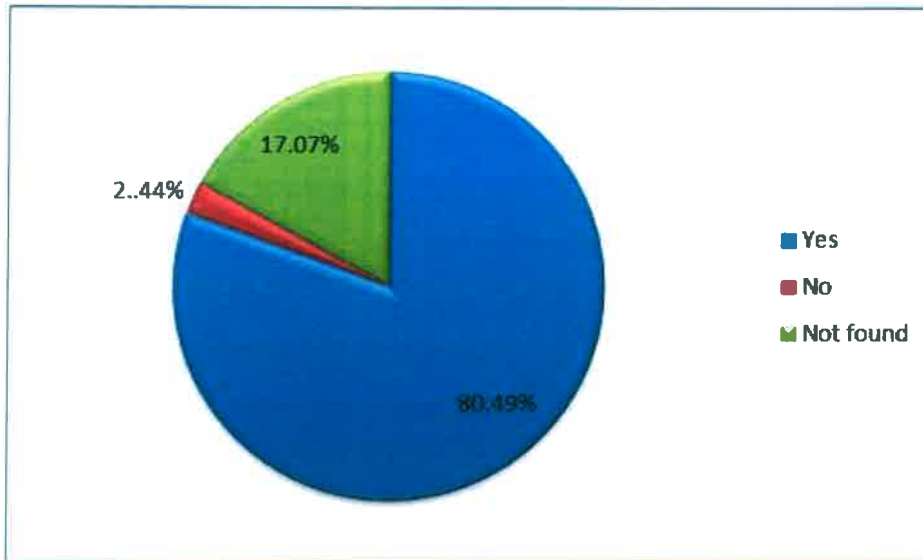




**Figure 13: HH along the North route with accounts in financial institutions**

Along the South route, 80.49% (33HH) own accounts, 2.44% (1HH) do not own any form of accounts.

During the survey and asset inventory, those PAH who were found not own accounts were informed that compensation would only be done by bank/ financial institution transfer to account and therefore essential to own one.



**Figure 14: HH along the South route with accounts in financial institutions**

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## CHAPTER 5: RESETTLEMENT IMPACTS

This chapter draws on information presented in Chapter 4: Baseline, as well as information gathered through stakeholder engagement, the census and asset inventory to determine the resettlement impacts.

Under this section, details of the displacement impacts are elaborated, appropriate compensation and relevant measures for restoration of livelihoods proposed, in accordance with the JICA E&S 2010, WB OP4.12 and National regulations.

### 5.1. KEY RESETTLEMENT IMPACTS

The magnitude of displacement associated with the Project is outlined in the table below. The main impacts as a result of the Project are loss of houses, agricultural land and crops and trees.

**Table 11: Magnitude of Displacement Caused by Land Acquisition**

| Displacement  | Impact                | Unit | Magnitude of Displacement |          |          |          |           | Total |
|---|-----------------------|------|---------------------------|----------|----------|----------|-----------|-------|
|   |                       |      | Gasabo                    |          |          | Kicukiro | Rwamagana |       |
|   |                       |      | Ndera                     | Gikomero | Rusororo | Masaka   | Fumbwe    |       |
| <b>North route (New Gasogi- Nyagasambu Distribution line)</b> |                       |      |                           |          |          |          |           |       |
| Loss of Residential Houses                                    | Physical Displacement | PAH  | 10                        | 3        | 1        | 0        | 0         | 14    |
|   |                       | PAP  | 44                        | 12       | 1        | 0        | 0         | 57    |
| Loss of Agricultural Land                                     | Economic Displacement | PAH  | 22                        | 9        | 11       | 0        | 3         | 45    |
|   |                       | PAP  | 32                        | 27       | 31       | 0        | 12        | 102   |
| Loss of Crops/ Trees  |                       | PAH  | 13                        | 7        | 28       | 0        | 2         | 50    |
|   |                       | PAP  | 30                        | 23       | 52       | 0        | 12        | 117   |
| Land owned by district  |                       |      | 0                         | 0        | 1        | 0        | 4         | 5     |
| <b>South route (New Gasogi- Masaka Distribution line)</b>     |                       |      |                           |          |          |          |           |       |
| Loss of Residential Houses                                    | Physical Displacement | PAH  | 2                         | 0        | 0        | 0        | 0         | 2     |
|   |                       | PAP  | 6                         | 0        | 0        | 0        | 0         | 6     |
| Loss of Agricultural Land                                     | Economic Displacement | PAH  | 20                        | 0        | 6        | 1        | 0         | 26    |
|   |                       | PAP  | 70                        | 0        | 15       | 5        | 0         | 90    |
| Loss of Crops/ Trees  |                       | PAH  | 23                        | 0        | 5        | 1        | 0         | 28    |
|   |                       | PAP  | 79                        | 0        | 11       | 5        | 0         | 95    |
| Land owned by district  |                       |      | 1                         | 0        | 0        | 0        | 0         | 1     |

## LOSS OF HOUSING

### *Impact*

For both the North and south distribution line, the Project will result in the physical displacement of 16 PAH equivalent to 63PAPs rightly under the power lines and their ROW. Affected houses are constructed of earth bricks or mud and stick walls; roofed with iron sheets or clay baked roof tiles. Any associated structures such as toilets or storage sheds are also part of what will be lost.

Impacts arising from loss of housing include:

- Loss of shelter and the requirement to relocate.
- Loss or breakage of social networks within affected communities.
- Disturbance of relocating from old houses to new houses. i.e. packing, transporting and unpacking of house items.
- Inconvenience associated with unfamiliarity of the new location.

### *Mitigation and Interventions*

- Those that are physically displaced will be compensated for their loss of housing with cash compensation at replacement value for their property since the alternative of house for house is currently not possible.
- An additional 5% disruption cost will be added to the valued cost of the structure to cover any inconvenience caused by the exercise of displacement.
- Furthermore, PAH will have the right to salvage materials from their existing homes.

## LOSS OF AGRICULTURAL LAND

### *Impact*

As outlined in the baseline the majority of households rely on subsistence agriculture as their main form of livelihood. In addition, small livestock farming is undertaken. The land in the project area is registered as agricultural land and residential usage. From the asset inventory, 192 PAP will lose their land.

Loss of access to this land, in the absence of any mitigation, would result in the loss access to land for livelihood activities resulting in a potential for impoverishment and food insecurity.

### *Mitigation and Interventions*

The WB OP 4.12 prioritizes the provision of replacement land when resettling people who are reliant on subsistence agriculture or livestock rearing. However, replacement land is not available. As such cash compensation for land is being provided based on the following principles:

- *Cash Compensation:* Compensation rates for land were based on comparison of current market value of land in the different areas along the power line route. The certified property valuer compared prices of recent land transactions in coming with the unit rate of land. An additional 5% as disruption cost shall applied to the

valued cost, as required by the National expropriation law 2015. The valuation was shared with PAP so that they could understand the source of the compensation rates and agree to them.

- *Timing of Compensation:* Compensation payments would be made utmost 120 days from approval of the valuation expropriation report by the District and before any acquisition of land takes place.

With reference to the Rwanda expropriation law 2015, those who do not agree with the value, have the right to appeal to the grievance mechanism elaborated in chapter 3. For the absentee PAP, as per common practice in Rwanda, compensation amounts at full replacement cost shall be transferred to Sector level “Escrow account” from which, once absentee land owners make themselves known, they can collect their compensation. This is a practice that has been used for example in an AFDB project “Interconnection Uganda- Rwanda- DRC” transmission lines.

## **LOSS OF TREES AND CROPS**

### *Impact*

As the area is mainly categorised agricultural land, the acquisition of land will also result in loss of standing crops and trees. From the asset inventory, the number of PAPs that will lose trees and crops is 212. This includes PAP that have crops on land they legally own, have a recognizable claim to or on land they do not own but have either been renting or caretaking.

Based on the baseline survey the majority of the crops grown are seasonal crops that have a growth period of 3-6 months such as; beans, maize and sweet potatoes. However there are also perennial crops and trees that are harvested throughout the year such as; bananas, avocado trees, pawpaw trees, mango trees and planted eucalyptus tree forests.

### *Mitigation and Interventions*

- Compensation at full replacement cost will be provided for the loss of all other (perennial) crops and trees, as per the District Gazette on crop and tree prices.
- PAH will continue to be able to cultivate short season crops even under the ROW but not perennial crops and will therefore be able to harvest all such standing crops even after the power lines are erected.

## **LOSS OF ACCESS TO WAGED EMPLOYMENT**

### *Impact*

There are a limited number of people that undertake waged employment, mainly as day labourers on land plots that will be acquired. The loss of agricultural land will reduce the number of people that would hire such day labourers. However, the work is sporadic and it is therefore not possible to determine the extent of the losses.

In addition, there are a number of traders and skilled workers who operate in the area, many of who are based out of their homes. It is assumed that such individuals will simply relocate their businesses, noting that no business premises have been affected by the resettlement activities.

### *Mitigation and Interventions*

The following mitigation and interventions will be implemented:

- Employment opportunities during the construction of the New Gasogi substation and the power line will be made available for labourers and skilled tradesmen.

## **DISRUPTION TO SOCIAL NETWORKS AND ACCESS TO SERVICES**

### *Impact*

Some PAH have expressed concern over disruption to their existing social networks and access to any services they use in the existing area and other land plots that they may have in these locations.

Such disruption can lead to feelings of isolation and loss of informal support from neighbours and friends.

*Mitigation and Intervention-* Unfortunately mitigation or intervention can be proposed at this time to offset this impact. The area is peri-urban to urban and experiences relocation mainly from land transactions with the richer buying land of the poorer land owners hence common practice to relocate.

### **5.2. SCOPED OUT IMPACTS**

As a result of this project, business structures / premises, social amenities and infrastructure were not expropriated or affected. Access to these facilities will continue to be enjoyed by the communities. Access to wetlands or water resources was also not affected.

No cultural heritage, specifically graves, has been identified within the project area. However, a Chance Finds Procedure has been outlined in the ESIA and can be applied during project implementation.

Commercial land, squatters and street vendors were also not identified in the affected area.

These impacts were therefore scoped out of this ARAP.

## CHAPTER 6: ELIGIBILITY AND ENTITLEMENTS

### 6.1. ELIGIBILITY

With reference to the local expropriation law, persons eligible for compensation when displaced are those with recognized land lease title certification of ownership or recognized claim to the land or activities that were carried out on the land including; crops, forests, any buildings or any other activity aimed at efficient use of land or its productivity.

