

# **CORPORATE AFFAIRS AND BUSINESS DEVELOPMENT DIRECTORATE**

## **ENVIRONMENTAL IMPACT STATEMENT FOR THE PROPOSED LUSAKA 132kV TRANSMISSION RING REINFORCEMENT PROJECT**



**PREPARED BY  
THE ENVIRONMENT AND SOCIAL AFFAIRS DEPARTMENT**

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## EXECUTIVE SUMMARY

ZESCO Limited is a vertically integrated electricity parastatal registered under the Companies Act. ZESCO was established in 1970 and is wholly owned by the Government of the Republic of Zambia. However, ZESCO operates as an autonomous entity that is monitored by the Government, through the Board of Directors, to ensure that performance benchmarks are met. The Company is mandated to generate, transmit, distribute and supply electricity throughout Zambia.

With the view of improving the transmission and distribution infrastructure throughout ZESCO's four divisions namely; Lusaka, Copperbelt, Northern, and Southern, ZESCO proposes to undertake an electricity transmission and distribution system rehabilitation program. These rehabilitation works will be implemented through the Zambia Transmission and Distribution Rehabilitation Project (TDRP). Of critical importance is addressing the rehabilitation needs of Lusaka, considering that 40% of the non-mining loads are concentrated in this area. In recent years, Lusaka has been experiencing load shedding because the demand for power has outstripped the supply. This increase in demand is due to an increase in economic activities in various sectors such as mining, agriculture, tourism and domestic use. This increase in economic activities has resulted into a corresponding and indeed overwhelming increase in demand for electricity services, which has ultimately put a strain on the existing electricity supply capacity in these areas.

It is indeed a well-known fact that a resilient energy infrastructure plays an important role in fostering sustainable development. To this effect, through the TDRP, ZESCO intends to reinforce power supply to Lusaka by upgrading and reinforcing the existing transmission and distribution networks at a total cost of USD 240 Million. The International Development Association (IDA), European Investment Bank (EIB), and the Government of the Republic of Zambia (GRZ) will finance the project. The implementation of the TDRP in Lusaka will first focus on the transmission network after which the distribution component will be addressed. ZESCO, as the Implementing Agency on behalf of GRZ, therefore proposes to reinforce the Lusaka transmission network through the proposed Lusaka 132kV Transmission Ring Reinforcement Project at a cost of approximately USD 150 Million. The TDRP is expected to be implemented over a period of six years from 2013 and 2018. However, the Lusaka transmission component will be implemented over a period of 36 months starting in 2013.

The reinforced 132kV Transmission Ring will increase capacity of the system to satisfy the current and future demand, and increase reliability of the transmission system, thereby reducing interruption frequency and load shedding. The reinforced Ring will further provide adequate and reliable supply of electricity, which is an important ingredient for further attracting meaningful investment from both domestic and foreign investors into Lusaka.

The Lusaka Ring is an existing line that will be upgraded in some places and reinforced in other sections. The Ring is a series of transmission lines connecting Leopards Hill

and Lusaka West substations through three Bulk Supply Points (BSP). These BSP's are Coventry, Waterworks, and Roma substations. The Ring traverses the light industrial area, Central Business District (CBD), residential and farming areas.

During project implementation, both positive and negative impacts shall arise. The proposed project, in accordance with the provisions of the Environmental Management Act (EMA) No. 12 of 2011, Statutory Instrument No. 28 of 1997 – The Environmental Impact Assessment (EIA) Regulations, requires a comprehensive Environmental and Social Impact Assessment (ESIA) study be undertaken and an Environmental Impact Statement (EIS) developed detailing the study and its findings. Furthermore, as a requirement by the EMA, a Scoping meeting and other stakeholder consultations were conducted. Additionally, to address the issues of wayleave encroachment by structures and vending activities, a Resettlement Policy Framework (RPF) was developed to guide the preparation of the Resettlement and Compensation Action Plan (RCAP). The EIS and the RPF shall take cognizance of the International Finance Corporation's (IFC's) Sustainability Framework, in particular the IFC Performance Standards on Environmental and Social Sustainability, and the World Bank Safeguard Policies.

ZESCO, therefore, has undertaken an ESIA study to identify potential impacts and recommend measures to mitigate adverse impacts while enhancing the positive impacts which are documented in this report.

### **The Identified Significant Environmental and Social Impacts of the Project**

The project will affect the general physical, biological and social environments in the immediate project area through the works associated with the implementation of the Project.

The major impacts envisaged are social related as much of the wayleave has been encroached by agricultural and vending activities. People engaged in the said activities form the majority of the Project Affected Parties (PAPs), and are approximately 800 in total. To this effect, the project will entail temporal displacement and resettlement of the PAPs prior to the construction works commencing. The activities of the vendors will be temporarily restricted to the periphery of the wayleave. In consultation with the local authority, alternative land shall be sought for PAPs whose agricultural activities shall be temporarily disrupted. Where the above is not feasible, adequate compensation shall be awarded for the loss of livelihood. Other impacts, aside from the above, will include waste generation, air, water and noise pollution, which shall need to be addressed.

A project of this magnitude has the potential to influence an influx of job seekers into the area, hence, creating stress on the available social amenities. An influx of migrant labor force could also lead to the introduction of communicable diseases.

There will be an increase in power disruptions in various parts of the project area during the construction phase. During operation of the reinforced Ring, there will be an increase in the electric and magnetic fields produced by the power lines that will be upgraded from 88kV to 132kV.

The positive impacts include increased access to electricity, reduced load shedding, increased capacity to meet required demand, and an elevation in social status arising from enhanced education and health facilities which may be electrified. Clean, efficient, affordable and reliable electricity services are indispensable for our country's prosperity as they are a key factor for promoting social progress and economic growth both of which are closely linked to sustainable poverty eradication.

### **Mitigation and Enhancement Measures**

Appropriate mitigation and enhancement measures shall be implemented to address the identified impacts. These have been detailed in this document and operationalized through the Environmental and Social Management Plan (ESMP).

An RPF has been prepared for cases where people's assets are impacted, land acquired, or losses in income. The RPF will guide project implementers on the preparation of a RCAP.

Environmental, Health, and Safety (EHS), and campaigns shall be carried out at regular intervals to mitigate potential occupational health and safety risks.

Power disruption schedules will be communicated to the public, and load management strategies shall be employed to mitigate power disruption wherever possible.

The Project Affected Parties (PAPs) shall be compensated accordingly for this temporal disruption taking into account ZESCO's compensation policy and the IFC Performance Standard on Land Acquisition and Involuntary Resettlement, as well as, the World Bank OP 4.12 on Involuntary Resettlement

### **Recommendations/ Conclusion**

The Lusaka 132kV Transmission Ring Reinforcement Project is cardinal for the improvement of electricity supply in Lusaka, which is currently experiencing load shedding due to system incapacitation. Improved electricity supply will support the development of various sectors of the economy such as manufacturing, agriculture, tourism and infrastructure development.

To ensure implementation of the proposed mitigation, monitoring and positive impact enhancement aspects of the proposed project, it is recommended that environmental and social costs totaling **US\$1,002,800.00** should be included in the total project cost. Further, the actual implementation of the various environmental and social aspects

recommended in this report will be guided by an ESMP for the different project components and will be strictly monitored by the project developer.

This Project presents an opportunity for enhancement of the socio-economic status of the majority of people in Lusaka. Therefore, the need for the implementation of this Project cannot be overemphasised.

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## ACRONYMS AND ABBREVIATIONS

°C	Degrees Celsius
AIDS	Acquired Immune Deficiency Syndrome
ART	Anti-retroviral Therapy
BSP	Bulk Supply Point
CBD	Central Business District
CEA	Cumulative Effects Assessment
CSO	Central Statistical Office
EHS	Environmental Health and Safety
EIS	Environmental Impact Statement
EIA	Environmental Impact Assessment
EIB	European Investment Bank
EPB	Environmental Project Brief
ESIA	Environmental and Social Impact Assessment
ESMP	Environmental and Social Management Plan
EMA	Environmental Management Act
GRZ	Government of the Republic of Zambia
HIV	Human Immunodeficiency Virus
IDA	International Development Agency
IFC	International Finance Corporation
I &AP	Interested and Affected Parties
ITCZ	Inter-tropical Convergence Zone
KKIA	Kenneth Kaunda International Airport
KM	Kilometer
kV	Kilo Volts
M	Meter
MFEZ	Multi Facility Economic Zone
MMEWD	Ministry of Mines Energy and Water Development
MVA	Milli Volt Amperes
MW	Mega Watts
NPE	National Policy on Environment
PAPs	Project Affected Parties
PCR	Physical Cultural Resources
RCAP	Resettlement and Compensation Action Plan
ROW	Right of Way
RPF	Resettlement Policy Framework
SME	Small and Medium Enterprises
SNDP	Sixth National Development Plan
STIs	Sexually Transmitted Infections
ToRs	Terms of Reference
TDRP	Transmission and Distribution Rehabilitation Project
VCT	Voluntary Counseling and Testing
VEC	Valued Ecosystem Component
ZAWA	Zambia Wildlife Authority
ZEMA	Zambia Environmental Management Agency
ZESCO	ZESCO Limited

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## 1.0 INTRODUCTION

### 1.1 Project Background

ZESCO proposes to undertake an electricity transmission and distribution system rehabilitation program with the view of improving the transmission and distribution infrastructure in the Country throughout ZESCO's four Divisions namely Lusaka, Copperbelt, Northern, and Southern. These rehabilitation works will be implemented through the Zambia Transmission and Distribution Rehabilitation Project (TDRP). Of critical importance under this project is the urgency to address the rehabilitation needs of Lusaka, considering that 40% of the non-mining loads are concentrated in this area. The proposed project will therefore support the reinforcement of the existing transmission and distribution networks in the Lusaka Division of ZESCO which includes Lusaka City as well as its surrounding areas. The rehabilitation works in Lusaka will have two sub components which are; (i) Component 1: Reinforcement of the 132kV Transmission Network and (ii) Component 2: Rehabilitation of the 33kV and 11kV Distribution Network. However, this EIS addresses the transmission component only, which will be implemented through the Lusaka 132kV Transmission Ring Reinforcement Project. For component 2, the rehabilitation of the 33kV and 11kV distribution network, a draft Environmental and Social Management Plan (ESMP) (Appendix 1) is provided in this EIS as the actual sites for the rehabilitation have not been decided upon at this stage. Upon completion of site screening and design, Environmental Project Briefs (EPBs) shall be prepared, as required by the EMA, for new sites/substations whereas ESMPs shall be developed for rehabilitation of existing sites/substations.

The proposed Lusaka 132kV Transmission Ring Reinforcement Project and other components of the TDRP are being funded by GRZ, and the World Bank Group through IDA and EIB.

Lusaka is the capital city of Zambia and is a major economic hub of the country. Over the years, the city has experienced growth in population, industrialisation, commercialisation, and other developmental activities. Furthermore, Lusaka has been earmarked for the development of two Multi-Facility Economic Zones (MFEZ) to promote value addition. The goal of these developmental activities is to improve the socio-economic infrastructure and promote non-traditional exports in order to enhance accessibility to social and economic services as outlined in the Sixth National Development Plan (SNDP 2011 – 2015). Other proposed developmental activities are in the following categories:

- i. **Infrastructure** - Infrastructure Development, Rural Electrification, Strategic Petroleum Reserves
- ii. **Agriculture** - Crop Production and Productivity, Horticultural Products Development, Irrigation Development, Livestock Development, Fisheries Development, Resettlement Schemes Development,
- iii. **Tourism** - Tourism Infrastructure Development

- iv. **Manufacturing** - MFEZ Development, Industrial Parks Development
- v. **Education** - Infrastructure Development
- vi. **Health** - Infrastructure Development, Medical Equipment Provision
- vii. **Water and Sanitation** - Rural Water Supply and Sanitation
- viii. **Natural Resources** – Reforestation, Enterprise Development

Developments of this nature undoubtedly can only be driven by, among others, the provision of firm and reliable supply of electricity, which cannot be achieved with the current status of the electrical infrastructure in Lusaka. It is therefore not surprising that Lusaka City is one of the largest load centres of power demand in Zambia, requiring approximately 450MVA. Further, the average electrical annual load growth has been estimated at 6% over the past five years as observed from past annual load figures and statistical data.

The Lusaka transmission network is supplied at 330kV through two main supply sub stations; Leopards Hill in the east of the city and Lusaka West in the west of the city. These two substations supply three main Bulk Supply Points (BSPs) into Lusaka through a transmission ring connecting Coventry (132kV), Roma (132kV) and Waterworks (88kV) sub stations, referred to as the Lusaka 132kV ring transmission line. These BSPs further supply the more than twenty 33kV distribution substations throughout Lusaka area, which in turn supply the existing 11kV distribution networks. Following the developmental increase and power need in the city, recent network optimization studies carried out by consulting firms to ZESCO revealed that by 2021, the load demand in Lusaka will grow from its current suppressed level of 450MVA to an expected high of approximately 840MVA, far surpassing the capacity of the existing transmission ring (Aurecon, 2013). The expected average growth rate per annum over this period is approximately 6.8 %.

The Transmission Ring which supplies the Lusaka distribution network is old and currently operating close to its thermal capacity, and has become the bottleneck of the supply system; resulting in periodic load shedding and power outages. The transmission lines between Leopards Hill, Roma, Lusaka West, Coventry, and Waterworks substations are mostly overloaded and this situation has significantly increased the power outages in Lusaka. The Transmission Ring would, therefore, need to be reinforced to increase its transfer capacity and reliability and to ease expansion of the distribution networks to satisfy future load growth.

Additionally, the reinforcement works of the Transmission Ring will involve changes in the support structures from lattice steel towers to tubular steel poles. This would entail a reduction in the footprint of the servitude, as well as installation and maintenance costs. In addition, tubular steel poles are easier and faster to install, have a very high corrosion resistance, and are much stronger compared to lattice steel towers. The use of this technology is particularly appropriate for urban areas like Lusaka where the establishment and maintenance of Right of Way (ROW) is a challenge.

It is imperative therefore, to carry out an overhaul of the system to meet the increasing demand for electricity by reinforcing the existing transmission ring as a matter of urgency. It would also be necessary to standardize the voltage level of the Lusaka transmission network to 132kV. It is projected that this reinforcement will ensure that the network has the required capacity to handle the anticipated load growth over the next 15-20 years. As such, addressing the transmission system rehabilitation needs of Lusaka cannot be over emphasized.

#### **1.1.1 Benefits of the Project**

Project beneficiaries will be the rural and urban populations as well as commercial and industrial enterprises within the Lusaka division of ZESCO who will get improved access to electricity. In the long term, many new customers will also benefit from increased access to electricity due to ZESCO's ability to serve additional customers as a result of increased capacity and improved reliability of the system. Other benefits of the proposed project include the following:

- Increased capacity of the system to satisfy long-term demand growth
- Reduced power outages and load shedding

#### **1.1.2 Scope of the Environmental and Social Impact Assessment Study**

The study is concerned with the environmental and social aspects throughout the project area (Lusaka Ring) during the various phases of the project, which are planning, construction & decommissioning, and operational; particularly the possible negative effects such as pollution, relocation (resettlement) of people and other forms of social distress, restricted use on agriculture fields, and dangers to people.

Specifically, the ESIA study report:

- Describes the Lusaka 132kV Transmission Ring Reinforcement project and characterises the environment in which the project will be undertaken;
- Provides a description of the regulatory framework within which the proposed project will be planned, built and operated;
- Identifies potential bio-physical, socio – economic and cultural effects related to the proposed project;
- Describes the scientific analysis of ecosystem effects, local knowledge and the experience of locals in the project area and other sectors of the public that were used by the ESIA study team in the assessment of the environmental effects;
- Describes how the analysis of potential impacts to valued ecosystem components (VEC's) contributed to judging the significance of the effects on the well-being of the environment and the communities within the project area;
- Provides a summary of regional, provincial or national objectives, standards guidelines and relevant land and resource related agreements which were used in the evaluation of the significance of the environmental effects;



- Describes the consideration given to comments received from the public during the scoping phase ESIA process; and
- Proposes mechanisms for follow-up to identify and address the adverse impacts of the project, and to confirm the effectiveness of mitigation measures employed.

Undertaking the ESIA for the proposed development allows for comparison of the benefits generated by the project with the environmental and socio-economic impacts, in accordance with the requirements of the Environmental Management Act No. 12 of 2011 – Environmental Impact Assessment Regulations, Statutory Instrument No. 28 Of 1997. The EIA process is presented in Figure 1.

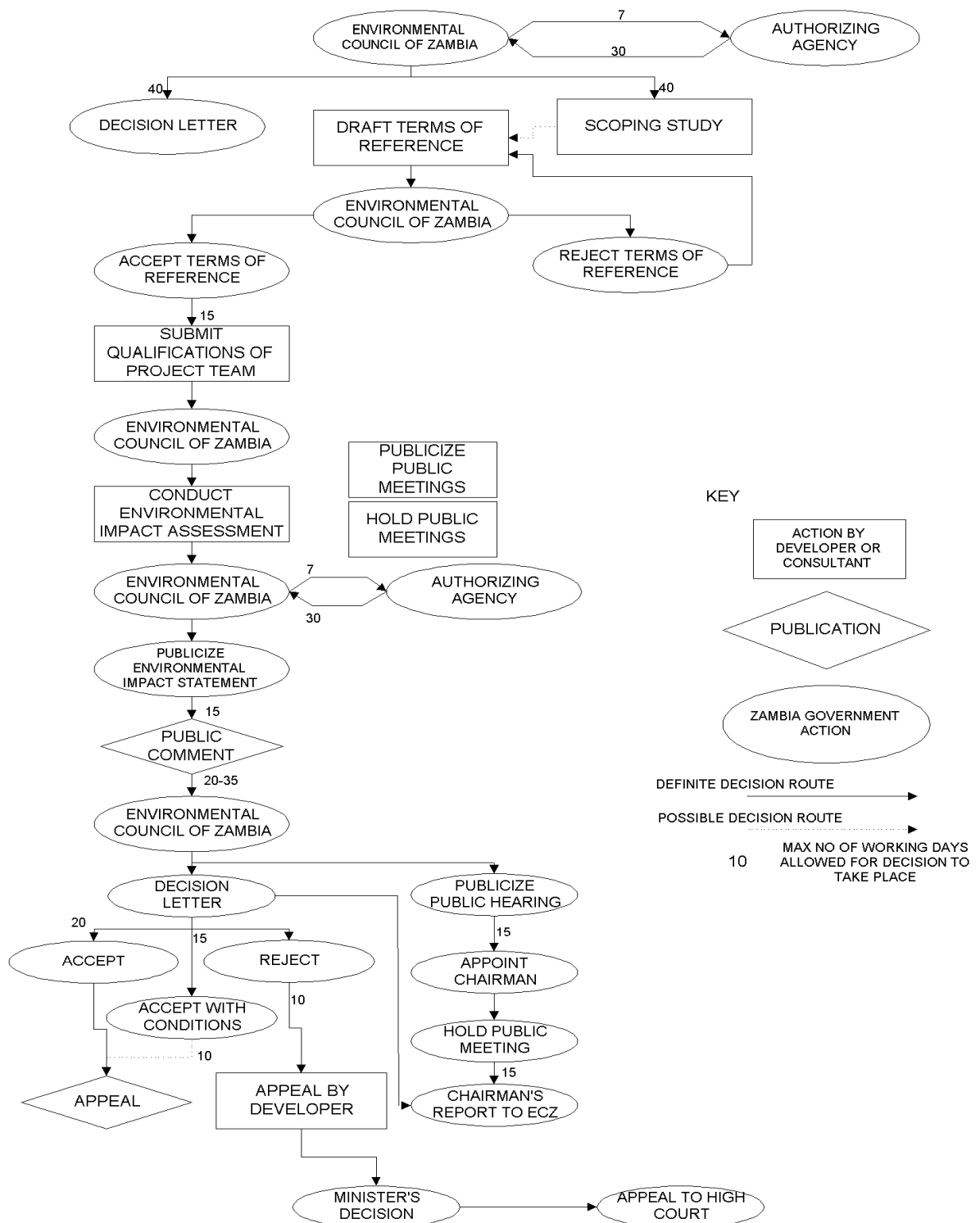
### **1.1.3 Stakeholder Engagement Process**

Effective stakeholder engagement is a key aspect to the success of the ESIA process and subsequent environmental management of projects. A scoping meeting, in addition to other public consultations, was held with stakeholders, prior to the preparation of this ESIA. The aim of the scoping meeting was to (i) disclose the proposed Lusaka 132kV Transmission Ring Reinforcement project; (ii) make known the possible impacts, both positive and negative, that would arise from the proposed project; and (iii) Obtain concerns and contributions relevant to the project from the various PAPs. Minutes of the scoping meeting held are attached in Appendix 2. Present at this scoping meeting were representatives from the community, private sector, traditional leaders, regulatory bodies, Ward Development Committees, Members of Parliament, governmental institutions, the media, and other interested and affected parties (IAP).

Some of the concerns raised were:

- i. Load management and power disruptions during the project construction phase;
- ii. Encroachment of wayleave;
- iii. Compensation of PAPs;
- iv. Severity of negative and positive impacts that may arise from the project; and
- v. Employment opportunities during the construction phase.

Additional public consultations shall be held with individual stakeholder groups to discuss concerns and issues pertinent to them.



**Figure 1: Environmental Impact Assessment Process in Zambia**

## 1.2 Summary Description of the Project

The project aims to modernize the electricity supply infrastructure in Lusaka by strengthening the existing transmission networks. This will improve the capacity and reliability of the network, thus enhancing ZESCO's power delivery capacity and improving services for agricultural, commercial, industrial and household customers.

The proposed Lusaka 132kV Transmission Ring Reinforcement project will involve the following main scope of works:

- a) Upgrading of the existing 132kV network with monopole structures for double circuit lines on the following Transmission Ring:
  - 28 km of lines from Leopards Hill BSP to Roma BSP to increase its capacity from the current thermal capacity of 86MVA to a capacity of at least 300MVA, and installation of 3x 30MVA 132/11kV transformers at Roma;
  - 15 km of lines from Roma to Lusaka West BSP to increase its capacity from the current thermal capacity of 86MVA to a capacity of at least 300MVA and installation of 330/132kV transformers to have a total firm capacity of 300MVA at Lusaka West BSP;
  - 9 km of lines between Lusaka West BSP and Coventry BSP to increase its capacity from the current thermal capacity of 86MVA to a capacity of at least 2x 200MVA.
  - Upgrading of the existing 88kV lines of about 22 km to 132kV lines between Waterworks BSP and Leopards Hill BSP to increase the line capacity from the current thermal capacity of 57MVA to a capacity of at least 200MVA;
  - Installation of 2x90MVA 132/33kV and 3x 30MVA 132/11kV transformers and related equipment at Waterworks BSP;
  - Installation of new 132kV lines with a total length of about 62km to connect the above listed 132/11kV BSPs to the network;
  - Upgrading of the existing 88kV lines of about 7km to 132kV lines between Coventry BSP and Waterworks BSP to increase its capacity from the current thermal capacity of 57MVA to a capacity of at least 200MVA; installation of 2x45MVA 132/11kV; and construction of line bays at Coventry substation;
  - Upgrading of the 132kV line of about 22 km between Waterworks and Leopards Hill substations to increase capacity from the current thermal capacity of 86MVA to a capacity of at least 200MVA.
  - Installation of the new 330kV Lusaka South BSP with 2x150MVA 330/132/11kV and 2x150MVA 330/33/11kV transformers to reduce the load at Leopards Hill BSP and to accommodate the Lusaka South Multi Economic Facility Zone Project and future load growth in the area.
- b) Upgrading of Coventry 132/11kV 2 x 25 MVA Substation.
- c) Upgrading of Roma Substation by introduction of 132/11kV transformation.

