

**Appendix 13    Draft EIA Report**  
**(TANESCO→NEMC)**

## ENVIRONMENTAL IMPACT ASSESSMENT REPORT

FOR

### REHABILITATION OF SUBSTATIONS AND CONSTRUCTION OF NEW LINES AND SUBSTATIONS IN DAR ES SALAAM

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23<sup>rd</sup> December, 2013

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**DECLARATION OF EXPERTS**

We hereby certify that the particulars given to this ESIA report are correct and true to the best of our knowledge and we shall provide any additional information that shall come to our notice in the course of the processing of this ESIA report.

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## EXECUTIVE SUMMARY

### PROJECT TITLE:

**THE PROPOSED PROJECT FOR REHABILITATION OF SUBSTATIONS AND CONSTRUCTION OF NEW LINES AND SUBSTATIONS IN DAR ES SALAAM**

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### Outline and Justification of Project

#### *Project Description*

The Government of Tanzania through Tanzania Electric Supply Company (TANESCO) is planning to undertake rehabilitation of substations and construction of new lines and substations in Dar es Salaam City. Under the Japanese International Corporation Agency (JICA) funding, TANESCO has completed carrying out a detailed design study of the proposed transmission and distribution line routes and substations, and preparation of the abbreviated resettlement action plan is in progress.

The overall objective of the project is to provide increased access to electricity with sustainable effects on poverty reduction by facilitating income generation and improved social services. The technical objective of the project is to stabilize the grid system, increase power supply, improve reliability of the power supply in Dar es Salaam city, as well as to increase the extent of TANESCO's distribution network in the city in order to be able to provide electricity to commercial business activities, water pumping, secondary schools, medical services, streetlights, residential houses, agro-processing activities etc. in the project area.

The proposed project has five (5) components which are:

- ✓ Reinforcement of Ilala substation and existing 132 kV transmission line from Ilala substation to Ubungo substation (7.5 km)
- ✓ Construction of new Jangwani Beach substation (33/11kV) and construction of distribution line (33kV) from Jangwani beach substation to Tegeta substation (6.5km)
- ✓ Construction of Muhimbili substation (33/11kV) and construction of distribution line (33kV) from Muhimbili to City Center substation (2km)
- ✓ Construction of Mwananyamala substation (33/11kV) and construction of distribution line (33kV) from Mwananyamala substation to Makumbusho substation (1.1km)
- ✓ Expansion of Msasani substation (33/11kV) and expansion of distribution line (33kV) from Msasani substation to Makumbusho substation (7.6km)

The Environmental Management Act, 2004 (Act No. 20 of 2004) requires that EIA be undertaken for all new projects that may cause adverse environmental and social impacts. Under the Environment Impact Assessment and Audit Regulations, 2005 (third Schedule, list 9 (i)), construction projects are categorized as EIA mandatory projects for which a full EIA is required. Thus upon registration of the

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project at National Environmental Management Council (NEMC), TANESCO was directed to carry out an EIA study starting with the scoping exercise (in NEMC Letter No. NEMC/513/1/Vol I/175 dated 07<sup>th</sup> May, 2013).

#### ***Description of the Environment***

The proposed project area is in the Dar es salaam City. The area has flat terrain which is much influenced by coastal climatic condition and normally experiences a modified type of equatorial climate. It is generally hot and humid throughout the year with an average temperature of 29°C. The hottest season is from October to March during which temperatures can raise up to 35°C.

The area becomes relatively cool between May and August, with temperature around 25°C. There are two main rain seasons; a short rain season from October to December and a long rain season between March and May. The average rainfall is 1000mm (lowest 800mm and highest 1300mm). Humidity is around 96% in the mornings and 67% in the afternoons. The climate is also influenced by the southwesterly monsoon winds from April to October and northwesterly monsoon winds between November and March.

The City is divided into three ecological zones, namely the upland zone comprising of the hilly areas to the west and north of the City, the middle plateau, and the low lands including Msimbazi valley, Jangwani, Mtoni, Africana and Ununio areas. The main natural vegetation includes coastal shrubs, Miombo woodland, coastal swamps and mangrove trees.

Dar es salaam City is vulnerable to floods, sea level rise and coastal erosion, water scarcity and outbreak of diseases. Vulnerability to climate change effects is largely contributed by:

- ✓ Poor planning: About 70 % of settlements are not planned.
- ✓ Poverty: Encroachment of hazardous lands is caused by lack of cash to access land in planned areas.
- ✓ Lack of infrastructure: The existing infrastructure such as storm water drainage system is not proportional to the population size.
- ✓ Corruption: Development in areas which have been identified as hazardous lands such as storm water channels.
- ✓ Location: Closer to Indian Ocean.

The city falls on the coastal forests belt an area under the Eastern Arc and Coastal forests biodiversity hotspot. The city itself is rich in biodiversity in its own right. Most of the vegetation and fauna have been lost or displaced due to intensive urban development of residential areas, infrastructures and gardens. Nevertheless the city still maintains a good number of species in all taxa. The dominant groups of fauna in the project area were birds and insects.

#### ***Stakeholder Consultations***

Stakeholders including all individuals, groups, all organization that might be affected or might affect positively or negatively the project in one way or other found at both national and local levels, ranging from the government authorities to local community members including, national environmental protection agency have been contacted. Stakeholders groups of relevance to this project are listed below. Details about the stakeholders (name of institution, person contacted etc. is found in Appendix VI. The main stakeholders were identified to be:

a. Central Government: Ministries, Departments and Agencies. These include Vice President's Office (Division of Environment, NEMC), Ministry of Lands, Ministry of Housing and Human Settlements Development,

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b. Project Proponent: Tanzania electric supply company (TANESCO)

c. Tanzania roads agency (TANROADS)

d. Local Government Authorities: Kinondoni and Ilala Municipal Council: Municipal Executive Director, and Management Team (Municipal Town Planner and Municipal Environmental Officer)

e. Local stakeholders included

- ✓ Mchikichini, Upanga East and Upanga West in Ilala Municipal Council, Makurumla, Kawe, Mzimuni, Kunduchi, Wazo, Msasani, Mabibo, Ubungo, Mikocheni and Makumbusho ward in Kinondoni Municipal Council Ward Executive Officers (Ward Development Committee consisting of Ward Councillors, Ward Executive Officers, Ward Extensionists, Ward Environment Committees) and people around the ward areas

f. Utilities providers: DAWASA/ DAWASCO, TTCL,

Consultations were conducted by organizing ward consultative meetings, during which the participants were also asked to fill- in the questionnaires related to the project social issues. Observations, Questionnaires and interviews were conducted in order to collect useful data.

Consultations were also conducted through focus group discussion and public meetings at ward level for 13 project wards where the project area residents attended these meetings. The meetings were attended by different categories of representatives focusing on their occupations, gender readiness to attend and contribute later-on among their *mitaa* communities by creating awareness about the project. These meetings were planned and executed with purpose of disseminating information about the project as such issues like the objective of the project, how it will executed or implemented. These meetings were always formalized by being presided either a ward councilor, or *Mtaa* chairperson nominated by the councilor. The Ward Executive Officer (WEO) of the respective ward was always the secretary for recording the proceedings.

From consultations it was observed that all consulted peoples showed interest on the project in view that in the long run, the project will improve the reliability of electric supply and stability of power supply to the city. Also removing of the steel poles with steel poles will reduce danger and unnecessary power cut off due to falling of the poles and disconnections caused by the current system. Other concerns were as addressed on chapter five regarding stakeholders consultation.

Conclusion the acceptance level of the project was assessed and all of them accepted the project. In almost all consultations, they all approved or agreed with the development since they mentioned that advantages are many including increase power supply quality, security and reliability, upgrading of their properties, employment, housing etc.

#### ***Major Significant Impacts***

The conclusion of the Environmental Impact Assessment is that, most of the negative impacts identified can be mitigated using engineering solutions during the design and construction phases. However, there is a good number of stakeholders who expressed strong reservations.

#### ***Alternatives Considered***

Alternative consideration was only limited to site selection and “no project” option. As for other aspects such as technology, design of depot, types of materials used are almost standard. The current

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route choice as it is within the road reserve (Municipal and TANROADS) was the safest option with environmentally friendly.

#### ***Mitigation of Impacts***

The following measures are recommended to be taken by the developer, to minimize negative impacts (both real and perceived impacts):-

#### ***Site Selection Phase***

*Damage to wetland habitat and contained biodiversity and other facilities*

The project should be limited to the demarcated area; i.e excavations only along the road reserves and substation built at the TANESCO and privately owned plots.

*Conflict of interest among the stakeholders*

In order to mitigate the perceived negative impacts and potential conflict among stakeholders TANESCO shall, with immediate effect, embark on awareness raising and information dissemination on the project. Special emphasis shall be given to the issues raised by the stakeholders.

*Cost of compensation and relocation disturbances*

Authenticity of ownership of facilities along the route shall be established if any and compensation shall be made according to the land and compensation acts.

#### ***Design Phase***

*Depletion of construction materials at points of source*

- ✓ The project shall procure construction materials from licensed suppliers.

#### ***Mobilization /Construction Phase***

*Contamination and /impaired quality of receiving body – land and water*

*Disposal of overburden*

- ✓ Excavated soil to be used as back filling material for the trenches while the excess to be disposed off.

*Disposal of domestic and office solid waste*

- ✓ Dispose solid through Kinondoni and Ilala Municipal Council disposal system.

*Disposal of metal parts*

- ✓ Metal parts will be sold to metal recyclers.

*Disposal of broken glass*

- ✓ Glass and broken bottles will be sold to recycling companies e.g. Kioo Ltd.

*Disposal of car batteries*

- ✓ Batteries will be collected and sent to recycling companies e.g. YUASA batteries.

*Disposal of plastic bottles*

- ✓ Plastic bottles will be collected and transported to plastic recycling plant or recycling dealers.

*Deteriorated / Impairment of local air quality*

- ✓ TANESCO to make sure the contractor use High quality Engine specification (Euro III) which has low emissions.

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- ✓ TANESCO to make sure the contractor uses vehicles that are serviced after every 5000km and gaseous emission free.

#### *Occupation health and safety*

- ✓ provide health and safety training to all workers
- ✓ put in place emergency plan
- ✓ provide first aid services
- ✓ provide proper personal protective gear
- ✓ ensure suitable working conditions

#### *Public health hazards/safety*

- ✓ Awareness campaigns on HIV/AIDS
- ✓ Sensitization of workers to undergo voluntary testing

#### *Compromised Security*

- ✓ the project site shall be fenced and controlled access shall be instituted
- ✓ Make use of hired security guards
- ✓ Security tapes and lights shall be put in place

#### *Contamination / Impairment of quality of receiving bodies*

- ✓ All petroleum products, used oil and other chemical shall have secondary containment
- ✓ Areas enclosed by secondary containment shall be maintained
- ✓ All accumulated water within secondary containment areas shall be disposed of through oil traps
- ✓ Collected oils shall be disposed of in boilers and/or furnaces

#### *Decommissioning phase*

##### *Contamination/impaired quality of receiving body due to management of decommissioning wastes and social impacts*

- ✓ The site shall be demolished and returned to its original state
- ✓ The demolished debris shall be disposed off safely
- ✓ Awareness and SACCOS creation so that people can cope when project come to an end
- ✓ All employee should be members of social security funds

#### ***Environmental and Social Management Plan***

The EIS presents an outline Environmental and Social Management Plan (ESMP). Much of the day to day responsibility during construction will be the role of TANESCO Environmental unit to supervise the contractor.

#### ***Monitoring and Auditing***

The EIS presents an outline Environmental and Social Monitoring Plan (EMP). This will assist TANESCO and stakeholders to monitor (1) Implementation of the proposed mitigation measures and (2) the efficacy of the proposed mitigation measure.

#### ***Cost Benefit Analysis***

The EIS presents an assessment of the project, in terms of negative impacts, compared to the socio-economic benefits that will not happen if the project is not implemented. Environmental cost benefit analysis is assessed in terms of the negative versus positive impacts. The potential benefits of the project, in terms of financial and social benefit are substantial. Similarly, the environmental impacts can be reasonably mitigated and the financial resources needed to mitigate negative impacts, when

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compared to the required investment, are relatively small. The EIS has demonstrated that the benefits outweigh the costs.

