STRATEGY AND CORPORATE SERVICES DIRECTORATE

ENVIRONMENTAL IMPACT STATEMENT FOR THE PROPOSED LUSAKA TRANSMISSION AND DISTRIBUTION REHABILITATION PROJECT: WATERWORKS-LSMFEZ-CHAWAMA-CHILANGA-LUSAKA WEST SUBSTATION 132KV TRANSMISSION LINE

PREPARED BY
THE ENVIRONMENT AND SOCIAL ANALYSIS UNIT
ZESCO LIMITED

FEBRUARY, 2018

1.0 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.

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. 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. These rehabilitation works in Lusaka will be implemented through the Lusaka Transmission and Distribution Rehabilitation Project (LTDRP). Therefore, the proposed project will support the reinforcement of the existing transmission and distribution networks in ZESCO's Lusaka Division, which includes Lusaka City and 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.

This Environmental Impact Statement (EIS) addresses an activity under Component 1, which will be the construction of the Waterworks – LSMFEZ – Chawama – Chilanga – Lusaka West Substation 132kV transmission line.

The proposed Waterworks – LSMFEZ – Chawama – Chilanga – Lusaka West Substation 132kV transmission line and other components of the LTDRP are being funded by the Government of the Republic of Zambia (GRZ), the World Bank Group (through the International Development Association (IDA)) and the European Investment Bank (EIB).

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 LTDRP: Waterworks – LSMFEZ – Chawama – Chilanga – Lusaka West Substation 132kV transmission line, ZESCO intends to reinforce power supply to Lusaka at a total cost of USD 61.1 Million. The LTDRP: Waterworks – LSMFEZ – Chawama – Chilanga – Lusaka West Substation 132kV transmission line is expected to be implemented over a period of three (3) years.

The project will increase capacity of the system to sati$_{sf}$y the current and future demand, and increase reliability of the transmission system, thereby reducing interruption frequency and load shedding. It will further provide an adequate and

reliable supply of electricity, which is an important ingredient for further attracting meaningful investment from domestic and foreign investors into Lusaka.

The transmission line which currently supplies the Lusaka distribution network is old, is currently operating close to its thermal capacity, and has become a bottleneck in the supply system, resulting in periodic load shedding and power outages. The transmission lines between Leopards Hill, Roma, and Lusaka West, Coventry, and Waterworks substations are mostly overloaded and this situation has significantly increased the power outages in Lusaka. Furthermore, developments south-west of Lusaka have necessitated extension of the 132kV network to meet the current and projected city's electricity demand through the construction of the Waterworks – LSMFEZ – Chawama – Chilanga – Lusaka West Substation 132kV transmission line.

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) to be developed to document the study and its findings. Furthermore, as a requirement by the EMA, a scoping meeting and other stakeholder consultations were conducted. Additionally, a Resettlement and Compensation Action Plan (RCAP) shall be developed to manage all issues related to resettlement and/or displacement and loss of livelihood associated to the project. The EIS and the RCAP shall take cognisance of the World Bank and EIB environmental and social safeguard requirements, in addition to the national legislation.

ZESCO, therefore, has undertaken an ESIA study to assess potential biophysical and social 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 implementation of the project will affect the general physical, biological and social environments in the immediate project area.

The major impacts envisaged are social, as the area is built up with numerous agricultural and commercial activities being undertaken. The project will entail displacement and/or resettlement of the Project Affected Parties (PAPs) prior to the construction works commencing.

The transmission line will also traverse the Lusaka National Park for approximately 7 km hence this shall significantly impact the wildlife resources therein. 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 result in an influx of job seekers into the area, hence creating stress on the available social amenities. An influx of migrant labour 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 however, the reliability and security of supply will be enhanced.

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 operationalised through an Environmental and Social Management Plan (ESMP).

A RCAP shall be prepared for cases where people's assets are affected, land acquired, or losses in income arise. The PAPs shall be compensated accordingly, taking into account ZESCOs Compensation Policy, the World Bank OP 4.12 on Involuntary Resettlement, and EIB Standard 6, in addition to the national requirements.

Environmental, Health, and Safety (EHS), and campaigns shall be carried out at regular intervals to mitigate potential occupational health and safety risks. Additionally, first aid kits shall be available at site and emergency response procedures shall be employed.

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

Recommendations/ Conclusion

The LTDRP: Waterworks – LSMFEZ – Chawama – Chilanga – Lusaka West Substation 132kV transmission line 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 and HSMP 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.

VICTOR M. MUNDENDE
MANAGING DIRECTOR – ZESCO LIMITED

The ESIA study team for the LTDRP: Waterworks – LSMFEZ – Chawama – Chilanga – Lusaka West Substation 132kV transmission line comprised the following:

Name & Qualification	**Profession/Title**	**Responsibility on the Team**	**SIGNATURE**
Elenestina Mutekenya Mwelwa PhD, MSc, BSc Hydrology	Chief Environmental & Social Analyst - South	Team Leader	
Bonje Muyunda MSc, BSc, Environmental Science	Principal Environmental Scientist	ESIA Study Coordinator/ LTDRP Environmental Specialist	
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John Chirwa MBA, BEng	Site Manager - LTDRP	Site Manager	
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Muleya Manyando BSc Env and Nat. Res	Environmental Scientist	Physical Environment	
Judy Mwaba BA Dev. Studies	Graduate Social Scientist	Socio-economic Environment	
Kelvin Bwembya, Dip. Land Survey	Wayleave Officer	Land Acquisition	
Elijah Mukanga, Dip. Land Survey	Wayleave Officer	Land Acquisition	

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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
DNPW	Department of National Parks and Wildlife
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
ERB	Energy Regulation Board
GRZ	Government of the Republic of Zambia
HIV	Human Immunodeficiency Virus
IDA	International Development Agency
IFC	International Finance Corporation
I&AP	Interested and Affected Party
ITCZ	Inter-tropical Convergence Zone
KKIA	Kenneth Kaunda International Airport
km	Kilometer
kV	kilovolt
LCC	Lusaka City Council
LSMFEZ	Lusaka South Multi Facility Economic Zone
m	Meter
MLNR	Ministry of Lands and Natural Resources
MVA	Milli Volt Amperes
MW	Mega Watts
NPE	National Policy on Environment
PAP	Project Affected Party
PCR	Physical Cultural Resources
RCAP	Resettlement and Compensation Action Plan
ROW	Right of Way
SME	Small and Medium Enterprise
RSNDP	Revised Sixth National Development Plan
SEP	Stakeholder Engagement Plan
STI	Sexually Transmitted Infection
TDRP	Transmission and Distribution Rehabilitation Project
ToRs	Terms of Reference
VCT	Voluntary Counselling and Testing
VEC	Valued Ecosystem Component
ZEMA	Zambia Environmental Management Agency
ZESCO	ZESCO Limited

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1.0 INTRODUCTION

1.1 Project Background

ZESCO proposes to undertake the rehabilitation of its electricity transmission and distribution system in the four divisions namely Lusaka, Copperbelt, Northern, and Southern. Of critical importance under this project are rehabilitation needs of Lusaka, considering that 40% of the non-mining loads are concentrated in this area. The rehabilitation works in Lusaka will be implemented through the Lusaka Transmission and Distribution Rehabilitation Project (LTDRP). Therefore, the proposed project supports the reinforcement of the existing transmission and distribution networks in ZESCO's Lusaka Division, which includes Lusaka City and its surrounding areas. The rehabilitation works in Lusaka will have two sub components:

(i) Component 1: Reinforcement of the 132kV Transmission Network;
(ii) Component 2: Rehabilitation of the 33kV and 11kV Distribution Network

However, this Environmental Impact Statement (EIS) addresses the construction of the Waterworks – LSMFEZ – Chawama – Chilanga – Lusaka West Substation 132kV transmission line under Component 1.