WB OP 4.12 has a broader definition of entitlement in that it recognizes persons eligible for compensation as those who: (i) have formal legal rights to the land or assets they occupy or use; (ii) do not have formal legal rights to land or assets, but have a claim to land that is recognized or recognizable under national law; or (iii) have no recognizable legal right or claim to the land or assets they occupy or use.

Both recognize the right to compensation for land and property owned at the time of the cut-off date.

The difference between national legislation and the WB OP 4.12 relates to recognizing those that have no recognizable legal right or claim to the land or assets they occupy or use.

In the case of this ARAP, in alignment with WB OP 4.12, those who have no recognizable legal right or claim to the land or assets they occupy or use, will be considered for compensation for the property/ assets they own but not the land itself.

### ELIGIBLE GROUPS

PAH identified during the census and baseline survey that are eligible for compensation as a result of land acquisition and involuntary resettlement are:

*Land Owner:* This refers to PAH that possess land lease titles certified by the National Land Commission or those with recognizable claim of the land.

*House Owner:* This refers to PAH that own houses in the expropriation area.

*Crop/Tree Owner:* This refers to PAH that cultivate crops or trees on land within the expropriated area. Crop/tree owners could be; (i) those that also own the land, (ii) those that are renting the land for cultivation, (iii) those care taking for the land owner.

### VULNERABLE GROUPS

In order to determine vulnerable groups, reference was made to the Socio-economic Baseline (SEB) study for the PAH. Based on the survey, only 1 household heads along the North route was over 80 years who would have been considered in the vulnerable group, however, will not be physically displaced (no house resettlement) and therefore not require any form of relocation assistance. None of those PAHs that will have houses resettled are of age above 80 years or less than 20 years, the oldest PAH among those losing houses is 71 years.

## 6.2. ENTITLEMENTS MATRIX

The entitlements matrix proposes eligibility and payments for the losses triggered by the project (e.g. land, housing, trees, crops, etc). The following entitlements matrix was developed based on analysis of the impacts of the project, criteria for eligibility and agreements made by government in terms of compensation and other support.

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Table 12: Entitlement Matrix

| Type of Loss   | Eligible Groups        | Impact   | Entitlements  | Responsible                    |
|--|------------------------|--|---|--------------------------------|
| Houses   | Owner of the Structure | Loss of residential dwelling   | <ul style="list-style-type: none"> <li>Cash compensation through PAPs accounts in financial institutions at full replacement cost for entire structure and other fixed assets without depreciation and addition 5% disruption fee as by expropriation law.</li> </ul> <p>And</p> <ul style="list-style-type: none"> <li>The right to salvage materials from the displaced house.</li> </ul>   | EDCL/<br>MINECOFIN             |
| Other Structures (kraals, livestock sheds, stores etc) | Owner of the Structure | Loss of structure  | <ul style="list-style-type: none"> <li>Cash compensation through PAPs accounts in financial institutions at full replacement cost.</li> <li>The right to salvage materials from the displaced house.</li> </ul>   | EDCL/<br>MINECOFIN             |
| Land   | Land Owner             | Displacement of people from land used for agriculture or housing.<br><br>Loss of livelihoods | <ul style="list-style-type: none"> <li>Cash compensation at current market value (including all transaction fees) for affected land plus an additional 5% disruption fee. Payment through PAPs accounts in financial institutions</li> <li>Priority for employment opportunities associated with the construction and erection of the New Gasogi Substation and towers.</li> <li>Awareness training on saving and access to credit schemes so as to manage acquired cash compensation.</li> </ul> | EDCL/<br>MINECOFIN             |
| Seasonal Crops   | Crop Owners            | Loss of crops used for subsistence<br><br>Loss of livelihoods                                | <ul style="list-style-type: none"> <li>Seasonal crops may continue to be planted under the ROW even after erection of towers as long as they do not grow tall to interfere with the power lines.</li> </ul>   | EDCL/ EUCL                     |
| Perennial Crops  | Crop Owners            | Loss of perennial crops used for   | <ul style="list-style-type: none"> <li>Cash compensation based on prices of such crops based on the age, size, area coverage and type of crop. Compensation will be paid.</li> </ul>  | EDCL/<br>MINECOFIN /<br>Sector |



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| Type of Loss                               | Eligible Groups | Impact  | Entitlements   | Responsible                    |
|--|-----------------|---|--|--------------------------------|
|  |                 | <p>subsistence</p> <p>Loss of livelihoods</p>                                     | <ul style="list-style-type: none"> <li>○ For owners of the land with lease land titles- payment will be made directly to their own accounts.</li> <li>○ For users of the land not owning the land: compensation payment will be made against the land owner but only released to the land owner on written agreement authenticated by local authority that he/she shall compensate the actual crop/ tree owner or proof he has already compensated them.</li> </ul>  |                                |
| Trees                                      | Tree Owner      | <p>Loss of trees used for subsistence, shade, etc.</p> <p>Loss of livelihoods</p> | <ul style="list-style-type: none"> <li>● Cash compensation at replacement value based on type, age and productive value of affected trees. Compensation will be paid as follows:               <ul style="list-style-type: none"> <li>○ For owners of the land: cash compensation to be paid directly into their accounts.</li> <li>○ For users of the land: cash compensation will be made against the land owner but only released to the land owner on written agreement authenticated by local authority that he/she shall compensate the actual crop/ tree owner or proof he has already compensated them.</li> </ul> </li> </ul> | EDCL/<br>MINECOFIN /<br>Sector |
| Waged Employment (Day Labourers & Traders) | Employees       | Loss of livelihoods   | <ul style="list-style-type: none"> <li>● Employment opportunities during the construction of the New Gasogi Substation and erection of towers for labourers and skilled tradesmen.</li> <li>● Traders will move their 'businesses' to suitable areas.</li> </ul>   | EDCL / Districts/<br>Sectors   |

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### 6.3. VERIFICATION AND DISCLOSURE OF ENTITLEMENTS

Asset inventory, census and socio-economic survey were done concurrently in the weeks of 9<sup>th</sup> -27<sup>th</sup> October 2017. Entitlement and all information from the asset inventory was disclosed to PAPs in Cell public meetings. Asset/Property valuation forms were shown to each PAP for verification, once they agreed to them then they signed or thumb pressed in ink against their names as a sign of agreement.

A cut-off date was established on 3<sup>rd</sup> November (after verification of asset inventory and valuation by PAHs) from which date none of the PAPs would add any asset and no encroachers were be allowed. No additional assets would be claimed by the PAPs for compensation beyond what was on these asset agreement forms. Cut-off date was were communicated through notices at each Cell office and through radio broad cast

These Asset valuation agreement forms signed by PAPs formed the valuation or expropriation report. Each of the agreement forms was then signed off by the cell leader, then shared with Sector authorities who countersigned as a sign of approval and authorization of legal process and sent to the District for approval by the council and final signature before it was then received by EDCL to commence on compensation payment process.

## CHAPTER 7: VALUATION METHOD

### 7.1. METHOD OF VALUATION

Asset inventory and valuation process was a field operation that involved a certified property valuer and local authorities, explaining the manner in which the inventory and valuation was done for the affected communities.

- Portions of land lost to ROW or towers were measured by tape measure to determine the size. This was done in the presence of the PAP.
- Houses were also measured by tape measure. Type and quantity of construction materials used on the houses were determined, as was the state of the structure. This was completed in the presence of the PAP. Still photos were taken with the rightful owner against his/ her house.
- Crops were determined based on area of coverage, in other cases number of standing crops and age.
- Trees were determined based on number of trees, age and type of tree.
- All this data was entered into individual valuation field sheets for each plot of land and for each PAP. Each of these sheets would be verified by the PAP, who would sign against the sheet. These sheets would then be signed off by the Cell and Sector authorities before they are sent to the District land commission for endorsement and submission to EDCL for payment processing.

### VALUATION OF LAND

Land to land compensation could have been the best option, however, as there was not enough land adequate in size in the vicinity of the displaced land, it was agreed with the PAP to have cash compensation for affected property instead of land to land compensation.

To determine a fair market value price for the land, the certified valuer compared prices referred from prices of land recently transacted in the same sector and cells. The unit prices determined per square metre (m<sup>2</sup>) of land, which includes taxes and transaction fees, were used for each of the cells as indicated in the table below.

**Table 13: Land prices used**

| No. | District | Sector   | Cells      | Village       | Price (Rwf)/m <sup>2</sup> of land |
|-----|----------|----------|------------|---------------|------------------------------------|
| 2   | Gasabo   | Ndera    | Kibenga    | Burunga       | 3000                               |
|     |          |          | Mukuyu     | Jurwe         | 3000                               |
|     |          |          | Cyaruzinge | Gashure       | 4000                               |
|     |          |          |            | Gatare        | 4000                               |
|     |          |          | Rudashya   | Ruhangare     | 6000                               |
|     |          |          |            | Munini        |                                    |
|     |          |          |            | Kacyinyaga    |                                    |
|     |          | Gikomero | Murambi    | Rugarama      | 2000                               |
|     |          |          | Munini     | Rudakabukirwa | 2000                               |
|     |          | Rusororo | Mbandazi   | Karambo       | 3000                               |
|     |          |          |            | Kinyana       | Nyagasozi                          |
|     |          |          |            |               | Kigabiro                           |
|     |          |          | Nyagahinga | Gisharara     | 10,000                             |

|  |           |        |            |            |         |
|--|-----------|--------|------------|------------|---------|
|  |           |        |            | Kabutare   | 20,000  |
|  | Kicukiro  | Masaka | Cyimo      | Kiyovu     | 15,000  |
|  |           |        |            | Murambi    | 15,000  |
|  | Rwamagana | Fumbwe | Nyakagunga | Kirehe     | 4,500   |
|  |           |        |            | Akabeza    | 4,500   |
|  |           |        |            | Nyagasambu | Rambura |

### VALUATION OF HOUSES

Pricing was based on costing of material and labour per m<sup>2</sup> for the foundation, wall elevations, roofing, finishes and number of items such as doors, windows and other installations. The details of each house were included in the full replacement cost/compensation agreement that was agreed and signed by the PAP by signature or thumb stamp, signed by cell, by the sector authorities as approved. For PAP that owned a house to be relocated, a picture was also taken of him/her standing against the house and a reference mark left on the house as proof that once compensated would be relocated.

### VALUATION OF CROPS AND TREES

During the asset inventory and valuation of trees and crops likely to be lost to project activities, unit prices applied to most of the crops and trees came from the following table. For trees age was important in determining the unit price, while for other crops it was the area that guided the unit price.