***Conclusion***

This report presents the results of the environmental impact assessment study for the proposed power network rehabilitation, rehabilitation of substations and construction of new lines and substations in Dar es Salaam. The results of the study have shown that the project activities from construction up to operation stages will not have significant negative impact to the environment. Most of the impacts are minor but should not be ignored. Few impacts that are relatively can be mitigated as described on ESMP and EMP. Therefore, the project is considered to be environmentally viable provided that the recommended mitigation measures adhered and implemented during all phases.



## LIST OF ACRONYMS/ABBREVIATIONS

AIDS	Acquired Immune Deficiency Syndrome
CBD	Convention on Biological Diversity
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DAWASCO	Dar es Salaam Water Supply & Sewerage Company
DAWASA	Dar es Salaam Water Supply and Sewerage Authority
DC	District Commissioner
EA	Environmental Assessment
EIA	Environmental Impact Assessment
EIS	Environmental Impact Statement
ESMP	Environmental and Social Management Plan
EMA	Environmental Management Act
EMP	Environmental and Social Monitoring Plan
ESIA	Environmental and Social Impact assessment
FDG	Focus Group Discussion
HIV	Human Immunodeficiency Virus
IUCN	International Union for Conservation of Nature
IPTL	Independent Power Tanzania Limited
JICA	Japan International Cooperation Agency
kV	Kilo Volt
LGA	Local Government Authority
NAWAPO	National Water Policy
NEMC	National Environment Management Council
NGOs	Non-governmental Organizations
O & M	Operation and maintenance
OSHA	Occupational Safety and Health Administration
S/S	Substation
TAC	Technical Advisory Committee
TANESCO	Tanzania Electric Supply Company
TANROADS	Tanzania National Roads Agency
TL	Transmission Line
ToR	Terms of Reference
TPDF	Tanzania People's Defense Force
TTCL	Tanzania Telecommunication Company Limited
TZS	Tanzanian Standards
WEO	Ward Executive Officer
SCADA	Supervisory, Control and Data Acquisition

## ACKNOWLEDGEMENT

EIA team wish to express a sincere gratitude to all individuals and institutions that in one way or another contributed to the successful completion of this work, key Stakeholders who provided their time and shared their knowledge are highly appreciated

Special thanks are due to the management and staff of the Ilala and Kinondoni Municipal Councils, Dar es Salaam for their valuable inputs and guidance during the study. We wish to mention few institutions and individuals like TANROADS, TTCL, DAWASA, Ward Executive Officers and Mtaa Chairpersons in project areas for providing valuable information and support, which enabled the study team to conduct the ESIA study smoothly.

## CHAPTER ONE

### 1.0 GENERAL BACKGROUND

#### 1.1 INTRODUCTION

The Government of Tanzania through Tanzania Electric Supply Company (TANESCO) is planning to undertake rehabilitation of substations and construction of new lines and substations in Dar es Salaam City. Under the Japanese International Corporation Agency (JICA) funding, TANESCO has completed carrying out a detailed design study of the proposed transmission and distribution line routes and substations, and preparation of the abbreviated resettlement action plan is in progress.

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- ✓ Construction of new Jangwani Beach substation (33/11kV) and construction of distribution line (33kV) from Jangwani beach substation to Tegeta substation (6.5km)
- ✓ Construction of Muhimbili substation (33/11kV) and construction of distribution line (33kV) from Muhimbili to City Center substation (2km)
- ✓ Construction of Mwananyamala substation (33/11kV) and construction of distribution line (33kV) from Mwananyamala substation to Makumbusho substation (1.1km)
- ✓ Expansion of Msasani substation (33/11kV) and expansion of distribution line (33kV) from Msasani substation to Makumbusho substation (7.6km)

The Environmental Management Act, 2004 (Act No. 20 of 2004) requires that EIA be undertaken for all new projects that may cause adverse environmental and social impacts. Under the Environment Impact Assessment and Audit Regulations, 2005 (third Schedule, list 9 (i)), construction projects are categorized as EIA mandatory projects for which a full EIA is required. Thus upon registration of the project at National Environmental Management Council (NEMC), TANESCO was directed to carry out an EIA study starting with the scoping exercise (in NEMC Letter No. NEMC/513/1/Vol I/175 dated 07<sup>th</sup> May, 2013).

TANESCO has commissioned **Eng. Hamdun Mansur** under TANESCO-Environmental Section to conduct the Environmental and Social Impacts Assessment assignment. This include the filling of EIA registration form as well as preparation of the project brief for the project, scoping report and ESIA study for final submission to the Council. This report presents the Environmental and Social Impact Assessment covering both phases

#### 1.2 SCOPING STUDY

Scoping study was conducted to make sure that relevant key environmental and social economic issues are identified hence a focused EIA is undertaken. The objectives of the scoping study for the project of improving the reliability of electric supply in the city centre were to ascertain key issues

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that are likely to be important during EIA and to identify and involve all stakeholders in the EIA process. This process afforded opportunity to these stakeholders to express their views and concerns to be included in the EIA study and subsequent project designs and project implementation. Specific objectives of scoping were to:

- ✓ Identify EIA study scope and boundaries;
- ✓ Identify required information for the study;
- ✓ Identify project alternatives;
- ✓ Develop effective methods of approaching the EIA study; and
- ✓ Define the Terms of Reference (ToR) for the EIA study.

### 1.3 OBJECTIVES OF THE ENVIRONMENTAL IMPACTS STUDY

**ELECTRIC POWER SUPPLY Project**, which involves Excavations of holes for steel poles and building substation falls under the mandatory list of projects that are required by the Environmental Management Act Cap 191Cap 191 to develop EIA. Part IV of the EIA Regulations G.N. No. 349 of 2005 provides the general objectives for carrying EIA. Among others the following are main objectives:

- ✓ To ensure that environmental considerations are clearly addressed and incorporated into the development of the project.
- ✓ To anticipate and avoid, minimise or offset the adverse significant biophysical, social and relevant effects of developmental proposal.
- ✓ To protect the productivity and carrying capacity of natural systems and ecological processes.
- ✓ To promote development that is sustainable and optimizes resources use and management opportunities.
- ✓ To establish impacts that are likely to affect the environment before a decision is made to authorize the project.
- ✓ To enable information exchange, notification and consultations between stakeholders.

Consequently, TANESCO undertook Environmental Assessment so as to decipher the principles of sustainable development and environmental protection into strategies and actions that can be practically applied to the proposed Electric Power Rehabilitation Project.

### 1.4 METHODOLOGY AND APPROACH OF THE STUDY

This study followed procedures stipulated in the Environment Impact Assessment and Audit Regulations, 2005. The study was done partly as a desktop study involving review of literature and by field study at the project site in thirteen wards in Kinondoni and Ilala Municipals, Dar es Salaam City to gather information and data on various aspects of the project site as well as consultations with key stakeholders. Consultations with key stakeholders identified during scoping, intended to collect their concerns so that they are addressed by the EIA and subsequently by the project designs and project implementation. The study adopted the following approach

#### 1.4.1 Communication with Stakeholders

The study adopted a participatory approach in preparation of the EIA study. This entailed seeking information/experience from stakeholders, i.e. ward leadership, business persons, private sector institutions, other local representatives and other institutions who have been involved in one way or another in implementation of the project and other activities related. Their views are incorporated in the report on chapter of stakeholder consultation.

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#### **1.4.1.1 Identification of stakeholders**

The stakeholders were identified based on the role and relevance of the implementation of the project especially excavation of holes for steel poles, replacement of 33kV with 132 kV wires. Most of the stakeholders such as house owners, road reserves owners and government authorities that might be impacted by the project were pre-determined while others were identified by different stakeholders.

#### **1.4.1.2 Involvement of Stakeholders**

The study team made trips across the construction site/area. Observations, Questionnaires and interviews were conducted in order to collect useful data.

#### **1.4.2 Baseline Data and Information**

The study made use of primary and secondary data sources. Primary data were collected based on the interviews and discussions with various groups, the community, local resource users at the area earmarked for laying of underground cable for 132 kV and 33 kV and other stakeholders. Secondary data were obtained from various reports that were found relevant. The study area was visited; interviews were conducted with the stakeholders and made spot verification of the status of environmental issues in the study area.

#### **1.4.3 Field Data / Information Collection**

The study applied various participatory approaches to accomplish the study. The ecosystem approach that not only focused on the construction area but on the whole ecosystem and associated factors, which have cumulative effects on communities around was also applied.

### **1.5 REPORT STRUCTURE**

This report is organized in twelve chapters. **Chapter 1** gives a general background to the study; **Chapter 2** deals with the project background and description; **Chapter 3** gives a description of policy, administrative and regulatory framework within which the project will operate; and **Chapter 4** presents the baseline or existing conditions of the project site. **Chapter 5** presents the findings from Stakeholders' consultations.

**Chapter 6**, presents the assessment of environmental and social impacts and identification of alternatives for the project and project operations. This chapter presents an assessment of aspects of the project that can cause environmental and socio-economic impacts. The chapters also determine the extent of the impacts and evaluate the significance of each in terms of defined criteria. Sources of both negative and positive impacts are presented. This is followed by impact quantification. Mitigation measures are provided for impacts considered to be of medium or high significance.

**Chapter 7** gives details of mitigation measures which are summarised in **Chapter 8** as Environment and Social Management Plan (ESMP). **Chapter 9** presents the Environment and Social Monitoring Plan (EMP), **Chapter 10** discusses cost benefit analysis, while **Chapter 11** presents an initial decommissioning plan. **Chapter 12** provides conclusions and recommendations of the project.

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#### 1.6 STUDY TEAM

This ESIA report was prepared by a team of EIA experts consisted of:

S/N	Name	Responsibility
1	Eng. Hamdun Mansur	Team Leader (Registered EIA Expert)
2	Mr. Fikirini M. Mtandika	Environmental Engineer (Registered EIA Expert)
3	Ms. Brigita Sylvester	Environmental Officer (Registered EIA Expert)
4	Ms. Vaileth Kimaro	Sociologist
5	Mr. Nyamboge Chacha	Ecological Expert (Registered EIA Expert)
6	Mr. Lugano Wilson	Noise, Air, Dust and Vibration Expert
7	Mr. David Mwakambonja	Land Surveyor

#### 1.7 PROJECT COST

The total cost of the Project in the event where it is implemented based on the Japan's Grant Aid scheme and costs to be borne by the government of Tanzania.

**Costs to be borne by the Tanzanian side 2,043,000 US\$ (approximately 196.8 million yen) Tanzania itemized details and their amounts are as given below:**

- ✓ Securing of land for material storage: **16,000 US\$ (1,500,000 JPY)**
- ✓ Payment of bank commission based on banking: **52,000 US\$ (5,000,000 JPY)**
  - i) Commission of an Authorization to Pay (AIP)
  - ii) Payment commission
- ✓ Registration for Japanese supervisors and engineers for construction period: **35,000 US\$ (3,400,000 JPY)**
- ✓ Expenses for necessary power outages during construction period: **15,000 US\$ (1,400,000 JPY)**
- ✓ RAP Compensation: **270,000 US\$ (26,000,000 JPY)**
- ✓ Expenses for relocation of grave sites: **110,000 US\$ (11,000,000 JPY)**
- ✓ Expenses for EIA procedures: **30,000 US\$ (2,900,000 JPY)**
- ✓ Excess weight charges for domestic transport: **66,000 US\$ (6,400,000 JPY)**
- ✓ Expenses for substations: **790,000 US\$ (76,100,000 JPY)**  
(Leveling the land, removing the un-used equipment, Construction of fences and gates, etc)

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✓ Expenses for 132kV transmission lines: **55,000 US\$ (5,300,000 JPY)**

(Leveling the land for the work space, removing the un-used conductor, insulators and accessories, etc)

✓ Expenses for 33kV distribution lines: **604,000 US\$ (58,200,000 JPY)**

(Replacement of the existing 11kV D/L interfered with the new 33kV D/L, Construction of 11kVD/L from new 33/11kV substations)

**Costs to be borne by the Japanese side (based on the Japan's Grant Aid scheme) will be determined on January, 2014 when Japanese officials will come to Tanzania to negotiate with side of government of Tanzania and TANESCO.**

## CHAPTER TWO

### 2. PROJECT BACKGROUND AND DESCRIPTION

#### 2.1 THE PROJECT PROPONENT AND PROJECT HISTORY

The Tanzanian Power System comprised about 1200 MW installed capacity in 2007 and it is expected to be raised up to 1400 MW in 2010 (permanent plants). It is characterized by dependence on hydropower generation (47% of installed capacity). In addition to permanent thermal plants, especially Songo Songo Gas, there are several diesel generating stations in Dar es Salaam, Mpanda, Kigoma, Songea, Mwanza, Tabora, Musoma and Mbeya. The National Grid only covers a part of the country, leaving a significant part of the population without access to electricity. TANESCO's distribution network has a number of serious problems.