### 1.3 Objectives of the Project

The main objective of the project is to provide a cost effective measure to strengthen the existing transmission network in Lusaka in order to improve the quality and reliability of supply within the power transmission network.

Therefore, the Lusaka 132kV Transmission Ring Reinforcement project is aimed at:

- Increasing the capacity of the existing 132kV lines, upgrading the 88kV lines to 132kV, reinforcing the bulk supply substations in order to increase the capacity of supply to the distribution system in Lusaka;
- Meeting the increased demand which has outstripped system capacity;
- Reducing local load shedding which is due to depleted transmission systems capacity;
- Improving the electricity network performance and thereby improve customer service delivery;
- Providing sufficient and dependable power to support development activities in Lusaka;
- Contributing to the improvement in the standard of living of the people within and outside the project area, and,
- Mitigating local power deficit, supply industrial, commercial, and agricultural sectors.

### 1.4 Brief Description of Project Location

The proposed project area is located in Lusaka, the capital city of Zambia. The project area encloses the entire Central Business District (CBD) of Lusaka including some outlying areas of Chongwe in the east and extends further south east to Leopards Hill substation. In the west the Ring extends up to Lusaka West substation. In between Leopards Hill and Lusaka West substations, the Ring passes through three main supply points which are Coventry substation in the light industrial area close to city market, Waterworks substation in Libala area, and eventually into Roma substation. Location maps are presented in Appendix 3.

### 1.5 Particulars of Shareholders / Directors

ZESCO Limited is a Parastatal wholly owned by the Government of the Republic of Zambia and is registered under the Companies Act. The following constitutes the Board of Directors of ZESCO Limited:

- i. Fr. Frank Bwalya (Board Chairperson)
- ii. Mr. Webster Chisanga Kashimoto
- iii. Chief Emmy M. Simamba
- iv. Ms. Angela Cifire
- v. Mrs. Dorothy Kasanda

- vi. Mr. Felix Nkulukusa (PS. Ministry of Finance)
- vii. Mr. George K. Zulu (PS Ministry of Mines, Energy and Water Development)
- viii. Mr. Charles Mubanga
- ix. Mr. Cyprian Chitundu

## 1.6 Physical Address of Developer and Contact Details

### Physical Address

ZESCO Limited  
Great East Road,  
Stand No.6949  
P.O. Box 33304  
Lusaka

### Contact Person

Mr. Cyprian Chitundu  
Managing Director ZESCO Limited  
Email: CChitundu@zesco.co.zm  
Tel: +260 211 362710

## 1.7 Track Record/Previous Experience of Enterprise Elsewhere

ZESCO Limited is an electricity utility created in 1970 which is owned entirely by the Government of the Republic of Zambia, and falls under the jurisdiction of the Ministry of Mines, Energy and Water Development. The company's main objective is to generate, transmit, distribute and supply electricity to all its clientele. ZESCO uses hydro power for over 99% of power generation in the country, though diesel stations have been put in a few places like Zambezi, Kabompo, Chavuma and Mwinilunga. ZESCO Limited has undertaken and continues to undertake a number of projects as listed below:

- **The Power Rehabilitation Project (PRP)** - The Zambia Power Rehabilitation Project's (PRP) overall objective was to support the Government's objectives of enhancing the ability of the country's electricity supply industry to provide electricity at least cost and in an efficient and sustainable manner to stimulate more and inclusive growth in the economy. The works involved rehabilitation of generation, transmission and distribution infrastructure that included power line repairs and replacements, and reinforcement of substations. Upon completion of the rehabilitation works at the power stations there was an additional 210MW added to the total generation capacity.
- **Kafue Gorge Lower Hydro Power Project (750 MW)** - The Kafue Gorge Lower (KGL) Hydro Power Project with a capacity of 750 MW is currently being

implemented. The project will include constructing a 330kV transmission line from the KGL power station into the National Grid.

- **Itezhi Tezhi Hydro Power Project (120 MW)** - ZESCO signed a Memorandum of Understanding (MoU) with Tata Africa to develop the Itezhi Tezhi 120MW hydro power project. The two companies formed a joint venture company known as Itezhi Tezhi Power Company (ITTPC). So far site surveys, technical designs and economic appraisals by ZESCO and Tata Africa have been done. The provision for the development of the power station was made during the construction of the existing Itezhi Tezhi Dam. The power generated will be fed into the National grid through a high voltage line, the Itezhi Tezhi-Mumbwa-Lusaka West 330kV transmission line.
- **Kariba North Bank Extension Project (360 MW)** - The project is aimed at increasing the capacity of Kariba North Bank power station by adding two generating units of 180MW each to the existing four units. A dam with sufficient capacity exists and provision for the addition of two machines to the existing four was made. For this project, a transmission line will be constructed to take the power to the Kafue west substation.
- **Optic Fibre Communication Project** - The state of the art optic fiber is aimed at replacing the existing ground wire on the high voltage power lines. The fibre has been installed on strategic line networks. The optic fibre offers better clarity, has a higher bandwidth and thus offers a better channel of communication for the various services that ZESCO uses. The project has resulted in improved overall corporate effectiveness and efficiency in ZESCO.
- **Transformer and Meter Manufacturing** - In order to encourage knowledge transfer and improve effectiveness; ZESCO is engaged in a strategic Private Public Partnership Project with El Sewedy of Egypt to manufacture meters and transformers in Ndola. The two companies are Zambia Electrometer Limited which manufactures Meters and EL Sewedy Electric Zambia Limited manufactures Transformers.
- **Itezhi Tezhi 330kV Transmission Line** - The project is aimed at constructing a 273 km long line from the Itezhi Tezhi Power Station to the existing Lusaka West Substation, through the proposed Mumbwa 220kV/330kV Substation. The objective is to transmit the 120MW to be generated by the new power station into the national grid.
- **Kariba North Bank Extension 330kV Transmission Line** - The project involves constructing a 130km long line from the Kariba North Bank Extension power station to the existing Kafue West Substation. The objective of the project is to transmit the 360MW to be generated by the new power station.
- **Muzuma Upgrade 220kV- 330kV Transmission Line** - The project involves upgrading the existing Livingstone – Kafue Town 220kV transmission line to a 330kV

line. The objective of the project is to increase the line's voltage capacity in order to transmit more power.

- **Leopards Hill – Luangwa 132kV Transmission Line** - The project involves constructing a 187km long 132kV line from the existing Leopards Hill Substation to the proposed 132/33kV Chitope substation in Luangwa District, through a 132/33kV substation in Rufunsa District. The Project will also include a 33kV reticulation line in Rufunsa and another 33kV line from the Chitope substation to Luangwa Town (62km) and to the Great East Road turn off (25km). The objective of the project is to connect Rufunsa and Luangwa Districts to the National Grid. The Project will also lead to the decommissioning of the less environmentally friendly Luangwa diesel powered power plant.
- **Pensulo - Kasama 330kV Transmission Line** - The project involves constructing a 400km long line from the existing Pensulo substation in Serenje to the proposed Kasama Substation, through the proposed 330/66kV Substation in Mpika. The project is aimed at extending the 330kV network in order to provide reliable supply to Luapula, Muchinga and Northern Provinces.
- **Pensulo – Chipata 330kV Transmission Line** - The project involves constructing a 285km long line from the existing Pensulo substation in Serenje to the proposed Chipata 330kV substation, through the proposed 330kV substation in Msoro. The Project is aimed at extending the 330kV network to Chipata in order to provide reliable supply to the Eastern Province.
- **Transmission Networks Developed** - ZESCO Limited constructed the Luano – Kansanshi Mine 330kV and the Kansanshi Mine – Lumwana Mine 330kV transmission lines in order to support economic activities in the mineral rich North-Western Province. ZESCO also constructed the Victoria Falls – Katima Mulilo 220kV transmission line.

To ensure environmental compliance in all its projects and operations, ZESCO established the Environment and Social Affairs Unit in 1996. Over the last 16 years, the Unit has evolved into a department and undertaken numerous ESIA studies for generation, transmission and distribution projects, some of which are mentioned above.

#### 1.8 Total Project Cost/Investment

The proposed Lusaka 132kV Transmission Ring Reinforcement project will cost approximately USD150 Million.

#### 1.9 Proposed Project Implementation Date

The project will be executed over a period of 36 months.

## **2.0 POLICY, LEGAL AND INSTITUTIONAL FRAMEWORK**

### **2.1 Environmental Policy Framework**

In view of the various environmental challenges the country faces, Zambia launched its National Policy on Environment (NPE) in 2007. The environmental policy document identifies deforestation, land degradation, wildlife depletion, soil erosion, loss of land productivity, inadequate sanitation and air and water pollution as the main environmental challenges the country is facing.

The NPE calls upon all institutions, Non-Governmental Organisations (NGOs), and community based or people's organizations whose activities affect the environment in any way to carry out their activities judiciously in order to maintain the productivity and integrity of the environment.

Further, the NPE recognizes the need for EIA studies in all development projects in order to eliminate or mitigate adverse environmental impacts and enhance the benefits of the projects. The National Policy on Environment states that "EIAs will be required as deemed necessary to ensure that public and private sector development options are environmentally sound and sustainable and that any environmental consequences are recognized early and taken into account during project design and implement."

### **2.2 Environmental Legislation**

The legislative responsibility of environmental impact assessment is vested in the Zambia Environmental Management Agency (ZEMA) which administers the Environmental Management Act (EMA) No. 12 of 2011, Statutory Instrument No. 28 of 1997 – The Environmental Impact Assessment (EIA) Regulations. The Zambia Environmental Management Agency is mandated to:

- a) identify types of projects, plans and policies for which environmental impact assessments are necessary and to undertake or request relevant institutions to undertake such assessments for consideration by the Agency;
- b) to monitor trends in the use of natural resources and their impact on the environment;
- c) to request information on the quantity, quality and management methods of natural resources and environmental conditions from any individual or organization anywhere in Zambia; and
- d) to consider and advise the government, on all major development, on all major development projects at an initial stage and on the effects of any sociological or economic development on the environment.



In addition to the above, the Ministry of Lands, Natural Resources and Environmental Protection in consultation with ZEMA, is empowered to make regulations by statutory instrument for any matter that can be prescribed under the Act in the protection of the environment.

In Zambia, it is a legal requirement under the Environmental Management Act No. 12 of 2011, that developers should implement projects in line with the provisions of the law. Section 3 (1) of Statutory Instrument No. 28 of 1997 of the above Act states that “A Developer shall not implement a project for which a project brief or environmental impact statement is required under these Regulations, unless the project brief or an environmental impact statement has been concluded in accordance with these regulations and the Environmental Council of Zambia has issued a Decision letter.”

In the category of electrical infrastructure, the types of projects which need Project Briefs are new electricity generation stations, electrical power transmission lines more than 1 km long and surface roads for electrical and transmission lines more than 1 km long. The project under consideration falls within the types of projects which require an Environmental Impact Assessment.

ZEMA also provides report formats for presenting findings of ESIA studies. This EIS follows the prescribed format as presented in Appendix 4.

The legislation that is relevant to the proposed Lusaka 132 kV Transmission Ring Reinforcement project is presented in Table 1 below. The table also describes how the project will comply with this legislation.

**Table 1: Legislation Relevant to the Lusaka 132 kV Transmission Ring Reinforcement Project**

Legal Instrument	Main Provisions	Responsible Institutions	Relevance to / Compliance with the 132kV Lusaka Ring Transmission Line project
<b><i>Environment and Natural Resources Management</i></b>			
Environmental Management Act (EMA) No.12, 2011	This act provides for integrated environmental management and the protection and conservation of the environment and the sustainable management and use of natural resources. It also provides for the prevention and control of pollution and environmental degradation so as to provide for the health and welfare of persons, animals, plants and the environment.  The Act covers the	Ministry of Lands, Natural Resources and Environmental Protection  Zambia Environmental Management Agency,	Implementation of the project is dependent on the EIS approval decision letter.  Carrying out this EIA study is in compliance with the EMA No. 12 of 2011 in particular, the EIA Regulations, and is important as it enhances environmental protection.  Furthermore, environmental monitoring on various aspects of the project shall continue throughout the project phases, in compliance with respective Statutory Instruments of the EMA No. 12 of 2011, such as waste, water and air.

<b>Legal Instrument</b>	<b>Main Provisions</b>	<b>Responsible Institutions</b>	<b>Relevance to / Compliance with the 132kV Lusaka Ring Transmission Line project</b>
	management of water, air, waste (hazardous and municipal), pesticides and toxic substances, noise, ionizing radiation and natural resources, etc.		ZESCO shall endeavour to adhere to the principles of sustainable development during all phases of project implementation. This shall be done by making sure that all identified negative impacts are minimized and positive impacts are enhanced in accordance with the EIS and the mitigation measures thereof.
Natural Resources Conservation Act, Cap 315, 1970	Conservation and improvement of natural resources and control of bush fires and powers of Minister to make regulations	Ministry of Lands, Natural Resources and Environment Protection	Monitoring of natural resource conservation and utilization aspects in order to comply with sustainable development principles.  The project implementation shall comply with the Natural Resources Conservation Act of 1970.
<b>Water Supply and Sanitation</b>			
The Water Supply and Sanitation Act No. 28 of 1997	Framework for providing and regulating water and sanitation services to all areas. Creates the Council (i.e. NWASCO) which administers the Act	Ministry of Local Government & Housing; NWASCO	Regulates water supply and sanitation aspects.  All sanitation and water aspects arising from the project will abide by the Water Supply and Sanitation Act No.28 of 1997, thus preventing pollution of water bodies and land pollution from sanitary wastes.
<b>Forestry Resources Management</b>			
The Forest Act No. 7, 1999	Control, manage, conserve and administer National and Local forests; Participation of local communities, traditional institutions, and NGOs; Conservation and sustainable use of forests and trees; and, Implementation of International Instruments. Creates Forestry Commission	Zambia Forestry Commission (yet to be formulated) / currently by the Department of Forestry	Coordination and management of the surrounding forest areas.  All project activities relating to the use of forest resources or affecting forests shall be done in accordance with the Forest Act No. 7, 1999 to ensure the project does not degrade any forests in the neighbouring environment.
<b>Wildlife Resources Management</b>			
The Zambia Wildlife Act, No. 12 of 1998	To control and manage national parks, GMAs and bird sanctuaries for the purposes of conserving and enhancing wildlife eco-systems.	Zambia Wildlife Authority	Protection and conservation of wildlife resources.  During the implementation and operation phases of the project, wildlife, forest resources and ecosystems will be protected and conserved in accordance with the Zambia Wildlife Act, No. 12 of 1998. Project activities will be carried out such that there would be no natural habitat degradation in the project area.
<b>Mining Activities</b>			
Mines and Minerals Act, No.	Regulates the law relating to mines and minerals	Ministry of Mines, Energy and Water	Provides for controlled blasting.

<b>Legal Instrument</b>	<b>Main Provisions</b>	<b>Responsible Institutions</b>	<b>Relevance to / Compliance with the 132kV Lusaka Ring Transmission Line project</b>
31 of 1995		Development: Mine Safety Department	The project will prepare a blast management plan in compliance with the Act.
<b>Cultural Aspects</b>			
National Heritage Conservation Act No. 23 of 1989	To conserve and protect both natural and cultural heritage, e.g. waterfalls, artefacts, graves,...in perpetuity and other resources within the boundaries of the site for the benefit of the present and future generation	National Heritage and Conservation Commission	Monitoring and management of all identified physical and cultural heritage sites and artefacts in the area.  The National Heritage Conservation Act No. 23 of 1989 shall be adhered to throughout the life-cycle of the project to ensure conservation of national heritage material.
<b>Electricity Industry</b>			
Energy Regulation Act Cap. 436, 1995	ERB) was created under the <b>Energy Regulation Act</b> of 1995 Chapter 436 of the Laws of Zambia following the issuance of Statutory Instrument number 6 of 1997, the Energy Regulation Act (Commencement Order) of 27 <sup>th</sup> January 1997.  The role of the ERB, among other functions, ensures that all energy utilities in the sector are licensed, monitors levels and structures of competition, and investigates and remedies consumer complaints	Ministry of Mines Energy and Water Development  Energy Regulation Board	License for transmission of power required before commencement of the project.  All associated project activities shall be done in accordance with the Energy Regulation Act Cap. 436, 1995. The development of the transmission line project will be monitored by ERB to ensure conformity to the provisions of the Act.
Electricity Act No.433 of 1995	Provides for the regulation of the generation, transmission, distribution and supply of electricity; and provides guidance on the matters connected with or incidental to the foregoing and to ensure that ZESCO power projects and operations are carried out in line with the provisions of the Electricity Act	Ministry of Mines, Energy and Water Development  Energy Regulation Board	It is the governing Act for the operations concerning the Transmission line.  The project operations shall comply with the Electricity Act No.433 of 1995
<b>Lands Management</b>			
The Lands Act, 1995 (CAP 292, CAP 289, CAP 288)	The Department of Lands administers the Land Act, 1995 (CAP 292, CAP 289, CAP 288) and the Lands Acquisition Act, 1995 for the allocation and alienation of land under statutory leaseholds. The Department is also responsible for the	Ministry of Lands, Natural Resources and Environment Protection	Governs the acquisition of the land to be used for the development of the Transmission line infrastructure.  All land acquisition procedures, where applicable, shall comply with the Lands Act, 1995 (CAP 292, CAP 289, CAP 288) to ensure all PAPs are duly compensated.

<b>Legal Instrument</b>	<b>Main Provisions</b>	<b>Responsible Institutions</b>	<b>Relevance to / Compliance with the 132kV Lusaka Ring Transmission Line project</b>
	administration of lands and deeds registration and land surveys and mapping.		
Town and Country Planning Act, Cap 283, 1962	Provides for the appointment of planning authorities, the preparation approval and revocation of development plans, and the control of development and subdivision of land	Ministry of Local Government and Housing  Local Authorities	Approvals of construction and area plans for siting of substations.  The development of the project shall comply with the Town and Country Planning Act, Cap 283, 1962.
Local Government Act, 1990	Provides for the establishment of Councils in districts, the functions of local authorities and the local government system. Some of these functions relate to pollution control and the protection of the environment in general.	Ministry of Local Government and Housing  Local Authorities	The Act is relevant to the project as some pollution control and environmental protection functions are handled by the local Council.  The project will comply with the Act in terms of all pollution control and waste related matters.

## 2.3 World Bank Safeguard Policies

In addition to the national environmental legal framework, this ESIA takes into consideration World Bank Safeguards Policies that could be potentially triggered by the project. Table 2 below gives some of the Environmental and Social Safeguard Policies that would potentially be triggered by the transmission line project.

**Table 2: List of World Bank Environmental and Social Safeguard Policies relating to power line projects and their Objectives**

No.	Safeguard Policy	Objective
OP 4.01.	Environmental Assessment	<ul style="list-style-type: none"><li>• To help ensure the environmental and social soundness and sustainability of investment projects</li><li>• To support integration of environmental and social aspects of projects into the decision making process</li></ul>
OP 4.04	Natural Habitats	<ul style="list-style-type: none"><li>• To promote environmentally sustainable development by supporting the protection, conservation, maintenance, and rehabilitation of natural habitats and their functions.</li></ul>
OP 4.12	Involuntary Resettlement	<ul style="list-style-type: none"><li>• 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.</li></ul>
OP 4.11	Physical Cultural Resources	<ul style="list-style-type: none"><li>• To assist in preserving physical cultural resources and avoiding their destruction or damage. PCR includes resources of archaeological, paleontological, historical, architectural, religious (including graveyards and burial sites), aesthetic, or other cultural significance.</li></ul>

## 2.4 International Conventions, Protocols and Guidelines

Additional international guidelines that will govern the development of the ESIA will be the International Finance Corporation's (IFCs) Sustainability Framework, in particular, the Performance Standards (PS) on environmental and social sustainability. The IFC Performance Standards applicable to this project are in Table 3 below.

**Table 3: IFC Standards on Environmental and Social Sustainability**

.	Performance Standard	Objective
PS 1	Assessment and Management of Environmental and Social Risks and Impacts	The requirements of this Performance Standard apply to all business activities unless otherwise noted. Its objectives are to promote environmental and social performance of clients, ensure grievances of affected communities and external communication from stakeholders are addressed appropriately
PS 2	Labour and Working Conditions	This standard's objectives are to promote the fair treatment, non-discrimination, and equal opportunity of workers, establish, maintain, and improve the worker-management relationship. Promote compliance with national employment and labour laws; protect workers, including vulnerable categories of workers such as children, migrant workers, workers engaged by third parties, and workers in the client's supply chain. Promote safe and healthy working conditions and the health of workers and avoid the use of forced labour
PS 3	Resource Efficiency and Pollution Prevention	This standard aims to avoid or minimize adverse impacts on human health and the environment by avoiding or minimizing pollution from project activities, promote more sustainable use of resources, including energy and water and reduce project-related GHG emissions
PS 4	Community Health, Safety, and Security	The standard's objectives are to anticipate and avoid adverse impacts on the health and safety of the affected community during the project life from both routine and non-routine circumstances, ensure that the safeguarding of personnel and property is carried out in accordance with relevant human rights principles and in a manner that avoids or minimizes risks to the affected communities
PS 5	Land Acquisition and Involuntary Resettlement	<p>This standard aims at avoiding, and when avoidance is not possible, minimize displacement by exploring alternative project designs, avoid forced eviction, anticipate and avoid, or where avoidance is not possible, minimize adverse social and economic impacts from land acquisition or restrictions on land use by</p> <ul style="list-style-type: none"> <li>i. providing compensation for loss of assets at replacement cost and</li> <li>ii. ensuring that resettlement activities are implemented with appropriate disclosure of information, consultation, and the informed participation of those affected, improve, or restore, the livelihoods and standards of living of displaced persons and improve living conditions among physically</li> </ul>

		displaced persons through the provision of adequate housing with security of tenure at resettlement sites.
PS 8	Cultural Heritage	This Standard recognises the importance of cultural heritage for current and future generations. Consistent with the Convention Concerning the Protection of the World Cultural and Natural Heritage, this Performance Standard aims to ensure that clients protect cultural heritage in the course of their project activities. In addition, the requirements of this Performance Standard on a project's use of cultural heritage are based in part on standards set by the Convention on Biological Diversity.

Further, Zambia has signed and is party to more than thirty Regional and International Protocols and Conventions. The most relevant environmental conventions are: The Southern African Development Community (SADC) protocols on environment, natural resources management and water and soil conservation.

Some of the other international conventions that Zambia is party to include those dealing with the Protection of the World Cultural and Natural Heritage (of 1972) and ratified by Zambia in 1982; statutes of the International Union for the Conservation of Nature and Natural Resources (IUCN); Convention on International trade in Endangered Species of the wild fauna and flora (CITES), 1993, ratified in 1993; the RAMSAR Convention; and Bonn Convention. Zambia has also ratified the Basel Convention (1994) which regulates trans-boundary movements of hazardous wastes.