**Table 14: Rate of Valuation of Crops and Trees**

| Crop Type                      | Area affected (m <sup>2</sup> ) |
|--------------------------------|---------------------------------|
| Napier grass "Ubwatsi bw'inka" | 3119                            |
| Peas "Amashaza"                | 881                             |
| Cassava leaves "Isombe"        | 26                              |
| Sweet potatoes "Ibijumba"      | 951                             |
| Maize "Ibigori"                | 1971                            |
| Beans "Ibishyimbo"             | 2243.8                          |
| Sorghum "Amasaka"              | 390                             |
| Ground nuts "Ubunyobwa"        | 700                             |
| Imiravumba                     | 86                              |
| Passparum                      | 789                             |
| Flowers "Indabo"               | 168                             |
| Tomatoes "Inyanya"             | 284.7                           |
| <b>Total surface area</b>      | <b>11,609.5</b>                 |

| Tree Type | No of trees affected |
|-----------|----------------------|
| Mangoes   | 54                   |

|                                     |               |
|-------------------------------------|---------------|
| Avocado                             | 151           |
| Cassava "Imyumbati"                 | 1020          |
| Yams "Amateke"                      | 992           |
| Banana                              | 782           |
| "Imiyenzi"                          | 2445          |
| Tree tomato "Ibinyomoro"            | 4             |
| Pine apple "Ananas"                 | 26            |
| Macadamia "Makadamiya"              | 167           |
| Eucalyptus trees "Inturusu"         | 12317         |
| Cedrela                             | 19            |
| Passion fruit "Amacunga"            | 5             |
| Greveria "Gereveriya"               | 94            |
| Guava "Amapera"                     | 22            |
| "Imihati"                           | 299           |
| "Imitagara"                         | 12            |
| "Kasiya"                            | 102           |
| "Filawo"                            | 3             |
| "Umunyinya"                         | 2             |
| Paw paw "Ipapayi"                   | 6             |
| "Umusave"                           | 20            |
| "Cypres"                            | 2367          |
| Bamboo "Umugano"                    | 2             |
| Jacaranda                           | 12            |
| "Ibibonobono"                       | 8             |
| <i>Erythrina abyssinica</i> "Umuco" | 2             |
| <b>Total number of trees</b>        | <b>20,622</b> |

The Expropriation/valuation report will be verified by the consultant to ensure that all relevant documents have been signed by the relevant parties i.e. PAPs, cell, Sector and district authorities and certified by the valuer. The report will then be sent to EDCL which after verification, will commence compensation process. It will be sent to Ministry of Finance and Economic Planning (MINECOFIN) for payment.

The full replacement compensation packages will be made directly by the Ministry of Finance and Economic Planning (MINECOFIN) to the PAPs' bank accounts or Savings and Credit Cooperation (SACCOs) accounts. PAPs without bank accounts are encouraged to open bank accounts before payments can be made.

## CHAPTER 8: LIVELIHOOD RESTORATION

### 8.1 INTRODUCTION

Resettlement affects the income-earning capacity of PAP, and compensation alone does not guarantee the restoration or improvement of their living standards. WB OP 4.12 requires initiatives to be implemented that lead to an improved standard of living for the PAP.

In developing the Livelihood Restoration Plan (LRP) key considerations were given to the following:

1. Restoration of sources of income and living standards- through land based and wage based measures.
2. Income restoration based on income generating activities other than just a one-time cash compensation.
3. Participatory dialogue between PAP, the EDCL and local authorities.

#### HOUSEHOLDS CONSIDERED IN THE LRP

The LRP covers the following PAH interviewed in the census and socio-economic survey (i.e. 114HH), categorised in the following manner:

- **House Owners** - of the 16PAHs an equivalent of 63PAPs.
- **PAP that owned land and/or crops-**
  - PAP that owned land – 192
  - PAP that owned perennial crops and trees - 212

Those HH that only owned land and once compensated would leave the area, in absence, would not be expected to benefit from the LRP.

The design of the LRP was guided by data obtained from the socio-economic survey to understand the current livelihoods of affected communities, determine the categories of livelihoods that would need to be restored and the LRP's focus in maintaining or improving the livelihoods of PAH.

### 8.2 LIVELIHOOD RESTORATION PLAN (LRP)

The LRP is designed to have two stages, i.e.

- *Short term* measures during the construction of the New Gasogi substation and tower erection, to support the transition of PAH and
- *Long term* measures to achieve a sustainable livelihood for PAH. It should be noted that these measures are in addition to providing all PAH with their cash compensation for lost assets.

#### SHORT TERM LIVELIHOOD RESTORATION MEASURES

The short term measures are directed to livelihood resources or activities for generating incomes during the initial phase of implementation thereby providing immediate assistance and ensuring continued access to livelihoods.

##### *Wage Based Livelihood Restoration*

As a positive initiative in restoring the PAPs source of income probably lost from agricultural land or any other source, it is proposed that PAP are given priority to be employed as unskilled and skilled labour during the erection of the distribution and transmission lines and new substation. An example, unskilled casual labourers on the current market could earn 2,500Rwf/day as opposed to 800-1000Rwf/day earned for a day's hire on agricultural land. Skilled labourers such as masons, carpenters and welders could also benefit from these opportunities. EDCL shall inspect the contractor to ensure PAPs are given first priority at the time of construction.

**LONG TERM LIVELIHOOD RESTORATION MEASURES**

The long term plan will be implemented post displacement-project construction and shall continue through the project implementation and its life cycle.

*Wage Based Livelihood Restoration*

EUCL will require skilled and unskilled people to work during the maintenance of the erected towers, the new substation and mostly clearing ROW of trees, bushes and access roads to the towers. It is proposed that PAPs are given priority for paid temporary employment for both skilled and unskilled roles.

The indicative LRP implementation schedule is shared below:

| <b>Livelihood Restoration Plan schedule</b> |  | <b>2018</b> |          |          |          | <b>2019</b> |          |          |          |
|---|--|-------------|----------|----------|----------|-------------|----------|----------|----------|
| <b>S/n</b>                                  | <b>Activities</b>  | <b>1</b>    | <b>2</b> | <b>3</b> | <b>4</b> | <b>1</b>    | <b>2</b> | <b>3</b> | <b>4</b> |
|   | <b>Wage based Restoration plan</b>   |             |          |          |          |             |          |          |          |
| 1   | Employment during construction on sites, project implementation and project life             |             |          |          |          |             |          |          |          |
|   | <b>Vulnerable group livelihood restoration plan</b>  |             |          |          |          |             |          |          |          |
| 2   | Inclusion of Vulnerable groups in the Direct financial support from VUP government Programme |             |          |          |          |             |          |          |          |
| 3   | Medical insurance support  |             |          |          |          |             |          |          |          |

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## CHAPTER 9: INSTITUTIONAL ARRANGEMENTS

### 9.1 OVERVIEW

Institutional arrangement is essential in clearly defining the responsibilities of the institutions involved in implementing the entire ARAP and LRP. The institutional responsibilities will involve: (i) determining those who are entitled to compensation; (ii) determining how asset valuation and compensation will be implemented; (iii) implementing the livelihood restoration programs (iv) undertaking stakeholder engagement throughout the implementation of the ARAP; (v) disseminating information regarding the resettlement process; (vi) budget management; and (vii) coordination of all agencies that are implementing the resettlement.

Other than clearly defining responsibilities, the institutional arrangements will build a ARAP implementation network between EDCL (the resettlement project implementer), the PAPs and local government authorities. The affected area currently has no legally registered NGOs with the competence to support this resettlement process and therefore no NGOs will be part of the institutional arrangements.

This chapter describes:

The arrangements in place that form the resettlement institutional framework and their importance to the implementation of the resettlement and LRPs.

- The roles and responsibilities of these Institutions.
- Capacity building requirements for these Institutions to effectively undertake their tasks.

### 9.2. INSTITUTIONAL ROLES AND RESPONSIBILITIES

**Rwanda Energy Group (REG)** - Is the institution in Rwanda responsible for development of energy and delivery to the public. In this particular project the type of energy is electricity. Under it, operate two autonomous companies, i.e. EDCL and EUCL. EDCL in charge of all infrastructure development of these energy sources, while EUCL plans, manages this utility and recovers funds from the services provided to the public. EDCL is responsible regarding approval and implementation of the RAP

**Energy Development Corporation Ltd (EDCL)** - Is responsible for overseeing the designs of the project, reviewing the RAP and valuation of property likely to be affected by the project before submitting the complete report of full replacement compensation to MINECOFIN. EDCL will also participate in the tendering process of a potential contractor and supervise the construction works of this project. It is responsible for grievance redress throughout the project from planning to the commissioning of construction works.

Once the works are complete, the power lines are then transferred to EUCL for operation and management.

**Energy Development Corporation Ltd (EUCL)**-Is responsible for operation and maintenance of the project after construction works have been commissioned, including informing communities not to build structures or plant trees that may come within the 5m clearance from the lowest power line.



**Local government-** Sector and Cell authorities shall be responsible on verifying the valued property of PAPs and this will be verified by signature and stamp from Executive Secretaries of Sector and Cells against each PAPs valued compensation agreement. They will also inform the PAPs by list on notice board of the completion of bank transaction of their full replacement compensation. The Village, Cell and Sector levels shall be the core of resolution of the grievance redress. Only when the grievance redress has reached the Sector level shall the District land commission be involved.

**Ministry of Finance and Economic planning (MINECOFIN)** - Shall be responsible for disbursing the full replacement compensation to verified PAPs as per list and bank accounts submitted by EDCL.

## CHAPTER 10: GRIEVANCE REDRESS MECHANISM

Full replacement cost for compensation is supervised by the by the resettlement and compensation committee. This committee comprises of; members from EDCL and Sector authorities. Their duty is to verify whether all assets valued and all PAH have been fully compensated at the full replacement cost agreed by both the PAH and EDCL. In the event that the PAH rejects the value given by this compensation committee or in the case that a PAH is not paid at full replacement cost, then this is the point at which the grievance redress mechanism commences.

Other grievances may occur along the course of the project, such as:

- Dust, noise, loss of land or crops from storm water or excavated soil piles and encroachment during construction.
- Disputes over ownership of expropriated land and the compensation process.
- Issues associated with maintenance works of the power lines ROW and access routes to the towers after erection of towers with EUCL operating the lines.

A grievance mechanism is therefore essential for affected communities to have timely redress of any grievances so as to achieve satisfaction in the implementation of the resettlement and project implementation.