The proposed Waterworks – LSMFEZ – Chawama – Chilanga – Lusaka West Substation 132kV transmission line and other components of the LTDRP are being funded by the Government of the Republic of Zambia (GRZ), the World Bank Group (WB) (through the International Development Association (IDA)) and the European Investment Bank (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 Revised Sixth National Development Plan (SNDP 2013 – 2016). Other proposed developmental activities are in the following categories:

i. **Infrastructure -** Infrastructure Development, Expansion of Electricity Network
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** - Water Supply and Sanitation Development

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. Therefore, it is not surprising that Lusaka City is one of the largest load centres of power demand in Zambia, requiring approximately 450MVA. Further, statistics show that the average electrical annual load growth has been estimated at an average of 6% per year over the past five years.

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 transmission ring. These BSPs further supply the more than twenty 33kV distribution substations throughout Lusaka area, which in turn supply 11kV distribution networks. Following the increased power needs in the city, recent network optimization studies 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 expected to be approximately 6.8 %.

The transmission line that supplies the Lusaka distribution network is old and currently operating close to its thermal capacity, and has become a 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. Furthermore, developments south-west of Lusaka have necessitated extension of the 132kV network to meet the current and projected city's electricity demand through the construction of the Waterworks – LSMFEZ – Chawama – Chilanga – Lusaka West Substation 132kV transmission line.

The construction works of the Waterworks – LSMFEZ – Chawama – Chilanga – Lusaka West Substation 132kV transmission line will involve the erection of tubular steel poles as opposed to the traditional steel lattice towers. This would entail a reduction in the footprint of the infrastructure, as well as a reduction in installation and maintenance costs. Furthermore, tubular steel poles are easier and faster to install, have a very high corrosion resistance, and are much stronger than 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) are challenges.

1.1.1 Benefits of the Project

Project beneficiaries will be the rural and urban populations, commercial and industrial enterprises within the Lusaka division of ZESCO who will get improved and more reliable access

to electricity. In the long-term, this will increase 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:

- Increasing the transfer capacity of the system to satisfy current, which has outstripped system capacity, and long-term demand growth;
- Reducing power outages and local load shedding which is due to depleted system capacity;
- Improving the electricity network performance and thereby improve customer service delivery;
- Providing sufficient and dependable power to support commercial, industrial and other infrastructural development activities; and
- Contributing to the improvement in the standard of living of the people within and outside the project area.

1.1.2 Scope of the Environmental and Social Impact Assessment Study

The study is concerned with potential environmental and social impacts throughout the project area during the various phases of the project, which are planning, construction and operation; particularly the possible negative effects such as pollution, relocation (resettlement) of people and other forms of social distress, restricted use of land, and the safety of the public.

Specifically, the EIS:

- Describes the LTDRP: construction of the Waterworks – LSMFEZ – Chawama – Chilanga – Lusaka West Substation 132kV transmission line and characterises the environment in which the project will be undertaken;
- Described the regulatory framework within which the proposed project will be planned, built and operated;
- Identifies potential bio-physical, socio – economic and cultural impacts related to the proposed project;
- Describes the scientific analysis of ecosystem effects, local knowledge and the experience of local people in the project area and other sectors of the public that were used by the ESIA study team in the assessment of the environmental and social 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 and social effects;
- Describes the consideration given to comments received from the public during the scoping phase of the 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, pursuant to Statutory Instrument No. 28 of 1997, the Environmental Impact Assessment Regulations. The EIA process is presented in Figure 1.