There have been insufficient investments for the expansion and maintenance of the existing facilities. In Dar es Salaam access to electricity is highest, but even there less than 50% of all households are connected. Out of the 118 districts in the 2002 population census, only in 18 districts do more than 20% of households have access to electricity. The overall government policy instrument is the National Strategy for Growth and Reduction of Poverty (NSGRP or MKUKUTA). The main energy challenge is to reverse the reliance on firewood and charcoal. Currently about 90% of the total energy consumption is from this source. The Government Plan and Budget for 2009/2010 reflect the Government's efforts to implement the Millennium Development Goals (MDGs) and the MKUKUTA strategies. However, the target of connecting 20% of population to grid electricity is very ambitious. Improvement of the operation and efficiency of the most important power distribution area of the country will not only benefit central Dar es Salaam but also help expand electricity services to poor settlements and rural areas through the improved financial situation of TANESCO.

In Dar es Salaam an estimated 19 % of the population is poor, most of them living in slums and other informal settlements. There has been a massive migration from rural areas to urban areas where economic activities have been stimulated by trade liberalization. The proposed power distribution project is an important contribution to the situation. So far the financial and technical constraints have severely hampered extension of the distribution grid and the connection of poor households to the grid. Several background studies are available. The key technical issues repeatedly identified in these studies are:

- ✓ obsolete equipment
- ✓ overloaded transmission and distribution system components
- ✓ bad voltage profile on the medium and low voltage network
- ✓ bad power factor
- ✓ numerous outages due to overloaded transformers and line tripping
- ✓ high technical and non-technical losses in the distribution networks
- ✓ suppressed demand
- ✓ missing network monitoring

The response by the Tanzanian Government, TANESCO and the donor such as JICA has been designed to undertake rehabilitation of substations and construction of new lines and substations in Dar es Salaam City as improvement of the capacity of existing networks in Dar es Salaam by reducing technical and nontechnical losses and improving the overall reliability of the system.



## 2.2 Objective and purpose of the project

The overall objective of the project is to provide increased access to electricity with sustainable effects on poverty reduction by facilitating income generation and improved social services. The technical objective of the project is to stabilize the grid system, increase power supply, improve reliability of the power supply in Dar es Salaam city, as well as to increase the extent of TANESCO's distribution network in the city in order to be able to provide electricity to commercial business activities, water pumping, secondary schools, medical services, streetlights, residential houses, agro-processing activities etc. in the project area.

The proposed project has five (5) components which are:

- ✓ Reinforcement of Ilala substation and existing 132 kV transmission line from Ilala substation to Ubungo substation (7.5 km)
- ✓ Construction of new Jangwani Beach substation (33/11kV) and construction of distribution line (33kV) from Jangwani beach substation to Tegeta substation (6.5km)
- ✓ Construction of Muhimbili substation (33/11kV) and construction of distribution line (33kV) from Muhimbili to City Center substation (2km)
- ✓ Construction of Mwananyamala substation (33/11kV) and construction of distribution line (33kV) from Mwananyamala substation to Makumbusho substation (1.1km)
- ✓ Expansion of Msasani substation (33/11kV) and expansion of distribution line (33kV) from Msasani substation to Makumbusho substation (7.6km)

## 2.3 Site description and project area:

The project area as a whole has mixed land use activities, the areas covered by the project are highly developed as settlements, or institutions such as hospitals, schools, churches etc. There are few planted trees alongside the road where by the project will pass and most of vegetation covers have been cleared for urban development activities. All the proposed 33kV distribution lines will be constructed along road reserves.

The 132kV transmission line from Ubungo S/S to Ilala S/S will be on the existing steel poles which are along the TANESCO line corridor parallel to the first 132kV interconnector. Apart from upgrading this interconnector to 132kV TL, reinforcement of Ilala substation and construction of new system control building will be done.

There are four distribution lines to be constructed in this project, three lines in Kinondoni municipality and one in Ilala municipality with their respective substations namely;

### ✓ **Tegeta substation - Jangwani Beach proposed substation**

The distribution line will be constructed from Tegeta substation which is opposite IPTL through Skanska road, Oilcom Tegeta, New Bagamoyo road up to Africana then will continue through Bagamoyo road to Jangwani Beach 15MVA, 33/11kV proposed substation. The substation plot is located opposite Tanzania Peoples Defence Forces rifle range pitch along Old Bagamoyo road (now Mwai Kibaki road); it was part of recreational area for TPDF.

### ✓ **Makumbusho substation - Msasani substation**

The 33kV line construction will start from Makumbusho 132/33/11kV substation through Regent Street, Migombani Street, Old Bagamoyo road along with US Embassy, Kimweri road, Oysterbay

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Street, Haile Selassie road to Msasani substation at Masaki. In this project there will also be expansion of Msasani substation; a 15MVA, 33/11kV substation is going to be constructed closer to the existing one.

✓ **Makumbusho substation - Mwananyamala proposed substation**

Construction of the line will start from Makumbusho substation passing through Victoria Primary School area, Makumbusho Secondary and Primary School area respectively, Kwa Mama Zakaria Belege Street up to the Mwananyamala 15MVA, 33/11kV proposed substation. The substation plot is situated in a residential area.

✓ **City Centre substation - Muhimbili proposed substation**

The distribution line for this project will be constructed from City Centre substation situated at Bibi Titi Mohamed road/Magore Street junction through Magore Street and Maliki road at Upanga to Muhimbili 15MVA, 33/11kV proposed substation situated in the hospital compound.

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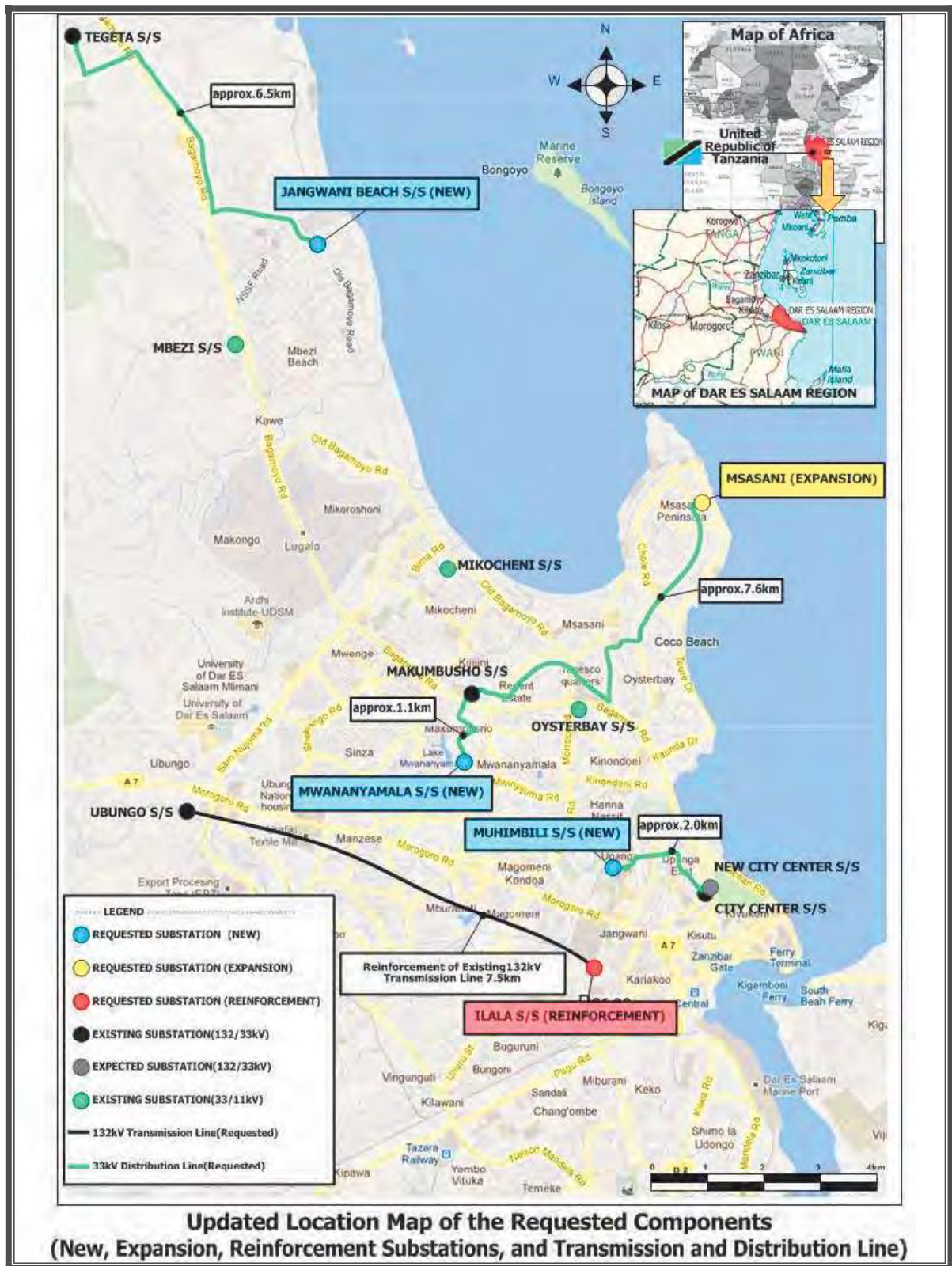


Figure 2.1 Map Showing the project area and transmission line sections and substations

## **2.4 Design**

### **2.4.1 Transmission line sub-project**

The proposed transmission line will use the existing transmission towers from Ilala to Ubungo which currently has double circuits of 33kV and 132kV. This will involve upgrading/reinforcing of the 33kV line to 132kV. The major activity will be stringing of the 132kV aluminum conductor in the existing towers and therefore the project will involve no new construction of towers. The existing transmission line uses steel lattice towers with concrete or grillage foundations. Therefore the existing wayleave will be used for this project.

### **2.4.2 Distribution**

The planned design of the distribution lines is to use steel poles. The current design proposes the distribution line routes be located along existing road reserves, that is TANROADS' and Municipal Councils' so as to minimize the environmental and social impacts i.e. resettlement of people along the proposed routes. The line route corridor will be about 2.5 up to 10 meters wide depend on nature of the site. The line route will be located so that no resettlement is required, however few of them found to be in the way leave will have to be relocated. On the other hand the construction of these new distribution lines will be associated with construction of new substations as well as reinforcing the old ones for selected sites, therefore mounting of transformers will also be involved.

### **2.4.3 Ilala substation**

Reinforcement of Ilala substation and 132kV transmission line from Ilala substation to Ubungo substation of about 7.5km, the transmission line will be constructed from Ilala substation to Ubungo substation along the existing 132kV line II in Dar es salaam City crossing the two municipalities of Kinondoni and Ilala.

### **2.4.4 Jangwani Beach substation (33/11 kV)**

New Construction of Jangwani beach substation and construction of 132 kV distribution line of approximately 6.5 km from Jangwani beach substation to Tegeta substation. The Jangwani S/S will be located in plot owned by TPDF.

### **2.4.5 Muhimbili substation (33/11 kV)**

Construction of Muhimbili substation and construction of a distribution line of 33 kV from Muhimbili substation to City centre S/S of approximately 2km. The Muhimbili S/S will be located in plot owned by Muhimbili hospital.

### **2.4.6 Mwananyamala substation (33/11 kV)**

Construction of Mwananyamala substation and construction 33 kV of distribution line of 1.1km from Mwananyamala substation to Makumbusho substation. The Mwananyamala S/S will be located in plot owned by TANESCO after compensate two houses.

#### **2.4.7 Msasani substation (33/11 kV)**

Expansion of Msasani substation and expansion of 33 kV distribution line of approximately 7.6km from Msasani substation to Makumbusho substation. The Msasani S/S will be located in plot owned by TANESCO.