### 10.1. GRIEVANCE REDRESS FRAMEWORK

The grievance and redress mechanism is conducted through amicable negotiations in order to resolve any raised disputes. To avoid duplication and confusion, the grievance and redress mechanism follows the current dispute resolution hierarchy at local government level. The following procedure is applied:

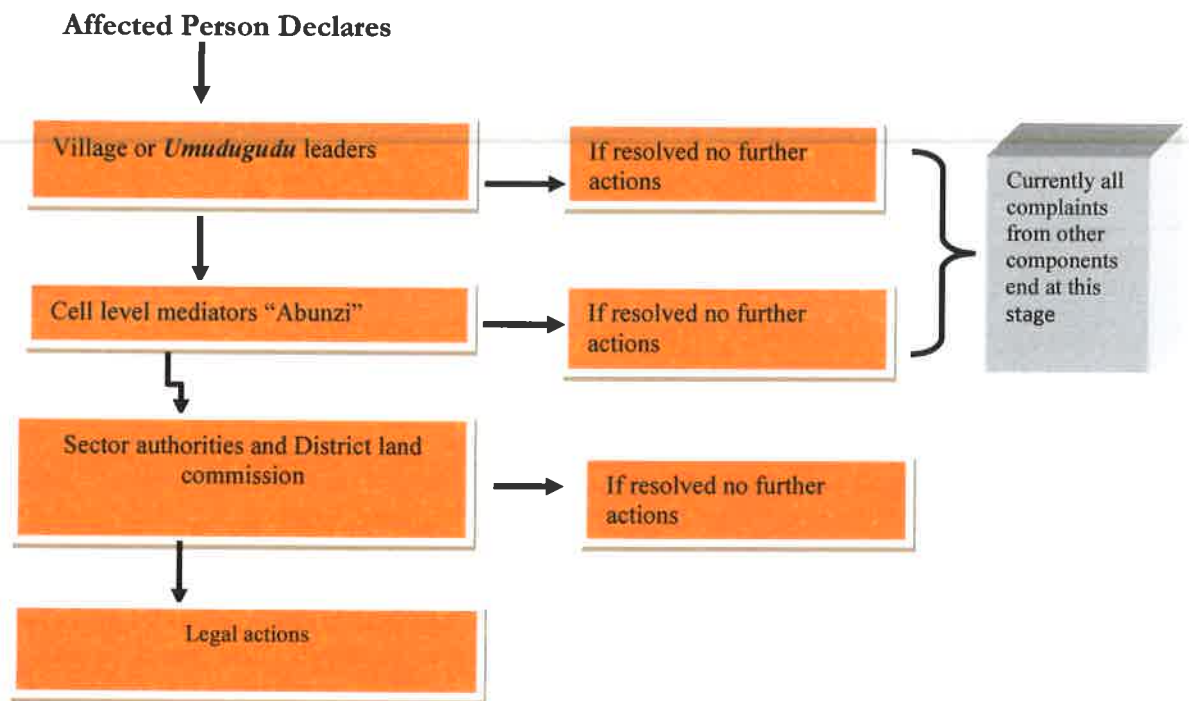
- *Stage 1-* PAP will raise the issue with Village leaders “locally called Umudugudu” for a solution to be reached. If the resolution at this stage does not satisfy the PAP, it is raised to the next stage.
- *Stage 2-* The issue is raised at the Cell level “locally called Akagali”. At this stage are Cell mediators “locally called Abunzi” that sort out matter below a threshold of 5Million Rwanda Francs. Here the grievance is assessed by these mediators in the presence of the PAP and written resolution declared. Should it not be satisfying to the PAP, then the PAP will raise it with the next stage.
- *Stage 3-* at the Sector level; where a team from the Sector and District land commission seat to resolve the issues between the PAP and developer (EDCL). In case grievance reached this stage, it is at this level that from previous projects, effective resolutions are passed to the satisfaction of both parties. However, should this fail, the matter is raised by the grieving PAP to the Courts of law.

According to Article 26 of the Expropriation Law N0 18/2007 of 19/04/2007, filing a case in the courts of law does not stop the expropriation process from continuing in terms of transfer of land rights. Article 26 provides the complaints procedures for individuals dissatisfied with the value of their compensation. It stipulates that dissatisfied persons have a period of 30 days after the project approval decision has been taken to appeal (Article 19).

It should be noted that grievance redress is a process undertaken at no cost and anyone can appeal, except at the stage of the courts of law, where a fee is incurred.

EDCL will follow up the aggrieved PAPs at each level to ensure that the grievances are resolved. Each sector should identify one PAP to work with EDCL and the local leaders to ensure that the grievances are attended to in time. This is in addition to the existing Compensation Committee.

To ensure that the affected parties are fully aware and to reduce possible backlog of complaints, it should be noted in advance that most PAPs take time to decide to complain exceeding the 30 day period required to file their complaints. As per international standards, grievances logged outside this timeframe may still be valid and legitimate. Customarily, the government expropriation authorities ensure that all affected people are fully informed, and will issue warnings about the consequences of failure to lodge their complaints in time. Within this customary procedure, affected people were informed by the consultant during the public consultation and were found to be fully aware of the grievance and redress procedures before their assets are compensated.



**Figure 15: Organigram of Grievance Redress Mechanism**

## CHAPTER 11: MONITORING AND IMPLEMENTATION PLAN

### 11.1. OVERVIEW

The WB OP 4.12 require that projects monitor and report on the effectiveness of ARAP implementation, including the physical progress of resettlement and rehabilitation activities, the disbursement of compensation, the effectiveness of public consultation and participation activities, and the sustainability of livelihood restoration and development efforts among affected communities.

The objective of monitoring is to provide the Project with feedback on ARAP implementation and to identify problems and successes as early as possible to allow timely adjustment of implementation arrangements.

This ARAP provides a description of the monitoring that will be undertaken through the implementation of the ARAP and explains:

- The framework of methods that will be applied in the monitoring plan focusing on three areas; performance monitoring, impact monitoring and completion audit.
- Institutional responsibilities in the monitoring process; and
- Monitoring implementation schedule.

### 11.2. MONITORING FRAMEWORK

#### PERFORMANCE MONITORING

Performance monitoring is an internal management function allowing the organization responsible for resettlement to measure physical progress against milestones. It shall therefore be integrated in the overall project management to synchronize it with the project implementation activities.

Performance milestones that will be monitored in this Project are as follows:

- Consultation meetings were held and will continue to be held with PAPs during ARAP development and implementation in line with the requirements of the Stakeholder Engagement Plan (see Chapter 13).
- Effectiveness of Grievance redress procedures following the existing dispute resolution structure of the local government in place.
- Establishment of functioning institutional frameworks aligned with the relevant phase of the resettlement process.
- Completion of census, assets inventories, ESIA assessments, and socioeconomic study.
- Identification and categorizing of PAPs as per asset type affected. i.e. land, houses, crops, trees, etc.
- Disbursement of compensation payments.
- Agreement on livelihood restoration schemes with affected communities.
- Monitoring and evaluation reports submitted.

## IMPACT MONITORING

Impact monitoring will gauge the effectiveness of the ARAP and its implementation in meeting the needs of the affected people. The purpose of impact monitoring is: (i) to provide the agency responsible for ARAP implementation (i.e. EDCL) with an assessment of the effects of resettlement on the affected communities; (ii) to verify internal performance monitoring; and (iii) to identify adjustments in the implementation of the ARAP and LRP as required.

The effects of an ARAP will be tracked against the baseline conditions of the population before resettlement.

As part of developing the monitoring plan, EDCL will apply the indicators mentioned in the baseline survey and any relevant ones at the time, for measuring the impact of physical and economic relocation on the health and welfare of the remaining affected population and the effectiveness of impact mitigation measures, including livelihood restoration and development initiatives.

Example parameters that will help to monitor any changes include;

- Ownership of household goods. e.g. phones, radios and foam mattresses
- changes in quality and quantity of agricultural production;
- changes in employment rates;
- changes in the number of working household members versus the total number of household members (ie. dependency ratios);
- changes in household income levels;
- changes in household expenditure patterns;
- changes in access to social infrastructure and services;
- changes in asset ownership / quality / size;
- small business numbers, ownership by men vs. women; and
- proportion of children in each household attending primary school; and

It should be noted that the above mentioned livelihood and standard of living parameters are examples only and the monitoring plan will need to carefully review the baseline and proposed entitlements to develop a full set of indicators.

In addition to the quantitative indicators from the baseline survey, impact monitoring will be supplemented by the use of qualitative indicators to assess the satisfaction of affected people with resettlement initiatives and, thus the adequacy of those initiatives. The most effective qualitative monitoring methodology is direct consultation with the PAPs through regular meetings, focus group discussions, or similar forums established by the project sponsor for public participation as part of the consultation framework.

## COMPLETION AUDIT

The key objective of the completion audit is to determine whether the measures outlined in this ARAP (and the supporting LRP) have been successful. The audit should verify that all physical inputs committed in the ARAP have been delivered and all services provided. In addition, the audit should evaluate whether the mitigation actions prescribed in the ARAP have had the desired effect. The socioeconomic status

of the PAP should be measured against the baseline conditions of the PAP before displacement.

This audit may be undertaken after 2 years to determine if all ARAP inputs including the livelihood restoration schemes have been completed. Assuming the completion audit shows a successful outcome, its realization shall be bring closure to EDCL's liability for resettlement, compensation and livelihood restoration. Should areas of concern be raised by the Closure Audit, EDCL will put in place corrective actions prior to repeating the relevant aspects of the Closure Audit.

### 11.3. SCHEDULE

Implementation and monitoring of the ARAP and livelihood restoration shall follow indicators and timing indicated in the ARAP and LRP implementation schedule in Table below.