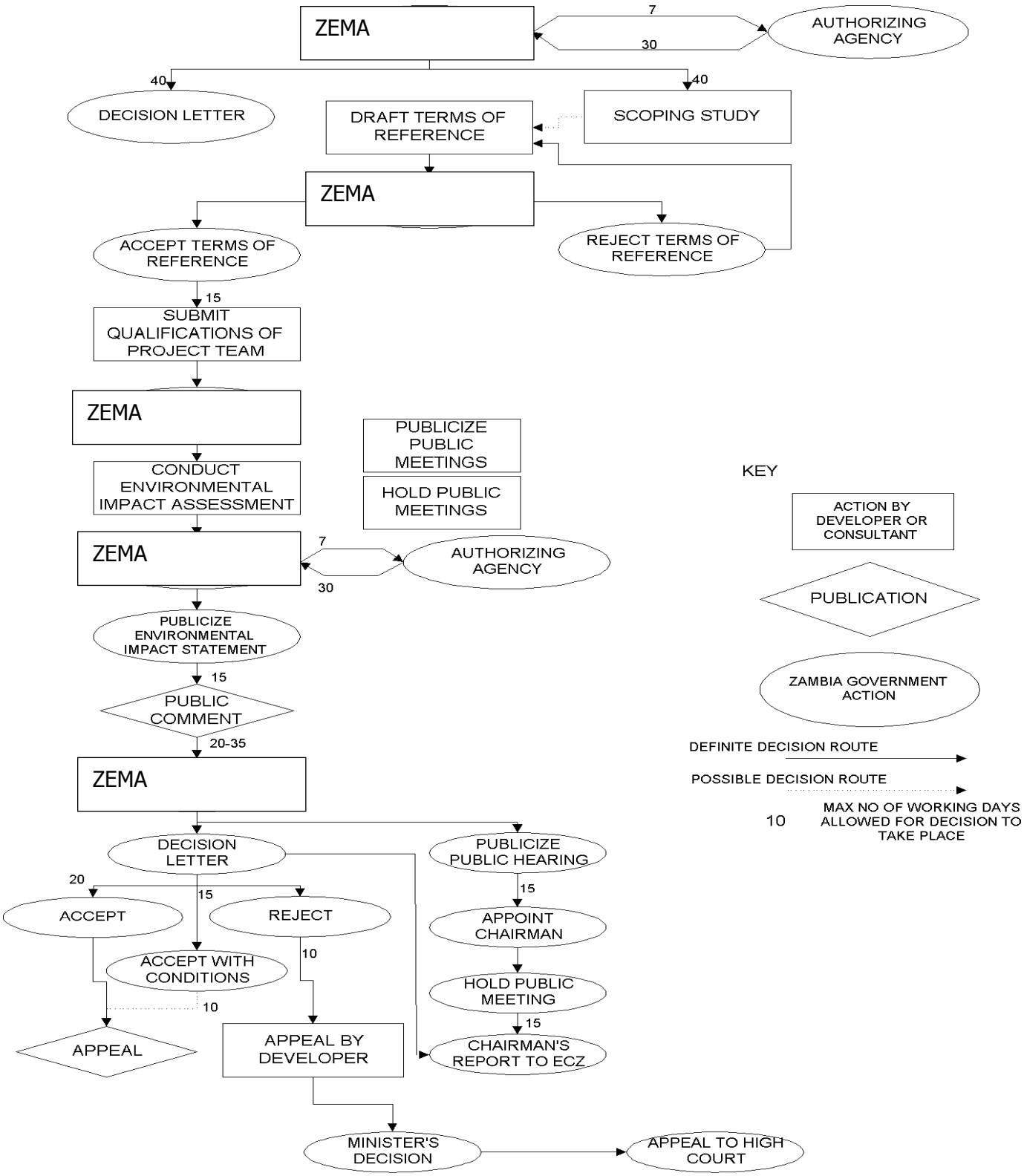

Figure 1: Environmental Impact Assessment Process in Zambia

1.2 Summary Description of the Project

The development of the Waterworks – LSMFEZ – Chawama – Chilanga – Lusaka West Substation 132kV transmission line involves the construction of 99 km of 132kV transmission line with associated substation infrastructure as presented in Appendix 1. The project will comprise construction of sub-transmission lines and associated substation works as follows:

Water Works to LSMFEZ to Chawama Substation

- Construct 18km of new 132kV (200MVA) single circuit, Kingbird conductor with OPGW, Monopole line from Water Works to LSMFEZ Substation;
- Construct new Chawama 132/11kV Substation (4 x 132kV Feeder Bays, 3 x 132/11kV 30MVA transformers Bays), associated switching room with 17 panels (3 x incomers / 2 x sections / 12 x feeder panels);
- Construct 2 x 11 kV Switching Stations, typically consisting of 3 x incomer circuit breakers, one bus-section and twelve feeder breakers, and associated 6 x 185mm2, 11kV underground cable, interconnecting the Switching Stations with Chawama Substation (approximately 3km / circuit totalling 18km); and
- Construct 18km of new 132kV (2 x 200MVA) double circuit, Kingbird conductor with OPGW, Monopole line from LS MFEZ to Chawama Substation.

Chawama to Chilanga Substation

- Construct new Chilanga 132/33/11kV Substation (2 x 132kV Feeder Bays, 2 x 132/33kV 90MVA transformer bays, 3 x 132/11kV 30MVA transformers Bays), 7 x 33kV outdoor feeder bays, associated switching room with 17 panels (4 x incomers / 3 x sections / 18 x feeder panels);
- Construct 2 x 11 kV Switching Stations, typically consisting of 3 x incomer circuit breakers, one bus-section and twelve feeder breakers, and associated 6 x 185mm2, 11kV underground cable, interconnecting the Switching Stations with Chilanga Substation (approximately 3km / circuit totalling 18km);
- Construct 9km of new 132kV (200MVA) single circuit, Kingbird conductor with OPGW, monopole line from Chawama to Chilanga Substation, allow for strain tower for future loop-inloop-out to Chilanga 2 Substation; and
- Decommission existing 33kV Lines from Chilanga to Chawama substation.

Chilanga to Lusaka West Substation

Lusaka West Substation upgrade includes the following scope of work:

- Lusaka West: Upgrade Lusaka West 330/132kV to 500MVA firm substation. Replace Lusaka West 2x 125MVA, 330/132kV with 3 x 250MVA, 330/132kV transformers;
- Add one by 330kV/132kV Transformer bay; and
- Upgrade 132kV busbar to double busbar with bus coupler.

The Chilanga – Lusaka west 132kV line works include the following scope of work:

- Equip 132 kV line bays (200 MVA) at Chilanga and Lusaka West; and
- Construct 50 km of new 132kV (200MVA) double circuit, Kingbird conductor with OPGW, Monopole line from Chilanga to Lusaka West Substation.

The wayleave size for the 132kV transmission line shall be 32m (16 m on either side of the centre line).

1.3 Objectives of the Project

The main objective of the proposed project is to improve the reliability and capacity of electricity supply in Lusaka and surrounding areas. This is aimed at meeting the current and future demand for electricity services in the area. Once the project is implemented, it will have a number of benefits such as:

- ✓ 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, thereby improving customer service delivery;
- ✓ Reduction of reliance on energy sources such as charcoal and firewood, thereby improving air quality; and
- ✓ General improvement in the living conditions of the people in and around the proposed project area.

1.4 Brief Description of Project Location

The proposed project area is located in the Lusaka and Chilanga Districts of Lusaka Province. The proposed 132kV line will originate from 132/33kV Waterworks Substation located along the new Tokyo Way. From Waterworks Substation, the proposed 132kV line will be in the existing 88kV wayleave towards Leopards Hill Substation for about 6km. The line will then leave the existing wayleave and turn south, running parallel to the eastern side of Tokyo Way, for about 3.2km entering the Lusaka South Multi-Facility Economic Zone (LSMFEZ). The proposed 132kV line then turns west and runs 16m into LSMFEZ and runs parallel to LSMFEZ perimeter wire fence landing outside LSMFEZ boundary. It will then continue to run outside and parallel to the LSMFEZ boundary up to the end of the property and thereafter land at LSMFEZ Substation. From LSMFEZ Substation, the proposed line runs south-west and joins the existing 330 and 88kV wayleave which comes from Leopards Hill Substation and stays Northern side and parallel to the 330kV line passing through the recently established Lusaka National Park for about 7km.

The proposed line then leaves the existing wayleave, turns north - west and then enters the privately owned Lilayi Game Reserve. It then runs for approximately 16km parallel to the perimeter wire fence next to an existing gravel road. After the Lilayi Game Reserve the line traverses four private properties before it reaches Chawama Substation. From

Chawama Substation the line traverses one private property (locally known as Miller Farm) into Chilanga Substation, for 7.5km. The line leaves Chilanga Substation and takes up the 33kV wayleave to Mapepe, for 11km. From Mapepe the proposed line again joins and runs adjacent to the existing 330kV line from Leopards Hill Substation for about 1.5km, before passing through private farms and crossing Kafue Road. The Line continues after Kafue Road, passing through private farms and the Lafarge quarry plant. The line again passes through private farms up to the Linda Road. The private farms practice a mixture of subsistence and commercial farming. From Linda Road the line joins the wayleave to Lusaka West Substation and runs on the eastern side of the 88kV line, for 40km. Refer to Appendix 2, Map of the Line Route.