Other International conventions that the country is party to include:

- Convention on Wetlands of International Importance, especially as waterfowl habitat
- African Convention on the Conservation of Nature and Natural Resources
- Montreal Protocol on Substances that Deplete the Ozone Layer
- Convention on Biological Diversity
- United Nations Framework Convention on Climate Change, and
- United Nations Convention to Combat Desertification

### **3.0 PROJECT DESCRIPTION**

#### **3.1 Location**

##### **3.1.1 Proposed Transmission Ring Route**

The proposed project area is located in Lusaka. The Lusaka transmission network is supplied at 330kV through two main supply sub stations; Leopards Hill in the east of the city and Lusaka West in the west of the city. These two substations supply three main Bulk Supply Points (BSPs) into Lusaka through a transmission ring connecting Coventry (132kV), Roma (132kV) and Waterworks (88kV) sub stations.

From Lusaka West 330/132/88kV substation the Ring travels approximately 9km south-east into Coventry 88kV substation in the Lusaka light industrial area. From Coventry, the Ring cuts across Mumbwa Road, through Soweto Market, past Los-Angeles Road and across Kafue Road through Kamwala South and Misisi and finally terminates after 7km at Waterworks 11kV substation in Libala South. From Waterworks substation, the Ring heads eastward to Leopards Hill 330/132/88kV substation for a distance of 22km, passing within the vicinity of Bauleni and Lusaka South Multi Facility Economic Zone (MFEZ).

From Leopards Hill substation, the Ring moves north-west into Avondale, then across Great East Road near Kenneth Kaunda International Airport round-about, crossing Airport Road. It then heads westward through Cheltsone and Ng'ombe passing along the northern boundary of Foxdale residential housing complex, and crosses Zambezi Road into Roma 132/33/11kV substation. The distance between Leopards Hill and Roma substations is approximately 28km.

From Roma substation the Ring heads south-west for 15km and terminates at Lusaka West substation having passed through Zani Muone near Kabangwe and Matero. The approximate total circumference of the Ring is 81km.

##### **3.1.2 Project Route Map / Geographical Coordinates**

A satellite image of the project location and a map showing the outline of the Lusaka 132kV transmission ring are presented in Appendices 3A and 3B respectively.

#### **3.2 Project Description**

##### **3.2.1 Raw Materials**

The main construction materials on the project will include, but not limited to, the following:

- Steel for towers, concrete reinforcement, fencing etc.
- River sand and cement for concrete works
- Stone and aggregate of various sizes for concrete



- Timber of various sizes
- Insulators, cables, bolts, nuts,
- Conductors, busbars and transformers

### **3.2.2 Products and by-products**

The main product of the project is electric power that will be transmitted through the reinforced Ring.

The resulting by products from the project shall include: waste materials from the construction process such as cement bags and other packaging materials, aggregates, steel off-cuts, bolts & nuts, wood, waste (domestic) from camp sites, etc. All waste shall be disposed of in designated sites and where possible recycled or reused.

### **3.3 Main Project Activities**

#### **3.3.1 Preparation Phase**

The activities to be conducted during the site preparation phase of the project include reconnaissance survey, clearance of encroached wayleave, and training of personnel.

##### **3.3.1(a) Reconnaissance Survey**

A reconnaissance survey of the transmission Ring was conducted and the transmission ring will be adjusted to minimize environmental impacts and displacement/resettlement. This included the review of maps and preliminary ground truthing. Additionally, the survey was done to determine the nature of works to be carried out on the line

##### **3.3.1(b) Wayleave Clearance**

The transmission Ring that is being reinforced and upgraded to 132kV already has an existing wayleave. However, over the years, this wayleave has been encroached upon by temporal vending and agricultural activities. The temporal vendors are not using permanent structures for conducting their business. To facilitate construction works, the vendors will be required to operate outside the wayleave as a safety precaution. It is anticipated that this movement of a few hundred metres, would not cause any undue burden. Further, construction activities will occur after crop harvesting in sections where the wayleave is encroached by agricultural activities, therefore not impacting crops. In view of the fact that the extent of substation expansion works and tower/pole locations have not been established, it is premature at this point to state who and what exactly will be affected hence the preparation of an RPF to precede the RAP for this project. Refer to Appendix 3A for the wayleave numbering of the Ring.



Example of wayleave encroachments in Lusaka

### **3.3.1(c) Training of Personnel**

Environmental, Health and Safety, (EHS) training will be given to appropriate contracted personnel prior to the commencement of the works on the transmission Ring. The level of training will be commensurate with the type of duties of the personnel. The training program will cover plans and procedures specific to the project and may include ZESCO EHS policies, wayleave clearing guidelines, waste management and general EHS education. Application of occupational health and safety practices will be mandatory at the project site.

### **3.3.2 Construction Phase**

The implementation phase of this project will be divided into three sub-components as follows:

- i. Lusaka Transmission Ring Upgrade,
- ii. Upgrade of existing Bulk Supply Point Substations of the sub transmission ring, and
- iii. Upgrade/Construction of 132kV substations and lines.

### **3.3.2(a) Lusaka Transmission Ring Upgrade**

This sub-component aims at increasing the transfer capacity of the transmission ring which supplies the Lusaka area to enhance the security of supply and to satisfy future load growth. These works include:

- i. Replacement of the existing 50km of the old 132kV (86MVA) lines which are installed on lattice steel towers between the Leopards Hill – Roma – Lusaka West substations , with a new 132kV (300MVA) transmission line on compact monopole double circuit structures;
- ii. Replacement of about 10km of the old 132kV (86MVA) lines which are installed on lattice steel towers between Lusaka West and Coventry substations with a new 132kV (400MVA) transmission line on compact monopole double circuit structures;
- iii. Replacement of about 22km of two old 88kV (57MVA) lines which are installed on standard towers between Waterworks and Leopards Hill substations with a new 132kV (200MVA) transmission line on compact monopole double circuit structures; and
- iv. Construction of 132kV looping in/out lines for Kanyama, Bauleni and Matero substations

### **3.3.2(b) Upgrade of existing Bulk Supply Point Substations of the Transmission Ring**

This sub-component will focus on the upgrading of the capacity of transformers at the existing BSPs to allow the evacuation of power supply to the distribution network. The activity under this sub-component concerns:

- i. The upgrading of the transformers, switchgear and other equipment at exiting BSPs including Leopards Hill, Lusaka West and Waterworks substations.
- ii. For Waterworks substation, Upgrading of the 132/33kV transformation to 2x 90MVA and replacement of the 132/11kV transformation by 3x 30MVA, and
- iii. Upgrading of the 330/132kV transformation to 3x 250MVA For Leopards Hill and Lusaka West substations.

### **3.3.2(c) Upgrade/Construction of 132kV substations and lines**

The upgrading and construction of 132kV substations and lines at strategic locations would increase the capacity and reliability of the network by enhancing its configuration. This sub-component would consist of the following activities:

- i. Construction of new 132/11kV substations, including the construction of new 132/11 kV 3x30MVA substations at Kanyama, Roma, Chawama, and Ibex;
- ii. Upgrading of existing 132/11kV substation, including the upgrading to 3x30MVA or to 2x30MVA of the Bauleni, Matero, Chongwe, and Unza substations and the

- corresponding 132kV line extensions throughout the network as recommended by ZESCO's consultants;
- iii. Upgrading of 88kV lines to 132kV and construction of 132kV new lines: this activity includes the upgrading of the Leopard Hill –Chongwe – Figtree 88 kV line to a 132kV - 200MVA line, and the construction of 132kV 200MVA lines between the following substations: Leopards Hill –Ibex; Ibex-Unza; and Lusaka West - Mungwi Road.



Segment of the Lusaka Transmission Ring

### 3.3.3 Operation Phase

The transmission Ring shall be declared operational once all pre-commissioning tests and activities are completed and the line energized. Route maintenance of the wayleave (vegetation control) and technical inspections (line patrols), general line performance and normal switching's shall constitute the operation phase of the reinforced Ring.

The reinforced Ring will be operated and maintained by ZESCO in accordance with standard procedures designed to ensure the integrity of the transmission system.

Routine inspections will be conducted on the Ring to ensure line security and public safety. During operation, routine maintenance of the Ring will be carried out during annual wayleave maintenance by ground patrol. The vegetation along the wayleave will be controlled to minimize conducting power to the ground and ground clearances are not to be exceeded. ZESCO currently uses a combination of mechanical bush control and manual cutting for vegetation according to the ZESCO wayleave guidelines.

### 3.4 Project Costs and Financing

The total estimated capital expenditure to ensure the adequate functioning of the transmission network is broken down in Table 4 below.

**Table 4: Breakdown of Project Costs**

<b>S/N</b>	<b>Rehabilitation of the Transmission Network</b>	<b>Cost (USD' 000)</b>
1	Lusaka Transmission Ring Upgrade	20
2	Upgrade of existing BSPs of the ring	44
	<b>Upgrade/construction of 132kV substations and lines</b>	
3a	Construction of new 132/11kV substations	35
3b	Upgrade of existing substations	34
3c	Upgrade of 88kV lines to 132kV and construction of 132kV new lines	17
<b>TOTAL</b>		<b>150</b>

The total project cost and different financing sources of the proposed project is explained in the following table.

<b>Project Components</b>	<b>Total Project cost (Million USD)</b>	<b>Project Cost Financed by</b>			<b>% of IDA Financing</b>
		<b>IDA</b>	<b>EIB</b>	<b>Recipient</b>	
Rehabilitation of the Transmission Network	150	90		60	38%

However the section of the Ring between Coventry and Waterworks substations shall be financed solely by ZESCO.

## 4.0 PROJECT ALTERNATIVES

The project seeks to address the current incapacitation of the Lusaka transmission network. The available project alternatives for addressing this situation are discussed below.

### 4.1 Location Alternatives

With regard to project location, there were no alternatives considered since the project will involve reinforcement of an existing transmission network. As such, the sole location for the implementation of the project is in the footprint of existing servitude for the Lusaka Ring.

### 4.2 Process and Technology

Options of using either Tubular Steel Poles or Steel Lattice Towers for the transmission lines support structure were considered and the tubular steel poles were preferred.

### 4.3 The Do-Nothing Option

The ‘do nothing’ option was considered but if selected would not be beneficial to resolve the crisis situation of unsustainable power supply and the developmental needs of Lusaka considering the increasing demand for electricity. Given the state of the infrastructure (i.e. more than 20 years old), it is necessary to upgrade it.

### 4.4 Project Implementation Option

This current project implementation option was considered and selected as a preferred alternative as it would be beneficial to the developmental needs of Lusaka and less costly than developing a new transmission network. Further, it would yield the intended results and benefits within a reasonable time frame.

### 4.5 Justification of Preferred Options

The justification of the preferred options is presented below:

- i. *Location Alternatives:* This option was the only one available. This was because the project is concerned with the reinforcement of the existing Lusaka 132kV transmission Ring. As such, the location will be restricted to Lusaka, and will involve the rehabilitation and upgrading of the Transmission lines connecting Lusaka West, Coventry, Waterworks, Leopards Hill, and Roma substations; all located in Lusaka. Therefore, the described route and location of the project is the only option available.

- ii. *Process and Technology:* Tubular steel poles were preferred to the steel lattice towers. This is because the change in transmission lines support structure from lattice steel towers to tubular steel poles would be necessary to reduce the installation and maintenance costs. This would also eliminate the numerous bolted connections that require periodic inspection and tightening. In addition, tubular steel poles are easier and faster to install, have a very high corrosion resistance, and are much stronger compared to lattice steel towers. The use of this technology is particularly appropriate for urban areas like Lusaka where the establishment and maintenance of Right of Way is a challenge.
- iii. *The Project Implementation Option:* This was the only viable option as selecting the 'do-nothing option' would entail that the current situation of unstable supply of power within Lusaka would continue and operational risks (structural failure, fire, etc.) and maintenance costs associated with this transmission network would increase. This would retard development, and demand for power will continue to outstrip supply, as load shedding would continue being the status quo.



## **5.0 ENVIRONMENTAL BASELINE STUDY**

### **5.1 Physical Environment**

The physical environment on the route refers to the natural environment associated with the Lusaka ring 132kV reinforcement project area from Leopards Hill substation via Avondale, Roma, Lusaka West, Coventry, Waterworks Substation and back to Leopards Hill. The physical environment includes: the geology, topography, soils, climate, and hydrology of the study area

#### **5.1.1 Geology**

Rocks underlying the city of Lusaka consist of schists interbedded with quartzites and dominated by thick and extensive sequences of marbles, with the latter being generally referred to as the Lusaka Dolomites or Lusaka Limestones (Figure 2). The Dolomites occurs as crystalline banded, grey and white dolomitic limestone. Compared to other calcareous rocks of the Katanga sequence, it appears to be purer and includes a much higher proportion of dolomitic rocks, particular the massive, pink, white and grey varieties. These are underlain by a thick sequence of Precambrian metasediments which have been intruded by granitic and basic bodies (Simpson et al., 1963). These Precambrian rocks were divided into a mostly granitic Basement complex and the metasediments of the Katanga Super group.



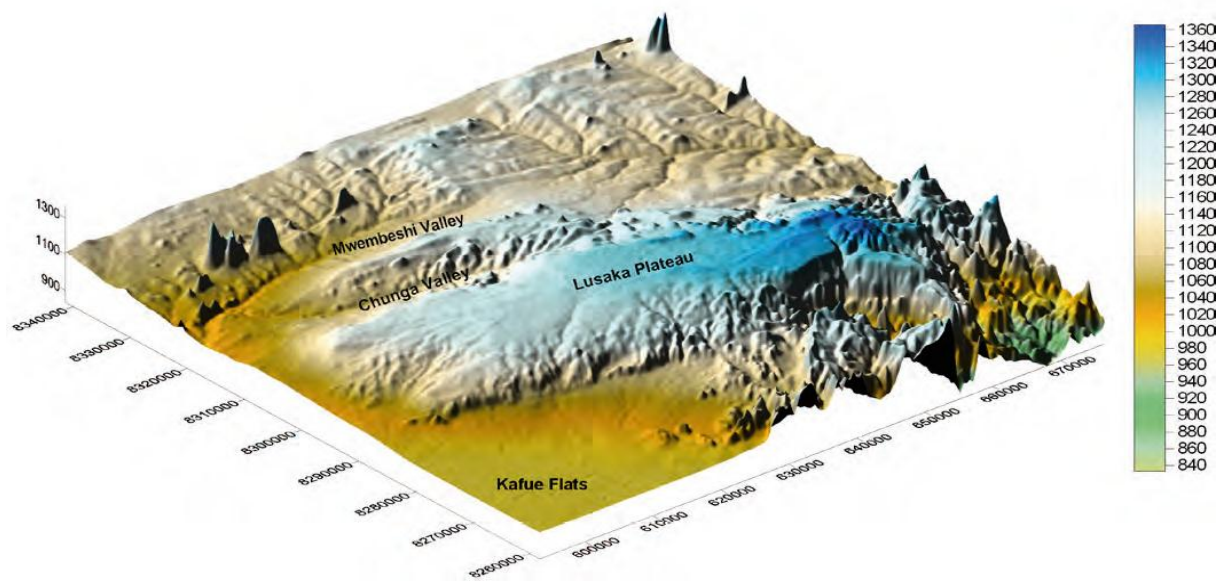
**Figure 2: Gray and White laminated Lusaka dolomite in Lusaka South (ZESCO, 2013)**

The Basement complex crops out to the North and South of Lusaka and is composed of coarse grained quartz-muscovite-biotite schists and sheared quartz-feldsparbiotite gneisses in the North and augen gneisses, feldspathised and foliated schists in the South. The augen gneisses have been dated at 1106 $\pm$ 19 Ma (Hanson, 1990). The metasediments, which dominate in the central part of the area and underly the central business district (CBD) of Lusaka, are composed, from bottom to top, of Matero Quartzite, Ridgeway Schist and Lusaka Dolomite (Newman & Matheson, 1966; Thieme, 1984). These last are grouped in the Lusaka Formation, prevalently composed of dolomitic marbles. From a structural point of view many fracture joints, shears and thrust faults occur especially on the schist-dolomite contact, representing highly permeable areas in which surface water easily reaches the water table.

The Lusaka granite is located about 20km north-west of Lusaka. The foliated coarse-grained granite intruded the marble and quartzite horizons of the Cheta Formation to the north and schist and amphibolite of the Chunga Formation to the south. The granitoid rock is a coarse-grained adamellite, a silica rich (>65%) igneous rock with approximately equal proportions of orthoclase and plagioclase feldspars of uniform composition throughout its exposed area. A number of smaller igneous intrusions occur in the areas south and west of the Lusaka Plateau and in the Chisamba areas predominantly as gabbroic plugs.

### **5.1.2 Topography**

Lusaka is built on a plateau which stands at an altitude of 1,300 meters above sea level (masl). To the North and gently drops to 1,200 masl towards the East, the South and the West. The plateau is an about 70km long and 10km wide ESE-WNW stretching low ridge (Figure 3). The flat morphology of the Lusaka plateau is the result of intense and long weathering of the outcropping lithologies, resulting in flat schist and carbonate plains with rounded quartzite hills, forming an immense erosion plateau known as the Gondwana and Africa surface (Dixey, 1945). The Lusaka plateau forms a watershed between the Chumba River, which ends up in the Mwembeshi River to the West, and many smaller rivers which end up into the Chongwe to the Northwest and Kafue rivers to the South.



**Figure 3: Block Diagram of the Lusaka Plateau (vertical exaggeration 26x) (Desk Study & Proposed Work Program Report No. 2 – Development of a Groundwater Information & Management Program for the Lusaka Groundwater Systems, 2008)**

### 5.1.3 Soils

In Lusaka and upon ancient rocks, alluvial sediments (Quaternary) have been deposited. Furthermore, rocks are covered with a more or less thick cover of soils, mainly composed of iron-oxide oolites in a clayey matrix on dolomitic lithologies and sandy sediments on schists, gneisses and granites. The soil distribution appears to be mainly influenced by morphology (e.g. slope and position) followed by parent material. The three most common soil types in the area are:

- i. **Leptosols:** These are very shallow, extremely stony or gravelly and well drained soils, they prevail mainly in the hilly areas. Locally these soils are known as the “Makeni Series”. The texture corresponds to sandy loams or clay loam. The soil colour ranges from red to brown and mainly depends on the content of iron oxides. Outcrops of hard rock are frequent. So-called pisoplinthic horizons or layers containing nodules that are strongly indurated by iron can frequently be observed. The soil commonly forms pockets between solution pillars of the carbonate rock that are known as karrenfelder.
- ii. **Lixisols:** These are a soil type with high-base status having higher clay content in the subsoil than in the topsoil as a result of soil forming (pedogenetic) processes, developed on flat or gently sloping areas.
- iii. **Vertisols:** These are heavy clay soils with a high proportion of swelling clays, they are found in the poorly drained unconsolidated deposits. These are also common along dambos or near streams, in particular along the north-western edges of Lusaka; they are poorly drained dark-grey to blackish, fine-textured and heavy calcareous and are locally known as “Cheta Series”. These soil types are normally too wet for cultivation and contain more clay and humus and is extracted and used as a fertile substratum for gardens.

#### **5.1.4 Climate**

Lusaka, like the rest of the country, experiences a tropical Savannah climate with three distinct seasons: the warm-wet season, stretching from November through April; cool dry season from May to August with the mean temperatures varying between 14°C and 30°C. The hot dry season is experienced during the months of September and October.

Rainfall in Lusaka is caused mainly by the convergence of the North-east and South-east Trades that form the Inter-tropical Convergence Zone (ITCZ). The rainy season lasts approximately five months with December, January and February period experiencing greatest rainfall while November and March have less. The mean annual rainfall ranges between 750mm and 880mm.

The mean annual temperature in Lusaka is 20.7°C which is slightly below the Zambian average of 21.0°C. The coolest months are June and July with an average of around 16°C. The maximum monthly temperatures occur in October with a mean of about 24°C.

The area receives sunshine similar to the national average. Sunshine duration measured at stations at Kenneth Kaunda International Airport (KKIA) average at 7.7 hours compared to 7.8 hours per day countrywide.

#### **5.1.5 Hydrology**

Drainage of the area reveals an essentially radial pattern. This pattern appears consistent with the domical-type relief, which conforms to the basin and swell structural concept explaining the relief of Africa, with the Lusaka plateau forming a minor swell. One of the most conspicuous features of this plateau is the scarcity and/or complete lack of surface drainage particularly in its central part. Thus, rainwater drains into fissures and/or infiltrates through the overburden to join the underground water. Only surface water in excess of the infiltration capacity is drained into minor seasonal streams.

#### **5.1.6 Air Quality**

Lusaka being the capital city is heavily congested by both human settlement and motor vehicle traffic. While there are number of light industries in the area, the industrial base of the city has not reached its full potential; as such, air pollution is not as serious an issue as in other mining towns of Zambia. There are usually heavy traffic flows that contribute to mobile sources of air pollution. However, most of the air pollution in Lusaka is localized.

There are other activities such as road construction and periodic maintenance that cause dust pollution. Generally, due to lack of vegetation cover, during the windy months of July-August, dust pollution is experienced.

### 5.1.7 Noise

Lusaka as earlier alluded to is congested both in terms of human population and motor vehicle traffic. Sources of noise pollution are mainly from anthropogenic activities such as construction and heavy industry associated works in various localities within the city.

## 5.2 Biological Environment

### 5.2.1 Fauna

Lusaka City has undergone steady and rapid urbanisation over the last sixty (60) years, and the indigenous fauna population has dwindled. Terrestrial animal species encountered during the field survey were *Locustana pardalina* (brown locust), *Lobobunaea angasana* (emperor moth), *Euxanthe wakefieldii* (forest queen butterfly), *Danaus plexippus* (monarch butterfly), *Philaeus Chrysops* (jumping spider), *Spodoptera exempta* (African armyworm), and *Microcerotermes* sp. (wood-feeding higher termites). The surveyed project area has no significant natural watercourses, thus no aquatic animal species were observed during the study.

Other fauna species, which are wild to the project area, are confined to fish farms (e.g. *Oreochromis niloticus* or Nile tilapia), smallholder cattle ranches [e.g. Boran, Baila, Angoni (all *Bos indicus*) and Freisian] and reptile farms (e.g. *Crocodylus niloticus* or Nile crocodile). The Lusaka National Park, a recently gazetted wildlife reserve in the Shantumbu area, is outside the project area. Nonetheless, it is perhaps the only facility close to the project area which will stock large wild mammals. The Lusaka National Park is primed to have a wildlife species' portfolio that will include *K. l. smithemani* (Black Lechwe), *Alcelaphus buselaphus* (Hartebeest), *Manis* spp. (Pangolin), *Giraffa camelopardalis* (Giraffe), *Phacochoerus africanus* (Warthog), *Tragelaphus strepsiceros* (Greater Kudu), *Aepyceros melampus* (Impala), *Hippotragus equinus* (Roan Antelope), *Hippotragus niger* (Sable antelope), *Taurotragus oxyx* (Eland), *Tragelaphus angasii* (Nyala), and *Redunca arundinum* (Common Reedbuck). No endangered or rare fauna species were identified in the project area.

### 5.2.2 Flora

Lusaka City has very low vegetation biodiversity, owing to the level of urbanisation in much of the project area, as can be seen in the satellite image in appendix 3a. The most visible vegetation, as can be seen from the bright green patches on the image, is composed of crops grown for human and livestock consumption. The area near Roma Substation is dominated by relatively young regenerating Miombo woodland, due to the level of indiscriminate charcoal harvesting that the area appears to have previously experienced. Thicket patches, surrounding termite mounds, occur in some regions of the project area. The existing wayleaves are covered by grasses, small shrubs and low-lying crops.