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**Table 15: ARAP Implementation schedule**

| Activities   | Responsible Agencies                       | Oct-17 | Nov-17 | Dec-17 | Jan-18 | Feb-18 | Mar-18 | Apr-18 | May-18 |
|--|--|--------|--------|--------|--------|--------|--------|--------|--------|
| <b>1 Preparation for implementation</b>  |  |        |        |        |        |        |        |        |        |
| Asset inventory and valuation of property  | Local consultant                           |        |        |        |        |        |        |        |        |
| Establishment and announcement of cut-off dates for different sectors through stakeholder engagement.  | Local consultant                           |        |        |        |        |        |        |        |        |
| PAP signature of valued asset agreement forms and completion of the valuation/expropriation report   | Local consultant                           |        |        |        |        |        |        |        |        |
| Authorization and signature of Expropriation report by respective government agencies (i.e. Gasabo, Kicukiro and Masaka Districts and Sectors of Gikomero, Ndera, Rusororo, masaka and fumbwe) | EDCL/ Sector leaders                       |        |        |        |        |        |        |        |        |
| Submission of Valuation/Expropriation report to EDCL for review and commencement of compensation process   | Local consultant                           |        |        |        |        |        |        |        |        |
| Continue stakeholder engagement with PAPs through Sector and Cell authorities on progress of project and compensation  | EDCL/ Sector leaders                       |        |        |        |        |        |        |        |        |
| Processing of compensation funds   | EDCL/ MINECOFIN                            |        |        |        |        |        |        |        |        |
| <b>2 Implementation</b>  |  |        |        |        |        |        |        |        |        |
| Payment of compensation to PAPs through bank transfer to their individual accounts. Dissemination of information all PAPs through Cell authorities of compensation payment.                    | EDCL/MINECOFIN                             |        |        |        |        |        |        |        |        |
| Monitoring and evaluation  | EDCL                                       |        |        |        |        |        |        |        |        |
| Grievance Redress with procedure of recording and processing of grievances   | EDCL/ Sector authorities/ local consultant |        |        |        |        |        |        |        |        |
| <b>3 Contingency</b>   |  |        |        |        |        |        |        |        |        |
| Contingency funds for increased costs  | EDCL                                       |        |        |        |        |        |        |        |        |
| Documentation of Compensation process and Resettlement Planned changes   | EDCL                                       |        |        |        |        |        |        |        |        |

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## CHAPTER 12: COST AND BUDGET

### 12.1. COMPENSATION COSTS

The total compensation budget for the property likely to be affected by the “Improvement of substation and Distribution network Phase III” Project will be **141,271,129.2Rwf**. It includes the cost of compensation for crops, trees, land and residential houses. EDCL will be responsible for the compensation costs displayed in this ARAP.

**Table 16: Compensation Costs**

| Items of Compensation Activities                       | Cost (Rwf)           |
|--|----------------------|
| North route (New Gasogi- Nyagasambu Distribution line) |                      |
| Land   | 50,272,105.25        |
| Crops and trees  | 6,052,842            |
| Houses   | 40,971,268.99        |
| South route (New Gasogi- Masaka Distribution line)     |                      |
| Land   | 37,049,109.5         |
| Crops and trees  | 4,987,293            |
| Houses   | 1,938,510.46         |
| <b>Total Compensation Budget</b>                       | <b>141,271,129.2</b> |

### 12.2. IMPLEMENTATION BUDGET

The budget has been estimated for the resettlement implementation process based on the activities described in the implementation schedule in *Chapter 11*.

**Table 17: ARAP Implementation Budget**

| Activities  | Responsible Agencies     | Unit    | Quantity | Cost (Rwf)        |
|---|--------------------------|---------|----------|-------------------|
| <b>1 Preparation for implementation</b>   |                          |         |          |                   |
| Continue stakeholder engagement with PAPs through Sector and Cell authorities on progress of project and compensation | EUCL/ Sector leaders     | Trips   | 5        | 150,000           |
| <b>2 Initiating Implementation</b>  |                          |         |          |                   |
| Dissemination of information to PAPs of compensation payment.   | EUCL/ Sector leaders     | Trips   | 5        | 150,000           |
| Grievance Redress meetings with procedure of recording and processing of grievances                                   | EUCL/ Sector authorities | Trips   | 10       | 300,000           |
| <b>3 Contingency</b>  |                          |         |          |                   |
| Contingency funds for increased costs   | EUCL                     | Lumpsum | 1        | 14,127,113        |
| Documentation of Compensation process and Resettlement Planned changes  | EUCL                     | Lumpsum | 1        | 100,000           |
| <b>Total</b>  |                          |         |          | <b>14,827,113</b> |

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### 12.3. TOTAL BUDGET

The total cost of compensation and estimated budget for ARAP implementation is shown below.

*Table 18: Total Budget for compensation and ARAP implementation*

| No | Item                             | Cost (Rwf)           |
|----|----------------------------------|----------------------|
| 1  | Compensation budget              | 141,271,129.2        |
| 2  | ARAP & LRP Implementation budget | 14,827,113           |
|    | <b>Total</b>                     | <b>156,098,242.2</b> |

## CHAPTER 13: STAKEHOLDER ENGAGEMENT PLAN (SEP)

This section discusses the stakeholder consultation that was undertaken for the Project during preparation of the ARAP and also presents the Stakeholders Engagement Plan (SEP).

### 13.1. RAP STAKEHOLDER CONSULTATION

Stakeholder consultation for the project incorporated:

- Stakeholder identification during ARAP preparation.
- A stakeholder consultation schedule during ARAP preparation.
- Issues raised and responses given from the stakeholder consultation.
- A grievance mechanism (see *Chapter 10* for details – no further information is presented in this chapter).
- Photographs of stakeholder consultation.
- Stakeholder engagement Plan proposed during ARAP implementation

### NATIONAL LEGISLATION FOR STAKEHOLDER ENGAGEMENT

Law relating to expropriation in public interest, No. 32/2015, *in article 10*, requires that the concerned population (PAPs) was sensitized about the project and its importance. It also requires committees in charge of monitoring projects of expropriation to conduct a consultative meeting with the population living where the land is located concerning the relevance of the project of expropriation in the public interest.

Further to this since the ARAP was carried out by the same consultant doing the ESIA and consultations were concurrently done for the same PAPs, guidelines on EIA were also referred on public consultation to beef up the relevance of stakeholder engagement.

National Environmental Impact Assessment (EIA) guidelines state that during an environmental impact study, EIA experts will seek the views of persons who may be affected by the project. This will be done particularly during the scoping process and at any other crucial stages considered necessary by the Rwanda Environment Management Authority (REMA). Consulting the public during an impact study is important in identifying issues and impacts considered important by local communities. Identifying and addressing pertinent issues early will avoid difficulties during subsequent public review of the EIA report.

### WB REQUIREMENTS FOR STAKEHOLDER ENGAGEMENT

Stakeholder engagement is the basis for building strong, constructive and responsive relationships that are essential for the successful management of a project's environmental and social impacts. Stakeholder engagement is an ongoing process that may involve, in varying degrees, the following elements: stakeholder analysis and planning, disclosure and dissemination of information, consultation and participation, grievance mechanism and ongoing reporting to the affected communities. The nature, frequency and level of effort of stakeholder engagement may vary considerably and will

be commensurate with the project's risks and adverse impacts and the project's phase of development.

### **STAKEHOLDER IDENTIFICATION DURING ARAP PREPARATION**

Stakeholder engagement began by identifying the stakeholders that would be affected or influenced by project activities. These stakeholders were placed in four categories for purposes of public consultation (not in chronological order):

- (1) Project Affected Households (PAHs).
- (2) Local government officials at sector, cell and village level.
- (3) Representatives of EDCL on behalf of REG.

No registered or operating NGOs were identified in the project area and so are not included in the stakeholder categories.

As indicated in *table 1, sub-chapter 1.2*, PAH comprised of persons from:

- Gasabo District- Ndera and Gikomero Sectors and their Cells in the ROW of the power lines;
- Kicukiro Distict- Masaka sector and one of its cells in the ROW of the power lines;
- Rwamagana District- Fumbwe sector and its cells in the ROW of the power lines.

Consultation was also undertaken with local government officials representing the sectors, cells and villages of the affected communities mentioned above and EDCL focal people.

### **METHODS APPLIED**

In the interest of project implementation, public consultation for the ESIA and ARAP were undertaken concurrently by the same consultant. During the public consultation, the consultant applied different participatory methods:

- For PAH- methods applied were; public meetings, Focus Group Discussions (FGD), one-to-one discussions.
- For local government officials and representatives of EDCL- Informed Consultation and Participation (ICP) that involved interviews and one-to-one discussions.

The consulted stakeholders were informed of the proposed project and by using a guiding questionnaire, the consultant was able to guide discussions and obtain relevant information on the likely impacts of the project activities. Stakeholders were asked to raise their concerns on the proposed project. An issue raised by one individual or a group of people was cross-checked by discussing it with other individuals or groups. It is from these concerns that the common issues were determined and summarized hereafter.

### **DISCLOSURE OF INFORMATION**

All meetings began with the consultant introducing his team to the attendees, where they are coming from and purpose of their visit. Similar procedure was followed during the public consultation meetings and individual consultations with the local authorities and local residents.

For meetings held with the sector authorities, EDCL issued a letter to the relevant Districts informing them of the proposed project and the exercise of expropriation. With reference to this letter, the consultant requested meetings directly with the each Executive Secretary (sector leader) either by telephone or by written request. Meetings were then scheduled and organized by the sector leader at his availability.

The sector leader would then request that the cell leaders are available for a meeting with the consultant and in turn cell leaders would facilitate organizing a meeting at village level with PAPs. The cell leaders facilitated meeting with the displaced communities. In all the meetings held with sector leaders, cell leaders and PAPs, information disclosed to stakeholders included:

- The purpose of the Project.
- Components of the Project and the ROW of the Project affected area.
- Overall schedule/duration of project development.
- The likely impacts by the Project. i.e. the benefits and likely negative impacts.
- Process of land acquisition and resettlement.
- Eligibility and entitlement to compensation.
- Development initiatives proposed for the livelihood restoration of the displaced persons.
- Proposed stakeholders engagement process.
- Proposed grievance and redress mechanism for any concerns.