1.5 Particulars of Shareholders / Directors

ZESCO Limited is a Parastatal Company under the Companies Act, wholly owned by the Government of the Republic of Zambia (GRZ). The Company's business is to generate, transmit, distribute and supply electricity to local and international markets.

1.6 Physical Address of Developer and Contact Details

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1.7 Track Record/Previous Experience of Enterprise Elsewhere

ZESCO Limited is an electricity utility created in 1970 and is owned entirely by the GRZ, and falls under the jurisdiction of the Ministry of Energy. The company's main objective is to generate, transmit, distribute and supply electricity to all its clientele. ZESCO uses hydropower 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, including, but not limited to, the following:

The Power Rehabilitation Project - 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 750 MW Hydro Power Project - The Kafue Gorge Lower (KGL) HydropPower 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.

Kariba North Bank Extension 360MW Project - 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 fibre 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.

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 - Mansa 330kV Transmission Line - The project involves constructing a 400km long line from the existing Pensulo substation in Serenje to the proposed Mansa 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 Limited established the Environment and Social Analysis Unit in 1996. Over the last 16 years, the Unit has undertaken numerous ESIA studies for generation, transmission and distribution projects.

1.8 Total Project Cost/Investment

The proposed LTDRP: construction of the Waterworks – LSMFEZ – Chawama – Chilanga – Lusaka West Substation 132kV transmission line project will cost approximately USD 61.1 Million.

1.9 Proposed Project Implementation Date

The project will be executed over a period of 36 months

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2.0 STAKEHOLDER ENGAGEMENT PROCESS

Consultation with the public forms an integral component of this investigation and enables interested and affected parties (I&APs) (e.g. directly affected landowners, national, provincial, traditional and local authorities, environmental groups, civic associations, the media, regulatory authorities and communities), to identify their issues and concerns relating to the proposed activities. These should be addressed in the ESIA process. The stakeholder engagement process has been structured to provide I&APs with an opportunity to gain more knowledge about the proposed project, to provide input through the review of documents/reports, and to voice any issues of concern at various stages throughout the ESIA process. Additionally, the Stakeholder Engagement Plan (SEP), Appendix 2, has been developed to inform and guide the ESIA stakeholder engagement process for the Project. The objectives of stakeholder engagement were to provide information to the public, identify key issues and concerns at an early stage, respond to the issues and concerns raised, provide a review opportunity, and to document the process properly. The SEP managed to meet these objectives throughout the following stakeholder engagement process:

(i) **Engagement through Formal Meeting**:

ZESCO organized a formal Scoping Meeting with all interested and affected parties during the scoping exercise. The Scoping Meeting considered a wider audience that included individuals and institutions that had a stake in the project, and those who were directly affected (the PAPs). During this meeting (which was held at Sandy's Creation on 17 March 2016), ZESCO had the opportunity to explain to its stakeholders in a simplified way the nature, scope, need for the project and how the project would be implemented. Further, ZESCO through its Environment and Social Analysis Unit (ESU) explained the environmental and social aspects associated with the project.

ZESCO also shared the identified methods of enhancing the positive impacts and proposed realistic mitigations for the negative impacts. The formal meeting was moderated by the ZESCO Public Relations personnel ensuring fair opportunities were given to all to ask questions, seek clarifications, and make criticism and positive contributions.

During the meeting, ZESCO also highlighted the need for continuous process of consultation beyond project planning and implementation. All feedback from Stakeholders culminated into significant contributions for planning and implementation of this LTDRP project component (Refer to Figure 2).

The major concerns raised during the scoping phase are:

i. Load management and power disruptions during the project construction phase;
ii. Restricted land usage arising from wayleave acquisition;

iii. Collaboration between ZESCO and the local authority in developmental planning;
iv. The potential environmental and socio-economic impacts of the proposed transmission line, such as loss of property and livelihoods;
v. Determination of compensation entitlement of PAPs and payment modalities;
vi. Enhancement of stakeholder engagement and participation throughout the project lifecycle and not limited to the scoping meeting;
vii. Employment opportunities during the construction phase;
viii. Health and safety hazard to local communities in and around the project area; and
ix. Potential impacts of the proposed transmission line on agricultural activities and agricultural economy.

The Minutes of the Scoping Meeting are attached to Appendix 3.

Figure 2: PAPs engaging at Stakeholder Meeting

(ii) One-on-One Engagement

During the survey, a total of 17 PAPs whose property would be affected were identified. The PAPs were engaged on a one-on-one to inform them on the impacts of the project onto their livelihood and physical assets, come up with realistic and feasible alternatives, negotiations for the compensation packages and obtain consent for the Right of way for the Transmission Line. As proof of the engagement, wayleave consent forms were signed by the PAPs allowing ZESCO to go ahead with the Project survey and implementation. The consents are hereto attached in the Appendix 4 Further engagement with the PAPs shall be premised on loss of property, livelihood opportunity, compensation entitlements and means of redress, which shall be addressed in the Resettlement and Compensation Action Plan (RCAP).

In addition, all grievances associated with the project shall be addressed through the established Project Grievance Redress Mechanism, Appendix 5.

The SEP to date is summarised in Table 1 below.

Table 1: Summary of the SEP to Date

<table>
<tr><th>Task</th><th>Details</th><th>Date</th></tr>
<tr><td colspan="3">I&AP notification (relevant authorities and I&APs)</td></tr>
<tr><td>I&AP identification</td><td>An I&AP database was developed for the project by establishing the jurisdiction of organisations, individuals and businesses in proximity to the project site or within an interest in the proposed development. The database of I&APs includes the landowner, the adjacent landowners, relevant district and local municipal officials, relevant national and provincial government officials, and organisations. This database is being augmented via chain referral during the ESIA process and will be continually updated as new I&APs are identified throughout the project lifecycle. The current list of potential I&APs is attached in Appendix 3.</td><td>September and October 2015</td></tr>
<tr><td>BID distribution</td><td>The Background Information Document (BID) for the proposed project was distributed at a public hearing meeting held on 17 March 2016 and highlighted in the invitation letters to the I&APs and in the print and electronic media notification (Daily Mail and Times of Zambia Newspapers).
In addition, notices of the Meeting were distributed to PAPs along the entire route.
.</td><td>February 2016</td></tr>
<tr><td>Addressing comments received</td><td>All comments received on the project arising from the public hearing meeting are addressed in the Minutes of Meeting in Appendix 3.</td><td>March 2016</td></tr>
<tr><td>Public Meeting</td><td><u>Invitations were sent to all registered I&APs to attend the scheduled public hearing meeting at Sandys Creations</u> on 17 March 2016<u>. The details of the meeting are reflected below.</u>