**Figure 2.2: Site for the proposed expansion of Msasani S/S**

#### **2.5 Clearing of Right of Way (ROW)**

The existing transmission line route have a Right of Way (RoW) of 40 meters (20 meters each side of the center line) of land to be cleared however the new line will not acquire new way leave instead the same right of way (RoW) will be used. In the line route corridor neither settlements nor crops higher than 4 meters will be allowed for production.

#### **2.6 Existing facilities**

##### **2.6.1 Current Land uses**

The current use of the land for the project, is road reserve with some few improvements in some areas where people are using as garden, decorated with paving.

##### **2.6.2 Land required**

Steel poles will be constructed along the road reserve thus no need of land acquisition. The Substations will be constructed in the plots which some are owned by TANESCO (Msasani S/S and Ilala S/S), others such as Jangwani S/S will be under TPDF plot, Muhimbili S/S will be under Muhimbili hospital plot in which already TANESCO acquire permits. Lastly Mwananyama S/S will be on residential plots which TANESCO already compensate two houses.

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#### **2.6.3 Water**

As the project area is at the city centre where there are no other source of water like lakes or rivers then the main source of water used for domestic and other uses come from water authority (DAWASCO) and/or Boreholes.

Water comes mainly from the Ruvu River; production capacity as at 2003 was judged to be sufficient to supply a population of 3 million of the whole Dar es salaam city, though there are problems with transmission, storage capacity and treatment quality (World Bank 2003). The UN currently projects water stress for Tanzania in 2025 (UNEP/GRID-Arendal 2002). A 2001 household survey estimated that about 85% of the city's population has some sort of access to piped water supply; however, the service is erratic, and most households buy water from neighbours, truck vendors or small vendors. It is estimated around 67.9% of population have access to safe drinking water.

#### **2.6.4 Power**

Most power used for generating machine and other uses come from TANESCO, and Generators which use diesel/petroleum products will used as backup.

#### **2.6.5 Major utilities**

Major utilities available at site include infrastructures belongs to DAWASCO/DAWASA, TTCL and TANESCO.

#### **2.7 Waste generation and management**

The project implementation activities will generate liquid wastes and various solid wastes. Liquid waste will include lubricant, used oils, which will be removed from the machines and vehicles and effluents to be generated from the workshop and campsite. Solid wastes will include, wood, metal, tins, paper, plastic materials, drums, containers and other packaging materials.

At campsites soak away pits will be constructed to treat sewage before released to water bodies. All used oils, bitumen and lubricants will be properly handled, collected and packed in the containers or drums and disposed off safely to a dumping site. Degradable solid wastes will be burnt or buried whilst non-degradable wastes will be taken back to the suppliers such as bitumen containers and others will be disposed off to the recommended dumping place.

#### **2.8 Overall proposed activities and management**

The project works will comprise the excavation of trenches, holes for steel poles and construction of new sub-station building. During construction, the execution of all project work is the responsibility of the contractor. The contractor will:

- ✓ Develop a project plan
- ✓ Acquire approval of plan
- ✓ Manage the implementation of all activities described in it
- ✓ Update the plan as changes occur
- ✓ Communicate the changes to project manager and consultant

The contractor will also be responsible for the employment of the required personnel and preparation of schedule of works. There will be planned site meetings under the project manager and/or consultant to assess the progress of the works. During these meetings the contractor will present progress reports including plans for the next phase.

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#### **I. Pre-construction Phase:**

During this phase, the project activities to be performed include:

- ✓ Detailed engineering design and specification of cable material;
- ✓ Land acquisition or plot acquisition for new sub-station
- ✓ Identification borrow pits, quarry sites, and sources of water
- ✓ Construction of temporary contractor's offices

#### **II. Mobilization Phase**

This will involve preparations for construction works including moving equipment, construction materials and crew to site; setting base/crew camp and site clearance.

##### **Site preparation activities**

- ✓ Camp for contractor approximately 0.5 ha of land from construction area.
- ✓ Removal/stripping of top soil average 150 mm depth within the sight and access/right of way.
- ✓ Clearance of vegetation and removal of top soil by using motor grader machines as well as removal of some bricks on road reserve.
- ✓ Overburden from borrow pits will be deposited adjacent to opened pits and later on will be used as part of backfill material.
- ✓ Top soil will be spread during site tidying up

##### **Construction materials required, equipments, crew, and sources.**

This will involve preparations for construction works including moving equipment, construction materials and crew to site; setting base/crew camp and site clearance. The project will require various standard construction materials including: compaction/fill materials, aggregates, sand, bitumen and water as narrated below:

- ✓ Cement will be purchased in Dar es Salaam and used for construction of substations and drainage structures whenever they are required. Sand will be obtained in Dar es salaam or whenever it is available in nearby places
- ✓ Hard stones for construction of drainage structures and channels will be sourced.
- ✓ At the quarry site and burrow pits, materials such as gravels and aggregates of different sizes will be excavated by excavator and wheel loader machine and loaded into trucks.
- ✓ Water to be extracted from DAWASA/DAWASCO as well as boreholes for construction activities and campsites
- ✓ Timbers will be needed for construction of form works and shutters for concrete works

All construction materials will be stored at the specific area at the site and campsites close to the roadwork site, whereby, fuels and bitumen will be stored in the drums or tanks, gravels and sand will be piled on the backyard and water ponds will be constructed to keep water for construction work.

##### **Storage**

Materials will be used immediately after delivery/piled up. On site-workshop will be set. Materials to be used for construction and others will be stored within the project area. Services and repair facilities will be initiated at project site.

##### **Construction crew**

Approximately 100 people both skilled and unskilled labor force will be employed to work for the project. Majority of the semi-skilled personnel will be hired locally (from Kinondoni and Ilala municipals and neighbouring areas). Accommodation of senior staff will be within Kinondoni and Ilala Municipal Councils. Junior staff will also be stationed on camp site while labourers will be residing in their homes.

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#### **Local supplies and services (food, medicals, fuel, water etc.)**

Food supplies will be from the local suppliers. Medical supplier will be from local registered medical practitioner. Fuel will be supplied from internal suppliers and water for domestic purpose will be from the project area.

### **III. Construction Phase**

Construction work will be the implementation of the project which is essentially civil works in nature mainly consisting of;

- ✓ Construction of contractor site offices
- ✓ Earth works, trenches (including vegetation clearance and moving of soils )
- ✓ Extraction of construction materials such as gravel, sand, aggregates and rocks and transportation;
- ✓ Buildings construction and installation of equipments
- ✓ Construction of drainage system and installation of drainage structures.
- ✓ Installation of signboards.

### **IV. Demobilization or closure of the construction activities will involve the following activities:**

- ✓ Handing over of the permanent structures and facilities in the camp site to the client;
- ✓ Remove temporary infrastructure, installations and equipments from the temporary office
- ✓ Clearance of all sorts of waste including used oil, sewage, solid wastes (plastics, wood, metal, drums, papers, etc). Deposit all wasted to the authorized dumping place



## CHAPTER THREE

### 3. RELEVANT POLICY, LEGAL AND INSTITUTIONAL ASPECTS

#### 3.1 INTRODUCTION

Design, construction/mobilization, operation and final decommissioning of the Power network rehabilitation project will have both positive and negative impacts on the ecology and social environment. These impacts need to be addressed so that the envisaged operations do not unnecessarily cause detrimental social and ecological environmental impacts, and also to ensure that they are in line with policies and/or legal regime operating in Tanzania. Furthermore, there are international agreements and/or conventions, to which Tanzania is a Party, which also need to be considered during project construction and operation. The following sections discuss Tanzania national and sectoral policies, legislation and institutional framework, which are relevant to this project.

#### 3.2 NEED FOR ENVIRONMENTAL IMPACT ASSESSMENT

Environment Impact Assessment is an important planning tool which is used to facilitate and promote sustainable development by integrating environmental conservation and management in the decision making process. As such, most sector policies and legislation have incorporated the requirement of undertaking EIA in designing and implementing development project. The purpose of EIA is to evaluate the environmental and related social implications (negative and positive) of carrying out a development project. Such an evaluation can then be set alongside socio-economic objectives of the proposal in order to make balanced decisions.

#### 3.3 RELEVANT POLICIES

Clarifying relevant policies is important in setting boundaries for the EIA in line with national interests and future prospects. The following are relevant sectoral and cross – sectoral policies which stipulate the need for EIA and provide directives on how projects should be operated in Tanzania. The project proponent will need to observe these policies in the course of designing and implementing the proposed project activities.

##### 3.3.1 National Environmental Policy (1997)

The National Environment Policy provides a framework for environmental protection in Tanzania. The policy requires that project development be done in a way that it does not compromise the environmental integrity. It stipulates that the chosen technologies should be environmentally sound, socially acceptable and economically viable. Relevant provisions of this policy to Power Network Rehabilitation are:

- ✓ Sections 28 and 29, which states that in all projects, environmentally sound technologies (i.e. those that generate no or low waste or protect environment) should be used.
- ✓ Section 48 (c), which advocates for technologies that use water efficiently, provides wastewater treatment.
- ✓ Section 56 (f), which states that workers' health shall be adequately protected from environmental health hazards.

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TANESCO in the implementation of the project shall comply with all of the above and other relevant provisions.

#### **3.3.2 The National Land Policy (URT, 1995)**

The National Land Policy advocates for the protection of land resources from degradation for sustainable development. Among other things the policy requires that project development should take due consideration the land capability, ensures proper management of the land to prevent erosion, contamination and other forms of degradation. Important sections of the policy relevant to the Developer are 2.4 (on use of land to promote social economic development), section 2.8 (on protection of land resources) and section 4 (on land tenure). TANESCO in land usage and plot acquiring for the project shall observe these provisions.

#### **3.3.3 The National Human Settlements Development Policy (2000)**

One of the objectives of National Human Settlement Development Policy (2000) is to protect human settlements, the environment and embedded ecosystem thereof from environmental pollution, environmental degradation and destruction of loss of biodiversity in order to attain sustainable development. The planning and design of the proposed power network rehabilitation shall observe this requirement.

#### **3.3.4 National Water Policy (2002)**

The National Water Policy (NAWAPO) calls for the adoption of holistic basin approach integrating multi-sectoral planning and management to minimize negative impacts on water resources development to ensure sustainability and protection of the environment. NAWAPO recognises the following, among others:

- ✓ There is a growing scarcity, misuse and wastage of water resources in many places of Tanzania, which may become a serious threat to sustainable availability of the resource.
- ✓ That uncontrolled abstraction of water resources from different water basins is taking place.

NAWAPO requires the developer to observe judicious use of water by putting in place water conservation measures. Power network rehabilitation project intends to use, relatively, small amount of water - about 100m<sup>3</sup> of water per day during construction and 2 – 5 m<sup>3</sup> per day during operation, mainly for substation usage.

#### **3.3.5 The National Construction Industry Policy (2003)**

This policy promotes among other things, application of cost effective and innovative technologies and practices to support socio-economic development including utilities and ensure application of practices, technologies and products which are not harmful to both the environment and human health. This EIA is undertaken to ensure that the project proponent uses technologies, materials and products not harmful to both the environmental and human health by providing appropriate mitigation measures. During the design and operation environmentally friendly cables will be used.

#### **3.3.6 The National Transportation Policy (2003)**

The policy aims at guiding the development of an efficient, well integrated and coordinated transport infrastructure and operations, which are economically financially, socially and environmentally sustainable. Relevant sections of the policy are:

- ✓ 2.6.1 - which recognises that road accidents are on the increase due to non-adherence and enforcement of rules and regulations. And that environmental problem (noise, air, water pollution) are on the increase due to traffic congestion. The construction vehicles shall be controlled to hinder the traffic and cause any pollution
- ✓ 4.1.1 (vi) on the intention of the policy to facilitate sustainable development by ensuring all aspects of environmental protection and management are given sufficient emphasis at the design antidevelopment stages of transport infrastructure and when providing services

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- ✓ 5.3.2.5 - which shows that the policy advocates for developing and operating mode of transport in urban centres on the basis of economic savings on fuel use, operation efficiency, including reducing traffic congestion, environmental protection and safety.