The scheduled stakeholder meetings and gatherings are presented in the table below:

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Table 19: Summary of Stakeholder Engagement Schedule during ARAP preparation

| Date and Time                                   | Place                                      | Methods | Type of participants   | Number of participants | Purpose of meeting.  |
|---|--|---------|--|------------------------|--|
| 19 <sup>th</sup> and 23 <sup>rd</sup> June 2017 | Kigali                                     | ICP     | EDCL   | 3                      | <i>To understand;</i> the project objectives, executing agency, their part in the project (institutional framework), institutional capacity to manage the project,<br><br><i>To record and understand:</i> likely benefits and impacts of the project and proposed mitigation measures.  |
| 21 <sup>st</sup> June 2017                      | Kigali                                     | ICP     | RURA   | 7                      | To understand guidelines on ROW of power lines and most importantly guidelines pertaining existing power lines that require rehabilitation.  |
| 3 <sup>rd</sup> - 7 <sup>th</sup> July 2017     | Gasabo, Kicukiro Districts                 | ICP     | Sector secretaries for; Ndera, Rusororo, Gikomero, Fumbwe and Masaka | 5                      | <i>To explain;</i> Project objectives, Components of the project, project area of development, benefits gained from the project and the purpose of the consultation. Explain the process that will be followed during resettlement and inform them of what preparations to make for smooth asset inventory, valuation and compensation of affected assets. |
| 5 <sup>th</sup> - 12 <sup>th</sup> July 2017    | Ndera, Gikomero, Fumbwe and Masaka sectors | ICP     | Cell secretaries for; Kibenga, Cyaruzinge, Rudashya, Mukuyu          | 11                     | <i>To record and understand;</i> local perception of the project, likely benefits, the likely impacts by the Project and proposals on mitigation measures to negative impacts.   |

| Date and Time                                      | Place  | Methods                            | Type of participants   | Number of participants | Purpose of meeting.   |
|--|--|------------------------------------|--|------------------------|---|
| 10 <sup>th</sup> - 21 <sup>st</sup> July 2017      | Project intervention Cells                   | Public meetings, FGD               | and Gikomero in Ndera Sector. Nyagahinga, Mbandazi and Kinyana cell in Rusororo sector. Cyimo in Masaka sector. Nyakagunga and Nyagasambu in Fumbwe sector | 52                     |   |
| 9 <sup>th</sup> - 13 <sup>th</sup> October 2017    | Ndera, Gikomero, Rusororo and Fumbwe sectors | One on one consultations with PAPs | PAHs   | 114                    | Asset inventory, census and socio-economic study of PAHs and valuation of assets. Also sensitizing PAPs of what documents to prepare for the process of resettlement and compensation to smooth |
| 16 <sup>th</sup> - 20 <sup>th</sup> October 2017   | Ndera, Rusoro and Masaka Sectors             | One on one consultations with PAPs | PAHs   | 114                    |   |
| 30 <sup>th</sup> October- 3 <sup>rd</sup> November | Ndera, Gikomero, Rusororo, Fumbwe and        | FGD and one on one consultations   | PAHs   | 114                    | Verification of the asset inventory and valuation of assets, establishment of cut-off dates and   |

2

| Date and Time   | Place  | Methods | Type of participants   | Number of participants | Purpose of meeting.  |
|---|--|---------|--|------------------------|--|
| 2017  | Masaka Sectors                                   |         |  |                        | signature of compensation agreements of affected assets by the PAPs.   |
| 6 <sup>th</sup> -<br>24 <sup>th</sup><br>November<br>2017 | Ndera,<br>Rusororo, Fumbwe and<br>Masaka Sectors | ICP     | Local authorities at<br>village, cell, sector<br>and District levels | 71                     | Authorisation by signature that the resettlement process was authentic and justified for compensation by EDCL. |

**Table 20: Key Issues Raised and Responses from Stakeholder Engagement during ARAP preparation**

| Issues  | Responses   |
|---|---|
| <ul style="list-style-type: none"> <li>• Locals expected to lose land, structures, crops and trees to the power line project and wanted to know whether they would be fairly compensated.</li> <li>• Questions were raised on eligibility for compensation. i.e. which structures, land, crops and trees that would be compensated.</li> <li>• Questions were raised on whether Job opportunities were available for locals during construction phase.</li> <li>• Questioning whether the power lines would serve their communities.</li> <li>• Worry of exposure to electro-magnetic for those under the power line.</li> <li>• Worry of human electrocution.</li> </ul> | <ul style="list-style-type: none"> <li>• An ARAP was being prepared to guide the resettlement process and PAPs would be compensated for assets lost at fair market price with an additional 5% disruption cost. Cash Compensation payment would be done by EDCL. Asset inventory and Valuation would be done by an independent registered Valuer and prices of land, structures, crops and trees would be referred from commissioned prices set by the Institute of Real Property Valuers (IRPV) in Rwanda. Compensation would be paid in 120 days from signature of agreement by the PAPs as long as all supporting land lease title documents are in order.</li> <li>• In reference to the RURA 2015 guidelines, all structures under ROW of power line would be displaced.</li> <li>• Land displaced will be that land on which the towers shall be erected and any other portion of the plot of land left that is not of any economic use after tower has been lost.</li> <li>• An affirmative program was suggested that gives locals in the area, employment priority during construction.</li> <li>• Communities were informed that purpose of the power lines was to increase the amount of power in the Sectors of Ndera, Rusororo, Gikomero, Fumbwe and Masaka.</li> <li>• To answer the question of exposure to electro-magnetic fields and electrocution, it was explained that a clearance of more than 5m above the lowest conductor was maintained for all structures</li> </ul> |



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| Issues | Responses   |
|--------|---|
|        | within which no electrocution can occur. It was also explained that these fields only revolve around the conductor and not beyond. Sharp spokes shall be placed at lower members of the tower to prevent unauthorised people from climbing. |

Figure 16: Photo Log for the Stakeholders Engagement



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### 13.2. STAKEHOLDER ENGAGEMENT PLAN DURING ARAP IMPLEMENTATION

Stakeholders are individuals who are impacted by the change (positive or negative), those who can influence the change outcome and/or whose involvement is key to its success. The stakeholder engagement plan proposed follows and shall follow a four step approach.

#### Four-Step Approach to the Stakeholder Engagement Plan



#### List of Key Stakeholders identified:

- PAPs;
- Local Government – Gasabo, Kicukiro and Rwamagana District and relevant sectors, cells and villages;
- Central Government institutions- Rwanda Development Board(RDB), MINECOFIN
- Autonomous Institutions- EDCL, EUCL and RURA.



|   |   |
|---|---|
| <p><b>● PAP -Accepting</b><br/> <b>Accept:</b> Those seen as willing to go along with the change.<br/> <b>List comprises of:</b><br/>         Households comfortable with their asset valuation and compensation.</p> | <p><b>● Ambassadors/Champions</b><br/> <b>Committed:</b> Stakeholders seen to be actively supportive of the project. They provide tangible resources and is visibly involved.<br/> <b>List comprises of:</b> EDCL, Local and central Government institutions mentioned above.</p> |
| <p><b>● PAP - Resistance</b><br/> <b>Resistant:</b> Those seen to be against the change. Providing reasons against the project.</p>   |   |

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|  |  |
|--|--|
| <p>Not willing to give up their land. May or may not do what is needed.</p> <p><b>List comprises of:</b> PAPs with other projects planned on their land along the ROW.</p> |  |
|--|--|

**3. Understand Stakeholders Better**

| Stakeholder   | Map Position     | Source of Emotion/ concern                                    | Cause of Resistance  | Actions Needed   | Support Needed                         |
|---|------------------|---|--|--|--|
| Project Affected People (PAP)   | PAH Support      | Improve their livelihood                                      | None   | Payments for their assets and LRP initiatives  | EDCL, MINECOFIN, Districts and sectors |
| Project Affected People (PAP)   | PAH – Resistance | Loss of access to houses, land and existing networks          | Change in livelihoods and circumstances, Affected planned projects on their land and Fear for the future | Payments for their assets and LRP initiatives. Stakeholder engagement to address concerns and established grievance mechanism to address concerns. | EDCL, District and Sectors, MINECOFIN  |
| Local Government- Gasabo, Kicukiro and Rwamagana Districts and relevant sectors and cells | Champion         | Changing economic-social life of its people                   | None   | Participate and collaborate with stakeholders to achieve set objectives. Ensure grievances are resolved.   | All stakeholders involved              |
| Autonomous institutions. i.e. EDCL, EUCL  | Champion         | Leading agreement negotiations and provide after care service | None   | Implementation of the agreement during construction and during operation. Ensure grievances are resolved.  | EDCL and EUCL                          |
| Central Government Institutions. i.e. MINECOFIN   | Champion         | Wrong or insufficient information for payment                 | None   | Payment of compensation for PAPs   | MINECOFIN                              |

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4. Create  
Action Plan and  
Follow Up

B- Stakeholder Engagement Plan

| Stakeholder | Where are we now? | Where do we want to be on these stakeholders? | Concerns, Issues, Resistance   | Planned Engagement Actions  | Timeline  |
|-------------|-------------------|---|--|---|---|
| PAP         | PAH - Support     | Champion                                      | -Compensation payments.<br>-opportunities of employment for PAPs during construction and operation of project. | -Reports on lists of the PAPs whose compensation payment has come through and those whose has bounced. Give early reason why, request PAPs to rectify documents and then request for repayment.<br>-Allow for agricultural land use under the ROW of the power line.<br>-Provide PAPs with job opportunities during construction and operation of project.<br>- Increase electricity connectivity in the areas of the route of power line for ownership of the project. | -Monthly reports on compensation progress submitted to cell and sector levels.<br>-Monthly meeting by grievance committee at cell levels.<br>-Quarterly review of employment stat.us of PAPs during project construction and operation. |
| PAP         | PAH - Resistance  | Champion                                      | -Compensation payments.<br>-loss of houses, land and livelihood.<br>- planned projects                         | - Expedited compensation for assets lost.<br>-Ensure PAPs job availability during construction and operation.   | -Bi- weekly meeting at cell and sector level with PAPs on alternatives to specific PAPs with alternative projects.<br>-Monthly reports on compensation  |

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| Stakeholder  | Where are we now? | Where do we want to be on these stakeholders? | Concerns, Issues, Resistance  | Planned Engagement Actions   | Timeline  |
|--|-------------------|---|---|--|---|
|  |                   |   | <ul style="list-style-type: none"> <li>on their land affected</li> <li>-uncertainty of new employment.</li> <li>-fear of future of uncertainty.</li> </ul>          | <ul style="list-style-type: none"> <li>-Consult and agree on alternatives to their planned projects or line route.</li> </ul>  | <ul style="list-style-type: none"> <li>progress submitted to cell and sector levels.</li> <li>-Monthly meeting by grievance committee at cell levels.</li> <li>-Quarterly review of employment stat.us of PAPs during project construction and operation.</li> </ul>  |
| Local Government- Gasabo, Kicukiro and Rwamagana Districts and relevant sectors and cells. | Champion          | Champion                                      | <ul style="list-style-type: none"> <li>-People resistant to being resettled due to above concerns.</li> <li>-Proposed Livelihood restoration of the PAP.</li> </ul> | <ul style="list-style-type: none"> <li>- Expedited compensation for assets lost</li> <li>- Ensure PAPs job availability during construction and operation.</li> <li>- Consult and agree on alternatives to their planned projects or line route.</li> <li>-Mobilize and sensitise resistant people.</li> </ul> | <ul style="list-style-type: none"> <li>-Bi- weekly meeting at cell and sector level with PAPs on alternatives to specific PAPs with alternative projects.</li> <li>-Monthly reports on compensation progress submitted to cell and sector levels.</li> <li>-Monthly meeting by grievance committee at cell levels.</li> <li>-Quarterly review of employment stat.us of PAPs during project construction and operation.</li> </ul> |
| Autonomous institutions. i.e. EDCL, EUCL   | Champion          | Champion                                      | <ul style="list-style-type: none"> <li>- wrong or insufficient information for payment execution</li> <li>- PAPs resistance for reason stated above</li> </ul>      | <ul style="list-style-type: none"> <li>- Meticulous verification of expropriation report to avoid missing information.</li> <li>- expedite compensation process.</li> <li>- Consult and agree on alternatives to their planned projects or line route.</li> </ul>  | <ul style="list-style-type: none"> <li>-Monthly meeting at cell and sector level with PAPs on alternatives to specific PAPs with alternative projects.</li> <li>-Monthly reports on compensation progress submitted to cell and sector levels.</li> <li>-Monthly meeting by grievance committee at cell levels.</li> <li>-Quarterly review of employment stat.us of PAPs during project construction and operation.</li> </ul>    |