The dominant woody species in the project area are: *Brachystegia boehmii*, *Brachystegia utilis*, *Julbernardia globiflora*, *Albizia antunesiana*, *Pterocarpus angolensis*, *Brachystegia spiciformis*, *Combretum molle*, and *Markhamia obtusifolia*. The species of smaller trees and shrubs observed in the project area include *Pavetta schumanniana*,

*Ochna schweinfurthiana*, *Dalbergiella nyasae*, *Psorospermum febrifugum*, *Steganotaenia araliacea*, *Rothmannia engleriana*, *Diplorhynchus condylocarpon*, *Multidentia crassa*, *Olax obtusifolia*, *Securidaca longipedunculata*, *Senna singueana*, *Vernonia glaberrima*, and *Vigna vexillata*. Four (4) species of grasses were seen in the area, and these are *Eragrostis racemosa*, *Andropogon chinensis*, *Zonotriche inamoena*, and *Brachiaria brizantha*.

Secondary vegetation consists of species such as *Vernonia glabra*, *Clerodendrum fructectorum*, *Rourea orientalis*, *Zornia glochidiata*, *Solanum incanum*, *Macrotyloma africana*, *Waltheria americana*, *Cynodon dactylon*, *Andropogon gayanus*, *Indigofera nummulariifolia*, *Tephrosia elata*, *Eleusine Africana*, *Melinis repens*, and *Pogonarthria squarrosa*.

Crops and grasses grown in the project area include *Zea mais* (maize), *Dactylis glomerata* (Orchard grass), *Glycine max* (soybeans), and *Cucurbita pepo* (pumpkin). Some trees of *Mangifera indica* (Mango) were also observed in the area.

No aquatic species of flora were found in the project area. Similarly, no endangered or rare flora species exist in the area.

### **5.2.3 Birds**

The biodiversity of avifauna in the project area is very low, and anthropogenic factors have severely limited the available habitats for proliferation of bird species that are currently found in Lusaka City. Birds seen or heard during the baseline survey were *Crecopsis egregia* (African crane), *Treron calvus* (African green pigeon), *Cisticola chiniana* (Rattling cisticola) and *Chrysococcys caprius* (Diederik cuckoo). No endangered or rare avifauna was observed in the project area.

## **5.3 Socio-Economic Environment**

### **5.3.1 Population**

Lusaka is the most populated Province of all the ten provinces of Zambia. The population of Lusaka increased from 1,391,329 in 2000 to 2,198,996 in 2010. This means that the annual average population growth rate for the province was at 4.7% in the 2000-2010 inter - censal period. Lusaka had the highest provincial population growth rate in the country. Kafue and Lusaka districts had the highest annual average growth rate at 4.9 percent each. Chongwe district grew at a rate of 3.2 percent while Luangwa and Chibombo districts had the lowest growth rate of 2.9 and 2.0 percent, respectively. Refer to table 5 below for the population distribution.

The high rate of growth of the population in the Province could be attributed to the high rates of migration from other provinces in the country. The low economic activities in the mining sector, especially on the Copperbelt Province, led to the shrink in employment opportunities, hence the migration in search of jobs.

**Table 5: Population Size and Growth Rates of Lusaka province by District, 2000 - 2010**

District	Population						Growth Rate
	2000			2010			
	Male	Female	Total	Male	Female	Total	
Chibombo	121,948	119,664	241,612	145,438	148,327	293,765	2.0
Chongwe	70,211	67,250	137,461	93,934	94,035	187,969	3.2
Kafue	77,001	73,216	150,217	121,321	121,433	242,754	4.9
Luangwa	9,546	9,402	18,948	12,309	12,985	25,294	2.9
Lusaka	549,020	535,683	1,084,703	852,588	890,391	1,742,979	4.9
Total	827,726	805,215	1,632,941	1,225,590	1,267,171	2,492,761	3.6

*Source: Central Statistics Office (CSO), 2010 Census of Population and Housing, Preliminary Report, February, 2011*

Lusaka, being the capital city of Zambia dominates the country's urban system and accounts for 32 percent of the total urban population in the country. Lusaka's central location, in addition to its capital city status, gives it strategic importance as it is easily accessible from all parts of the country. The high rate of growth of the population could be attributed to the migration trends of people from other parts of the country as well as natural increase arising from high birth rates. Lusaka also has a direct link between income levels and the population density. Higher residential densities are located on the outskirts of the city and lower densities are located in the inner city.

### **5.3.2 Settlement Pattern and Traditional Authority**

The project area has both urban and peri-urban settlements. Towns in the urban areas are planned and zoned into residential, industrial and commercial areas by the City council. Houses are built in designated residential areas. Urban settlements are sparsely populated whilst peri-urban settlements are densely populated.

Some of the land is state owned, under the jurisdiction of the Lusaka City Council, whereas other parts of the project area fall under the custody of Senior Chieftainess Nkomeshya Mukamambo II and Chieftainess Mungule.

### **5.3.3 Local Economy**

Lusaka provides among other services, administrative functions to Zambia as a whole. It plays a significant role in the country's manufacturing sector. Though the economy of the city is more diversified than that of the country, it is quite weak, as most of the sectors are underdeveloped. The basic manufacturing activities, such as food and beverages processing, textiles and leather goods dominate the manufacturing activities.

Lusaka District is the second largest economic Centre in Zambia after the Copperbelt, and is notable for its substantial diversification in the production of goods and services. With respect to Central and Southern Provinces, Lusaka is economically very significant since it provides the market for the absorption of agriculture products from these areas. Manufacturing industry, transport and financial sector, and Small and Medium



Enterprises (SMEs), are the most significant economic activities in Lusaka. It is estimated that only 9 percent of the city's population is engaged in formal employment. A major reason for this is that the local economy has been drifting towards the private sector and self-employment since the liberalization of the economy in the early 1990s.

Lusaka plays a significant role in the socio-economic status of adjoining rural and urban areas and thereby provides a ready market for agricultural and other goods. The overwhelming majority of the economic establishments in the city fall within the wholesale and retail trade categories, which together represent the largest formal employer in Lusaka after the government.

One of the biggest challenges faced in Lusaka and the country as a whole, is poverty. The poverty level has been steadily increasing over the last two to three decades mainly due to the high levels of population growth (refer to Table 6). Other causes of poverty would include the social exclusion of the vast majority. It is generally accepted that there can be no poverty reduction without growth in the economy. Unfortunately the economy of Lusaka has not been measured as a stand-alone.

**Table 6: Incidence of Poverty by Province, 1991-2006**

Provinces	1991	1993	1996	1998	2004	2006
	Incidence of poverty	Incidence of poverty	Incidence of poverty	Incidence of poverty	Incidence of poverty	incidence of poverty
Central	70	81	74	77	76	72
Copperbelt	61	49	56	65	56	42
Eastern	85	91	82	79	70	79
Luapula	84	88	78	82	79	73
<b>Lusaka</b>	<b>31</b>	<b>39</b>	<b>38</b>	<b>53</b>	<b>48</b>	<b>29</b>
Northern	84	86	84	81	74	78
North Western	75	88	80	77	76	72
Southern	79	87	76	75	69	73
Western	84	91	84	89	83	84

Source: CSO website, <http://www.zamstats.gov.zm/lcm.php> (accessed January 2013)

### 5.3.4 Land Tenure

There are several Acts governing the administration of land, vis-à-vis; Cap 292, 289, 288 for the allocation and alienation of land, Land Acquisition Act which provides for the compulsory acquisition of land and the Local Government Act (No. 22 of 1991) which provides for control of land by Local Authorities. Under the Land Act, land has been demarcated into categories, namely state, local authority and traditional land. The traditional authorities (Chiefs) have rights over the traditional land, with a mandate to recommend to Government lease to those who want to acquire land.

Land is currently scarce because of the vast growing population and unplanned settlements. Most of the land in the project area is state owned land under the Ministry of Lands, Natural Resources and Environmental Protection and the Lusaka City Council.



### **5.3.5 Land Use**

The area along the proposed route is mainly residential whereas, some portions have been turned into trading centres, especially the area between the Coventry and Waterworks substations. Other land uses in the area include subsistence farming and both small and large scale quarrying. The common land use in the outskirts of Lusaka is commercial farming, especially around Leopards Hill and Lusaka West substations.

### **5.3.6 Agriculture**

Commercial and subsistence farming is practiced in the project area. The major crops grown include maize, sweet potatoes, wheat and groundnuts.

Livestock reared in in some parts of the project area include cattle, sheep, goats and pigs. Poultry rearing and fish farming are also practiced.

### **5.3.7 Mining**

It is important to note that there are no major mining activities within the project area. However, quarrying is the most significant mining activity in Lusaka. Oriental Quarries, United Quarries, Lions Group Quarry, Tatios, Raubex and Kafue Quarries are among the largest producers of aggregates and quarry dust for construction purposes.

### **5.3.8 Tourism**

Lusaka has few tourist attractions. The main sources of attraction to the province are the Freedom Statue, house of the first President Dr. Kenneth Kaunda, the Lusaka Museum, and the Presidential burial site. The opening up of the Lusaka National Park in Lusaka South will provide an added avenue for tourism.

### **5.3.9 Employment**

According to the 2010 national employment statistics from the Central Statistical Office (CSO) website:

- The proportion of the unemployed among persons aged 12 years and above for the nation was 14percent.
- Looking at sex differentials at national level, 13 percent of the males and 15 percent of the females were unemployed.
- Urban areas recorded higher unemployment rates (32 percent) than rural areas (5 percent).
- Copperbelt and Lusaka provinces recorded higher unemployment rates than the other provinces with 31 percent each.
- The highest unemployment rates for females were recorded in Lusaka Province at 41 percent followed by Copperbelt with 40 percent.

Lusaka offers a wide range of economic activities offering employment to various occupational groups. Almost half of the people of Zambia in the manufacturing industry

are employed in Lusaka with the figure of 29,012 out of the total 70,560. However, there are currently approximately 120,233 people in formal employment in Lusaka. This represents 9.02 percent of the total population, or 16.85 percent of the economically active. In other words the unemployment rate is about 83 percent, notwithstanding informal employment.

### **5.3.10 Public Health**

Health is key to the economy of Lusaka, as productivity is severely hampered when disease prevalence is high. There are number of challenges in health provision in the city among them; access to health facilities and the incidence of some diseases whose occurrence is driven by the state of the environment. In Lusaka, more than 1,000,000 residents have access to a health Centre within 1.5 km and less than 200,000 have to travel more than 1.5 km to access a health facility.

Lusaka has 34 government health institutions and about 134 registered private clinics and health centers. The two main hospitals in Lusaka are the University Teaching Hospital, which is the designated national referral health facility, and the newly built Levy Mwanawasa General Hospital.

The most common diseases in the project area are malaria, diarrhoea, respiratory, eye, and skin infections, sexually transmitted infections (STIs), and Tuberculosis.

The prevalence of HIV/AIDS and STIs in the project area is very high according to the statistics from the urban and rural health centers. Various HIV/AIDS and STIs programmes have been initiated by the Government and some NGOs. For the infected people, there are programmes that have been introduced by NGOs such as Home Based Care.

Voluntary Counseling and Testing (VCT) and Anti-Retroviral Therapy (ART) services are provided. Refer to Table 7 for statistics on HIV/AIDS for Zambia.

**Table 7: HIV/AIDS Statistics in Zambia**

Estimated adult HIV prevalence rate (aged 15–49), 2009	13.5
Estimated number of people (all ages) living with HIV, 2009 (thousands), low estimate	980
Estimated number of people (all ages) living with HIV, 2009 (thousands), low estimate	1000
Estimated number of people (all ages) living with HIV, 2009 (thousands), high estimate	1100
Mother-to-child transmission, Estimated number of women (aged 15+) living with HIV, 2009 (thousands)	149
Paediatric infections, Estimated number of children (aged 0–14) living with HIV, 2009 (thousands)	120
Prevalence among young people, (aged 15-24), HIV prevalence among young people (%) 2009, total	6.6
Prevalence among young people (aged 15-24), HIV prevalence among young people (%) 2009, male	4.2
Prevalence among young people, (aged 15-24) HIV prevalence among young people, (%) 2009, female	8.9
Prevalence among young people, (aged 15-24), % who have comprehensive knowledge of HIV, 2005–2010*, male	41
Prevalence among young people, (aged 15-24), % who have comprehensive knowledge of HIV, 2005–2010*, female	38
Prevalence among young people, (aged 15-24), % who used condom at last higher-risk sex, 2005–2010*, male	39
Prevalence among young people, (aged 15-24), % who used condom at last high-risk sex, 2005–2010*, female	33
Orphans, Children (aged 0–17) orphaned by AIDS, 2009, estimate (thousands)	690
Orphans, Children (aged 0–17) orphaned due to all causes, 2009, estimate (thousands)	1300
Orphans, Orphan school attendance ratio, 2005–2010*	93

Source: UNICEF 2010, [http://www.unicef.org/infobycountry/zambia\\_statistics.html#66](http://www.unicef.org/infobycountry/zambia_statistics.html#66)

### **5.3.11 Transport and Communication**

The geographical, commercial and governance centrality of Lusaka has made it a major destination. As a result, Lusaka has a superior transport system compared to other urban Centres around the country.

Lusaka is connected to four major truck roads; the Great East, Great North, Kafue and Mumbwa roads. The Great North road forms the backbone of the network, serving both local and transitory movements. The Great East Road and Mumbwa Road to the west of the city centre, together with the Great North Road form the intersection of the national transportation axes within Lusaka. Lusaka has witnessed an increase in the number of motor vehicles and this development is not commensurate to the expansion of the road network.

The railway network through Lusaka goes to the Copperbelt, Northern and Southern provinces, and on to the Democratic Republic of Congo and Tanzania.

KKIA located 22.2 km east of Lusaka handles both local and international flights. Among the notable international carriers include British Airways, Ethiopian Airways, South African Airways, KLM and Kenyan Airways.

There are various telecommunications service providers, providing a wide range of digital and analogue solutions. Among them are Zamtel, MTN and Airtel, ZNBC, Muvi TV, ZAMNET Communication Systems, Coppernet Solutions, Micro link Technologies and UUNET.

### **5.3.12 Water Supply and Sanitation**

Lusaka relies on both surface and ground water as sources of raw water. Lusaka Water and Sewerage Company (LWSC) is the utility that provides water and sanitation services in the project area. Other sources of water include private boreholes and shallow wells.

Three major types of sanitation services are utilized in Lusaka, namely, waterborne sewer systems, septic tanks, and pit latrines. Only about 30 percent of the city supplied with water by LWSC is serviced by a sewer network. The areas without sewer reticulation systems utilize septic tanks or pit latrines for sanitation services.

### **5.3.13 Education**

Lusaka is the Centre of the national educational and cultural establishments and thus plays an important role in the education of the Zambian population. Pre-primary, primary, secondary and tertiary education institutions are found in Lusaka. One of the public universities in the country, the University of Zambia Great East Road Campus is in Lusaka. Other notable higher educational institutions in Lusaka are the Evelyn Hone College, the National Institute for Public Administration and Zambia Center for Accountancy Studies Lusaka University and Cavendish University. The city has about

95 lower basic, middle basic, upper basic and secondary schools. Lusaka also has a number of community schools and skills training Centres.

Existing educational facilities are unable to cater for the growing demand in the city. Hence there is need for schools to be built in the city as the population is growing at a fast rate.

#### **5.3.14 Planned Development Activities**

There are many developments that have been planned in the project area. There are plans to improve the quality of life for the majority of the population by focusing on developmental strategies that address poverty by ensuring that minimum requirements including provision to health, education, water and sanitation and access roads are in place. There are plans to improve the provision of basic services and investment in key economic infrastructure such as roads and access to electricity.

Infrastructure development serves as the central delivery mechanism in the generation of quality socio-economic advancement.

#### **5.3.15 Social Services and Amenities**

Recreation facilities in the project area include sports facilities, play parks, restaurants, casinos, cinemas and night clubs. In the outskirts and peri-urban areas, recreation is provided through localized celebrations, games (especially football), beer drinking, and other ceremonies.

#### **5.3.16 Physical Cultural Resources**

Ancient, cultural and natural heritage, relics and other objects of aesthetic, historical, pre-historical, archaeological or scientific interest are protected under the National Heritage Conservation Commission (NHCC) Act (Cap 173), No. 23 of 1989 (amended 1994). Under this Act, Physical Cultural Resources (PCR) are objects of historical, scientific, anthropological, archaeological, aesthetic or cultural value made or used in Zambia before 1st January, 1924.

In order to ascertain the heritage resources present in the project areas, the National Heritage Conservation Commission Register and the local people were consulted. The Lusaka 132kV transmission Ring does not traverse any sites declared as national monuments. Preliminary on-site consultations with local communities revealed that no PCR exist in servitude for the transmission network.

## **6.0 IDENTIFICATION OF IMPACTS**

### **6.1 Physical Environment**

The proposed project construction activities will result in some impacts on the physical environment as outlined in this section. However, the project will utilize the existing wayleave, therefore, the anticipated impacts on the physical environment are minimal.

#### **6.1.1 Geology**

Considering the nature of the geology, it may be required to use explosives or jack hammers to penetrate or remove some of the rock materials. This will cause vibrations and fly rocks, leading to loosening of the rock strata, and cracking of some of the existing infrastructure in the immediate project area.

Type of Impact: This is a negative, direct, irreversible impact of medium significance

#### **6.1.2 Topography**

The gentle undulating topography of the project area provides a favorable working condition for the reinforcement of the Ring. Therefore, there is no significant leveling that will be required other than in a few isolated places. The project can be defined as a brown field project as it will be implemented along the footprint of the already existing Ring, thus reducing the possibility of adverse impacts on the topography of the area. The digging of burrow pits for sourcing building material such as sand may have an adverse impact on the general land scape defining the topography of the study area.

Type of Impact: This is a negative, indirect, irreversible impact of low significance

#### **6.1.3 Soils**

There will be a lot of digging for holes in places where the mono steel poles will be erected in the project area. This will entail upsetting the soil layout in these areas. However, these impacts will not be random, but at selected intervals along the span of the Ring.

Type of Impact: This is a negative, indirect, irreversible impact of low significance

#### **6.1.4 Vegetation Clearing and Climate**

The project will not entail substantive clearing of natural vegetation as most of the project area is already built up and will occur in the footprint of the existing wayleave. Therefore, there are no perceived impacts that will result in moderating climate.

### **6.1.5 Hydrology**

Though the project area has a few seasonal streams, there are no anticipated significant impacts on the hydrology as a result of project activities in the area.

### **6.1.6 Air Quality**

During the construction phase increased traffic flows and construction activities will lead to increased dust, gas, and particulate emissions. However, this will be confined to the construction period. The activities that may cause air pollution during construction include equipment operation and movement, grubbing, and clearing of access roads.

Type of Impact: This is a negative, direct, short term impact of low significance

### **6.1.7 Noise**

Noise pollution will arise from blasting, heavy duty construction equipment that shall be used in the stringing of conductors and tower erection, as well as other associated construction activities. In addition, increased traffic flows during this phase may also contribute to noise generation. Noise pollution shall however, be limited to the construction period.

Type of Impact: This is a negative, direct, short term impact of low significance

However, during operations transmission conductors will produce noise under certain conditions because of corona discharge. Corona discharge is the ionization of the air next to the conductor by the electric field which is related to the voltage on the conductors. The loudness of the noise depends on conductor conditions, voltage level, and weather conditions under these conditions the power lines will make a hissing, popping or cracking sound.

Type of Impact: This is a negative, direct, long term impact of low significance

## **6.2 Biological Environment**

### **6.2.1 Terrestrial Fauna and Birds**

While parts of the project area were found to be relatively rich in some terrestrial fauna and bird species, the type of habitat is widespread through the outskirts of the city, and no species of terrestrial fauna and avifauna that are rare or endangered were found in the project area. Similarly, no species of scientific value were found. As such, the impact on the population, habitat or biodiversity will be low. Further, the existing ROW does not traverse any land or property used as an animal sanctuary or wildlife reserve.

Type of Impact: *This is a negative, direct, long term, irreversible impact of low significance*

### **6.2.2 Flora**

Due to the already existing relatively high rate of infrastructure development in much of the project area, there is no loss of endemic or indigenous flora anticipated as a result of proposed project activities. The greater part of the project area is already built up, with patches of flora scattered throughout the area. Most of the reinforcement activities will be implemented primarily on the existing wayleave; therefore, impact on vegetation will be very low. Impacts from expansion of some of the transmission bulk supply points may require clearing of vegetation in the surrounding areas. Nonetheless, the level of loss will be quite low and relatively insignificant as much of the area is already cleared and within the ROW.

Type of Impact: *This is a negative, direct, long term, irreversible impact of low significance*

## **6.3 Socio-Economic Impacts**

### **6.3.1 Population and Settlement Patterns**

During construction, there shall be an influx of people in the project area in search of employment, most of whom shall be unskilled and semi-skilled. The contractor is also expected to come with a team of skilled personnel to carry out various specialized tasks during the entire construction phase. However, this influx shall be restricted to the construction phase. Once construction is completed, workers are expected to go back to their respective places of origin.

During implementation of the project, the contractor will build temporal camps in different places along the proposed route of the Lusaka ring. This could add pressure on the existing social amenities and may also exacerbate social conflicts. However, the camps will not alter the settlement patterns in the areas because they will be demolished upon completion of the construction activities.

Type of Impact: This is a negative, direct, short term, reversible impact of medium significance.

Furthermore, structures in the wayleave shall be demolished to pave way for construction activities.

Type of Impact: This is a negative, direct, long term, irreversible impact of high significance.





Examples of Temporary Structures in the Lusaka Transmission and Distribution  
Wayleave

### **6.3.2 Local Economy**

Some people in the project area shall be employed during construction and this shall lead to an increase in their disposable income and improve their standard of living.

In addition, some materials for construction such as sand, crushed stones, and cement, shall be sourced locally, thereby benefiting the local economy.

Type of Impact: This is a positive, direct, short term, reversible impact of high significance.

Upon completion of the proposed project, provision of firm and reliable power will lead to the development of the project area and the nation as a whole.

Type of Impact: This is a positive, direct, long term impact of high significance.

### **6.3.3 Land Tenure and Land Use**

There are no anticipated impacts on land tenure, as the works will be carried out in the existing wayleave. Chiefs, local authorities, the state and farmers will maintain their land ownership during both during the construction and operation phases of the project.

Utilization of the land within the wayleave will be restricted during the construction phase. Construction of infrastructure, planting of fruit and other trees and similar activities under the power line will not be allowed. However, growing of low crops such as groundnuts, beans, sweet potatoes and maize is permitted, but no ploughing is allowed at the foot of the tower to avoid destabilizing the foundations of the towers. There is a possibility that some crops in the fields will be damaged during construction.

Type of Impact: This is a negative, direct, short term impact of low significance.

### **6.3.4 Education**

Upon completion of the project, the availability of firm and reliable supply of power to schools and other learning institutions will enhance the education services such as the use of computers and laboratories.

Type of Impact: This is a positive, direct, long term impact of high significance.