#### **3.3.7 The Energy Policy of Energy of 2003**

Section 5.4 states that Environmental implications of energy consumption need to be considered in all sectors. All stages of energy resources (be it fossil or non-fossil) exploitation, production, conversion, *transportation, storage and end-use* can have negative impact on the environment. Health, safety and environmental consequences of energy production and utilisation have become a major concern. Some of pertinent polices are "To promote environmental impact assessment as a requirement for all energy programmes and projects" and "To promote energy efficiency and conservation as a means towards cleaner production and pollution control measures" This has been observed closely with even views from the stakeholder especially on their safety. The project implementation will observe these provisions.

#### **3.4 RELEVANT LEGISLATION AND REGULATIONS**

This section addresses the legal and regulatory conditions which are relevant to the proposed Power rehabilitation network project. This EIA has been conducted in general compliance with these legislations in mind.

##### **3.4.1 Environmental Management Act Cap 191**

The Environmental Management Act Cap 191 seeks to provide for legal and institutional framework for sustainable management of the environment in the implementation of the National Environmental Policy.

The Environmental Management Act Cap 191 provides for continued existence of the National Environmental Management Council (NEMC). Under this Act, NEMC is mandated to undertake enforcement, compliance, review and monitoring of environmental impact assessment and has a role of facilitating public participation in environmental decision making, exercise general supervision and coordinating over all matters relating to the environment. The Act also requires the Council to determine whether the proposed project should be subjected to an EIA, approves consultants to undertake the EIA study, invites public comments and also has the statutory authority to review EIS and recommend to the Minister for approval and issuance of EIA certificate. This new Act imposes an obligation on developers to conduct an EIA prior to the commencement of the project to determine whether the project may/or is likely to have, or will have a significant impact on the environment. Article 82 makes EIA mandatory to all projects that fall under the EIA mandatory list (Schedule 3). TANESCO has complied with relevant provisions of the Act in carrying out this EIA.

##### **3.4.2 The Environment Impact Assessment and Audit Regulations, G.N. No. 348 of 2005**

According to this regulation, the developer first registers the project, by submitting Form EIA to NEMC, with outline details of the project and its likely impacts. The regulations advocate for periodic and independent reassessment and that the outcome of such assessment will serve to provide instructive feedback into the environmental management process. Environmental Impact Statement (EIS) is then submitted to the Technical Advisory Committee (TAC) coordinated by NEMC for review. The proponent to meet the costs of the review. In carrying out this EIA, the requirement of these regulations is observed.

##### **3.4.3 The Land Use Planning Act No. 6 of 2007**

The National Land Use Commission (NLUPC) was established under this Act as the principal advisory organ of the Government on all matters related to land use. Among other functions, it recommends measures to ensure that Government policies, including those for development and

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conservation of land are in harmony. It also takes adequate account of their effects on land use and seeks the advancement of scientific knowledge of changes in land use. It encourages development of technology to prevent, or minimize adverse effects that endanger man's health and his/her welfare; it also specifies standards, norms and criteria for beneficial uses and maintenance of the quality of land. In accordance with the functions mentioned above, the Commission can indirectly help to prevent or minimize pollution by restricting location of potential and actual pollution sources. The Power network rehabilitation project is planned in accordance with the requirement of this Act as only road reserves will be used and the substation to be constructed to a privately owned plot.

#### **3.4.5 The Urban Planning Act No. 8 of 2007**

The town and Country Planning Ordinance Cap 378, part IV provides for control of urban development while implementing a scheme of land development. Important aspects include the designation and allocation of adequate land for solid waste disposal in any urban site. The law further stipulates design of a good sewerage system to manage liquid waste from various major consumers. The law empowers local authorities to enforce such schemes and punishments as stipulated in the Act. The law further empowers neighbours and any individual to take to court anyone who injuriously affects others due to his/her unhygienic activities. The developer will observe provisions of this Act during construction and operation of Power network rehabilitation Project.

#### **3.4.6 The Local Government (Urban Authorities) Act No. 8 of 1982**

This Act establishes urban authorities for the purposes of local government, to provide for the functions of those authorities and for other matters connected with or incidental to those authorities. Section 55 of the Act enumerates basic functions of the urban authorities. The functions that are relevant to the Power network rehabilitation Project are:

- ✓ to provide for the prevention and abatement of public nuisances or of nuisances, which may be injurious to the public health or to the good order of the area of the authority;
- ✓ to regulate any trade or business, which may be noxious, injurious to the public health or a source of public danger, or which otherwise it is in the public interest expedient to regulate, and to provide for the issue of licenses or permits to facilitate the regulation of any such trade or business, and for the imposition of fees in respect of such licenses or

Section 59 lists the powers of the Urban Authorities. The following powers are considered relevant to the Project activities:

- ✓ to undertake the abatement of fire and the prevention of the spread thereof and for such purposes to enter any premises;
- ✓ to provide for the imposition and fixing of charges to be paid in respect of services rendered by the authority.

Section 80 of the Act empowers the urban authorities to set by-laws. TANESCO shall observe these and other relevant provisions in this Act.

#### **3.4.7 The Occupational Health and safety Act No 5 of 2003**

This deals with the protection of human health from occupational hazards. It specifically requires the employer to ensure the safety of workers by providing safety gear at the work place. Relevant sections of the ordinance to the project activities include Part IV which deals with general health provision, such as provision of regular medical examination of employees; safe means of access and safe working place; prevention of fire etc.; and Part V on health and welfare provisions, which includes provision of supply of clean and safe to workers, sanitary convenience, washing facilities and first aid facility. Section 50 deals with fire prevention issues. Part III requires that the Project Proponent submits the drawing of the facility to the Chief Inspector.

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Section 15 gives powers to the Registrar of Factories and workplace to enter any factory or workplace to perform his duties as provided by the Act. Section 16 requires that factories and workplace should register with Registrar of factories and workplaces before commencing operations. TANESCO and the Contractor will observe the provision of this act during construction and running of the network and substation. Part VI is dealing with special safety provisions for working places involving handling hazardous chemicals, hazardous processes or hazardous equipment.

#### **3.4.8 The Road act No. 13 of 2007: Cap 15, Paragraph 17 (2) and (3).**

Steel poles will be along the road reserve. Section 30.-(1) of the act specifies that for the purposes of sub section (2) and (3) of section 29 of the Act, terms and conditions of alternative use of road reserve are that;

- ✓ the management and control of the road and the road reserve shall be the responsibility of the road authority
- ✓ a person shall not use the road reserve of a public road without a written approval from the roads authority;
- ✓ where, the road authority has approved the use of the road reserve for utilities such as placing of public telegraph, telephone, electric supply, sewers and water supply, such utilities shall be located at the edge of the road reserve or a distance from the end of the road reserve as may be authorized in writing by the road authority;
- ✓ application for approval shall be in writing prescribing the purposes and use for which the approval is sought;
- ✓ application is submitted to the road authority within thirty days prior to the days on which the purpose and use is due;
- ✓ where the road authority refuses application it shall within fourteen days and in writing give reasons to the applicant for refusal; and
- ✓ the approval shall expire within six months from the date of Issuance.

Sub section (2) state that "Where the application is granted a written approval as specified in the Second Schedule to these Regulations shall be issued authorizing" The client and the contractor in this project will observe this act.

#### **3.4.9 Land and Village Land Acts (1999)**

Essentially, the land Act, No 4 of 1999 regulates the urban land while Village Land Act, No 5 of 1999 regulates land in rural areas., Land Regulations and government standing order on expropriation for public utilities prescribes that holders of occupancy rights on land pre-empted for the public works must be compensated and assisted in relocating their assets to the nearest suitable place. The project is basically intended to use the road reserve, where other public utilities are located thus this act is not applicable except the reinstatement of paved blocks and other facilities interfered in the road reserve

#### **3.4.10 The Forest act No 14 of 2002**

The act has identified the "sensitive area" to mean

- ✓ catchment area;
- ✓ an area renowned for its high bio-diversity;
- ✓ mangrove area;

Section 18.(1) specifies that " any Proposed development in a forest reserve, Private forest or sensitive forest area including watersheds to which this section applies, whether that development is Proposed by, or is to be implemented by, a person or organisation in the public or Private sector, the proposer of the development shall prepare and submit to the Director an Environmental Impact Assessment of the proposed development for sustainability of mangroves.

#### **3.4.11 The Water Resource Management Act No. 11 of 2009: Cap 388:**

Part II section 4.-( 1) of the act specifies the objective of the Act that is to ensure that the nation's water resources are protected, used, developed, conserved, managed and controlled in ways which takes into account a number fundamental principles, including- " preventing and controlling pollution and degradation of water resources;" The issues of laying underground cables, the use of liquid and solid wastes have been considered to make sure the water resources and especially underground water is not polluted. That cable cannot emit pollution to the underground and the wastes are environmentally disposed off.

#### **3.4.12 The Water and Sanitation Act no. 12 of 2009, Cap 437:**

Part XIV section 52 provides that any person who deposit or allow or causes to be deposited any earth, material or liquid in such manner or place that it may be wasted, fall or be carried out into the waterworks commits an offence and shall be liable on conviction to a fine or to imprisonment. Observing this act the solid and liquid waste to be generated are recommended to be disposed off in environmental friendly manner.

### **3.5 INTERNATIONAL AGREEMENTS AND CONVENTIONS**

Tanzania is a Party to a number of Conventions. International agreements convention and treaties which are relevant to this project are:

#### **3.5.1 Convention on Biological Diversity (1992)**

Tanzania signed the CBD in 1992 and ratified it in March 1996, thereby committing to the conservation and sustainable use of biological diversity. The objective of the Convention on Biological Diversity (CBD; 1992) is to conserve biological diversity, promote the sustainable use of its components, and encourage equitable sharing of the benefits arising from the utilization of genetic resources (see [www.biodiv.org](http://www.biodiv.org)). Article 8 of the CBD addresses in situ conservation, stating that each Contracting Party shall:

- ✓ Establish a system of protected areas or areas where special measures need to be taken to conserve biological diversity;
- ✓ Promote the protection of ecosystems, natural habitats and the maintenance of viable populations of species in natural surroundings; and
- ✓ Subject to its national legislation, respect, preserve and maintain knowledge, innovations and practices of indigenous and local communities embodying traditional lifestyles relevant for the conservation and sustainable use of biological diversity and promote their wider application.

Article 6 provides general measures for conservation and sustainable use of biodiversity. Article 9 deals with ex-situ conservation strategies. Article 14 requires parties to carry out EIA on all projects and development in protected areas. As was reported in Sections 4.3.1 75% of the fauna in the area is grassland. This EIA study has established that there are no rare or endangered species on the site. However, whenever possible TANESCO and the Contractor shall conserve natural biodiversity by avoiding unnecessary land clearance and wetland drainage.

#### **3.5.2 Convention on Wetlands of International Importance Especially as Waterfowl Habitat (the Ramsar Convention) (1971)**

The Convention on Wetlands is an intergovernmental treaty that provides the framework for national action and international cooperation for the conservation and wise use of wetlands and their resources. It was adopted in the Iranian city of Ramsar in 1971 and came into force in 1975, and it is the only global environmental treaty that deals with a particular ecosystem. The Convention's member countries cover all geographic regions of the planet.

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The Convention's mission is "the conservation and wise use of all wetlands through local, regional and national actions and international cooperation, as a contribution towards achieving sustainable development throughout the world.

Each Party to the Convention has a right to list its wetland to be included in the Ramsar List as stated in the Convention ".....*Each Contracting Party shall designate suitable wetlands within its territory for inclusion in a List of Wetlands of International Importance, hereinafter referred to as "the List" which is maintained by the bureau [secretariat of the Convention] established under Article 8...."*

Wetlands included in the List acquire a new status at the national level and are recognized by the international community as being of significant value not only for the country, or the countries, in which they are located, but for humanity as a whole. However, the project areas there are no lists of the Ramsar List.

#### **3.5.3 African Convention on the Conservation of Nature and Natural Resources, September (1968)**

This covers measures for the countries, including Tanzania, Party to the agreement to conserve nature and natural resources and specifies rare and endangered species in specific areas of the continent. This EIA was carried out to identify if there is any rare or endangered species within the project site. The study has identified none.