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| Stakeholder | Where are we now? | Where do we want to be on these stakeholders? | Concerns, Issues, Resistance | Planned Engagement Actions  | Timeline   |
|-------------|-------------------|---|------------------------------|---|--|
| MINECOFIN   | Champion          | Champion                                      | -Wrong account number.       | -Bring confirmation of bank account number.<br>-Correct previous account number and repay returned payment. | status of PAPs during project construction and operation.<br>Whenever the required document is received. |

## CHAPTER 14: REFERENCES

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- IFC, 2012. IFC Performance Standards on Environmental and Social Sustainability.
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- *JICA, 2010.* Japan International Cooperation Agency (JICA) Guidelines for environmental and social considerations.
- *JICA, 2015.* Field report for Preparatory survey on Improvement of substations and distribution network phase 2 in the Republic of Rwanda.
- World Bank, 2004. Involuntary Resettlement Source book



APPENDICES

APPENDIX 1: MINUTES OF PUBLIC CONSULTATION MEETINGS

Akarere ka Gasabo  
Umuryango wa Kubarokore

Kuva 15/07/2017

Akayali ka Kinyana  
Umudugudu: Kijabura

Impamvu: Gusobanurira abaturage ibyerekeye Umushinga w'amashyamba yavuye  
Uzabwira Gasabo ushinzwe Nyagasamba

Inama yatangijwe n'umuyobozi w'umudugudu atanga itangazo  
kubashyirikiye aribo: Songasylvia, Olivier Rukemampunga na  
amubonye muri J Paul  
songo yafashye ijamba atangira kubasobanurira ibyerekeye imigabane  
y'umushyamba ibyerekeye imamba u'ibya kubwirako ibintu byabo bishobora  
kubonye gusa n'ubwo umushinga ushinzwe ushinzwe

Impungenge zibabwirako, umuhamya yatangirye abaza ibyanyambura  
azitwaza umugabo aya kubwirako, undi yatangirye ibintu bya  
abaza niba umuhamya niba ushinzwe niba ushinzwe niba ari  
umushinga amapoto gusa amutwambura, undi yabonye niba  
abazishyamba ari abaturage imamba gusa umushinga niba umushinga  
ibintu byanyambura byashyamba, undi yabonye ibyerekeye imamba  
kubwirako gitandukanye kuri ibintu byanyambura kuho sinze

Umuyobozi w'umudugudu: Mwigereza Bernadine

Umushyitsi: SONGA Sylvie

Akarere ka Basabwa  
Umurungu wa Kutororo

KUWA 15/07/2017

Akayali ka Kinyana  
Umudugudu: Kinyana

Impamvu: Gusobanurira abaturage ibyerekeye Umushyamba w'amashyamba yavuye  
Uzabwira Gasaga usana Nyagasamba

Inama yatangijwe n'umuyobozi w'umudugudu atanga itanga  
kubashyirira urubwira: Songasilvin, Olivier Rukemampungu na  
Andihamana J. Paul

songo yafashye ijamba atangira kubababwirira ibyerekeye imigambwe  
y'umushyamba ibyerekeye imamba n'ibya kubwirirwa ibintu byabo bishobora  
kuwanga gusa umushyamba w'umushyamba. Uyu

Impungenge zibabwirirwe, umuhamya yatangirye abaza ibyanyambura  
azitwaza umushyamba aya kubwirirwa, undi yatangirye ibintu aya  
abaza niba uwo muriho neho uzabwirirwe agombye niba ari  
umushyamba amapfa gusa awo ubwira, Undi yabwirirye niba  
abashyamba ari abaturage imamba gusa agombye niba nibindi  
ibintu byabwirirwe byabwirirwe, undi yabwirirye ibyerekeye imamba  
kubwirirwe gitandukanye hari ibintu byabwirirwe kuba Sima

Umuyobozi w'umudugudu: Mwigenera Baramba

Umushyamba: SONGA Silvin


Akare ka Gasaba  
(Umurenge wa Ndera  
Akagali ka Mukuyu  
Umudugudu wa ~~Mukuyu~~ Jurwe

Kuwa 20/07/2017

Impamvu. Gusobanurira abaturage ibyerekeye  
Umushinga w'amashyamba ari ugashyamba Gasaba  
Uya Nyagasamba

Ikoma yatanyijwe n'umuyobozi w'umudugudu  
atanga ubusobanuro bwa kugerekeye Umushinga w'amashyamba  
n'ibyabantu bafite gupima, asoje aha ibaze abashyamba ari bo  
Songa J. Paul na Olivier.  
Songa yafashe ijamba atangira asobanurira abaturage  
ibyerekeye umushinga, anababwira ko umushinga ubabura  
kugira ibyo wanyuze mu mitungo y'abaturage.

Yababwirako hari amapoto azashyirwa mu butaka bw'abaturage  
cyangwa se kubimaze y'abantu ariyo mpamvu  
bozabwira kugira ngo babishyur ibyabo biraba byanyiriza  
abaturage bafashe ijamba kagaragaza impungenge zabo,  
abaza niba izihe byosezeye inzu niba byashyirwa amafaranga  
cyangwa bakopukira ahandi utari, undi yabajije niba ahantu  
shatagize ipoto naho buhambira, banasabye ko bakururwa  
ubuvugizi mu byerekeye kubambira w'abashyirwa, bafite ubushye  
cy'ibyangombwa by'ubutekanywe ubashyirwa kandi bakomeze kugira  
barasaba ubuvugizi niba bakwishyurwa aho insinga zizanyorahwe

Umuyobozi w'umudugudu: BAKUNZI Ferdinand   
umushyamba: SONGA Silvia: 

Akarere ka Gasabo

KUWA 21/07/2017

Umurenge wa Ndera

Akajali ka Rudashyamba

Umudugaliwacu Rukashyamba a kashyamba

Impamvu: Gusobanurira abaturage ibyerekeye umushinga w'amashyamba uzava i Gasaga ujana i Nyagasamba

Inama yatangijwe n'umuyobozi ushinze imibereho myiza y' abaturage mu karere ka Rudashyamba aho akaze abashyirako ariko, Songa, J. Paul na Olivier Songa yafashwe ijamba atangira aburira abaturage ibyerekeye abasobanurira ibyerekeye umushinga w'amashyamba ufatwako Gasaga ujana Nyagasamba. Yabababwirye ko hari amapoto azashyirwa mu masamba yabo; abasobanurira ko ayo mapoto haribye azengizwe ariyo impamvu byombi kubahirwa kugirango bozishyururwe ibyanyujwe.

Hakurikijwe impungenge zabaturage, uwambere yabonye ikibazo giteye gitya ko hari abantu bashinze amapoto muniniyo yabo kandi utabashyururwe, avuye ku bashyirako ibiri kubonye; abenshi bafite ikibazo kuri phase ya L. barabaniwe ariko utabashyururwe; ikindi kubonye mu yababwirye byaburira abaturage ko baturako mutakiriye afite mu kibazo kandi kubahirwa ushira ziganyura kubonye y'izwe ariko utabwo baturako ushira y'izwe.

Umuyobozi ushinze imibereho myiza y'abaturage: G. ASANA

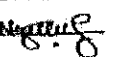

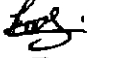

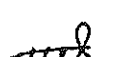
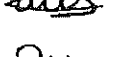
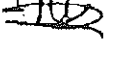


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APPENDIX 2: LIST OF PUBLIC OR PARTICIPANTS  
CONSULTED

**PUBLIC CONSULTATION LIST FOR  
THE PROJECT FOR IMPROVEMENT OF SUBSTATIONS AND DISTRIBUTION  
NETWORK PHASE 3 IN RWANDA**

| Izina/Names                                | Aho ubarokwwe/<br>Institution               | Contact/<br>telephone | Signature   | Date       |      |
|--|---|-----------------------|---|------------|------|
| 1. Njirumanahoro<br>Dokete                 | Nyagisozi: Ikimyamba<br>Umurungu/ Nyagisozi |                       |  | 20/07/2017 | Bona |
| 2. RUTONNES FOR Aharara                    | UMUDUGU/ NYAGISOZI                          |                       |  | 20/07/2017 |      |
| 3. KAYITESI GUSTAVE                        | NYAGISOZI                                   |                       |  | 20/07/2017 |      |
| 4. ALUKAKARISA JACQUES                     | NYAGISOZI                                   |                       |  | 20/07/2017 |      |
| 5. RUKUNSO ESTHER                          | NYAGISOZI                                   |                       |  | 20/07/2017 | Bona |
| 6. NIYONZIMA OLIVIER                       | NYAGISOZI                                   |                       |  | 20/07/2017 |      |
| 7. TUMUSENGE JEANNE                        | NYAGISOZI                                   |                       |  | 20/07/2017 |      |
| Umuyobozi w'Umuduguru<br>HABIYAREMYE SPRIE |   |                       |   |            |      |
| 1.   |   |                       |   |            |      |