<table><tr><th><u>Venue</u></th><th><u>Date</u></th><th><u>Time</u></th><th><u>Address</u></th></tr><tr><td><u>Sandys Creations</u></td><td><u>17 March 2016</u></td><td><u>10:00 – 12:30</u></td><td><u>Kafue Road, Lusaka</u></td></tr></table>
The advertisements stated the venue of the public meeting. Attendance Registers for this meeting is attached in Appendix 3 of the minutes. Prior to the meeting, ZESCO advertised three times in print media (Daily Mail and Times of Zambia Newspapers). In addition, notices of the Meeting were</td><td>February 2016</td></tr>
</table>

<table>
<tr><th>Task</th><th>Details</th><th>Date</th></tr>
<tr><td></td><td>distributed to PAPs along the entire route.</td><td></td></tr>
<tr><td>Focus Group Meetings</td><td>Focus Group Meetings were held with crop owners at Waterworks Substation and New Kasama area to discuss concerns and issues pertinent to them. Invitations were sent via telephone and in verbatim. The list of the PAPs engaged is presented in Appendix 6

<table>
<tr><th>Venue</th><th>Date</th><th>Issues discussed</th><th>Stakeholders present</th></tr>
<tr><td>Waterworks Substation</td><td></td><td>Details of project activities and compensation for loss of crops affected at the site for the Waterworks</td><td>Crop owners at the Waterworks Substation site</td></tr>
</table>

<table>
<tr><th>Venue</th><th>Date</th><th>Issues discussed</th><th>Stakeholders present</th></tr>
<tr><td>New Kasama</td><td></td><td>Compensation for restricted land usage in the Waterworks – LSMFEZ stretch wayleave, time line for project implementation</td><td>PAPs along the Waterworks – LSMFEZ 132kV greenfield transmission line</td></tr>
</table></td><td></td></tr>
</table>

3.0 POLICY, LEGAL AND INSTITUTIONAL FRAMEWORK

3.1 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 implementation."

3.2 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 ZEMA 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) monitor trends in the use of natural resources and their impact on the environment;
c) 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) Consider and advise the Government, 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 Water, Sanitation 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 must conduct environmental impact assessments for certain categories of projects. Specifically, 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 Zambia Environmental Management Agency has issued a decision letter".

In the category of electrical infrastructure, the types of projects that 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 second schedule of types of projects which require an Environmental Impact Statement.

ZEMA also provides report formats for presenting the findings of ESIA studies. This EIS follows the prescribed format as presented in Appendix 7 of this report.

The legislation that is relevant to the proposed project is presented in Table 2 below. The Table also describes how the project will comply with this legislation.

Table 2: Legislation Relevant to the LTDRP: construction of the Waterworks – LSMFEZ – Chawama – Chilanga – Lusaka West Substation 132kV transmission line Project.

Legal Instrument	Main Provisions	Responsible Institutions	Relevance to the proposed project	Compliance with Legislation
Environment and Natural Resources Management				
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. Section 29 (1) of the Act provides that A person shall not undertake any project that may have an effect on the environment without the written approval of the Agency, and except in accordance with any conditions imposed in that approval. The Act also covers the management of water, air, waste (hazardous and municipal), pesticides and toxic substances, noise, ionizing radiation and natural resources, etc.	Ministry of Water, Sanitation and Environmental Protection Zambia Environmental Management Agency,	Implementation of the project is dependent on the EIS approval Decision Letter. ZESCO shall 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 to enhance environmental protection. Environmental monitoring on various aspects of the project in relation to air and water pollution; waste management; hazardous waste and ozone depleting substances.	Carrying out this EIA study is in compliance with the EMA No. 12 of 2011 in particular, Statutory Instrument No. 28 of 1997, The EIA Regulations, The Environmental Management (Licensing) Regulations, Statutory Instrument No. 112 of 2013 provide for the licensing of facilities that have the potential to pollute the environment arising from its activities.
Water Supply and Sanitation				
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 Water Sanitation and Environmental Protection NWASCO	Regulates water supply and sanitation aspects. ZESCO as a utility is in consultation with Water utility companies and the	All sanitation and water aspects arising from the project will abide by the Water Supply and Sanitation Act No.28 of

Legal Instrument	Main Provisions	Responsible Institutions	Relevance to the proposed project	Compliance with Legislation
	Section 24 (3) of the Act provides that a utility or service provider and a local authority in its service area shall establish procedures for adequate consultation to be carried out for developmental planning or for implementing physical works.		Local Authorities on the best approach of implementing the project without disturbing the water and sanitation installations. ZESCO shall abide by any agreement/instructions from other utilities and Local Authorities.	1997, thus preventing pollution of water bodies and land pollution from sanitary wastes.
Forestry Resources Management				
The Forest Act No.4 of 2015	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. Section 50 (2) provides that a person who intends to fell, cut, work or remove any major forest produce from any State Land, land under leasehold tenure vested in any person or customary area or sell, offer for sale, barter or deal in any major forest produce shall apply for a licence or permit under this Part.	Ministry Lands and Natural Resources	Coordination and management of the surrounding forest areas. Cutting of trees in the greenfield of the project route will require clearance from the Forestry Department. Consequently, ZESCO Limited shall comply with the provisions of the Forestry Act.	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.
Wildlife Resources Management				
The Zambia Wildlife Act, No. 14 of 2015	To control and manage national parks, GMAs and bird sanctuaries for the purposes of conserving and enhancing wildlife eco-systems.	Department National Parks and Wildlife	Protection and conservation of wildlife resources. Project activities will be carried out such that there would be no natural habitat degradation in the project	During the implementation and operation phases of the project, wildlife, forest resources and

Legal Instrument	Main Provisions	Responsible Institutions	Relevance to the proposed project	Compliance with Legislation
	Section 5 (f) of the Act provides for undertaking of measures to ensure the proper balance between the sustainable use of wildlife and the management of eco-systems in National Parks, Community Partnership Parks, bird and wildlife sanctuaries and Game Management Areas.		area. Development of an overhead transmission line needs to ensure that they comply with the laid down procedures of the Department of National Parks and Wildlife without compromising the integrity of the Lusaka National Park.	ecosystems will be protected and conserved in accordance with the Zambia Wildlife Act, No. 12 of 1998.
Mining Activities				
Mines and Minerals Development Act, No. 11 of 2015	Regulates the law relating to mines and minerals Section 80 (1) (b) provides that there is need to ensure that any mining or mineral processing activity prevents any adverse socio-economic impact or harm to human health, in or on the land over which the right or licence is sought.	Ministry of Mines Mine Safety Department	Provides for controlled blasting and the acquisition of extracted raw materials from approved quarry sites.	During the implementation and operation phases of the project, aspects related to mining activities shall be carried out in accordance with the provisions of the Mines and Minerals Development Act, No. 11 of 2015.
Cultural Aspects				
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	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