#### **3.5.4 Other International Conventions Ratified by Tanzania**

- ✓ ILO Convention: C138 Minimum Age Convention, 1973 (Ratified by Tanzania (United Republic of) on 16:12:1998) which prohibits Child labour. TANESCO and The Contractor shall ensure no child is employed in its activities.
- ✓ ILO Convention: C148 Working Environment (Air Pollution, Noise and Vibration) Convention, 1977 (Ratified by Tanzania (United Republic of) on 30:05:1983) which protects Workers against Occupational Hazards in the Working Environment Due to Air Pollution, Noise and Vibration. TANESCO and the Contractor shall ensure workers are protected against occupational hazards.

### **3.6 GUIDELINES AND STANDARDS**

Following guidelines are considered to be relevant to the project and are discussed below:

#### **3.6.1 JICA Guidelines for Environmental and Social Considerations (April 2010)**

In principle, JICA confirms that projects meet the requirements for environmental and social considerations stated in the Guidelines in the following ways. JICA confirms that projects comply with laws or standards related to the environment and local communities in the central and local governments of host countries; it also confirms that projects conform to those governments' policies and plans on the environment and local communities.

JICA confirms that project do not deviate significantly from World Bank's safeguard policies and refers as a benchmark to the standards of International Financial organizations, to internationally recognized standards, or international standards, treaties and declarations etc and to the good practices etc of developed nations including Japan when appropriate.

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JICA takes note of the importance of good governance surrounding projects in order that measures for appropriate environmental and social considerations are implemented. JICA discloses information with reference to the relevant laws of project proponents and of the government of Japan.

JICA classifies the proposed project into one of four categories (A, B, C, and FI) depending on the type, location, sensitivity, and scale of the project and the nature and magnitude of its potential environmental impacts. The government is responsible for the assessments required by the guidelines while the JICA is responsible for overall compliance with these policies.

#### **3.6.2 World Bank Safeguards Policies (OP 4.00 2005)**

The World Bank has developed a series of safeguard policies to help staff promote socially and environmentally sustainable approaches to development as well as to ensure that Bank operations do not harm people and the environment. These safeguard policies include, among others, the Bank's policy on Environmental Assessment (EA).

The World Bank conducts Environmental Assessments (EA) of each proposed investment loan to determine the appropriate extent and type of environmental impact analysis to be undertaken, and whether or not the project may trigger other safeguard policies. The Bank classifies the proposed project into one of four categories (A, B, C, and FI) depending on the type, location, sensitivity, and scale of the project and the nature and magnitude of its potential environmental impacts.

The government is responsible for the assessments required by the Safeguard Policies while the World Bank is responsible for overall compliance with these policies. While the objectives of these safeguard policies are many the following are relevant objectives to Power Network Rehabilitation Project.

- ✓ To help ensure the environmental and social soundness and sustainability of investment projects.
- ✓ To support integration of environmental and social aspects of projects into the decision making process.
- ✓ To promote environmentally sustainable development by supporting the protection, conservation, maintenance, and rehabilitation of natural habitats and their functions.
- ✓ To avoid or minimize involuntary resettlement and, where this is not feasible, to assist displaced persons in improving or at least restoring their livelihoods and standards of living in real terms relative to pre-displacement levels or to levels prevailing prior to the beginning of project implementation, whichever is higher.

The safeguard policies also recommend operational principles. The following is a list of those principles the Consultant consider very key to this project.

- ✓ Assess potential impacts of the proposed project on physical, biological, socio-economic and physical cultural resources, including transboundary and global concerns, and potential impacts on human health and safety.
- ✓ Assess the adequacy of the applicable legal and institutional framework, including applicable international environmental agreements, and confirm that they provide that the cooperating government does not finance project activities that would contravene such international obligations.
- ✓ Provide for assessment of feasible investment, technical, and siting of alternatives, including the “no action” alternative, potential impacts, feasibility of mitigating these impacts, their capital and recurrent costs, their suitability under local conditions, and their institutional, training and monitoring requirements associated with them.
- ✓ Prevent and, where not possible to prevent, at least minimize, or compensate for adverse project impacts and enhance positive impacts through environmental management and



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planning that includes the proposed mitigation measures, monitoring, institutional capacity development and training measures, an implementation schedule, and cost estimates.

- ✓ Involve stakeholders, including project-affected groups and local nongovernmental organizations, as early as possible, in the preparation process and ensure that their views and concerns are made known to decision makers and taken into account. Continue consultations throughout project implementation as necessary to address EA-related issues that affect them.
- ✓ Use independent expertise in the preparation of EA where appropriate. Use independent advisory panels during preparation and implementation of projects that are highly risky or contentious or that involve serious and multi-dimensional environmental and/or social concerns.
- ✓ Disclose draft EA in a timely manner, before appraisal formally begins, in an accessible place and in a form and language understandable to key stakeholders.
- ✓ Where projects adversely affect non-critical natural habitats, proceed only if viable alternatives are not available, and if appropriate conservation and mitigation measures, including those required to maintain ecological services they provide, are in place. Include also mitigation measures that minimize habitat loss and establish and maintain an ecologically similar protected area.
- ✓ Consult key stakeholders, including local nongovernmental organizations and local communities, and involve such people in design, implementation, monitoring, and evaluation of projects, including mitigation planning.
- ✓ Provide for the use of appropriate expertise for the design and implementation of mitigation and monitoring plans.

### **3.6.3 The Tanzania Bureau of Standards Act No. 3 of 1975**

The Tanzania Bureau of Standards is the designated national authority (TBS Act 1975) for developing all kinds of national standards, including environmental standards. The TBS Act establishes the National Environment Standards Committee (NESC) which is responsible for developing environmental standards. The National Environment Management Act 2004, recognises the existence of the NESC. Part X enumerates the types of environmental standards to be established, they include water quality, discharge of effluent into water, air quality, control of noise and vibration pollution, sub-sonic vibrations, soil quality, control of noxious smells, light pollution, and electromagnetic waves and microwaves. Development of national environmental standards is still at its infancy stage. Only 9 compulsory environmental standards (those that require compulsory compliance) have been developed so far. Although, it is not stated in the Acts, in the absence of national standards, project proponents are encouraged to use international standards such as those of WHO, World Bank, BS, EU, American Public Health Association (APHA), US EPA etc.

#### **Relevant national environmental standards (to a limited extent though) include:**

TZS 860: 2005 Municipal and Industrial Wastewaters – General Tolerance Limits for Municipal and *Industrial Wastewaters*. This standard provides permissible limits of important environmental parameters such as BOD, COD, pH, Colour, Temperature range, Total suspended solids and turbidity. It also gives permissible limits of a range of inorganic and organic components.

TZS 845:2005 Air Quality – Specification: This standard gives permissible emission limits of sulphur oxides, carbon monoxide, hydrocarbons (as total organic carbon), Dust, Nitrogen oxides and lead.

EMDC 2(1758): Air Quality - Vehicular Exhaust Emissions Limits and This standard is mainly derived from EU Directives 96/69/EC, 91/542/EEC and 97/24/EC. This Tanzania Standard gives permissible limits of some common substances found in exhaust emissions of motor vehicles, namely carbon monoxides, suspended particulate matter (PM), oxides of nitrogen, and hydrocarbons. The standard covers all types of vehicles namely, passenger cars, light commercial vehicles, heavy-duty

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vehicles, and two and four strokes motorcycles and scooters. AESL need to ensure that the hired vehicles or its own meets this standard.

EMDC 6 (1733) P 2: ACOUSTICS - General Tolerance Limits for Environmental Noise: This standard focuses on urban environmental noise, and does not cover occupation environment. In the absence of other standards it may be used to give indication of permissible noise levels in factory/workshop environment.

TANESCO shall observe these standards during construction and operation of the project.

### 3.7 INSTITUTIONAL FRAMEWORK

Table 3.1 shows a list of relevant institutions and groups of stakeholders and their responsibilities as stipulated in various policy and legal documents and articulated by stakeholders during consultation.

**Table 3.1: Districts within the Internal Drainage Basin.**

Level	Stakeholders group	Responsibilities
National level	Vice President's Office- Division of Environment	<ul style="list-style-type: none"> <li>✓ Co-ordinate environmental management policy, act and guidelines</li> <li>✓ Environmental monitoring and auditing.</li> <li>✓ Advise Government on all environmental matters</li> </ul>
	Prime Minister's office	<ul style="list-style-type: none"> <li>✓ Improved and Reliable Power</li> <li>✓ Provide standards for operations</li> <li>✓ Funds for resettlement /Compensation (if any)</li> <li>✓ Project monitoring and internal auditing</li> </ul>
	Ministry of Lands, Housing and Human Settlement Development	<ul style="list-style-type: none"> <li>✓ Advice government on land use issues</li> <li>✓ Allocation of plots and sites for projects</li> </ul>
	NEMC	<ul style="list-style-type: none"> <li>✓ Reviewing of EIA reports</li> <li>✓ Enforcement and compliance of EMA Act, No.20 of 2004</li> </ul>
Regional level	Dar es salaam Regional Commissioners office	<ul style="list-style-type: none"> <li>✓ Oversee and advice on implementation of national policies at Regional level</li> <li>✓ Oversee enforcement of laws &amp; regulations</li> <li>✓ Advice on implementation of development projects and activities at Regional level</li> </ul>
Municipal Level	Kinondoni and Ilala Municipal Councils	<ul style="list-style-type: none"> <li>✓ Plan and coordinate activities on the Municipality.</li> <li>✓ Enforcement of laws and regulations</li> </ul>

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		<ul style="list-style-type: none"> <li>✓ Baseline data on health, social and economic conditions</li> <li>✓ Provides guidelines for management of land within project area and area of influence,</li> <li>✓ Land use planning</li> <li>✓ Environment management</li> <li>✓ Land valuation and compensation procedures</li> </ul>
Ward level	<p>Mchikichini, Upanga East and Upanga West in Ilala Municipal Council</p> <p>Makurumla, Kawe, Mzimuni, Kunduchi, Wazo, Msasani, Mabibo, Ubungo, Mikocheni and Makumbusho ward in Kinondoni Municipal Council.</p>	<ul style="list-style-type: none"> <li>✓ Oversee general development plans for the Ward.</li> <li>✓ Provide information on local situation Extension services</li> </ul>
Utilities service providers	<p>DAWASA</p> <p>TTCL</p>	<ul style="list-style-type: none"> <li>✓ Providing water and sewerage services</li> <li>✓ Providing telecommunication services</li> </ul>
Public and interested/affected groups	<ul style="list-style-type: none"> <li>✓ Residents around the project site</li> <li>✓ Primary schools near the project site.</li> <li>✓ secondary schools near the project site</li> </ul>	<ul style="list-style-type: none"> <li>✓ Information on local social, economic, environmental situation</li> <li>✓ View on socio-economic and cultural value of the sites</li> </ul>

## CHAPTER FOUR

### 4. BASELINE DATA AND INFORMATION

Baseline data and information on physical, biological and socio economic for the proposed project provides an important background for a well organized EIA. This chapter provides physical, biological and socio-economic characteristics pertaining in the core project area and area of influence for the construction of the proposed project. Information provided in this chapter will be superimposed in the project concept and components for impact identification, evaluation and development of mitigation measures during the impact assessment.

#### 4.1 PHYSICAL CHARACTERISTICS

##### 4.1.1 Climate and Hydrology

The proposed project area is in the Dar es salaam City. The area has flat terrain which is much influenced by coastal climatic condition and normally experiences a modified type of equatorial climate. It is generally hot and humid throughout the year with an average temperature of 29°C. The hottest season is from October to March during which temperatures can raise up to 35°C.

The area becomes relatively cool between May and August, with temperature around 25°C. There are two main rain seasons; a short rain season from October to December and a long rain season between March and May. The average rainfall is 1000mm (lowest 800mm and highest 1300mm). Humidity is around 96% in the mornings and 67% in the afternoons. The climate is also influenced by the southwesterly monsoon winds from April to October and northwesterly monsoon winds between November and March.

The City is divided into three ecological zones, namely the upland zone comprising of the hilly areas to the west and north of the City, the middle plateau, and the low lands including Msimbazi valley, Jangwani, Mtoni, Africana and Ununio areas. The main natural vegetation includes coastal shrubs, Miombo woodland, coastal swamps and mangrove trees.