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**PUBLIC CONSULTATION LIST FOR  
THE PROJECT FOR IMPROVEMENT OF SUBSTATIONS AND DISTRIBUTION  
NETWORK PHASE 3 IN RWANDA**

| Izina/Names                 | Aho ubarizwa/<br>Institution | Contact/<br>telephone | Signature | Date         |          |
|-----------------------------|------------------------------|-----------------------|-----------|--------------|----------|
| 1. M. DONIGABU J. A. Yizama | KINYANA - KIGABIRO           |                       |           | 1E 19/7/2017 | Bome     |
| 2. RUSANKUNWA Soimana       | KINYANA - KIGABIRO           |                       |           | 1E 19/7/2017 | Bome     |
| 3. KAMANA Jamali            | KINYANA - KIGABIRO           |                       |           | 1E 19/7/2017 | Bome     |
| 4. MUNYANEXA Emmanuel       | KINYANA - KIGABIRO           |                       |           |              |          |
| 5. MUYIZANA Jamali          | " "                          |                       |           |              |          |
| 6. NYIRAGATAKI Umuhungu     | " "                          |                       |           |              | Umuhungu |
| 7. NURUKUBWA Madalina       | " "                          |                       | 2         |              |          |
| 8. NTEZIYAREMYE Innocent    | " "                          |                       |           |              |          |
| 9. NYIRAGATAKI Emmanuel     | " "                          |                       |           |              |          |
| 10. MURUKAZIHEYE Veronique  | " "                          |                       |           |              |          |
| 11. EGIRUKWAYO J. Paul      | " "                          |                       |           |              |          |
| 12. NIYONSENGA Albert       | " "                          |                       |           |              |          |
| 13. AWAMANA Jehadi          | " "                          |                       |           |              |          |
| 14. NTIBIMENYA Jean         | " "                          |                       |           |              |          |
| 15. NYIRANGANDA NIMONA Flo  | " "                          |                       |           |              |          |
| 16. HABANA BAWIZE Thomas    | " "                          |                       |           |              |          |
| 17. UGATITESH Ngoma         | " "                          |                       |           |              | Bome     |
| 18. ABISABURA Boma Valentin | " "                          |                       |           |              |          |
| 19. BAVULI Maitika          | " "                          |                       |           |              |          |
| 20. NEEYIMANA Yonuste       | " "                          |                       | 6         |              |          |
| 21. MUKANKUBWA              | " "                          |                       |           |              |          |

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**PUBLIC CONSULTATION LIST FOR  
THE PROJECT FOR IMPROVEMENT OF SUBSTATIONS AND DISTRIBUTION  
NETWORK PHASE 3 IN RWANDA**

| Izina/Names                 | Aho ubarizwa/<br>Institution              | Contact/<br>telephone | Signature | Date           |
|-----------------------------|---|-----------------------|-----------|----------------|
| 1. NIYONZWEYE<br>Vincent    | Gasabo Ndera<br>Kacyinyaga<br>Rudashyamba |                       |           | de 21/07/2017. |
| 2. MUKATWANA<br>Isabelle    | Gasabo Ndera<br>Kacyinyaga<br>Rudashyamba |                       |           | "              |
| 3. MARARA EDIGALO           | GASABO NDERA<br>RUMANGARE                 |                       |           | "              |
| 4. Muharurwiza<br>Constance | Ruhango                                   |                       |           | "              |
| 5. Karasira Innocent        | Ruhangara                                 |                       |           |                |
| 6. Ajirwanda Eugene         | Ruhangara                                 |                       |           |                |
| 7. Niyirameza Jolene        | Ruhangara                                 |                       |           |                |
| 8. Bazubagira Mariane       | Ruhangara                                 |                       |           |                |
| 9. Kabahizi J. de Dieu      | Ruhangara                                 |                       |           |                |
| 10. Kayiruka Claude         | Ruhangara                                 |                       |           |                |
| 11. Nsengimana Faustine     | Ruhangara                                 |                       |           |                |
| 12. GASTWA Donatien         | Rudashyamba                               |                       |           |                |
| 13. Nyiramukira Jolene      | Ruhangara                                 |                       |           |                |
| 14. Mukandakubwa Jeanne     | Ruhangara                                 |                       |           |                |
| 15. Mukokabayo Euphonie     | Ruhangara                                 |                       |           |                |
| 16. Bobamukiza Special      | Ruhangara                                 |                       |           |                |
| 17.                         |   |                       |           |                |

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**PUBLIC CONSULTATION LIST FOR  
THE PROJECT FOR IMPROVEMENT OF SUBSTATIONS AND DISTRIBUTION  
NETWORK PHASE 3 IN RWANDA**

| Izina/Names                | Aho ubarizwa/<br>Institution | Contact/<br>telephone | Signature       | Date          |
|----------------------------|------------------------------|-----------------------|-----------------|---------------|
| 1. Bwiza Fredina           | Chokwe zone                  |                       | [Signature]     | Le 20/07/2017 |
| 2. NSENGIYUMBA<br>Boniface | MURU<br>MURU, JOMU E         |                       | [Signature]     | KIRIYA        |
| 3. ISAMUREMYE JY.          | _____                        |                       | [Signature]     | BORNE         |
| 4. KARANGWA Ferech         | _____                        |                       | 253 [Signature] |               |
| 5. NSENGIYUMBA<br>J.D      | _____                        |                       | 24 [Signature]  | BORNE         |
| 6. NYIRAHABIMANA<br>Cher   | _____                        |                       | 4 [Signature]   |               |
| 6. NYIRINGIRA<br>MAMUKU    | _____                        |                       | 52 [Signature]  |               |

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Annex 9 Environmental and Social Monitoring Form

## MONITORING FORM

**1. Responses/Actions to Comments and Guidance from Government Authorities and the Public**

| Monitoring Item   | Monitoring Results during Report Period      |
|---|--|
| Number and contents of comments from Governmental Authorities | Number:<br>Contents:<br>Actions to be taken: |
| Number and contents of comments from the Public               | Number:<br>Contents:<br>Actions to be taken: |

**2. Mitigation Measures**

**- Air Quality (Emission Gas / Ambient Air Quality) (Construction Phase)**

| Item | Unit | Measured Value (Mean) | Measured Value (Max.) | Country's Standards | Referred International Standards | Remarks (Measurement Point, Frequency, Method, etc.) |
|------|------|-----------------------|-----------------------|---------------------|----------------------------------|--|
|      |      |                       |                       |                     |                                  |  |

**Note)** Negative impact on air quality is expected to some extent during construction such as dust. Hence, EDCL and Contractor shall monitor the status of necessary mitigation measures, including daily site inspection for certification of vehicle and heavy machineries.

**- Waste (Construction Phase)**

| Monitoring Item | Monitoring Results during Report Period |
|-----------------|---|
|                 |   |

**Note)** EDCL and Contractor should monitor disposal methods (storage, transport, disposal) of waste materials incurred by dismantling of existing towers in accordance with relevant laws and regulations of Rwanda.

**- Noise / Vibration (Construction Phase)**

| Item            | Unit | Measured Value (Mean) | Measured Value (Max.) | Country's Standards | Referred International Standards | Remarks (Measurement Point, Frequency, Method, etc.) |
|-----------------|------|-----------------------|-----------------------|---------------------|----------------------------------|--|
| Noise level     |      |                       |                       |                     |                                  |  |
| Vibration level |      |                       |                       |                     |                                  |  |

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**Note)** Noise and vibration standard for construction work is not stipulated in national standards of Rwanda (Acoustics- Noise Pollution- Tolerance limits RS236/2014; Vibration- Tolerance limits RS 237: 2014). However, EDCL and Contractor shall monitor the status of necessary mitigation measures, including time regulation of construction and daily site inspection for certification of vehicle and heavy machineries.

**- Soil (Construction/ Operation Phase)**

| Monitoring Item | Monitoring Results during Report Period |
|-----------------|---|
|                 |   |

**Note)** Insulating oil will be used for transformers, which may cause soil pollution if it is leaked. Hence, EDCL and Contractor shall conduct soil sampling at the new Gasogi Station before, mid-term and end of construction; EUCL shall conduct soil sampling on an annual basis at the new Gasogi Station.

**3. Natural Environment (Construction Phase)**

**- Ecosystem**

| Monitoring Item | Monitoring Results during Report Period |
|-----------------|---|
|                 |   |

**Note)** Since the project requires cutting trees, EDCL and Contractor shall conduct compensatory measures in accordance with relevant laws and regulations of Rwanda.

**4. Social Environment**

**- Resettlement (Pre-Construction Phase)**

| Monitoring Item                                 | Monitoring Results during Report Period |
|---|---|
| 1) Approval of ARAP by EDCL                     | Status/ Completion date:                |
| 2) Payment process by EDCL Finance Department   | Status/ Completion date:                |
| 3) Submission of the Payment order to MINECOFIN | Status/ Completion date:                |
| 4) Payment process by MINECOFIN                 | Status/ Completion date:                |
| 5) Relocation of PAPs                           | Status/ Completion date:                |
| 6) Land title request                           | Status/ Completion date:                |

**- Living / Livelihood (Pre-Construction, Construction and Operation Phase)**

| Monitoring Item                 | Monitoring Results during Report Period                   |
|---------------------------------|---|
| Livelihood restoration programs | Status (during and after livelihood restoration program): |

**- Record of grievance management (Pre-Construction/Construction/Operation Phase)**

| Monitoring Item                  | Monitoring Results during Report Period      |
|----------------------------------|--|
| Number and contents of grievance | Number:<br>Contents:<br>Actions to be taken: |

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Annex 10 Project Cost Estimation

Project Cost Estimation

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2. Cost to be borne by the Rwanda side: US\$861,000 (=approximately JP¥ 96.5 million)

| Cost Items   | US\$           | (≒JP¥)           |
|--|----------------|------------------|
| 1. RAP Compensation and Expense for land preparation   | US\$ 183,000 - | JP¥ 20,500,000 - |
| 2. Expenses for stockyard:   | US\$ 40,000 -  | JP¥ 4,500,000 -  |
| 3. Expenses for modification of SCADA system and Optical Network Management System in NECC (in Gikondo S/S) to accommodate the New Gasogi substation | US\$ 550,000 - | JP¥ 61,600,000 - |

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|  |                |                  |
|--|----------------|------------------|
| 4. Expenses for Demolish work of 110 kV towers at Gasogi Substation      | US\$ 10,000 -  | JP¥ 1,100,000 -  |
| 5. Contingency (10 %: Payment of bank commission based on banking, etc.) | US\$ 78,000 -  | JP¥ 8,800,000 -  |
| Approximate Total cost   | US\$ 861,000 - | JP¥ 96,500,000 - |

3. Conditions for estimation

(1) Time of estimation: July 2017

(2) Foreign exchange rates:

1 US\$ = 112.09 JPY (TTS average from April 2017 to June 2017)

1 EURO = 123.76 JPY (TTS average from April 2017 to June 2017)

(3) Others:

The above estimation was carried out in accordance with relevant rules and the guideline of the Japanese Grant Aid.

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