Legal Instrument	Main Provisions	Responsible Institutions	Relevance to the proposed project	Compliance with Legislation
	generation. Section 40 (1) of the Act provides that no person shall excavate, collect or export, as the case may be, any ancient heritage, any relic or part thereof, or alter, destroy, damage or remove from its original site any ancient heritage, national monument or relic.		So far in the proposed servitude, there are no such sites or artefacts. However, should there be any chance finds, ZESCO shall comply by seeking clearance from the National Heritage Conservation Commission.	project to ensure conservation of national heritage material.
Electricity Industry				
Energy Regulation Act Cap. 436, 1995	ERB) was created under the **Energy Regulation Act** 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 27th January 1997. Section 6 (f) provides that the ERB shall in conjunction with Government Agencies, formulate measures to minimize the environmental impacts of the production and supply of energy and the production, transportation, storage and use of fuels and enforce such measures by the attachment of appropriate conditions to licenses held by undertakings.	Energy Regulations Board	License for transmission of power required before commencement of the project. The development of the transmission line project will be monitored by ERB to ensure conformity to the provisions of the Act.	All associated project activities shall be done in accordance with the Energy Regulation Act Cap. 436, 1995.
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	ZESCO Limited, Rural Electrification Authority	It is the governing Act for the operations concerning the acquisition of land and compensation for the transmission line.	The project operations shall comply with the provisions of the Electricity Act No.433 of 1995

Legal Instrument	Main Provisions	Responsible Institutions	Relevance to the proposed project	Compliance with Legislation
	operations are carried out in line with the provisions of the Electricity Act. Section 20 of the Act provides that in the exercise of powers in relation to the execution of works. given under this Act, an operator of an undertaking shall cause as little detriment and inconvenience and do as little damage as possible, and shall make full compensation to all local and other authorities and other persons who have sustained damage, for all damage sustained by them by reason or consequence of the exercise of such powers and, in default of agreement between the parties, the amount and application of such compensation shall be determined by Arbitration in accordance with the provisions of the Arbitration Act and for that purpose the parties shall be deemed to be parties to a submission in which the reference is to two arbitrators.			
Lands Management				
The Lands Act, 1995 (CAP 292, CAP 289, CAP 288)	The Department of Lands administers the Lands Act, 1995 (CAP 292, CAP 289, CAP 288) and the Lands Acquisition Act, 1995. The Act also provides for the allocation and alienation of land under statutory leaseholds. The Department is	Ministry of Lands	The Act 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.

Legal Instrument	Main Provisions	Responsible Institutions	Relevance to the proposed project	Compliance with Legislation
	responsible for the administration of lands and deeds registration and land surveys and mapping. Section 10 (b) Provided that where the property acquired is land the President may, with the consent of the person entitled to compensation, make to such person, in lieu of or in addition to any compensation payable under this section, a grant of other land not exceeding in value the value of the land acquired, for an estate not exceeding the estate acquired and upon the same terms and conditions, as far as may be practicable, as those under which the land acquired was held.			
The Urban and Regional Planning Act, 2015	An Act to provide for development, planning and administration principles, standards and requirements for urban and regional planning processes and systems; provide for a framework for administering and managing urban and regional planning for the Republic; provide for a planning framework, guidelines, systems and processes for urban and regional planning for the Republic. Section 3 (1) (c) provides that	Ministry of Local Government Local Authorities	Approvals of construction and area plans for siting of substations and line wayleave. Route selection, Planning and implementation of this project has taken into consideration the provisions for sound environmental management through the preparation of the EIA report as part of the detailed design and planning.	The development of the project shall comply with the Urban and Regional Planning Act, 2015 to ensure synchronization with existing and planned developments.

Legal Instrument	Main Provisions	Responsible Institutions	Relevance to the proposed project	Compliance with Legislation
	planning procedures shall incorporate environmental standards and requirements specified in any law relating to the environment and natural resources.			
Local Government Act, Cap 281, No.22 of 1991	Section 60 of the Act read together with the Second Schedule the functions of the Act provides for the establishment of Councils in districts, the functions of local authorities and the local government system. Schedule II provides for functions relate to pollution control and the protection of the environment in general.	Ministry of Local Government Local Authorities	The Act is relevant to the project as some pollution control and environmental protection functions are handled by the local Council.	The development of the project shall comply with the Local Government Act, cap 281,No.22 of 1991 in relation to pollution control and environmental protection.
Anti-Gender-Based Violence Act, 2010.	An Act to provide for the protection of victims of gender-based violence; constitute the Anti-Gender-Based Violence Committee; establish the Anti-Gender-Based Violence Fund; and provide for matters connected with, or incidental to, the foregoing. Section 30 (1) provides that the Ministry responsible for social welfare shall provide mechanisms and programs for the rehabilitation of victims.	Ministry of Home Affairs Ministry of Gender	Increased access to electricity will help vulnerable group such as women be connected to the national grid and improve productivity. This will result in an increase in the levels of income, livelihood, less dependence on their spouses and a reduced number of incidence of GBV.	The development of the project shall take cognisance of the provisions of the Anti-Gender-Based Violence Act, 2010 to ensure that it addresses all vices that promote GBV.
Disaster Management Act, 2010	An Act to establish and provide for the maintenance and operation of a system for the anticipation, preparedness, prevention, coordination, mitigation and	DMMU	Lusaka has continued to experience increased incidences of floods that may pose a danger to ZESCO installations and the general public. The Disaster Management and	The development of the project shall adhere to the provisions of the Disaster Management Act, 2010 to ensure

Legal Instrument	Main Provisions	Responsible Institutions	Relevance to the proposed project	Compliance with Legislation
	management of disaster situations and the organization of relief and recovery from disasters; establish the National Disaster Management and Mitigation Unit and provide for its powers and functions. Section 7 (1) of the Act provides that the Unit shall give guidance to Government ministries and departments, the private sector, non-governmental organizations, communities and individuals to assess and prevent or reduce the risk of disasters, including (a) ways and means of: (i) determining levels of risks; (ii) assessing the vulnerability of communities, households, environment and economic assets to disasters; (iii) increasing the capacity of communities and households to minimize the risk and impact of disasters; and (iv) Monitoring the likelihood of, and the state of alertness to, disasters.		Mitigation Unit (DMMU) has been established and mandated to anticipate, prepare and manage disasters should they occur. ZESCO will work closely with DMMU should such an occurrence be experienced.	emergency preparedness and response.
Human Rights Commission Act, 1996	An Act to provide for the functions and powers of the Human Rights Commission; to provide for its composition and to provide for matters connected with or incidental to the foregoing.	Human Rights Commission	The Act is relevant because the project will involve involuntary resettlement, An activity which requires to be executed in a way that respects the Rights of the PAPs.	The development and implementation of the project shall adhere to the provisions of the Human Rights