Dar es salaam City is vulnerable to floods, sea level rise and coastal erosion, water scarcity and outbreak of diseases. Vulnerability to climate change effects is largely contributed by:

- ✓ Poor planning: About 70 % of settlements are not planned.
- ✓ Poverty: Encroachment of hazardous lands is caused by lack of cash to access land in planned areas.
- ✓ Lack of infrastructure: The existing infrastructure such as storm water drainage system is not proportional to the population size.
- ✓ Corruption: Development in areas which have been identified as hazardous lands such as storm water channels.
- ✓ Location: Closer to Indian Ocean.

#### Areas prone to floods

**i) Msimbazi valley:**

The area floods frequently. However the area continues to be populated exposing residents to life threatening floods and flood related health problems. The influx of people has been accelerated by number of factors such as easy access to unregulated farming and building plots, proximity to the city centre, low level of education and low cost housing.

**(ii) Jangwani:**

This is a slum area found on the left hand side of Morogoro road on the way to city centre from Magomeni. Low lying area which is characterized by floods during rainy season almost every year. The Msimbazi River passes through this valley increasing the risk of dwellers that are at the mouth of the river. The areas were declared not a residential by the former minister for lands and Human Settlement Development due to its susceptibility to environment threats.

**(iii) City Centre:**

This is the most flooded area in the city. The problem is exacerbated by poor infiltration and outdated unfunctioning storm water drainage system.

**(v) Mikocheni:**

The problem has been exacerbated by diversion of natural storm water drainage channel.

**4.1.2 Topography and Soils**

Altitude of Dar es Salaam is less than 200 m.a.s.l. The area is generally flat to gentle undulating plains, slopes ranges between 0-3percent developed on old alluvial terrace no longer flooded. Major soils are well drained, moderately deep to deep, red, yellowish red or orange sands and loamy sands with sandy loams in subsoil, weak structure, very low natural fertility; and moderately well to imperfectly drained, deep, brown, pale yellow, light grey or white mottled sands and loamy sands with weak structure and very low natural fertility; and imperfectly to poorly drained due to flat topography and ponding above ironstone pans in subsoil (0-7 to 1.5 m deep) which prevent deep percolation and are able to maintain perched water tables stable enough rice cultivation.

Mixed alluvial deposits occur on recent flood plains along Msimbazi river valley. The areas are subject to frequent flooding. This type of soil is marginally suitable for arable agriculture. There is also mixed soil on sub-recent or old alluvial deposits which are no longer flooded by river overflows. Fruits and vegetables are grown in the valleys.

**4.1.3 Waste Management**

Waste management, in principle, is directly the responsibility of Local Authorities. The Local Government (Urban Authority) Act 1982 imposes on urban authorities the mandate “to remove refuse and filth from any public or private place” and to provide and maintain public refuse containers for the temporary deposit and collection of waste.

The Municipal Councils play an important role in the financing, planning and providing waste collection and disposal services. According to the present management structure, waste management services are placed under Waste Management Department, but other departments such as Works, Health, and Urban Planning are also involved in one way or another.

The proposed project will have a number of laborers approximately 100 including skilled and unskilled employees. During construction and operation they are expected to produce various kinds of wastes such as papers, plastics bottles, plastics bags, food waste etc. It is also considered that sewage

waste will be generated from these areas therefore sanitary facilities such as portable toilets should be distributed.

During construction of the 33kV lines as well as stringing of the wires on the 132kV line, heavy machines are expected to be used these include vehicles, excavator, bulldozers, etc. These machines and vehicles are assumed to have low impact to the air quality as they will have regular checks and maintenance. This will minimize emissions such as NO<sub>x</sub> and SO<sub>x</sub> and noise pollution to the permissible level, therefore reducing adverse health effects to the workers, and nearby communities.

## 4.2 Air Quality, Noise, Dust and Vibration at Proposed project areas.

### 4.2.1 Ambient Air Quality

The assessment of ambient air quality at the four proposed substation locations was done using a portable desktop gas analyzer type KANE900 Plus. The gas analyzer recorded the air composition characteristics by establishing the proportions of oxygen (O<sub>2</sub>) [%], carbon monoxide (CO) [mg/nm<sup>3</sup>], nitrogen oxide (NO) [mg/nm<sup>3</sup>], nitrogen oxides (NO<sub>x</sub>) [mg/nm<sup>3</sup>], sulphur dioxide (SO<sub>2</sub>) [mg/nm<sup>3</sup>], carbon dioxide (CO<sub>2</sub>) [%], and ambient temperature [°C]. Three air samples were averaged to establish the characteristic air quality per sampling point.

The summarized findings on the ambient air quality assessment of air contaminants are presented in Table 4.1. The findings show that the four sites had an average oxygen level of 20.88% ranging from 20.8 to 20.9%. The average temperature level was 34.56°C. On the other hand, air gaseous contaminants of carbon monoxide (CO), carbon dioxide (CO<sub>2</sub>), and sulphur dioxide (SO<sub>2</sub>) were not detected whereas the concentration of nitrogen oxides (NO<sub>x</sub>) was sparse. The NO<sub>x</sub> were observed along Jangwani and Mwananyamala sites that are busy with motor vehicle traffic. With reference to Tanzania's Environmental Management (Air Quality Standards) Regulations (2007) the observed air quality at all these sites is within acceptable level.

**Table 4.1: The average air quality per assessed substation**

SNO	SITE NAME	O <sub>2</sub> [%]	CO [mg/m <sup>3</sup> ]	CO <sub>2</sub> [%]	AMBIENT TEMP. [°C]	SO <sub>2</sub> [mg/m <sup>3</sup> ]	NO [mg/m <sup>3</sup> ]	NO <sub>x</sub> [mg/m <sup>3</sup> ]
1	Jangwani Beach	20.8	-	-	33.3	-	0.0	0.01
2	Oysterbay	20.9	-	-	34.0	-	-	-
3	Muhimbili	20.9	-	-	34.6	-	-	-
4	Mwananyamala	20.9	-	-	36.4	-	0.0	0.02
	<b>MEAN VALUE:</b>	<b>20.88</b>	-	-	<b>34.56</b>	-	<b>0.01</b>	<b>0.01</b>

<b>HIGHEST LIMIT (TANZANIA)</b>		<b>10.00</b>						<b>0.12</b>
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STANDARD)*							
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\* The Environmental Management (Air Quality Standards) Regulations, 2007

#### 4.2.2 Noise Level

Noise level measurement along the pre-selected points was done using a Clas Ohlson digital sound level meter type 36-1604, model ST-805 with measurement range of 30 to 130 dB(A). The meter meets ANSI S1.4 type 2 standards and conforms to IEC 651 type 2. Accuracy of the meter is  $\pm 1.5$  dB of reading. The meter is calibrated using electrical calibration with built in oscillator (1 kHz sine wave).

On taking measurements, the meter was set to the “A” weighed measurement scale, which enables the meter to respond in the same manner as the human ear. The “A” scale is applicable for workplace compliance testing, environmental measurement, and workplace design and law enforcement. The meter was held approximately 1.5 m above the ground and at least 0.5 m away from hard reflecting surfaces such as trees and walls. A set of four readings were taken per point.

#### 4.2.3 Substations’ Noise Level

Generally, the noise levels to all assessed areas alongside the proposed substations were within acceptable level below the threshold value of 90 dB (A). As presented in Table 2 the mean noise level was 55.81 dB (A) and it ranged, amongst the sites, from 49 to 63 dB (A). Appendix III details the noise as assessed from the four proposed sites.

**Table 4.2: The average noise level per assessed point**

SNO	SITE NAME	NOISE LEVEL, dB(A)	HIGHEST LIMIT, dB(A)*
1	Jangwani Beach	62.62	90
2	Oysterbay	55.40	
3	Muhimbili	49.00	
4	Mwananyamala	56.21	
	<b>MEAN VALUE:</b>	<b>55.81</b>	

\* Occupational Safety and Health Administration; Occupational Noise Exposure Standard (OSHA – 29 CRF 1910.95)

#### 4.2.4 Dust – Total Suspended Particulates (TSP)

Dust levels were assessed using the Casella Microdust Pro particulate monitor model 176000A. The equipment is capable to sample dust in the range from 0.01 to 2500 mg/m<sup>3</sup> with a resolution of 0.001 mg/m<sup>3</sup> (1µg/m<sup>3</sup>). The Microdust Pro measures particulate concentrations using a near forward angle light scattering technique. Infrared light of 880nm wavelength is projected through the sampling volume where contact with particles causes the light to scatter. The amount of scatter is proportional to the mass concentration and is measured by the photo detector. Samples were collected at a breathing height of approximately 1.5 metres above the ground. A total of three samples were

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collected for each of the eleven assessed points the average of which was the measured TSP value to the individual point.

#### **4.2.5 Dust – Total Suspended Particulates (TSP)**

As detailed in Appendix V, the survey findings on the average particulates (dust) level along the proposed sites at Jangwani Beach, Oysterbay, Muhimbili and Mwananyamala showed that the dust particulates emissions were below the threshold value set by the World Health Organization (0.23 mg/m<sup>3</sup>).

#### **4.2.6 Ground Vibration**

XTECH SDL-800 vibration meter data logger was utilized to quantify the ground vibration at the proposed sites. With a resolution of 0.1 m/s<sup>2</sup>, accuracy of ±5%, acceleration of 200 m/s<sup>2</sup>, the data logger has a wide frequency range of 10 Hz to 1 kHz for capturing almost all possible vibrations for workplace assessments.

#### **4.2.7 Ground Vibration Level**

After capturing the ground vibration level to the individual substation locations, the exposure action value (EAV) and exposure limit value (ELV) were computed based on the assumption of 2 hours duration of exposure to the vibration per day.

The findings show that all the four sites had minimal vibration levels. However, Mwananyamala site had a relatively higher level of vibration. While none of the points along the other sites reached the EAV, two out of the six measured locations at Mwananyamala recorded vibration above the EAV. This is due to the nature of activities close to the site that generated vibration too. The overall vibration level at Mwananyamala, however this was within acceptable range.

#### **✓ Data Analysis**

Data collected under each measurement was compiled and analyzed with spreadsheet software, MS Excel. Interpretation of the data utilized various standards and norms and was compared to the specific threshold limits from the Tanzania standards or an alternative international standard.

### **4.3 BIOLOGICAL CHARACTERISTICS**

This involves assessment of Biological Environment mainly including Flora and Fauna, ecological interaction as well as species diversity. Ecologically sensitive areas, rare-endangered-endemic species shall be considered and if encountered, proper mitigation shall be considered for the impacts.

#### **4.3.1 Vegetation categories in the study area.**

Vegetation is an integrator of environmental factors in that it reflects the climatic, physiographic, edaphic and biotic features pertaining to the land on which it grows. An understanding of the vegetation and plants of an area can therefore give good insights into the agricultural or biological potential of that area. Some land uses also depend directly on the vegetation resource and in this case an inventory of vegetation is obviously of great importance (Timberlake, Nobanda and Mapoure, 1993). From the survey findings it has been noted that the proposed project area covers a very little part of natural vegetation types as it pass through the urban areas. Since the project foot prints aims to clear tree within the existing transmission lines, it is anticipated that the project activities will have very minimum negative impact into the vegetation.



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The survey was conducted along Ubungo-Ilala 132kV transmission line, the proposed distribution lines along road reserves and on the proposed 33kV substations. During the survey it was noted that the areas which are covered by natural vegetation to be cleared are mainly dominated with shrubs of maximum height of 5metres of which will not be affected by the project activities for erecting distribution poles and it was noted that the vegetations of the study areas are locally and regionally common.

In the project areas a total number of three types of vegetation units have been classified: **Secondary bushland, *Typha capensis* wetland, and Settlements with alien species.**

#### **4.3.2 Secondary bushland**

This vegetation type is being characterized by a land which is dominated by shrubs with scattered small trees less than 5m tall and subjected to regular disturbance especially slashing during road maintenance.

In the project area it is found on a small patch at Mbuyuni hill near the junction to IPTL along the road side.

It is being dominated with shrubs includes; *Harrisonia abyssinica*, *Dalbergia vacciniifolia*, *Marhkamia lutea* and *Hoslundia opposita*. The ground is covered by grass species of *Dichanthium annulatum*, *Sporobolus pyramidalis* and herbs of the species *Tridax procumbens*, *Euphorbia hirta* and *Ocimum baqcilicum* as shown on Figure 4.1.