### **6.3.5 Occupational Health and Safety**

Most occupational health and safety issues during the reinforcement, operation, maintenance and decommissioning of the Lusaka transmission Ring will include, among others, exposure to physical hazards from use of heavy equipment and cranes; trip and fall hazards; exposure to dust and noise; falling objects; work in confined spaces; exposure to hazardous materials; and exposure to electrical hazards from the use of tools and machinery.

*Type of Impact: This is a negative, direct, short term impact of high significance.*

### **6.3.6 Community Health and Safety**

Community health and safety impacts during the reinforcement and decommissioning of the transmission Ring will include, among others, dust, noise, and vibration from construction vehicle transit, and communicable diseases such as HIV/AIDS and STIs associated with the influx of temporary construction labour.

*Type of Impact: This is a negative, direct, short term impact of high significance.*

The operation of the reinforced Ring may generate the following specific impacts:

- Electrocution
- Visual amenity
- Noise

*Type of Impact: This is a negative, direct, long term impact of high significance*

#### **6.3.7 Water and Sanitation**

There is likely to be more pressure on the existing water and sanitation facilities with an increase in the population during the construction phase. Domestic and human waste generated at the camps for workers could adversely affect the sanitation in the area and could pollute the environment if not well managed.

Type of Impact: This is a negative, indirect, short term impact of medium significance.

#### **6.3.8 Minerals and Mining**

Upon completion of the project, a firm and reliable supply of power will support the enhancement of mining activities, in particular quarrying, in and around Lusaka.

Type of Impact: This is a positive, direct, long term impact of high significance.

#### **6.3.9 Tourism**

The proposed project will make more electricity available to support hospitality industries and tourism activities in and around Lusaka.

Type of Impact: This is a positive, direct, long term impact of high significance.

#### **6.3.10 Transport and Communication**

When construction commences there will be an increase in traffic on the Lusaka roads, from vehicles transporting construction materials, adding to the prevailing traffic congestion.

Type of Impact: This is a negative, direct, short term impact of medium significance.

#### **6.3.11 Planned Development Activities**

The provision of firm and reliable supply of power will support infrastructure development and enhance existing socio-economic services in education, health, tourism, agriculture, and industry among others.

Type of Impact: This is a positive, direct, long term impact of high significance.

#### **6.3.12 Physical Cultural Resources**

As indicated in section 5.3.16 of the baseline study there are no known PCRs in the Project area as the works will be within the existing footprint of the wayleave. Therefore, no impacts on PCRs are anticipated. Nevertheless, this EIS includes “chance finds” procedures for any PCRs that may be in the project area.

## 7.0 EVALUATION OF SIGNIFICANCE OF IMPACTS

Table 8: Evaluation of Significance of Impacts

ENVIRONMENTAL ASPECT/ISSUE	POTENTIAL IMPACT	POSITIVE/NEGATIVE	DURATION	FREQUENCY	SENSITIVITY	SPACIAL EXTENT	SIGNIFICANCE
<b>PHYSICAL ENVIRONMENT</b>							
Geology	Blasting or use of jack hammers to remove some rock materials may cause vibrations and fly rocks leading to loosening of the rock strata, and cracking of some of the existing infrastructure in the immediate project area	Negative	Long term	Low	Low	Project Area	Medium
Topography	Minimal impact on land scape defining the topography from excavation and construction.	Negative	Long term	Low	Low	Project Area	Low
Soils	Excavation in places where the mono steel poles will be erected will upset the soil layout	Negative	Short term	Medium	Medium	selected interval span of the line	Medium
Hydrology	There are no anticipated significant impacts on the hydrology of the area.	-	-	-	-	-	-
Air Quality	During the construction phase increased traffic flows and construction activities will lead to increased dust, gas, and particulate emissions. However, this will be confined to the construction period. The activities that may cause air pollution during construction include equipment operation and movement, grubbing, and clearing of access roads.	Negative	Short-term	Low	Medium	Project area	Low
Noise	Noise pollution will arise from blasting, heavy duty construction equipment that shall be used in the stringing of conductors and tower erection, as well as other associated construction activities. In addition, increased traffic flows during this phase may also contribute to noise generation. Noise	Negative	Short-term	High	Medium	Project area	Medium

ENVIRONMENTAL ASPECT/ISSUE	POTENTIAL IMPACT	POSITIVE/NEGATIVE	DURATION	FREQUENCY	SENSITIVITY	SPACIAL EXTENT	SIGNIFICANCE
	pollution shall however, be limited to the construction period						
	During operations transmission conductors will produce noise under certain conditions because of corona discharge. Corona discharge is the ionization of the air next to the conductor by the electric field which is related to the voltage on the conductors. The loudness of the noise depends on conductor conditions, voltage level, and weather conditions under these conditions the power lines will make a hissing, popping or cracking sound.	Negative	Long-term	High	Medium	Project area	Medium
<b>BIOLOGICAL ENVIRONMENT</b>							
Terrestrial Fauna and Birds	The impact on the population, habitat or biodiversity will be low. Further, the existing ROW does not traverse any land or property used as an animal sanctuary or wildlife reserve	Negative	Long term	Low	Low	Project Area	Low
Flora	Impact on vegetation will be very low. Impacts from expansion of some of the transmission bulk supply points may require clearing of vegetation in the surrounding areas. Nonetheless, the level of loss will be quite low and relatively insignificant as much of the area is already cleared and within the ROW	Negative	Long-term	Low	Low	Project Area	Low
<b>SOCIAL ECONOMIC ENVIRONMENT</b>							
Population and settlements	There shall be an influx of people in the project area in search of employment, most of whom shall be unskilled and semi-skilled. The contractor is also expected to come with a team of skilled personnel to carry out various	Negative	Short term	Low	High	Project area	High

ENVIRONMENTAL ASPECT/ISSUE	POTENTIAL IMPACT	POSITIVE/ NEGATIVE	DURATION	FREQUENCY	SENSITIVITY	SPACIAL EXTENT	SIGNIFICANCE
	<p>specialized tasks during the entire construction phase. However, this influx shall be restricted to the construction phase. Once construction is completed, workers are expected to go back to their respective places of origin.</p> <p>During implementation of the project, the contractor will build temporal camps in different places along the proposed route of the Lusaka ring. This could add pressure on the existing social amenities and may also exacerbate social conflicts. However, the camps will not alter the settlement patterns in the areas because they will be demolished upon completion of the construction activities</p>						
Land Tenure and Land Use	Utilization of the land within the wayleave will be restricted during the construction phase. Construction of infrastructure, planting of fruit and other trees and similar activities under the power line will not be allowed. However, growing of low crops such as groundnuts, beans, sweet potatoes and maize is permitted, but no ploughing is allowed at the foot of the tower to avoid destabilizing the foundations of the towers. There is a possibility that some crops in the fields will be damaged during construction.	Negative	Long term	Medium	Low	Project area	Medium
Local Economy	Increased investment and development of various industries.	Positive	Long term	High	High	Lusaka	High

ENVIRONMENTAL ASPECT/ISSUE	POTENTIAL IMPACT	POSITIVE/NEGATIVE	DURATION	FREQUENCY	SENSITIVITY	SPACIAL EXTENT	SIGNIFICANCE
	Employment opportunities during construction leading to increased disposable income and improved standard of living. Additionally, procurement of construction materials such as sand, crushed stones and cement shall be done locally.	Positive	Short term	High	High	Lusaka	High
Water and Sanitation	Development of water and sanitation services such as building of automated boreholes that will supply the needed improved reliable water thereby providing better health.	Positive	Long term	Medium	Medium	Lusaka	Medium
	There is likely to be more pressure on the existing water and sanitation facilities with an increase in the population during the construction phase. Domestic and human waste generated at the camps for workers could adversely affect the sanitation in the area and could pollute the environment if not well managed	Negative	Short Term	Low	Low	Project area	Low
Occupational health and safety	Impacts will include, exposure to physical hazards from use of heavy equipment and cranes; trip and fall hazards; exposure to dust and noise; falling objects; work in confined spaces; exposure to hazardous materials; and exposure to electrical hazards from the use of tools and machinery	Negative	Short term	Medium	High	Project area	High
Community Health and Safety	During construction phase, impacts will include, dust, noise, and vibration from construction vehicle transit, and	Negative	Short term	Medium	High	Project area	High



ENVIRONMENTAL ASPECT/ISSUE	POTENTIAL IMPACT	POSITIVE/ NEGATIVE	DURATION	FREQUENCY	SENSITIVITY	SPACIAL EXTENT	SIGNIFICANCE
	communicable diseases such as HIV/AIDS and STIs associated with the influx of temporary construction labour						
	The operation of the reinforced Ring may generate the following specific impacts: electrocution; electromagnetic interference; visual amenity; noise and ozone; aircraft navigation safety	Negative	Long term	Medium	High	Project area	High
Education	Upon completion of the project, the availability of firm and reliable supply of power will enhance the education services such as the use of computers and laboratories	Positive	Long term	High	High	Lusaka	High
Transport	When construction commences there will be an increase in traffic on the Lusaka roads, from vehicles transporting construction materials, adding to the prevailing traffic congestion	Negative	Short term	Medium	Medium	Lusaka	High
Tourism	The proposed project will make more electricity available to support tourism activities in and around Lusaka	Positive	Long term	Medium	Medium	Lusaka	High
Planned Development Activities	The provision of firm and reliable supply of power will support infrastructure development and enhance existing socio-economic services in education, health, tourism, agriculture, and industry among others	Positive	Long term	Medium	Medium	Lusaka	High
Physical Cultural Resources	There are no known PCRs in the Project area. Additionally, the works will be within the existing footprint of the wayleave.	N/A	N/A	N/A	N/A	N/A	N/A

**Table 9: Key for Rating of Impact Significance**

<b>IMPACT RATING</b>	<b>DESCRIPTION</b>
Low	An insignificant amount of negative impact, but requiring some mitigation; or positive impact requiring some attention to enhance it.
Medium	A level of negative or positive impact with moderate significance that will either require mitigation or enhancement respectively
High	A high level of adverse impact that could prompt authorities to reject implementation of the project; or A high level of positive impact that must prompt the project to be undertaken with enhancement measures.

## **8.0 PROPOSED MITIGATION MEASURES**

### **8.1 Physical Environment**

There are some anticipated negative impacts to be mitigated on the geology, soil, air quality, and, hydrology aspects of the project. Although this is a brown field project, the scope to reinforce and upgrade the existing Ring may impose some negative impacts on the physical environment. To minimise the negative impacts, and enhance the positive impacts, the following mitigation measures have been recommended.

#### **8.1.1 Geology**

To minimise impacts on geology, controlled blasting (controlling both fly rocks and ground vibrations during blasting) will be employed. Fly rocks shall be controlled effectively by covering the blasting patch with specially designed blasting mats. Ground vibrations shall be controlled through the use of non-electric shock tubes and emulsion explosives. Vibrations shall be monitored for every blast and subsequent blasts shall be designed accordingly. Additionally, the contractor will develop a blasting schedule to the approval of the environmental coordinator. This shall be communicated to the public and appropriate warning shall be given.

#### **8.1.2 Topography**

Impacts arising from burrow pits for construction material will be addressed through rehabilitation and where appropriate re-vegetation of burrow pits.

#### **8.1.3 Soils**

Upset of soil shall be limited to areas of pole erection and the soil returned during compaction within the foundation after mounting the poles.

#### **8.1.4 Climate**

Due to the nature of project, there are no anticipated impacts on the climate within the study area and therefore, no mitigation measures are proposed.

#### **8.1.5 Hydrology**

Though the study area has a few seasonal streams, there are no anticipated significant impacts on hydrology and therefore, no mitigation measures are proposed for the project area.

### **8.1.6 Air Quality**

Impacts of increased dust, gas, and particulate emissions shall be mitigated by dust suppression measures through spraying of water in dust prone areas by water bowsers; use of blast mats; and imposing speed limits within the project area, particularly during the construction phase.

Additionally the use of construction vehicles and equipment that are in good working condition shall be employed.

### **8.1.7 Noise**

The impacts of noise from the operation of equipment shall be mitigated through the use of mufflers, silencers, and screens to minimize noise from construction activities. Furthermore, vehicle movements and operation of loud machinery and equipment shall be restricted to daylight hours. In addition, the noise emanating from the use of explosives shall be moderated by employing controlled blasting.

## **8.2 Biological Environment**

### **8.2.1 Fauna**

The area has very low biodiversity and population in terms of medium-sized and large mammals and reptiles. Most the aforementioned are confined to private ranches and animal sanctuaries that are not in the immediate project area. However, it is important to protect whatever species that would be found during implementation of the proposed project. Awareness campaigns shall be conducted to all construction workers on the importance of conservation of wildlife. This shall be done in collaboration with the Zambia Wildlife Authority (ZAWA). Furthermore, where such animals are found, ZAWA shall be informed to facilitate the appropriate relocation to sanctuaries.

### **8.2.2 Flora**

The construction team shall exercise caution to preserve the natural landscape as much as possible. Trees and other forms of vegetation which do not interfere with construction works shall be left standing to provide vegetation cover to the ground to prevent soil erosion.

Vegetation clearance during annual wayleave maintenance shall be limited to the 50 meter swath as prescribed by the ZESCO wayleave guidelines.

### **8.2.3 Birds**

During the implementation of the project, areas of migratory bird staging/nesting areas shall be avoided as much as possible. Where some level of interaction with these areas is unavoidable, bird diversion equipment shall be incorporated in the structures.

## 8.3 Social Economic

### 8.3.1 Population and Settlement Patterns

For unskilled and semi-skilled labour, people in the immediate project area shall be employed to avoid an influx of people from other areas. Any infrastructure affected by the project shall be duly compensated as prescribed in the RPF attached (Appendix 5).

Temporal camps shall be demolished by the Contractor at the end of the construction phase and general clean up undertaken. All waste shall be cleared from site and disposed of in designated places.

### 8.3.2 Social and Cultural Set-up

Selection of the contractor's camps should be done in close consultation with the local people to avoid major disturbance to their social organization and life style. Awareness shall be undertaken on the workers to ensure they exercise respect and courtesy when dealing with the local people in the close proximity to their camps

### 8.3.3 Land Use

The works will occur in the existing footprint of the wayleave, therefore, the current land use will be maintained. Utilization of the land within the wayleave for other purposes will be restricted; however, growing of low lying crops such as groundnuts, beans, sweet potatoes and maize is permitted. To ensure the safety of the infrastructure and the public, the wayleave shall be cleared annually.



#### **8.3.4 Occupational Health and Safety**

To mitigate the occupation health and safety impacts associated with the project following shall apply;

- Only trained and certified workers shall be allowed to install, maintain or repair electrical equipment;
- All structures shall be tested for their integrity prior to undertaking works;
- A fall protection program shall be implemented;
- Installation of fixtures on tower components to facilitate the use of fall protection systems shall be carried out;
- Identification of potential electromagnetic exposure levels; and
- Use of PCB free transformers and other electrical components.

#### **8.3.5 Community Health and Safety**

In order to prevent the spreading of communicable diseases, health education on the dangers and prevention of communicable diseases should be given to the construction workers and the local community at regular intervals throughout the upgrading period. First Aid and Safety training shall be given to the workers and First Aid kits shall be available on site for emergencies.

To address the impacts during the operation phase of the project, the following shall apply:

- Use of signs, barriers, and education/public outreach to prevent public contact with potentially dangerous equipment; grounding conducting objects installed near power lines to prevent shock;
- Replacement of steel lattice towers with mono poles to minimise the visual impact; and
- Use of noise barriers or noise canceling acoustic devices should be considered as necessary to minimise noise.

#### **8.3.6 Water and Sanitation**

Pit latrines would be constructed in designated areas for use by construction workers. All wastes shall be disposed of in designated sites. Alternative water supply sources for construction works and labour force shall be put in place to minimise the strain on the existing facilities.

### **8.3.7 Transport**

Road signs should be put on the major and access roads in the project areas to warn road users about the presence of heavy trucks and construction machinery on the road. Drivers on the project shall be educated on road safety.

Speed limit shall be strictly adhered to and measures such as speed humps shall be put in place to minimize road incidents.

### **8.3.8 Physical and Cultural Resources**

A Chance Find Management Plan (Appendix 6) has been developed to provide a procedure for dealing with any opportunistic physical resources finds during implementation of the proposed project.

## 9.0 ENVIRONMENTAL AND SOCIAL MANAGEMENT PLAN FOR THE TRANSMISSION UPGRADE

Table 10: Environmental and Social Management Plan for the Transmission Upgrade

Aspect	Impact	Mitigation Measure	Frequency of Monitoring	Time Frame	Performance Indicator	Responsible Person	Cost (US\$)
<b>PHYSICAL ENVIRONMENT</b>							
Excavation, burrowing and blasting activities; movement of heavy duty machinery and vehicles	Vibrations leading to loosening of rock, and cracking of some of the existing infrastructure in the area.	Use of controlled blasting by qualified and registered (licensed) blasters; and appropriate warning given before blasting	Before and during blasting activities	Throughout project construction phase	Reduction in loosening of unwanted rock and no cracking of infrastructure	Contractor, Blasting personnel	Embedded in Project Cost
	Increased dust, gas, and particulate emissions	Dust suppression measures through spraying of water in dust prone areas by use of water bowsers use of blast mats; watering down the area; maintenance of access roads;	Daily	Throughout project construction phase	Dust levels suppressed	Contractor	100,000



Aspect	Impact	Mitigation Measure	Frequency of Monitoring	Time Frame	Performance Indicator	Responsible Person	Cost (US\$)
		and speed limits imposed;  Use of construction vehicles and equipment that are in good working condition.					
	Noise pollution	Use of mufflers, silencers, and screens to minimize noise from construction activities;  Restricting vehicle movements and operation of loud machinery and equipment to daylight hours.	Periodically	Throughout site preparation and construction phases	Reduction in noise generated	Contractor, Project Coordinator	100,000

Aspect	Impact	Mitigation Measure	Frequency of Monitoring	Time Frame	Performance Indicator	Responsible Person	Cost (US\$)
<b>BIOLOGICAL ENVIRONMENT</b>							
Vegetation clearance and construction activities	Loss of habitats and biodiversity of fauna.	Conservation awareness campaigns to be carried out;  Use of noise controlled equipment.	Periodically throughout project phases	From site preparation through to construction phase	Limited disturbance to fauna habitats	Project Coordinator, Contractor,	200,000
	Destruction to vegetation	Vegetation clearance and construction activities shall be restricted to project vicinity;  Trees shall be stumped as opposed to uprooting;  Site clearing will be restricted to scrub clearing; thereby retaining the rootstock. Felling of trees shall be avoided, and	Periodically during the site preparation and construction phases	Site preparation to construction phase	Vegetation destruction limited.	Project Coordinator, Contractor	N/A

Aspect	Impact	Mitigation Measure	Frequency of Monitoring	Time Frame	Performance Indicator	Responsible Person	Cost (US\$)
		trimming will be opted wherever possible;  Wayleave clearance shall be restricted to the 50m swath;  Use of fires shall be monitored and restricted to residential camps					
<b>SOCIO-ECONOMIC ENVIRONMENT</b>							
Increase in population in search of employment	Stress on social amenities	Employment during site preparation and construction stages shall be done from within the local community, wherever possible.	Weekly during the project implementation	Pre-site preparation phase to construction phase	Local people employed especially as unskilled labour	Project Coordinator, Contractor	Embedded in Project Cost
	Spreading of communicable diseases	Conducting of health awareness talks to the workers and the	Regular intervals	Site preparation phase to construction phase	Spread of communicable diseases reduced	Project Coordinator	100,000

Aspect	Impact	Mitigation Measure	Frequency of Monitoring	Time Frame	Performance Indicator	Responsible Person	Cost (US\$)
		community at regular intervals during project implementation.					
Site preparation and construction activities	Provision of employment to locals	Employment during site preparation and construction stages shall be done from within the local community	Weekly during the project implementation	Pre-site preparation phase to construction phase	Local people employed especially as unskilled labour	Project Coordinator, Contractor	Embedded in Project Cost
	Workers and members of the public exposed to hazards at project site.	First Aid training and first aid kits shall be given to workers as part of emergency preparedness and response.	Weekly	Site preparation through to construction phase	Reduced injuries and quick response to any hazards	Project Coordinator	100,000
		Provision of personal protective equipment to all project staff and site visitors	Daily	Throughout project implementation	All workers and site visitors dress in personal protective equipment whilst on site	Project Coordinator, Contractor	150,000
		Appropriate signage and safety symbols shall be placed	Regular Intervals	Throughout project implementation	Appropriate signage and safety symbols	Project Coordinator, Contractor	100,000

Aspect	Impact	Mitigation Measure	Frequency of Monitoring	Time Frame	Performance Indicator	Responsible Person	Cost (US\$)
		in respective areas to warn workers, visitors, and locals of any hazards that may exist			placed.		
<b>TOTAL</b>							<b>850,000 + amounts embedded in Project Costs</b>

## 10.0 ESTIMATED COST OF MITIGATION AND MONITORING ACTIVITIES

The cost of mitigating the impacts of the project and monitoring the management programme shall be included as part of the total project cost. This cost shall consist of a number of some small capital components for one-time expenses that will occur during or just after construction and an annual cost for continuing operations. The total mitigation budget is estimated to be US \$1,002,800.00. Estimates of these costs are presented in the Table 11 below.