Legal Instrument	Main Provisions	Responsible Institutions	Relevance to the proposed project	Compliance with Legislation
	Section 9 of the Act provides that the function of the Commission shall be: a) Investigate Human Rights Abuse b) Investigate any maladministration of justice c) Proposed effective measures to prevent human Rights abuse d) Do such things as incidental or conducive to the attainment of the functions of the commission			Commission Act, 1996 to uphold the basic requirements therein.
Occupational Health and Safety Act, 2010	Section 11 and 13 (1) of the Act provided for the establishment of the Occupational Health and Safety Institute and provide for its functions; provide for the establishment of health and safety committees at workplaces and for the health, safety and welfare of persons at work; provide for the duties of manufacturers, importers and suppliers of articles, devices, items and substances for use at work; provide for the protection of persons, other than persons at work, against risks to health or safety arising from, or in connection with, the activities of persons at work; and provide for matters connected with, or incidental to, the foregoing.	Ministry of Labour	During the implementation of project activities, personnel involved in construction of infrastructure and their operation will be required to adhere to best practices with regards to Occupational Health and Safety. Procedures and manuals and regular onsite training will be undertaken to ensure personnel working on site are conversant with the information contained. The project will ensure that high risk areas are clearly marked with restricted access and the provision of the relevant Personal Protective Equipment (PPE) will be mandatory.	The project will ensure adherence to the Occupational Health and Safety Act, 2010 to provide for a healthy and safe work environment.
Public Procurement Act, 2008	An Act to continue the existence of the Zambia National Tender Board and re-name it as the Zambia Public Procurement Authority (ZPPA); revise the law relating to procurement So as to ensure transparency and accountability in public procurement;	ZPPA	The project will involve the procurement of works, goods and services and this will require that the process follow the ZPPA guidelines to ensure fairness, transparency, integrity, accountability and promote public and stakeholder confidence. The process will be further	The project will ensure adherence to the provisions of the Public Procurement Act, 2008 for transparency and accountability in the

Legal Instrument	Main Provisions	Responsible Institutions	Relevance to the proposed project	Compliance with Legislation
	Section 21 of the Act provides that the user department in relation to procurement are to: (a) Provide information on forecasting procurement requirements to the procurement unit for the purpose of procurement planning. (b) Initiate procurement requirements (c) Provide technical inputs to the procurement process.		complimented by EIB and World Bank procurement policies on meeting environmental requirements	procurement process.

3.3 World Bank Safeguard Policies

In addition to the national environmental legal framework, this ESIA takes into consideration World Bank Safeguards Policies. Five (5) out of the ten (10) safeguards polices have been triggered by the project. Table 4 lists the safeguard policies that have been triggered by transmission line project and gives reasons for the trigger.

Table 3: List of World Bank Safeguard Policies and their Objectives

WORLD BANK SAFEGUARDS POLICY	POLICY FRAMEWORK	APPLICABLE	REASON FOR APPLICABILITY / NON-APPLICABILITY TO THE PROJECT
OP 4.01-Environmental Assessment	The Bank requires environmental assessment (EA) of projects proposed for Bank financing to help ensure that they are environmentally sound and sustainable, and thus to improve decision making.	Yes	The policy is applicable, as the bulk of the activities to be undertaken during implementation involve 33/132kV line upgrade and construction of a 132kV line. Works will involve increase in voltage with associated potential health and safety issues for workers; excavations and earth burrowing which would create dust and cause air pollution, generate high levels of noise from heavy machinery; potential clearing of natural vegetation could lead to soil erosion; accumulation of solid and liquid waste from construction materials and lubricants would pollute land, water and air in the neighbouring areas. This EPB has been prepared to assess the impacts that

WORLD BANK SAFEGUARDS POLICY	POLICY FRAMEWORK	APPLICABLE	REASON FOR APPLICABILITY / NON-APPLICABILITY TO THE PROJECT
			may arise from the project and also propose mitigation measures to reduce or eliminate the risks associated with the project.
OP 4.04 - Natural Habitats	The conservation of natural habitats, like other measures that protect and enhance the environment, is essential for long-term sustainable development. The Bank[2] therefore supports the protection, maintenance, and rehabilitation of natural habitats and their functions in its economic and sector work, project financing, and policy dialogue. The Bank supports, and expects borrowers to apply a precautionary approach to natural resources management to ensure opportunities for environmentally sustainable development.	Yes	The policy is applicable, as a good segment of the scope of works of the project will be implemented in the national park area, which will be disturbed by anthropogenic activities.
Pest Management	This policy contributes to the Bank's mission of ensuring that pest	No	The policy on pest management is not applicable, as the project will not require the

WORLD BANK SAFEGUARDS POLICY	POLICY FRAMEWORK	APPLICABLE	REASON FOR APPLICABILITY / NON-APPLICABILITY TO THE PROJECT
OP 4.09	management activities follow an Integrated Pest Management (IPM) approach, minimize environmental and health hazards due to pesticide use, contribute to developing national capacity to implement IPM and to regulate and monitor the distribution and use of pesticides		use of pesticides and toxic substances.
OP 4.10 - Indigenous Peoples	This policy contributes to the Bank's mission of poverty reduction and sustainable development by ensuring that the development process fully respects the dignity, human rights, economies, and cultures of Indigenous Peoples. For all projects that are proposed for Bank financing and affect Indigenous Peoples, the Bank requires the borrower to engage in a process of free, prior, and informed consultation. The Bank provides project financing only where free, prior, and informed	No	The policy is not applicable, as the geographical areas in consideration a high class suburb and is not likely to have indigenous people as defined by the Bank policy. A large section if it is the industrial park, Lusaka National Park and commercial farm.

WORLD BANK SAFEGUARDS POLICY	POLICY FRAMEWORK	APPLICABLE	REASON FOR APPLICABILITY / NON-APPLICABILITY TO THE PROJECT
	consultation results in broad community support to the project by the affected Indigenous Peoples. Such Bank-financed projects include measures to (a) avoid potentially adverse effects on the Indigenous Peoples' communities; or (b) when avoidance is not feasible, minimize, mitigate, or compensate for such effects. Bank-financed projects are also designed to ensure that the Indigenous Peoples receive social and economic benefits that are culturally appropriate and gender and inter-generationally inclusive.		
OP 4.11 - Physical Cultural Resources	This policy addresses physical cultural resources, which are defined as movable or immovable objects, sites, structures, groups of structures, and natural features and landscapes that have archaeological, paleontological,	No	The policy is not triggered, as the project will not affect some features of cultural significance as per consultation with the Heritage Conservation Commission.

WORLD BANK SAFEGUARDS POLICY	POLICY FRAMEWORK	APPLICABLE	REASON FOR APPLICABILITY / NON-APPLICABILITY TO THE PROJECT
	historical, architectural, religious, aesthetic, or other cultural significance. Physical cultural resources may be located in urban or rural settings, and may be above or below ground, or under water. Their cultural interest may be at the local, provincial or national level, or within the international community.		
OP 4.12 - Involuntary Resettlement	Bank experience indicates that involuntary resettlement under development projects, if unmitigated, often gives rise to severe economic, social, and environmental risks: production systems are dismantled; people face impoverishment when their productive assets or income sources are lost; people are relocated to environments where their productive skills may be less	Yes	The Policy is triggered because the project will involve involuntary resettlements during the acquisition of land for the construction of substations and relocation of PAPs in the existing footprints of the wayleave for the line upgrades. A Resettlement and Compensation Action Plan (RCAP) shall be prepared to manage these issues.