In the entire project areas, this is the only part covered with natural vegetation and it hosts the life of IUCN threatened plant species of the category Vulnerable (VU) *Dalbergia vacciniifolia* of the family Papilionaceae (Figure 4.1).

It is anticipated that the project activities will not affect the life of this shrub as it involves clearing of trees with height above 5metre high and this shrub does not reach that height.

However, this IUCN red listed shrub is locally and regionally common in the coastal habitats and it grows in protected areas such as Pande forest, Saadani National Park and Pugu Hills. Therefore, the species can be mitigated and avoid the loss of biodiversity.



**Figure 4.1: Secondary bushland vegetation type at Mbuyuni area along Bagamoyo Road. On the right side *Dalbergia vacciniifolia* an IUCN Red Listed plant species grows in this vegetation along the road side.**

### 4.3.3 *Typha capensis* wetland

This vegetation category is being characterized by a wetland which is dominated by reed species of *Typha capensis* in association with other grass species and few aquatic herbs and shrubs. In the project area this vegetation type is found at Jangwani substation the end point of the line from Tegeta substation. Common grass species growing in this habitat includes; *Panicum maximum*, *Dactyloctenium aegyptium*, *Heteropogon contortus* and *Rhynchelytrum repens*. Dominant sedge species becomes *Cyperus prolifer*, *Fuirena calolepis* and *Mariscus luteus*. Common shrub is *Pluchea discoloridis* as shown on Figure 4.2 below.

Although the project activities will have no negative impact onto this vegetation type as the species composing it are at lower height below 5metre tall, but also this vegetation type is locally and regionally common with no species of conservation significance. However, this vegetation type will be removed in the area measuring 1325 m<sup>2</sup> which has been proposed for construction of Jangwani Beach substation

Therefore there is no risk of loss of biodiversity due to project activities.



**Figure 4.2: *Typha capensis* wetland vegetation type at the proposed Jangwani Beach substation**

### 4.3.4 Alien trees with plant nurseries

This vegetation type occurs along the road side and road reserve where planted trees and shrubs are dominant in association with flying plant nurseries owned by flower and tree seedling vendors. In the project sites this vegetation type is the largest occupying almost 95% cover of the entire area covered by plants as shown on Figure 4.3 below.

This vegetation category will be affected by project activities as it is being dominated by trees with height above 5m tall which all will be cleared to allow power distribution lines to pass through.

Dominant tree exotic tree species includes; *Polyalthia longifolia*(Ashok), *Azidarachta indica* (Neem tree/Mwarobaini), *Terminalia catappa* (Bengal Almond Mkungu) *Terminalia mantaly* (Madagascar Almond), *Cocos nucifera* (Coconut/Mnazi) and *Mangifera indica* (Mango/Muembe) as shown.

Hence this vegetation type is composed of planted exotic plant species; there is no risk of loss of biodiversity due to project activities locally and regionally.

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**Figure 4.3: Alien trees with plant nurseries vegetation type at Jangwani Beach along Mwai Kibaki Road and Msasani area near Msasani peninsula**



**Figure 4.4: Existing way leave from Ubungo to Ilala Substation, the existing towers will be used for replacing lines (Left side) and on rightside the road reserve on Mwaki kibaki road in which the Tegeta to Jangwani line will pass through.**

#### 4.3.5 Fauna

There were observed no big and wild animals around the proposed project area, this is due to urbanized development of the city. Most animals observed during the survey included birds, lizards, butterflies, grasshoppers, ants of various kinds and many other invertebrates. Some domestic animals were also found where, most of cattles are zero grazing (indoor grazing especially cows and hens, however goats were mostly found grazing openly where there are grasses, the goats are tied with a string on big trees till evenings. These were mainly observed along the transmission line from Ubungo to Ilala and the proposed distribution lines.

#### Birds

Few species of birds were observed in the project areas during the site visits conducted, however Wildlife Conservation Society of Tanzania has listed over 100 species sighted within the city. Many are water birds seen frequently on the beaches and other aquatic environments. Notably the city is

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infested with the Indian crow which is an introduced species that has affected a number of native avian species which were previously abundant along the coast of the city. Indian crows appear in thousands in the city and are a serious pest. There are also pigeons which have become semi wild and inhabit residential areas. Additionally the house sparrow is very common species in all parts of the city.

#### **4.5 SOCIO-ECONOMIC CHARACTERISTICS**

This section describes the socioeconomic baselines of all the municipal affected by the project. The project covers one region namely Dar es Salaam and two municipals Ilala and Kinondoni. Generally, all streets that will be affected by the project have most of the basic social services as described in each Municipal socioeconomic profile. The services include schools (primary and secondary), water, health and communications (roads and telephone).

##### **✓ Dar es Salaam Region**

#### **4.5.1 Ilala Municipality**

Ilala Municipality is one of the Municipal in Dar es Salaam Region. The Municipality is bordered by the Indian Ocean on its Eastern part with distance of about 10 kilometers. On the southern part it is bordered by Temeke Municipality, whereas on its Western part it is bordered by Kisarawe District and on its Northern is bordered by Kinondoni Municipality. Ilala Municipality bears the status of an Administrative district lies between longitude 39° and 40° east and between latitude 6° and 7° south of the Equator. It has an area of 210 km<sup>2</sup>.

##### **✓ Population**

According to the 2002 National Household Census, Ilala Municipality had a population of 634,924 with an average growth rate of 4.6 percent. The inhabitants are of mixed tribes with different dialects. The Census of 2012, a preliminary result shows Ilala population has increased up to **956,471**. Population density now is 4555 while 2002 was 3923.

##### **✓ Economy**

The Municipality has several economic activities that include Office work, Fishing, Tourism, Hotels, Live story keeping especially chicken and dam cattle, Import and export businesses, Transportation and Banking.

#### **4.5.1.1 Demographic profile**

According to 2002 National Population Census and the 2012 National Population census the projection data for 2012 collected at site during the site visit, the population of the proposed project area is as follows:

**Table 4.3: Population in the villages in project area**

Street Name	Ward Name	Household	Street Population	
			Male	Female
Kilongawima	Kunduchi	2153	3217	3162
Mtongani	Kunduchi	4901	10124	9433

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Street Name	Ward Name	Household	Street Population	
Kwa Jongo	Makurumula	3065	2788	4005
Mianzini	Makurumula	5689	2905	4438
Mtambani	Mzimuni	700	12000	12500
Mwinyimkuu	Mzimuni	1200	25000	30000
Fire	Upanga Magharibi	605	1532	2540
Charambe	Upanga Magharibi	3714	3318	3218
Mfaume	Upanga Magharibi	540	1192	2011
Ilala Kota	Mchikichini	1707	3459	3411
Makumbusho	Makumbusho	4600	24000	36000

**Table 4.4: Primary, Secondary Schools and dispensaries in the project area**

Street Name	Number of Primary school	Number of Secondary school	Number of Dispensary & Health centres
Kilongawima	4	-	1
Mtongani	4	4	5
Kwa Jongo	1	-	2
Mianzini	-	-	-
Mtambani	2	-	1
Mwinyimkuu	2	-	-
Fire	-	-	-
Charambe	4	5	2
Mfaume	4	-	3
Ilala Kota	1	1	-
Makumbusho	2	1	3
	<b>24</b>	<b>11</b>	<b>17</b>

**4.5.1.2 Education Services**

Ilala Municipal Council for the year 2012 had managed to establish **76** pre-primary centres out of 105 public primary schools. While for private sectors there are **52** registered pre-primary centres. In total there are **3, 656** children (**1,780** boys and **1,876** girls) in Public schools and for non Government pre schools **4,636** children (**2,464** boys and **2,172** girls).

The Municipal Council has **105** public primary schools and **53** non-government schools. Expected enrolment in public schools for 2012/2013 was **20,279** pupils; **9,999** boys and **10,680** girls. The actual enrolment is **10,032** boys and **10,531** girls which totals to **20,563**. The enrolment shows access of **101.4%**. This indicates community awareness on Education.

There are **95** secondary schools of which **49** are for government and **46** owned privately. The total students for secondary schools are **44,543** among of them **20,852** are girls and boys are **23,791**.

**4.5.1.3 Health sector**

There are one hundred and fifteen (115) dispensaries of which sixteen (16) are government. Refer the table below that shows the distribution and location of these facilities.

NA	Health type	Ownership		TOTAL
		Public	Private/Public institution	
1.	National Ref	1	1	2
2.	Ref	1	0	1
3.	Hospitals	1	8	9
4.	Health centers	2	20	22
5.	Dispensaries	20	148	168
6	Public Inst(Military	9	0	9
7.	Special clinics	1	14	15
	Total	34	190	224

Source: Ilala Municipal annual report, 2013

**4.5.1.4 Water Supply**

Ilala Municipality has **304** wells as amongst the sources of water for human consumption. There are 170 deep wells of which 146 are in operation and the remaining 158 have stopped functioning due to technical problems. The wells which are in operation have the capacity of generating **1,231,439** liters that could have served **490,434** people by at least three buckets a day.

#### **4.5.1.5 Telecommunication**

Telecommunication is well covered with TTCL. There are cellular phones operators namely Zain, Tigo, Zantel, Vodacom and the new one in business being introduced by TTCL -Sasatel. A number of Internet services providers are also available.

#### **4.5.1.6 Energy Supply**

Charcoal is the most important form of energy used for domestic purpose such as cooking. Electricity is mainly used for domestic, commercial and industrial use. Other sources of energy are firewood, gas for cooking and biogas in a small case.

#### **4.5.2 Kinondoni Municipal**

The Municipality is bordered by the Indian Ocean to the North East, Ilala Municipal to the South, Bagamoyo District to the North, Kibaha District to the West and Kisarawe District to the South West. The Municipality has a total area of **531** square kilometers.

##### **4.5.2.1 Population**

According to the 2012 population Census, the Municipality has a population of **1,775,049** being the most populous local authority in the country, with the population growth rate of **5.0%** per annum and population density **3,343** people per square kilometer.

##### **4.5.2.2 Employment and economic activities**

It is estimated that 841,551 residents of Kinondoni Municipality are employed in private, public sectors and self employed. 513,346(61%) are employed in the private sector, 300,434 are self employed while the rest 27,771 are employed in the public sector. The majority of the residents are street vendors, service and shop sales workers, craftsmen fisheries, livestock keepers and farmers. Only 3% of the working force is engaged in subsistence agriculture in the peri-urban areas. There are no big farms but small plots ranging from 2.5 to 6 acres. Others make small gardens around their houses in which various vegetables and root crops like cassava and sweet potatoes are grown for family food and the surplus for income generating.

##### **4.5.2.3 Health Services**

The Council currently has a total of 304 health facilities of which 87 are government owned, while the remaining 217 are owned by Parastatal, Private and Faith Based Organizations. There are 25 hospitals, 14 health centres, 163 dispensaries and 102 reproductive and child health clinics.

##### **4.5.2.4 Education Services**

With regard to education, the Municipal Council has a total of 232 Pre primary school of which 127 are for Government and 105 are for private owners, 229 Primary school of which 139 are for Government and 90 for private owners, 5 Teachers college of which all belongs to Private Owners and 8 Universities of which 3 are for Government and 5 private Universities. There are **145** secondary schools of which **46** are for government and **99** owned privately.

##### **4.5.2.5 Water Supply**

The main source of water for Kinondoni residents is from Lower and Upper Ruvu which managed by Dar-es-salaam Water and Sewerage Authority (DAWASA). The water from DAWASA systems contributes 68% of water being consumed daily and the rest is contributed by shallow and deep wells

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which are owned by both private and community. The estimated population of Kinondoni Municipality is 1,627,355 out of that only 65% have direct access to clean and safe water while the rest which is 35% have no smooth access.

#### **4.5.2.6 Infrastructures**

Kinondoni Municipality enjoys good services of all important infrastructures. It can be easily accessed from all parts of the country by well maintained tarmac roads, railway line and by air.

#### **4.5.2.7 Telecommunication**

Telecommunication is well covered with TTCL. There are cellular phones operators namely Zain, Tigo, Zantel, Vodacom and the new one in business being introduced by TTCL -Sasatel. A number of Internet services providers are also available.

#### **4.5.2.8 Energy Supply**

Charcoal is the most important form of energy used for domestic purpose such as cooking. Electricity is mainly used for domestic, commercial and industrial use. Other sources of energy are firewood, gas for cooking and biogas in a small case.