**Table 11: Mitigation and Monitoring Budget**

ACTIVITY	IMPLEMENTING AGENCY	ESTIMATED COST US\$
<b>Environmental, Health, and Safety Education</b> Conducting environmental, health, and safety awareness campaigns to construction workers & the local community	<b>Ministry of Health / ZESCO</b>  Project ECO: 1 x US\$ 100/day x 20 days  EHS Staff: 3 x US\$ 70/day x 20 days  Logistics (fuel, etc) for 2 trips	2,000.00   4,200.00  2,000.00
<b>Subtotal</b>		<b>8,200.00</b>
<b>Natural Resources Management</b>  PCR Conservation	<b>National Heritage Conservation Commission (NHCC)</b>  NHCC Officers 2 x US\$ 70/day x 20 days  Project ECO: 1 x US\$ 100/day x 20 days  Logistics (fuel, etc) for 2 trips	2,800.00  2,000.00  2,800.00
<b>Subtotal</b>		<b>7,600.00</b>
<b>Monitoring &amp; Auditing</b>  Regular monitoring of implementation of mitigation measures	<b>ZESCO</b>  Project ECO: 1 x US\$ 100/day x 10 days/month (x 12 months)  Logistics (fuel, etc) US\$5,000 for the Project duration	12,000.00  5,000.00

<b><i>Subtotal</i></b>		<b><i>17,000.00</i></b>
<b>Statutory Review Fees</b>	<b>ZESCO</b>	
EIA Review Fees to ZEMA		120, 000.00
<b><i>Subtotal</i></b>		<b><i>120,000.00</i></b>
<b>Total Mitigation and Monitoring Budget</b>		<b>152,800.00</b>
<b>Total Cost of Mitigation Measures in ESMP</b>		<b>850,000.00</b>
<b>GRAND TOTAL MITIGATION BUDGET</b>		<b>1,002,800.00</b>

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## APPENDICES

APPENDIX 1: DRAFT ENVIRONMENTAL AND SOCIAL MANAGEMENT PLAN  
FOR THE PROPOSED LUSAKA DISTRIBUTION REHABILITATION NETWORK



**CORPORATE AFFAIRS AND BUSINESS DEVELOPMENT  
DIRECTORATE**

**ENVIRONMENTAL AND SOCIAL MANAGEMENT PLAN (ESMP)  
FOR THE PROPOSED  
LUSAKA DISTRIBUTION REHABILITATION PROJECT**

**PREPARED BY  
ENVIRONMENT AND SOCIAL AFFAIRS DEPARTMENT**

**MARCH, 2013**

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**LIST OF ACRONYMS**

BSP	Bulk Supply Point
CBD	Central Business District
ECO	Environmental Coordinator
EIA	Environmental Impact Assessment
EMA	Environmental Management Act
ERB	Energy Regulation Board
ESD	Environment and Social Affairs Department
ESMP	Environmental and Social Management Plan
GPS	Global Positioning System
IFC	International Finance Corporation
KM	Kilo Metres
kV	kilo Volt
kVA	kilo Volt Ampere
LCC	Lusaka City Council
LV	Low Voltage
MFEZ	Multi-Facility Economic Zone
MV	Medium Voltage
MVA	Mega Volt Ampere
OHL	Overhead Line
PCBs	Poly Chlorinated Biphenyls
PMT	Pole Mounted Transformers
PVC	Polyvinyl Chloride
RPF	Resettlement Policy Framework
UNZA	University of Zambia
UTM	Universal Transverse Mercator
ZEMA	Zambia Environmental Management Agency
ZESCO	ZESCO Limited

## **1.0 BACKGROUND**

ZESCO proposes to undertake an electricity transmission and distribution system rehabilitation program with the view of improving the transmission and distribution infrastructure in the Country throughout ZESCO's four Divisions namely Lusaka, Copperbelt, Northern, and Southern. These rehabilitation works will be implemented through the Zambia Transmission and Distribution Rehabilitation Project (TDRP). Of critical importance under this project is the urgency to address the rehabilitation needs of Lusaka, considering that 40% of the non-mining loads are concentrated in this area. The proposed project will therefore support the reinforcement of the existing transmission and distribution networks in the Lusaka Division of ZESCO which includes Lusaka City as well as its surrounding areas. The rehabilitation works in Lusaka will have two sub components which are; (i) Component 1: Reinforcement of the 132kV Transmission Network and (ii) Component 2: Rehabilitation of the 33kV and 11kV Distribution Network. However, this ESMP addresses the distribution component only, which will be implemented through the Lusaka Distribution Rehabilitation Project. This ESMP is a draft and will be finalised during project implementation as the actual sites for Component 2 have not been determined at this stage.

This Environmental and Social Management Plan (ESMP) outlines the duties and responsibilities of ZESCO Limited and the Contractor with respect to environmental management and protection during construction and operational phases of the Lusaka Distribution Rehabilitation Project. The requirements herein also take into consideration the established international practice in project management, by ensuring that the task that has to be undertaken is completed within a set time, budget, resources and performance specifications designed to meet the needs of stakeholders and beneficiaries.

The Contractor shall comply with all the requirements herein and the cost of compliance will be included in the contract price and the cost of the ESMP is included in the overall budget of the main project.

The Contractor shall carry out the specified environmental protection requirements to the approval of the Project Environmental Coordinator (ECO) or the Site Manager on behalf of ZESCO. If so instructed by the ECO or the Site Manager, the Contractor shall implement additional mitigation measures payable under the applicable rates in the Day Work Schedule.

## **1.2 The Purpose of the ESMP**

The rehabilitation of the Lusaka distribution network will have potential environmental and social impacts that are likely to occur during project construction and operation phases. Therefore, this ESMP seeks to give a comprehensive plan on how the proposed mitigation measures will be implemented. In the ESMP, environmental management activities and responsibilities are clearly outlined to ensure successful

implementation, monitoring and subsequent audits of the project. The overall purpose of the ESMP is to ensure environmental compliance throughout the project phases.

### **1.3 Environmental Coordinator**

ZESCO Limited will appoint an ECO to handle environmental and social issues that will arise during the implementation of the project. The ECO will assume overall responsibility to monitor the works and will report to the Project's Site Manager. The ECO will participate in all project meetings and the day-to-day running of the project. The ECO or Site Manager will be responsible for the organization and scheduling of Task Teams' environmental, safety and health awareness campaigns, monitoring and audits for various environmental aspects of the project. The ECO will also serve as the Community Liaison Officer to receive any complaints from the communities in the project area. The ECO will direct the complaints to the Site Manager or other appropriate officers for action as outlined in the developed grievance mechanism procedure. It will be the duty of the ECO to ensure that all grievances are recorded and resolved during project implementation and operational phases.

Environmental monitoring will mainly concentrate on the following aspects of prevention, mitigation or potential impacts minimization measures during construction:

- Site establishment;
- Excavations;
- Use of heavy duty machinery;
- Waste management;
- Occupational Health and Safety;
- Community Health and Safety;
- Soil erosion;
- Noise and dust nuisance;
- Water pollution;
- General pollution;
- Disruption of the socio-economic state; and
- Employment and other specified benefits to local communities.

The Contractor will appoint an officer who will be responsible for management of environmental issues on site. The Contractor's Environmental Officer will maintain close liaison with the ZESCO ECO and will have regular meetings.

## 1.4 Safety Officer

It is necessary to have a Safety Officer on site to ensure a safe working environment. The Safety Officer will be on site on full time basis to monitor and ensure that safety standards are followed in the daily operations of the Contractor and he will report to the Project's Site Manager. The Safety Officer will participate in all project meetings and the day-to-day running of the project. The Safety Officer will be responsible for organizing and scheduling of safety awareness meetings for the workers and the local people. The Safety Officer will collaborate with the ECO to schedule and organize awareness campaigns for both construction workers and local people, where applicable. The Contractor's Safety Officer will maintain close liaison with the Employer's Safety Officer and will have meetings regularly.

## 1.5 Collaborating Institutions

Below is a list of the institutions and Government offices that may be contacted to ensure successful implementation of this Environmental and Social Management Plan:

- Ministry of Mines, Energy and Water Development
  - *The Energy Regulation Board*
  - *Department of Energy*
  - *National Water Supply and Sanitation Council*
- Ministry of Lands, Natural Resources and Environment Protection
  - *Zambia Environmental Management Agency*
  - *Lands Department*
- Ministry Local Government and Housing
  - *Lusaka City Council*
- Ministry of Transport, Works, Supply and Communication
  - *Roads Department*
- Ministry of Chiefs and Traditional Affairs
  - *National Heritage Conservation Commission*
- Ministry of Education
- Ministry of Health

## 2.0 LEGAL FRAMEWORK

Various legal instruments and policy documents were reviewed to develop this ESMP. These include but not limited to the following:

- The Electricity Act, 1995;
- The Environmental Management Act No. 12 of 2011, Statutory Instrument No. 28 of 1997 – The Environmental Impact Assessment Regulations;
- The IFC's Sustainability Framework, 2012;



- The Land Act, 1995 (CAP 292, CAP 289, CAP 288) and the Lands Acquisition Act, 1995 for the allocation and alienation of land under statutory leaseholds;
- World Bank Environmental and Social Safeguard Policies; and
- World Bank Group Environmental, Health, and Safety Guidelines, 2007

### **3.0 MAIN COMPONENTS OF THE ESMP**

#### **3.1 Code of Conduct and Method Statement**

As the various works are undertaken by the Contractor(s), it is imperative that the Construction Supervisor complies with environmental protection measures adopted in this ESMP, through a well-articulated code of conduct. Further, the Method Statement shall stipulate how the works will be carried out, taking due care of the environment.

#### **3.2 Awareness Campaigns**

The ECO shall be responsible for scheduling and organizing of environmental and health awareness campaigns for both construction workers and local people within the affected community, where applicable. The Safety Officer will be responsible for scheduling and organizing of Safety awareness campaigns for both construction workers and local communities, where applicable. Where necessary and practicable, the two officers may organize joint meetings at which they will address the workers on various environmental, health and safety issues.

#### **3.3 Liaison with Stakeholders and the Press**

In order to avoid issuing conflicting statements to stakeholders, the press and other interested and affected parties, only individuals so designated by the Client (ZESCO) may talk to stakeholders and issue press statements, when necessary. The Client's Public Relations Manager, Project Manager or any other senior officer from the Client (ZESCO) may be designated to liaise with stakeholders and the press.

#### **3.4 Employment**

The Construction Supervisor or Site Manager will be encouraged to employ labour intensive techniques as much as possible. It is preferred that the Construction Supervisor employs local residents during the construction period. The Construction Supervisor shall tighten controls on employment to ensure that people from outside the area are not employed at the expense of locals, except in the case of specialized skills that cannot be sourced locally.

### **3.5 Environmental Aspects of Waste Management**

The following management features shall be applied:

- All waste (liquid and solid) arising from direct or indirect construction activities shall be disposed of in designated areas with approval from local authorities;
- Transformers and other equipment that will be installed at the project sites shall be free of Polychlorinated Biphenyls (PCBs) or any other hazardous materials;
- All machinery repairs shall be carried out at designated repair workshops onsite and offsite; and
- Waste oils shall be handled with care and stored in well labeled designated and safe sites as directed by the Site Manager. Waste oil should either be retreated for reuse or sold off to licensed vendors.

### **3.6 General Guidelines for Construction Works**

The Contractor shall conduct his activities in such a manner that causes the least possible disturbance to existing amenities, so as to comply with all relevant international and national requirements.

The Construction Supervisor shall abide by following general environmental guidelines during the course of works.

The Contractor shall not establish or undertake any activities that, in the opinion of the ECO or Site Manager are likely to affect the quality of work on site. Where required, the ECO or the Site Manager may direct the Contractor or their Site Agent to refrain from such activities or to take remedial actions to reduce the adverse effects of their activities on both the biophysical and socio-economic environments:

- No work shall be carried outside the defined area of the works without the prior written approval from the Site Manager or as stipulated in the contract;
- All work areas shall be clearly marked with proper signage;
- To minimize air and noise pollution, the construction team shall use only equipment in good condition, which shall be properly maintained;
- The Safety Officer and the Site Manager, in collaboration with the Contractor, shall document accidents at the construction site. Safety rules and procedures shall be tightened in form of information to reduce the chances of recurrence;
- The construction team shall at all-times exercise due care and diligence not to damage private property. All damages shall be made well at the Contractor's or ZESCO's cost depending on the type of damage and the responsible party for the damage;
- Disturbance or disruption of the daily lives of local communities and their livelihood, including noise and dust pollution shall be minimized in as far as is practicable using appropriate methods and technology;
- The Contractor shall ensure that the construction site is maintained in a neat and tidy condition at all times;

- The Contractor, in consultation with ZESCO's Site Manager, shall employ as many locals (as semi-skilled and unskilled labour) as possible for the execution of the works. The Contractor should provide on-the-job training for some skills which the local people may not have. Only in specialized jobs where the local people may not have the necessary skills can the Contractor employ people from outside the project area;
- A register shall be kept of all employees, showing as much information as may be deemed necessary; and
- Monthly labour returns should be submitted to Site Manager on a form to be provided by ZESCO giving the information mentioned above.

### **3.7 Temporary Works**

The following specific environmental guidelines shall be observed and implemented in mitigation of the potential environmental impacts in areas of activity, access roads and storage areas.

- Use of existing facilities such as access roads shall be encouraged as opposed to construction of new ones. Public roads used by the project shall be maintained in a trafficable and safe manner with minimum creation of dust. All local speed limits shall be observed;
- Temporary storage areas shall be located within the designated area of the construction site as may be directed by Site Manager. These storage areas shall be appropriately sited taking into account the topography, access, security and safety;
- Work-sites shall be kept clean and tidy;
- The area is within reach of fuel service stations as such there will be no need to store fuel on site. However should need arise, fuel and lubricants shall be stored in clearly labeled Energy Regulation Board (ERB) approved above-ground storage facilities to ensure the surface area can be visually inspected. Tanks shall be inspected daily and any leakages stopped immediately;
- Sumps surrounded by low bunds and floored with impermeable material shall be constructed around the transformers, and oil spilled to sumps will be removed for recycling or safe disposal;
- Oil changes in machinery and equipment including vehicles shall take place at designated workshops unless in case of a major vehicle breakdown; and
- Demobilization from a site will include removal and safe disposal of all temporary structures and all types of waste. No un-drained water will remain on site. All the pools of water which may have collected at construction sites and storage sites should be drained to avoid breeding of mosquitoes.

### **3.8 Vegetation Protection**

The project area consists of built-up commercial and residential areas, including farmland, and does not have significant natural vegetation cover. Most of the vegetation includes fruit trees and low-lying crops; as such impacts on natural vegetation are insignificant. However, where the activities affect any of the trees and crops, the

Contractor shall ensure that all work is undertaken in a manner that minimizes the impact on vegetation, outside the immediate area of works. The following shall apply with respect to the protection of areas of vegetation adjacent to the area of works:

- Vegetation clearance shall only take place within a specified area and for the purpose as defined in the project specifications;
- No tree or shrub outside the area of works shall be felled, cut or pruned, without the prior approval of the Site Manager; and
- No tree outside the area of works shall be burned for any purpose.

### **3.9 Protection of Fauna**

The area has very low biodiversity and population in terms of medium-sized and large mammals and reptiles. Most the aforementioned are confined to private ranches and animal sanctuaries that are not in the immediate project area. The Contractor shall ensure that all work is undertaken in a manner that minimizes impacts on the animals. Under no circumstances shall any animals, if found, be handled; removed; killed or interfered with by the construction team without guidance of the ECO or the Site Manager.

### **3.10 Protection of Public and Private Property**

The following guidelines shall apply in order to mitigate the impacts of the construction activities on public and private property in the project area, where applicable:

- Appropriate permits shall be obtained before any works are carried out near or on public or private property; and
- Appropriate local agencies such as the Lusaka City Council shall be consulted before sourcing any bulk local materials such as sand and crushed stones that may attract permits and fees.

### **3.11 Roads and Road Transport**

In carrying out construction works, the construction team and suppliers of materials shall comply with the provisions of the relevant Laws of Zambia on road usage, but not limited to the following:

- Where designated access routes are indicated in the work program, the construction team shall use no other routes without the approval of the ECO or the Site Manager;
- Where existing gravel roads are used frequently by the project in any part of the works as access roads for transporting labour and construction materials, the project shall maintain the road by:
  - Routine maintenance consisting of gravelling and dust control by watering.

- Periodically watering all gravel roads in the proximity of dwellings, where these are heavily used by construction traffic, to minimize dust emission.
- The construction team, in all instances, shall exercise utmost driving control and care; and
- Any area of public road, which is closed because of the Works, shall not be reopened until appropriate safety and traffic management measures have been completed, and or until the ECO confirms that it is in a suitable condition for use by the public.

### **3.12 Water Supply**

The local water supply system shall be used and, where possible, the contractor shall provide alternative water supplies or improve the existing water supply system so as to avoid negatively affecting the local supply system.

### **3.13 Private Property, Schools and Institutions**

There may be private properties and Government institutions that may be disrupted during the execution of the works. The following guidelines shall apply to mitigate the impacts on private property and public institutions that may not be known:

- The provisions in this ESMP on pollution reduction shall apply;
- The Contractor shall ensure that access to services such as fields, electricity supply etc. to private property owners is not disrupted; and
- Any reasonable conditions demanded by the Lusaka City Council (LCC) shall be respected and complied with in as far as it is practicable.

### **3.14 Refuse and Waste Pollution Control**

To mitigate the impacts arising from waste generation, the following programs shall be initiated:

- All waste materials will be collected in appropriate receptacles strategically placed and disposed of in designated sites within the City as approved by the local Authority;
- The waste management program will be an on-going responsibility of the Contractor and the ECO;
- Burning of plastic material or any other materials shall not be permitted and all such materials shall be disposed of in a manner acceptable to the Site Manager or ECO and in accordance with the waste management guidelines as provided for by LCC and ZEMA; and
- Soil contaminated by cement or other chemicals shall be removed and placed in approved disposal areas.

### **3.15 Fuel Storage and Workshop Areas**

Fuel dispensing and repairs for machinery shall be done from a designated workshop. However, where such facilities shall be provided within the project site area, the following shall apply;

- Fuel dispensing areas and workshop areas for machinery shall be provided with concrete hard standing surfaces draining to oil separators, where applicable or in relation to the national and international standards;
- Drainage into watercourses from fuel storage and machinery maintenance areas shall not be permitted and where possible treated to remove oil and/or fuel; and
- Soil contaminated by fuel and oil leakage shall be removed and disposed of at an approved site and in a permitted manner or treated according to the Hazardous Waste Management Regulations, Statutory Instrument No. 125 of 2001 of the Environmental Management Act, No. 12 of 2011.

### **3.16 Toilet Facilities**

The Contractor's work force shall be provided with appropriate mobile toilet facilities within the construction work area. Portable toilets shall be used on the construction site and shall be kept in clean and good working condition.

The local Civil Engineer shall ensure that there are sufficient toilets for use by the construction workers on site.

### **3.17 Air Pollution Control**

The Contractor shall take measures to reduce the emission of particulate matter from operations, excavations, road transport and other related construction activities. Equipment and vehicles that exhibit excessive emissions of exhaust gas due to poor engine adjustment or other inefficient operating conditions shall not be permitted. Burning of vegetative waste, construction materials and other waste shall not be permitted.

### **3.18 Noise Pollution Control**

Construction activities such as operation of plant and equipment, and heavy vehicles will result in noise nuisance to residents near the project area. Suitable methods and equipment, such the following shall be used to diminish noise pollution:

#### **(i) Restriction on Working Hours**

The Contractor shall restrict any of his operations, which may result in undue noise disturbance to nearby communities and dwelling to between 06.00 hrs and 18.00 hrs unless otherwise approved by the ECO or Site Manager.

**(ii) Plant and Equipment**

As far as practicable, the Contractor shall bring to site, and employ on the works, only environmentally acceptable and quietly operating plant and equipment, compatible with the safe and efficient construction of the works.

**(iii) Explosives**

No explosives shall be used. However, in the event that explosives are used on site, the following guidelines shall apply:

- The Contractor shall use explosives only in circumstances where it is safe to do so and is necessary, having due regard to the safety of persons;
- The Contractor shall obtain all licenses in accordance with the relevant Explosives Regulations and to the approval of the ECO and Safety Officer;
- The Contractor shall strictly comply with the provisions of the Zambian laws and regulations; and
- Due to the fact that the works will be undertaken in built up areas, measures shall be taken to ensure the residents are warned and informed of the time for use of explosives and that the existing equipment, machines and other facilities are not disturbed or damaged.

**3.19 Stockpiles and Spoil Dumps**

In carrying out works that could cause accumulation of soil stock piles or spoil dumps, the following shall apply:

- Where no longer required, these stockpiles and spoil dumps shall be shaped and re-vegetated to blend with the local environment as much as possible;
- Drainage shall be provided to control base water flow such that migration of fines is kept within the stockpile or dump; and

**3.20 Construction Work Site**

In establishing construction work site, the following general guidelines shall apply:

- Construction works shall not impinge on scenic beauty of undisturbed areas;
- A First Aid kit and toilets are provided for the workforce for operational use;
- Waste receptacles shall be used on site; and
- Protective clothing shall be issued to all categories of the workforce free of charge.

### **3.21 Health**

Construction projects and associated labour force could serve as a vehicle for spreading disease such as cholera, STIs, and malaria. To minimize the spread of communicable diseases, the following guidelines shall apply during construction:

- Where practicable, the Contractor shall employ locals unskilled man power and use locally trained manpower from within the township where practicable to minimize communicable diseases from outside the area;
- The Contractor shall provide First Aid kits for the labour force;
- In the case of serious injuries on site, the Construction Supervisor/Project Site Manager shall formulate a plan to deal with such emergencies; and
- The provisions on pollution control and sanitation shall apply to maintain a healthy working environment.

### **3.22 Respect for Cultural Values, Beliefs and Property Rights**

There is need for the Contractor to respect the cultural norms, beliefs and property rights of the local community during construction. The Construction team shall conduct their operations in a manner that will not upset the socio-religious order of any communities found near the project area.

### **3.23 Scenery Maintenance**

Areas outside the work areas that will be affected during construction such as grass and small bushes shall be restored in a manner that the final ground appears as a natural extension of the adjacent undisturbed ground.

## **4.0 MONITORING AND AUDIT PROGRAM**

A monitoring program will be implemented and carried out by ZESCO Environment and Social Affairs Department (ESD). A schedule of environmental activities will be developed at the beginning of the project as part of the overall project design. Monitoring will ensure that initiation and completion of the programs is done and meets the intentions of the program initiatives. Within this context this will include the following:

- Monitoring of route layout to ensure environmental programs are included in the design and construction schedules as well as ensuring the engineering design meets the intent of environmental program;
- Monitoring of construction activities to ensure that construction meets specifications and the ESMP;
- Monitoring and modification to meet changes which develop over the course of the program implementation; and



- Liaison with the community, and various government agencies to ensure all requirements associated with the project initiatives and environmental mitigation measures are met.

## 5.0 PHASING OF ACTIVITIES OF THE ESMP

In order to implement the ESMP, a phased program of activities has been proposed. However, the proposed outline does not exclude other appropriate activities as may be dictated by conditions during construction. The phasing of environmental activities shall be as outlined in the table below:

**Table 1      Phasing of the Environmental Activities of the ESMP**

<b>Phase</b>	<b>Activities</b>	<b>Responsibility</b>
Mobilization	Health and Safety awareness campaigns for workers	ECO with Health and Safety Team
Construction	Health and safety awareness for both Local people and construction workers	ECO with Health and Safety Team
	Monitoring of compliance to outlined environmental mitigation measures	ECO
	Ensure implementation of environmental mitigation measures	Construction Supervisor/Site Manager / ECO
Completion / Commissioning	Environmental Auditing	ECO with the ESD Auditing Team

## 6.0 SUMMARY OF ESMP AND COST ESTIMATES FOR THE LUSAKA DISTRIBUTION REHABILITATION PROJECT

This is a summary of activities that will be used to perform environmental and social management of aspects and impacts typically associated with execution of Component 2 activities (Distribution). Site-specific and detailed ESMPs will be prepared as and when actual substation sites and line routes have been identified.

Aspect	Impact	Mitigation Measure	Frequency of Monitoring	Time Frame	Performance Indicator	Responsible Person	Cost (US\$)
<b>PHYSICAL ENVIRONMENT</b>							
Excavation, burrowing and blasting activities; movement of heavy duty machinery and vehicles	Vibrations leading to loosening of rock, and cracking of some of the existing infrastructure in the area.	Use of controlled blasting by qualified and registered (licenced) blasters; and appropriate warning given before blasting	Before and during blasting activities	Throughout project construction phase	Number of deviations from approved blasting plan(s) and schedule(s);  Numbers of complaints from the community regarding blasting activities	Contractor, Blasting personnel	Embedded in Project Cost
	Increased dust, gas, and particulate emissions	Dust suppression measures through spraying of water in dust prone areas by use of water bowsers;  Use of construction vehicles and equipment that are in good	Daily	Throughout project construction phase	Number of deviations from water bowsing schedule;  Percentage of conformance to vehicle and equipment maintenance programme	Contractor	54,000

Aspect	Impact	Mitigation Measure	Frequency of Monitoring	Time Frame	Performance Indicator	Responsible Person	Cost (US\$)
		working condition.					
	Noise pollution	Use of mufflers, silencers to minimize noise from construction activities;  Restricting vehicle movements and operation of loud machinery and equipment to daylight hours.	Periodically	Throughout site preparation and construction phases	Number of mufflers issued to workers;  Quantity of construction equipment fitted with silencers;  Number of vehicles and construction equipment operational outside daylight hours	Contractor, Project Coordinator	54,000
Vegetation Clearance	Soil Erosion	Existing tracks or access roads shall be used and maintained as opposed to creating new routes;  Trimming or stamping of trees rather than complete removal;	During vegetation clearance	During project site preparation phase	Number of new tracks/routes created;  Number of trees uprooted	Project Coordinator, Contractor	Embedded in Project Cost
Construction and	Generation of	Disposal of waste	Whenever	Site preparation,	Conformance	Project	15,000

Aspect	Impact	Mitigation Measure	Frequency of Monitoring	Time Frame	Performance Indicator	Responsible Person	Cost (US\$)
decommissioning activities	construction, domestic, and vegetative waste	in an environmentally acceptable manner, in accordance with ZEMA regulations	waste is generated and disposed	construction, and operation phases	to stipulated regulations vis-à-vis waste management	Coordinator, Contractor	
	Visual impact and reduction in aesthetic value.	Underground lines, as opposed to overhead lines, wherever possible, shall be used in built-up areas;	During planning, design and construction phases	From design stage to construction phase	Length of overhead lines in built up areas	Project Engineer, Project Coordinator	Embedded in project Cost
<b>BIOLOGICAL ENVIRONMENT</b>							
Vegetation clearance and construction activities	Destruction of natural vegetation	<p>Vegetation clearance shall be restricted to wayleave and substation sites;</p> <p>Conservation awareness campaigns to be carried out;</p> <p>Site clearing will be restricted to scrub clearing; thereby retaining the rootstock. Felling of trees shall be avoided, and trimming and stumping will be</p>	Periodically during the site preparation and construction phases	Site preparation to construction phase	<p>Clearance of vegetation beyond wayleave and substation sites;</p> <p>Mode of vegetation clearance</p>	Project Coordinator, Contractor	108,000

Aspect	Impact	Mitigation Measure	Frequency of Monitoring	Time Frame	Performance Indicator	Responsible Person	Cost (US\$)
		opted for wherever possible;					
<b>SOCIO-ECONOMIC ENVIRONMENT</b>							
Load Management	Disruption of power supply for economic and domestic use	Power disruption schedule to be developed and communicated to the public;  Pursue intensive Demand Side Management strategies such as 'switch and save'.	Every 4-6 hours	Throughout construction phase	Duration of disruptions beyond scheduled times;  Reduced peak demand	Project Manager	15,000
Increase in population in search of employment	Stress on social amenities	Employment during site preparation and construction stages shall be done from within the local community, wherever possible.	Weekly during the project implementation	Pre-site preparation phase to construction phase	Numbers of people from outside the community employed	Project Coordinator, Contractor	Embedded in Project Cost
	Spreading of communicable diseases	Conducting of health awareness talks to the workers and the community at	Regular intervals	Site preparation phase to construction phase	Disease incidence	Project Coordinator	54,000

Aspect	Impact	Mitigation Measure	Frequency of Monitoring	Time Frame	Performance Indicator	Responsible Person	Cost (US\$)
		regular intervals during project implementation.					
Site preparation and construction activities	Provision of employment to locals	Employment during site preparation and construction stages shall be done from within the local community	Weekly during the project implementation	Pre-site preparation phase to construction phase	Local people employed especially as unskilled and semi-skilled labour	Project Coordinator, Contractor	Embedded in Project Cost
	Workers and members of the public exposed to hazards at project site.	First Aid training and first aid kits shall be given to workers as part of emergency preparedness and response.	Weekly	Site preparation through to construction phase	Number of workers trained; availability of first-aid kits; and response time to any hazards	Project Coordinator	54,000
		Provision of personal protective equipment (PPE) to all project staff and site visitors	Daily	Throughout project implementation	Availability of PPE and adherence to its use on site	Project Coordinator, Contractor	81,000
		Appropriate signage and safety symbols shall be placed in respective areas to warn workers, visitors, and locals of any hazards that may	Regular Intervals	Throughout project implementation	Appropriate signage and safety symbols placed.	Project Coordinator, Contractor	54,000

Aspect	Impact	Mitigation Measure	Frequency of Monitoring	Time Frame	Performance Indicator	Responsible Person	Cost (US\$)
		exist					
						<b>GRAND TOTAL</b>	<b>489,000 + amounts embedded in project costs</b>



## APPENDIX 2: MINUTES OF THE SCOPING MEETING

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**MINUTES OF THE ENVIRONMENTAL SCOPING MEETING FOR THE LUSAKA RING 132kV TRANSMISSION LINE PROJECT HELD AT THE MULUNGUSHI INTERNATIONAL CONFERENCE CENTRE ON 29<sup>TH</sup> JANUARY, 2013****ATTENDANCE**

The Scoping meeting was attended by 125 people, and the list of attendees is attached as an appendix to these minutes.

**AGENDA**

The agenda of the meeting was as follows:

1. National Anthem
2. Opening Prayer
3. Introductory Remarks by ZESCO Managing Director
4. Welcoming Remarks by ZESCO Board Chairperson
5. Remarks by Lusaka Province Provincial Minister
6. Official Opening by Minister of Mines, Energy, and Water Development
7. Presentation of the Project by Director – Transmission
8. Question and Answer Session
9. Closing Remarks by ZESCO Managing Director
10. Closing Prayer
11. National Anthem

**1.0 INTRODUCTORY REMARKS BY ZESCO MANAGING DIRECTOR**

The meeting was opened with the National Anthem, which was followed by a prayer.

The meeting was called to order by Mr. Cyprian Chitundu, ZESCO Managing Director, at 09:50 Hours. Mr. Chitundu recognised the presence of the Minister of Mines, Energy and Water Development Lusaka Provincial Minister, ZESCO Board Members and Management Team, Members of Parliament, District Commissioners, Royal Highnesses, Councillors, and the Media. He welcomed everyone to the meeting and urged all to be attentive to the presentations and deliberations; and further, to seek clarification over whatever concerns they may have, during the question and answer session.

Mr. Chitundu mentioned that ZESCO Limited intended to improve the transmission and distribution system in Lusaka Province by upgrading its infrastructure. This would be achieved through the implementation of the Lusaka Ring 132 kV Reinforcement project. The aim of the project was to improve the quality and reliability of electricity supply within the power distribution and supply network in line with the Government's efforts to increase access to electricity. Mr. Chitundu informed the meeting that the Lusaka Ring mainly supplying power at 33kV had reached its thermal limit, resulting in power supply failures in Matero, Lusaka West and Chalala areas.

He noted that the Scoping meeting was part of the Environmental Impact Assessment (EIA) process and was a statutory requirement under the Environmental Management Act (EMA) No. 12 of 2011. In this vein he stated that the aim of the meeting was to inform the public of the project, its benefits, and the impacts, both negative and positive, that would arise during implementation. In addition, the meeting will provide various stakeholders an opportunity to air their views and concerns related to the development and implementation of the proposed Project. These views and concerns would then be incorporated in the EIA study and aid in the preparation of the project Environmental Impact Statement (EIS) report that would be submitted to the Zambia Environmental Management Agency (ZEMA) for consideration.

Mr. Chitundu then called upon the ZESCO Board Chairperson, Fr. Frank Bwalya, to give his welcoming remarks.

## **2.0 WELCOMING REMARKS BY ZESCO BOARD CHAIRPERSON**

Fr. Frank Bwalya, the ZESCO Board Chairperson, reiterated the ZESCO Managing Director's remarks and stated that he hoped the meeting would be fruitful. Fr. Bwalya stated that ZESCO anticipated an unprecedented growth in load demand for Lusaka in the next 15 years, hence the need to start addressing the challenges early, before they become unmanageable.

He further indicated that Lusaka currently used 40% of the non-mining load generated by the utility. As such, to avoid unnecessary crisis of inadequate supply of power, which would retard development, there was need to plan adequately. He stressed that development was not possible in the absence of adequate and reliable energy, electricity in particular. Fr. Bwalya informed the meeting that in order to stabilize the power situation in Lusaka, the proposed Lusaka Ring 132kV reinforcement project was being planned and would be implemented soon. He assured the public that ZESCO was doing its best to improve the power situation in the country.

Fr. Bwalya then welcomed Mr. Freedom Sikazwe, Lusaka Provincial Minister, to give his remarks, and invite the Minister of Mines, Energy and Water Development to give the official opening speech.

## **3.0 REMARKS BY LUSAKA PROVINCIAL MINISTER**

Mr. Freedom Sikazwe, Lusaka Provincial Minister expressed happiness at the proposed undertaking by ZESCO. He welcomed the project stating that it would improve the power situation in Lusaka, and the country as a whole. He offered his support to ZESCO throughout the project implementation and asked the public to be patient during this process, as it was meant for their own good, and the development of the country as a whole.

Mr. Sikazwe called upon and introduced the Minister of Mines, Energy, and Water Development, Honourable Yamfwa Mukanga, to give the official opening speech.

#### **4.0 REMARKS BY MINISTER OF MINES, ENERGY, AND WATER DEVELOPMENT**

The Minister of Mines, Energy, and Water Development, Honourable. Yamfwa Mukanga officially welcomed everyone to the meeting, noting that their input into the deliberations would enhance and fine-tune the successful implementation of the project.

Honourable Mukanga described the population of Lusaka City and the surrounding districts to be growing at a rapid rate of close to 6% per annum. This population is exerting pressure on the social and economic areas of the society. Honourable Mukanga stated that government had developed a number of policy development plans aimed at fostering sustainable social economic development to the country. One such plan is the Lusaka Master Plan, which proposes modern infrastructure such as urban housing, professional drainages and ring roads.

He further recognised the fact that energy was an important driver for social and economic development without which the above plans would not be achieved. He reminded the stakeholders in the meeting of the importance of the gathering, stating that their views on the project were very important as it would help foster collaboration and ownership of this project.

Honourable Mukanga mentioned that the scoping meeting for the proposed Lusaka 132kV ring reinforcement project was in line with the Environmental Management Act (EMA) No. 12 of 2011. He stated that once implemented, Lusaka City would have power system infrastructure that will have the capacity to handle 850 MW of power as compared to the current 450MW. The Honourable Minister expressed gladness at the proposed project as once completed, it would mitigate the power deficits that the country has been experiencing. He however warned that the public should desist from acts of vandalism and encroachment on such infrastructure as this would be a drawback to progress already made.

He urged all the stakeholders present to cooperate fully with the ZESCO team and the project consultants as they worked on the project. In conclusion, the Minister commended ZESCO for the initiative that would impact positively on the provision of goods and services in Lusaka City and surrounding areas. In closing, Honourable Mukanga encouraged all the stakeholders present to be at liberty during the deliberations and contribute to the process for the benefit of everyone.

#### **5.0 PRESENTATION BY DIRECTOR TRANSMISSION**

The Director in charge of Transmission, Mr. Christopher Mubemba, gave a presentation on the Lusaka ring 132kV transmission reinforcement project.

The Director Transmission stated that there had been a rapid increase in power demand in the country due to factors such as increased mining and industrial activities, increased agricultural sector investments, and the rise in domestic loads. He however,

regretted that delayed investment in generation plants in the country had not matched the load growth, resulting in deficit in power generation capacity of about 70 Mega Watts. This delay in investment had also affected the transmission and distribution systems, thereby depleting power transmission and distribution capacity.

The meeting was informed that ZESCO's strategic direction was focussed on completing the Power Rehabilitation Project, building new generation plants, expanding the transmission network, upgrade of the transmission and distribution systems in all four (4) of ZESCO's operational divisions (Lusaka, Copperbelt, Northern and Southern), Implementation of demand side management, and proactive engagement with stakeholders and clients. The Director informed the meeting that ZESCO was hoping to reduce power demand by up to ten percent (10%) through effective demand side management, and that the upgrade of the transmission and distribution systems were going to start with Lusaka Division as forty percent (40%) of the country's non-mining loads are concentrated in the area.

Owing to the above, the meeting was informed that ZESCO had embarked on a number of generation and transmission projects to meet the power demand. This was through the building of new generation plants and transmission networks, and upgrading the transmission and distribution systems throughout the country. Among the generation projects were the Kariba North Bank power station rehabilitation and upgrade, Kariba North Bank Extension project, the Kafue Gorge Lower Hydro power station, Itezhi-Tezhi power station and upgrade of four small hydro power stations.

Among the notable transmission line projects being implemented were the connection of North-western Province to the national grid, Pensulo Kasama and Pensulo Chipata 330kV transmission line projects, Kariba North Bank Extension power evacuation project, and the Lusaka 132kV ring transmission line reinforcement project, for which this scoping meeting was called.

He noted that the aim of this project was to increase the capacity of the sub transmission and distribution system in Lusaka, thereby meeting the increased demand which has outstripped system capacity. In doing so, load shedding, which was as a result of depleted infrastructure capacity, was expected to reduce. He then presented a satellite image of the study area for the project as well as a schematic layout of the development plan for the Lusaka transmission network.

The director informed the meeting that the composition of the load for Lusaka is spread across three (3) power demand categories, namely; residential, commercial and industrial. The residential demand is spread in various directions of the city, stretching to the outskirts as well. He stated that the bulk of demand in the commercial category was from the city centre (i.e. Central Business District), which was currently being supplied through Coventry Substation. He stated that the industrial area, currently located west of Lusaka City was also being supplied through Coventry Substation.

The Director explained that Lusaka transmission/distribution supply network was currently being supplied through two (2) substations at 330kV. The two are Leopards Hill and Lusaka West substation in the east and west of the city, respectively. He further stated that the two substations supply three (3) main Bulk Supply Points (BSPs), which are Waterworks at 88kV as well as Roma and Coventry, both at 132kV. In turn, these BSPs supply more than twenty (20) distribution substations at 33kV, which then supply the 11kV distribution networks.

In his presentation, the Director indicated that the 132kV and 88kV transmission lines were rather old, providing a thermal limit of 86MVA and 57MVA, respectively. Due to this limited transmission capacity, the existing network was being operated close to thermal capacity, resulting in periodic outages. He further stated that the infrastructure was overloaded and was being pushed beyond safe operating capacity, hence the need to reinforce the transmission ring through this project. He went on to add that with an annual progression rate of six percent (6%), the power demand for Lusaka is projected to increase from 450MVA in 2011 to almost 1150MVA in 2030. Therefore, to counter the demand, ZESCO was planning to add nine (9) additional BSPs and install twenty four (24) new 132kVA circuits.

The scope of the works will include upgrading of 52km of the existing 132kV network with monopole structures for double circuit lines on the transmission ring, and installation of new transformers and related equipment at all the BSPs. The Director further stated that about 22km of 88kV lines between Leopards Hill Substation and Waterworks BSP will be upgraded to 132kV, in order to increase the current line capacity from 57MVA to a thermal capacity of approximately 200MVA. The scope will also include installation of the 132/11kV BSPs with 3X30MVA transformers in Avondale, Bauleni, Matero, Liverpool (Mungwi Road), and Makeni. The Director informed the meeting that about 62km of new 132kV lines will also be installed to connect the aforementioned 132/11kV BSPs to the network. He further stated that a new substation will be built between Coventry BSP and Lusaka West Substation, at a location to be determined. Overloaded distribution transformers located at different existing distribution substations, and some of the existing 33kV overhead lines and/or underground 33kV and 11kV cables will also be upgraded, including some of the switchgear on an as needed basis.

The Director stated that ZESCO was currently facing challenges in improving its service delivery, and the challenges included encroachments, unsynchronised planning between Lusaka City planners and ZESCO planners, vandalism, and availability of the required substantial financial resources. He informed the meeting that ZESCO was holding the scoping meeting in order to fulfil the legal requirements of Zambian law and its obligations as mandated by financiers of the proposed project, and the meeting was an important avenue to inform and consult various stakeholders on the intention to implement the project. He further stated that the purpose of the meeting was to bring out and highlight in advance key issues of concerns such as encroachments so as to ensure successful implementation of the project, as per EIA Regulations Statutory Instrument No. 28 of 1997.

The meeting was informed that benefits of implementing the project would include reduced power distribution losses by establishing the power injection points closer to the load centres, and distribution of the loads on transmission and distribution sub-networks. Increasing capacity of the Lusaka power system would satisfy long-term demand growth. The Director further stated that increased reliability of the distribution system would lead to reduced frequency of power supply interruption.

In conclusion, the Director stated that minimised load shedding, increased reliability of supply, additional capacity for new loads/ demand would lead to alleviation of poverty levels for the citizenry, and more money in people's pockets. He ended the presentation after showing some pictures of encroachments on wayleave for ZESCO power lines on the proposed project.

## 6.0 QUESTION AND ANSWER

The stakeholders present at the meeting were then allowed an opportunity to make their comments on the proposed project, as well as ask questions on various aspects on the project and its interaction with the environment.

ISSUE/COMMENT/QUESTION	NAME AND ORGANISATION	RESPONSE
<ol style="list-style-type: none"> <li>1. Why is it that power supply to Matero is affected during events such as televised soccer games?</li> <li>2. I would like to thank ZESCO for inviting me to this important meeting. As government we are also happy that this project, which is partially being funded through funds raised through the US\$750m Eurobond, is earmarked to start off.</li> </ol>	Honorable. Miles Sampa, Member of Parliament for Matero Constituency / Deputy Minister of Finance	<p>ZESCO-</p> <p>The problems being experienced are due to localized constraints.</p> <p>The Matero Substation has only 2x20MVA transformers and it supplies Matero, Kabanana, Chunga and Lilanda. Furthermore, the line supplying Matero is only able to carry about 86MW of power but demand is close to 150MW; therefore the supply in the area is affected tremendously when the load peaks (i.e. during</p>

ISSUE/COMMENT/QUESTION	NAME AND ORGANISATION	RESPONSE
		<p>nationally televised soccer matches). We would like our customers to “switch and save” during peak demand hours.</p> <p>Furthermore, the section of the Lusaka 132kV transmission ring that supplies Matero would be the first to be worked on.</p> <p>The Matero Substation is being upgraded and the current power transformation infrastructure there has been replaced with new 2x40MVA transformers, and site handover is slated for next week.</p> <p>The Kabangwe Substation has also been constructed and a substation will also be commissioned in Kabanana to reduce the load on the Matero Substation.</p>
<p>3. The project is long overdue and I commend ZESCO for taking this step towards implementation of the project. However, what are the negative impacts of the project on the environment?</p>	<p>Honorable. Given Lubinda, Member of Parliament for Kabwata Constituency / Minister of Foreign Affairs</p>	<p>The negative impacts of the project will include involuntary resettlement of people that have encroached in the wayleave, loss of income and livelihood</p>



ISSUE/COMMENT/QUESTION	NAME AND ORGANISATION	RESPONSE
<p>4. There is lack of synchronization between ZESCO and the local planning authority. I urge ZESCO to coordinate its work with the planning authorities so as to reduce incidences of encroachment and provision of power to illegally built properties.</p>		<p>for people engaged in trading under the line and within the wayleave, likely spread of communicable diseases from interaction of construction workers and community will be some of the challenges during implementation of the project.</p>
<p>5. How can ZESCO further engage the private sector in saving power?</p>	<p>Dr. Angelika Huwiler MD Foxdale Court</p>	<p>ZESCO – We have been making efforts to engage the private sector through energy audits, which we conduct free of charge. The audits, which are done by our Demand Side Management team, help our clients have better information on how to manage their power consumption levels without affecting their businesses. However, very few consumer entities have approached us on this matter and even those that we have been audited rarely implement the recommendations we make. We would encourage your organization and</p>

ISSUE/COMMENT/QUESTION	NAME AND ORGANISATION	RESPONSE
		<p>several others to improve the power factor through use of good power factor correction equipment. The duty on such equipment has been waived, so it's a step you should definitely take. We also provide CFLs so that our clients can still have good lighting and save power.</p>
<p>6. What is ZESCO doing to safeguard wayleaves that have been encroached?</p> <p>7. Why is it that ZESCO treats its clients differently, according to social or financial status?</p> <p>8. I wish to reiterate Honourable Lubinda's question: What are the negative impacts of the project?</p>	<p>David Rossi, Garden House Motel</p>	<p>ZESCO- We intend to fence off the Carousel – Mumbwa Road section of the Lusaka transmission ring as this is the area which is severely encroached. ZESCO does not practice discrimination in dealing with all its clients. Some areas experience more load shedding than others because the power demand in such areas is significantly higher than what we can manage to supply. We also have infrastructure challenges with our distribution system but we are making huge investments in such critical structures. Note also that certain</p>

ISSUE/COMMENT/QUESTION	NAME AND ORGANISATION	RESPONSE
		<p>installations, particularly hospitals and high security premises, are dealt with more expediently for obvious reasons.</p> <p>The negative impacts of the project will include disposal of solid wastes, relocation of people, disturbance of livelihoods and outages. Management of the load will be a serious challenge during implementation of the project. We are also aware that the interaction of contractors' personnel with member so of the community might lead to increases in certain disease(s) occurrences.</p>
<p>9. What ideas does government have to improve renewable energy?</p>	<p>Given Mulenga, Alternative Energy</p>	<p>Minister of Mines, Energy and water development: As government and as outlined in the energy policy, we are looking at promoting all alternative sources of energy such as Solar energy and biofuel. We all must change our attitude towards these sources of energy.</p>

ISSUE/COMMENT/QUESTION	NAME AND ORGANISATION	RESPONSE
10.I want to commend ZESCO for undertaking the project and on behalf of Kalingalinga ward Development Committee pledge to support ZESCO curb vandalism	Mr. Wafika Mtonga: Kalingalinga Ward Development Committee	ZESCO- We acknowledge thank you for the support pledged to help the cooperation curb vandalism
11.ZESCO needs to engage her Royal Highness Chieftainess Mungule on getting alternative land for the Kabangwe Substation as the current substation is on the road reserve	Headman Mupwaya: Mungule Royal Establishment	ZESCO: we thank you and acknowledge Her Royal Highness for the gesture to engage in alternate land negotiations for Kabangwe substation. We will approach her on the suggestion

## 7.0CLOSING REMARKS

The Managing Director thanked all who were present for taking time out of their busy schedules to attend the scoping meeting. He informed the meeting that ZESCO had a tight schedule for the project and that if they had any issues to feel free to present them to the corporation. He further informed the meeting that it was ZESCO's intention to implement the project with minimum disturbances to the public and the environment. The meeting was officially closed at 12:20 hours after singing the national anthem and a prayer.

**Chairperson**

**Secretary**

Name: Hon Mr. Yamfwa\_Mukanga\_ Name: Mr. C. Muvemba\_\_\_\_\_

Signature \_\_\_\_\_ Signature \_\_\_\_\_

Date \_\_\_\_\_ Date \_\_\_\_\_

**LIST OF ATTENDANTS OF THE ENVIRONMENTAL SCOPING MEETING FOR THE  
LUSAKA RING 132kV TRANSMISSION LINE PROJECT HELD AT MULUNGUSHI  
CONFERENCE CENTRE ON 29<sup>TH</sup> JANUARY, 2013**

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31	WILCLIFF N. CHIPETA	ZESCO LTD		wchipeta@zesco.co.zm
32	KENNEDY CHISANGA	ZESCO LTD		kchisanga@zesco.co.zm
33	FREDRICK MBESUMA	ZESCO LTD		fmbesuma@zesco.co.zm
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35	J.S TEMBO	C.F.C		tembojs@live.com
36	N. NJOVU	Q.fm Radio		cathynams21@yahoo.com
37	K. SHIKABI	ZESCO LTD		kshikabi@zesco.co.zm
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39	V. MUTALE	ZESCO LTD		vmutale@zesco.co.zm
40	COLLINS MTONGA	FREELANCE JOURNALIST	09621001257	
41	BRIGHTWELL MUYOBO	FREELANCE PHOTOGRAPHER	0979480203	
42	ANTHONORABLEY LUPEKE	ZBC NEWS	0977476553	alupeke@yahoo.com
43	JETHRO BBUKU	FREELANCE PHOTO JOURNALIST	0979444899	
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47	ROBERTSON MWENJE	ZESCO LTD	0966844318	rmwenje@zesco.co.zm
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51	BRIAN MUMBA	ZESCO LTD	0977796277	brmumba@zesco.co.zm
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54	SARAH NGULUBE	ZESCO LTD	0977688742	sngulube@zesco.co.zm
55	GETRUDE MWAMBA	ZESCO LTD	0979 098375	Getrudemwamba@ymail.com
56	GERSHOM SIAME	ZAMBEEF	0977809377	gershoms@zambeef.co.zm
57	LASTON MBUNDA	ZESCO LTD	0977789887	lmbunda@zesco.co.zm
58	MTONGA WAFIKA MASAUO	KALINGALINGA WARD DEV. COM.	0972833076	
59	NYIRENDA HARRY	CHAWAMA WARD 2 WARD DEV.COM	0974306622	
60	EVETTY BWALYA	CHAZANGA	0977 653953	
61	C. D. TEMBWE	ZESCO	0977825025	
62	LAZAROUS CHAMA	WDC MTENDERE	0977990800	
63	CLEMENT NONDE	WDC MTENDERE	0977760275	
64	AGATHA C. CHIWAMINE	WDC MTENDERE	0977766231	achiwamine@yahoo.com
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66	JASHONORABLE TATILE	NKOMESHYA ESTAB.	0977839837	jtatile@zamtel.zm
67	STEPHEN NKAUSU	NKOMESHYA ESTAB.	0979686838	BOX 60 CHONORABLEGWE
68	SNR CHIEFTAINNESS NKOMESHYA-J.LUPUTA	ROYAL ESTABLISHMENT	09776445212	BOX 36 CHONORABLEGWE
69	PETRO MWALE	JUSTIN KABWE WARD21	0979996342	BOX 30077 LUSAKA
70	BANDA JAMES	GARDEN HOUSE	0967584881	Bandaj717@yahoo.com
71	CHIEFTAINNESS MUNGULE	ROYAL ESTABLISHMENT		BOX 50, CHIBOMBO
72	ALBERT HANGWENDE		0977843921	
73	RUTH MALOLA		0977867749	
74	HEADMAN MUPWAYA A. PHIRI	MUNGULE ROYAL	097774445	

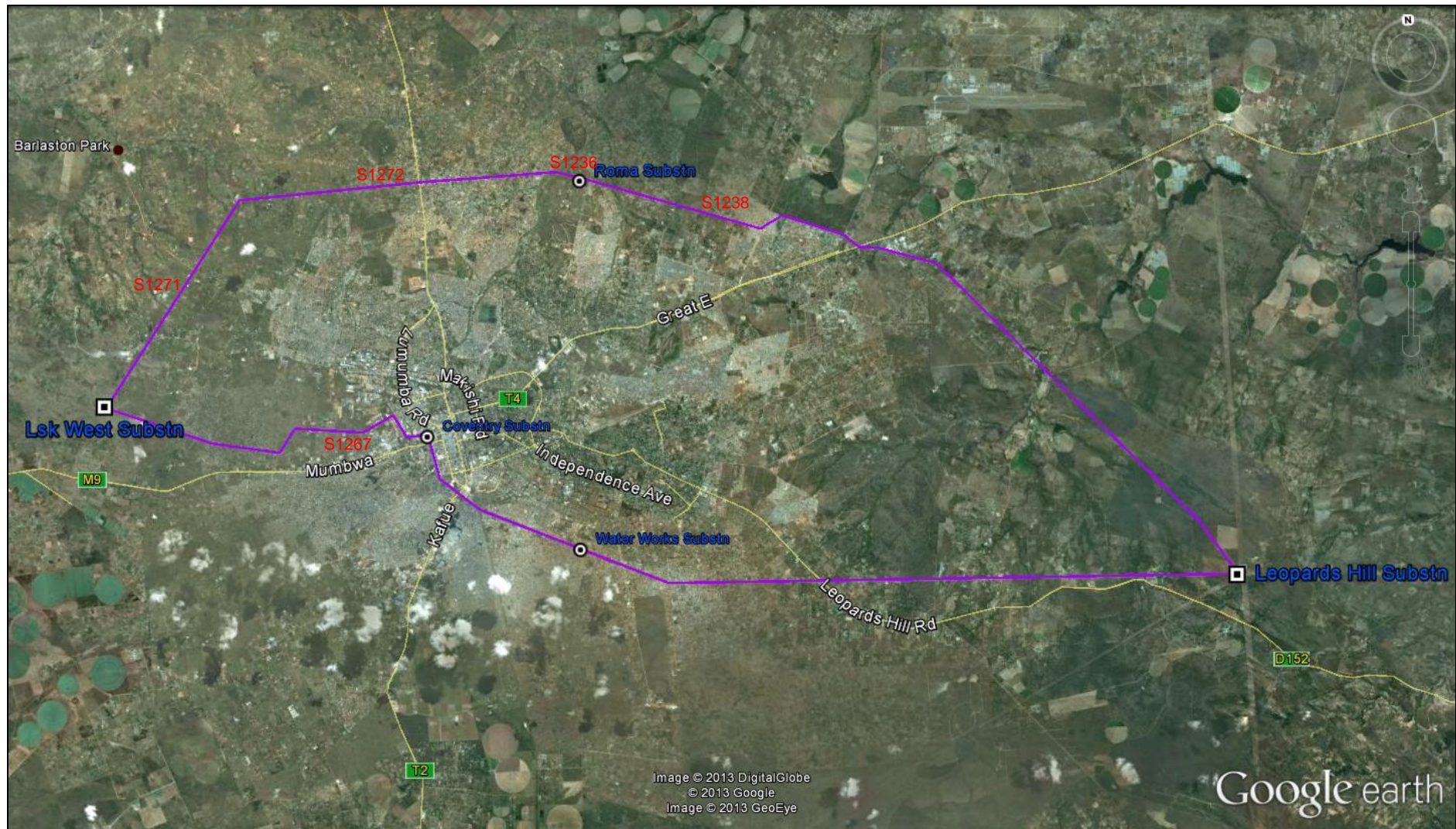
		ESTABLISHMENT		
75	HEADMAN HILAND D. MUTO		0974257534	
76	GIVEN MULENGA	ALTERNATIVE ENERGY	097942793	givenmulenga@ymail.com
77	WILLIAMS K. CREANS	ZAM		w.creans@zam.zm
78	STELLA KAYOPE	ZESCO		skayope@zesco.co.zm
79	JOHN MUKOPOLA	MILLENIUM RADIO	0978468310	mukopolaj@yahoo.com
80	LAWRENCE MULENGA	CHAZANGA WARD DEVELOPMENT COMMITTEE	0978059584	
81	ANGELIKA HUWILER	FOXDALE COURT	0978704252	
82	MUTUMA CHELLA	ZESCO	0966751235	
83	THELMA KULALE	ZCSMBA	254855	
84	PATRICIA MWICHE	WDC	0979400117	
85	JOHN MUYUNDA	PUMUZ OIL LTD	0977763901	
86	PERINE N. KASONDE	ZEMA	0211 254059 0977 887111	
87	MARJORY MWAPE	W.D.C MUNALI	0976880777	
88	M. MANGOLWA	R.T.S.A	0977707690	
89	DURBAN KAMIBAKI	GOOD TIME STEEL	241437/0977 194739	kambaki@zambia.co.zm
90	STEPEHEN NKAUSU(SNR HEADMAN KANCHUBIA	ROYAL BUSOLI	09666575450 0950004577	
91	AHMOD CHIKONDE	PECO LTD	0977720048	
92	RUTH MZUMARA	W. D. C.	0977644262	
93	S. KINSHUAMPOSHY	KINGS CHEMICALS LTD	0978942498	
94	DAVID B. ROSSI GARDEN HOUSE HOTEL		0977847126	
95	ROY CHIKWANDA	NCC	0977640020	
96	SAMUEL P. SINKALA	ZESCO	097768704	
97	DOYCE MUSUNSA	AIRTEL	0978980483	
98	THOMAS ZULU	KINGS	0979044314	



		CHEMICALS LTD		
99	STANLEY KACHIBE	S. K PROFESSIONAL RENTALS	0978278324	
100	SAMUEL PHIRI	MPULUNGU WARD D. C 23	0977195631	
101	SIMUZHIMBA, MP	L.C.C	0973198411	
102	RICHARD MANIMAINI	AIRTEL	0978980640	
103	NOEL NDHLOVU	ZAM	0977860557	
104	RIEBECK MATAMBO	KALINGALINGA W.D.C	0977435652	
105	CHIPOYA HENRY	YAPOCHI ENT.LTD	0977830828 0967830825	
106	RODGERS CHISAMBI	ZESCO	0973015530	
107	TEDDY MUSEENDO	PARMALAT	0967790865	
108	MELODY NAMBELA	ZESCO	0978 217620	
109	LOVENESS BANDA	MPULUNGU WARD 23	097715859	
110	FRANCIS KAWESHA	LUSAKA CHAMBER OF COMMERCE & INDUSTRY	0975768826	
111	TRYSON KAMPENGELE	D.C LUSAKA DISTRICT	0955914890	
112	ANGELA MUSENGE	LUSAKA DISTRICT	0976942858	
113	MWEENE VICTOR	AFRIACN MILLING	845069 0977-323482	
114	MULENGA EMMANUEL	W.D.C MUNALI	0979188245	
115	FR. JOHN MWELWA	ST. IGNATIUS CHURCH	0976 088739	

### APPENDIX 3A: SATELLITE IMAGE OF PROJECT AREA

Additional photos sent on a separate email since the document became too heavy to transmit.



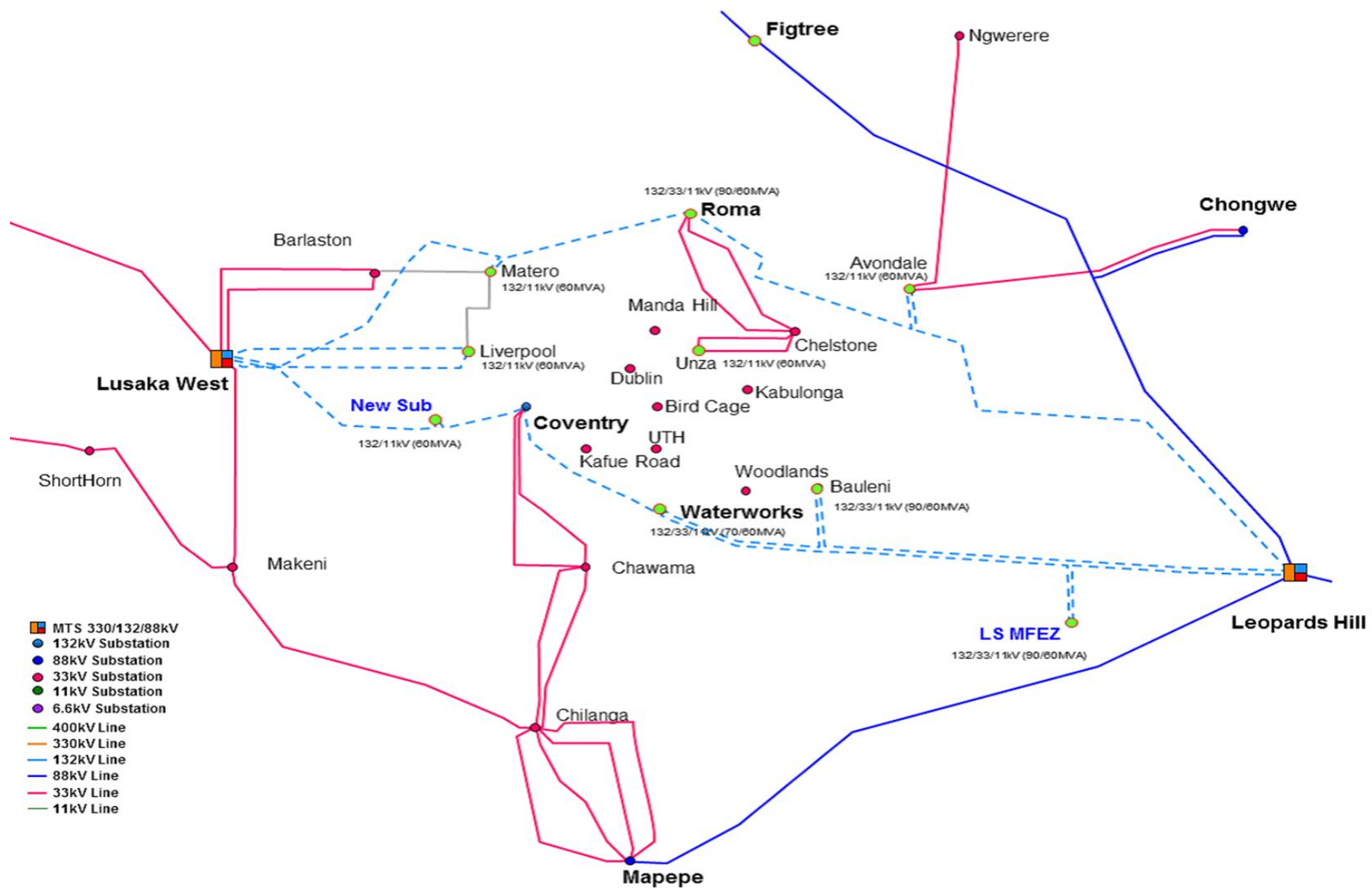
The 132kV power transmission wayleave around Lusaka was acquired in 1986. The wayleave has a width of **50m**, is surveyed and numbered as **S1214 – S1230** and **S1236 – S1272**. The consents were obtained from various land owners

#### LEGEND

— Proposed Upgrade of 132kV

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APPENDIX 3B: LOCATION MAP OF PROJECT AREA







## **ENVIRONMENTAL IMPACT STATEMENT FORMAT**

### **1.0 Executive Summary**

- *Briefly describe the project background, objectives, location, shareholders, investment cost, relevant legislation, project description, technology, project alternatives, main findings, mitigation measures and lifespan.*
- *The executive summary should be signed by the developer and the study team.*

### **2.0 Introduction**

- 2.1 Background of the project
- 2.2 Summary description of the project including project rationale
- 2.3 Objectives the project
- 2.4 Brief description of the Location
- 2.5 Particulars of Shareholders/Directors
- 2.6 The developer's physical address and the contact person.
- 2.7 Track Record/Previous Experience of Enterprise Elsewhere
- 2.8 Total Project Cost/Investment
- 2.9 Proposed Project Implementation Date

### **3.0 Policy, Legal and Institutional Framework**

*(cite all Policy, legal and institutional framework relevant to the project)*

### **4.0 Project Description**

#### **4.1 Location**

- *Include distances and nature of business of surrounding community*
- *Satellite images*
- *Maps*
- *Geographical coordinates*

#### **4.2 Project description**

- *Raw materials (including hazardous materials and their storage on site)*
- *products and by-products*
- *process and technology (including flow diagrams)*

- *production capacity*
- *Schedule and life time of the project*

#### 4.3 Main activities

- Site preparation phase
- Construction phase
- Operation phase

#### 5.0 Project Alternatives

*Analyse the available alternatives such as but not limited to :*

- 5.1 Location Alternatives
- 5.2 Process and technology
- 5.3 Raw materials
- 5.4 Product
- 5.5 Demand Alternatives (*Production Capacity*)
- 5.6 Justification for the selected option(s)

#### 6.0 Environmental Baseline Study

*Description of the site and the surrounding environment especially those aspects that are relevant to the project including evaluation of the sensitiveness of the environment. Baseline data should include but not limited to the following:*

- 6.1 Topography
- 6.2 Climate
  - *Rainfall, Temperature, Humidity, Sunshine*
- 6.3 Air quality
- 6.4 Geology
- 6.5 Hydrology
  - *Surface water quality*
  - *Groundwater quality*
- 6.6 Hydrogeology
- 6.7 Soils
- 6.8 Land use
- 6.9 Built Environment
- 6.10 Land tenure
- 6.11 Noise and vibration



#### 6.12 Fauna

- *Field survey of animal species (Aquatic and terrestrial)*
- *Identification of rare or endangered species*

#### 6.13 Flora

- *Terrestrial species*
- *Aquatic species*
- *Identification of rare or endangered species*

#### 6.14 Birds

- *Field survey of bird species*
- *Identification of rare and endangered bird species*

#### 6.15 Archaeological and cultural environment

- *Sources of raw materials for such events, or location of significant historical or archaeological features*

#### 6.16 Social-cultural and economic set up

- *Population*  
*Growth rate, population density and distribution*
- *Administration*
- *Social services and amenities*
- *Market availability on various commodities*
- *Literacy levels, health and gender equity*
- *Traditional and religious practices and rites*

### 7.0 Impacts

#### 7.1 Biophysical Environment

- *Positive – direct, indirect, short term, long term, reversible and irreversible*
- *Negative – direct, indirect short term, long term, reversible and irreversible*

#### 7.2 Socio-economic and cultural

- *Positive – direct, indirect, short term, long term, reversible and irreversible*
- *Negative – direct, indirect short term, long term, reversible and irreversible*

#### 7.3 Evaluation of impacts significance should combine:

- *the frequency of occurrence of the impact*
- *the duration of the impact*
- *the spatial extent of the impact*
- *the sensitivity of the element being impacted.*

## 8.0 Environment and Social Management Plan

*(Management Commitments for mitigating negative Environmental Impacts identified and evaluated in Section 6.0 and measures for enhancing positive impacts)*

**8.1 Environment and Social Monitoring Plan** *(These should include environmental management cost estimates, responsible personnel and the frequency of monitoring)*

Aspect*	Impact	Mitigation measure	Frequency of Monitoring	Time frame	Performance indicator	Responsible person	Cost

*\*NOTE: Aspect is an activity, service or product that is likely to cause an impact due to interaction with the environment*

**9.0 Decommissioning and Rehabilitation Plan** *(State environmental management commitments associated with the Decommissioning and Closure Phase for the project)*

**References** *(Full references of the main documents cited in the report should be given)*

**10.0 Declaration of authenticity of report contents**

**11.0 Appendices**

- *Maps and satellite images*
- *Certificate of Incorporation*
- *Investment License*
- *Proof of Public consultation (Minutes and comments from the public during consultation and scoping) and adverts*
- *Land ownership (Title deeds or lease agreement)*
- *Specialised study Reports*
- *Any other relevant supporting documents or information that cannot be presented in the main report*

## APPENDIX 5: PCR CHANCE FIND MANAGEMENT PLAN

## **PHYSICAL CULTURAL RESOURCES CHANCE FIND MANAGEMENT PLAN**

### **Zambia Electricity Transmission and Distribution System Rehabilitation Project: Physical Cultural Resources Chance Finds Procedure**

#### **1. Physical Cultural Resources Definition**

This Chance Finds Procedure is prepared for purposes of providing a procedure for managing opportunistic physical cultural resources finds during the implementation of the Zambia Electricity Transmission and Distribution System Rehabilitation Project. Physical Cultural Resources (PCR) includes movable or immovable objects, sites, structures or groups of structures having archeological, paleontological, historical, religious, aesthetic, or other cultural significance.

#### **2. Ownership**

The ownership of the artifacts found would be determined by the Government of the Republic of Zambia as these could typically be belonging to the state, government, a religious institution, or the land owner. In Zambia, the Ministry of Tourism and Arts, through the National Heritage Conservation Commission (NHCC), established by the National Heritage Conservation Act No. 23 of 1989, is mandated to provide for the conservation of ancient, cultural, and natural heritage, relics, and other objects of aesthetic, historical, pre-historical, archaeological, or scientific interest; to provide for the regulation of archaeological excavations, and export of relics; and to provide for matters connected with or incidental to the foregoing. The NHCC would provide guidance with regard to ownership of any PCR chance finds at any given site.

#### **3. Recognition**

Upon recognition of a physical cultural resource as prescribed by the NHCC Act, ZESCO and/or contractors will request a specialist from Government to assist them with identification and classification of artifacts upon discovery of such items.

#### **4. Procedure upon Discovery**

As soon as a physical cultural resource is discovered, the following shall apply:

##### **4.1 Suspension of Work**

If a PCR comes to light during the execution of project related works, ZESCO/contractor shall stop the works. The scale of work stoppage could fall under any of the following types: (i) all works to be stopped; or (ii) only the works immediately involved in the discovery, or (iii) in cases where large buried structures may be expected, all works may be stopped within a specified distance (for example, 50 metres radius) of the discovery. Guidance on this issue will be provided by a qualified Archaeologist.

After stopping work, ZESCO/contractor must immediately report the discovery to the Project Manager. In the case of a contractor, the contractor may not be entitled to claim compensation for work suspension during this period.

#### **4.2 Demarcation of the Discovery Site**

With assistance from a specialist, ZESCO/contractor will be required to temporarily demarcate, and limit access to the site.

#### **4.3 Non-suspension of Work**

The Archaeologist may advise ZESCO/contractor on whether the PCR can be removed and for the work to continue, for example in cases where the find is one coin.

#### **4.4 Chance Find Report**

The Project Manager should then assign an official who would then, and within seven working days, prepare a Chance Find Report, recording:

- Date and time of discovery;
- Location of discovery;
- Description of the PCR;
- Estimated weight and dimensions of the PCR;
- Temporary protection implemented

The Chance Find Report should be submitted to the Project Manager and other concerned parties as agreed with the Director of NHCC or his/her representative, and in accordance with national legislation. The Project Manager, or other party as agreed, is required to inform the NHCC accordingly.

#### **4.5 Arrival and Actions of Director of NHCC**

The Director of NHCC is responsible for ensuring that a representative will arrive at the discovery site within an agreed time such as 24 hours, and determine the action to be taken. Such action may include, but not be limited to:

- Removal of PCR deemed to be of significance;
- Execution of further excavation within a specified distance of the discovery point;
- Extension or reduction of the area demarcated by ZESCO/contractor.

These actions will be taken within seven days of arrival of an official from the NHCC.

If the cultural authority fails to arrive within the stipulated period (24 hours), ZESCO/contractor may have to extend the period by a further stipulated time (another 24 hours).

If the cultural authority fails to arrive after the extension period, the Project Manager may have the Director of NHCC or his/her representative to instruct ZESCO/contractor to remove the PCR or undertake other mitigating measures and resume work. Such additional works can be charged to the NHCC. However, ZESCO/contractor may not be entitled to claim compensation for work suspension during this period.

#### **4.6 Further Suspension of Work**

During the 7 day period, the cultural authority may be entitled to request the temporary suspension of the work at or in the vicinity of the discovery site for an additional period of up to, for example 30 days.

ZESCO/contractor may or may not be entitled to claim compensation for work suspension during this period. However, the contractor will be entitled to establish an agreement with the cultural authority for additional services during this further period under a separate contract with the cultural authority.