WORLD BANK SAFEGUARDS POLICY	POLICY FRAMEWORK	APPLICABLE	REASON FOR APPLICABILITY / NON-APPLICABILITY TO THE PROJECT
	applicable and the competition for resources greater; community institutions and social networks are weakened; kin groups are dispersed; and cultural identity, traditional authority, and the potential for mutual help are diminished or lost. This policy includes safeguards to address and mitigate these impoverishment risks.		
OP 4.36 – Forests	The management, conservation, and sustainable development of forest ecosystems and their associated resources are essential for lasting poverty reduction and sustainable development, whether located in countries with abundant forests or in those with depleted or naturally limited forest resources. The objective of this policy is to assist borrowers to harness the potential of forests to reduce	Yes	The policy is triggered, as construction activities will involve opening up new areas and vegetation removal and this may result in the loss of significant trees.

WORLD BANK SAFEGUARDS POLICY	POLICY FRAMEWORK	APPLICABLE	REASON FOR APPLICABILITY / NON-APPLICABILITY TO THE PROJECT
	poverty in a sustainable manner, integrate forests effectively into sustainable economic development, and protect the vital local and global environmental services and values of forests.		
OP 4.37 - Safety of Dams	For the life of any dam, the owner is responsible for ensuring that appropriate measures are taken and sufficient resources provided for the safety of the dam, irrespective of its funding sources or construction status. Because there are serious consequences if a dam does not function properly or fails, the Bank is concerned about the safety of new dams it finances and existing dams on which a Bank-financed project is directly dependent.	No	The policy is not triggered as it will not involve the construction or maintenance of dams as defined by the Bank policy.
OP 7.50 - Projects on	1. This policy applies to the following types of international	No	The policy is not triggered as it will not involve financing activities or subprojects

WORLD BANK SAFEGUARDS POLICY	POLICY FRAMEWORK	APPLICABLE	REASON FOR APPLICABILITY / NON-APPLICABILITY TO THE PROJECT
International Waterways	waterways: (a) any river, canal, lake, or similar body of water that forms a boundary between, or any river or body of surface water that flows through, two or more states, whether Bank members or not; (b) any tributary or other body of surface water that is a component of any waterway described in (a) above; and (c) Any bay, gulf, strait, or channel bounded by two or more states or, if within one state, recognized as a necessary channel of communication between the open sea and other states--and any river flowing into such waters.		lying within riparian areas of international waterways.

WORLD BANK SAFEGUARDS POLICY	POLICY FRAMEWORK	APPLICABLE	REASON FOR APPLICABILITY / NON-APPLICABILITY TO THE PROJECT
OP 7.60 - Projects in Disputed Areas	Projects in disputed areas may raise a number of delicate problems affecting relations not only between the Bank and its member countries, but also between the country in which the project is carried out and one or more neighbouring countries. In order not to prejudice the position of either the Bank or the countries concerned, any dispute over an area in which a proposed project is located is dealt with at the earliest possible stage. The Bank may support a project in a disputed area if the governments concerned agree that, pending the settlement of the dispute, the project proposed for country A should go forward without prejudice to the claims of country B.	No	The policy is not triggered, as it will not finance any activities in disputed areas or territories.

WORLD BANK SAFEGUARDS POLICY	POLICY FRAMEWORK	APPLICABLE	REASON FOR APPLICABILITY / NON-APPLICABILITY TO THE PROJECT
OP 4.01- Environmental Assessment	The Bank requires environmental assessment (EA) of projects proposed for Bank financing to help ensure that they are environmentally sound and sustainable, and thus to improve decision making.	Yes	The policy is applicable, as the bulk of the activities to be undertaken during implementation involve 33/132kV line upgrade and construction of a 132kV line. Works will involve increase in voltage with associated potential health and safety issues for workers; excavations and earth burrowing which would create dust and cause air pollution, generate high levels of noise from heavy machinery; potential clearing of natural vegetation could lead to soil erosion; accumulation of solid and liquid waste from construction materials and lubricants would pollute land, water and air in the neighbouring areas. This EPB has been prepared to assess the impacts that may arise from the project and also propose mitigation measures to reduce or eliminate the risks associated with the project.
OP 4.04 - Natural Habitats	The conservation of natural habitats, like other measures that protect and enhance the environment, is essential for long-term sustainable development. The Bank[2] therefore supports the protection, maintenance, and	Yes	The policy is applicable, as a good segment of the scope of works of the project will be implemented in the national park area, which will be disturbed by anthropogenic activities.

WORLD BANK SAFEGUARDS POLICY	POLICY FRAMEWORK	APPLICABLE	REASON FOR APPLICABILITY / NON-APPLICABILITY TO THE PROJECT
	rehabilitation of natural habitats and their functions in its economic and sector work, project financing, and policy dialogue. The Bank supports, and expects borrowers to apply a precautionary approach to natural resources management to ensure opportunities for environmentally sustainable development.		
Pest Management OP 4.09	To be filled in	No	The policy on pest management is not applicable, as the project will not require the use of pesticides and toxic substances.
OP 4.10 - Indigenous Peoples	This policy contributes to the Bank's mission of poverty reduction and sustainable development by ensuring that the development process fully respects the dignity, human rights, economies, and cultures of Indigenous Peoples. For all projects that are proposed for Bank financing and affect Indigenous Peoples, the Bank requires the borrower to engage in a process of free, prior, and	No	The policy is not applicable, as the geographical areas in consideration a high class suburb and is not likely to have indigenous people as defined by the Bank policy. A large section if it is the industrial park, Lusaka National Park and commercial farm.

WORLD BANK SAFEGUARDS POLICY	POLICY FRAMEWORK	APPLICABLE	REASON FOR APPLICABILITY / NON-APPLICABILITY TO THE PROJECT
	informed consultation. The Bank provides project financing only where free, prior, and informed consultation results in broad community support to the project by the affected Indigenous Peoples. Such Bank-financed projects include measures to (a) avoid potentially adverse effects on the Indigenous Peoples' communities; or (b) when avoidance is not feasible, minimize, mitigate, or compensate for such effects. Bank-financed projects are also designed to ensure that the Indigenous Peoples receive social and economic benefits that are culturally appropriate and gender and inter-generationally inclusive.		
OP 4.11 - Physical Cultural Resources	This policy addresses physical cultural resources, which are defined as movable or immovable objects, sites, structures, groups of structures, and natural features and landscapes that have archaeological, paleontological,	No	The policy is not triggered, as the project will not affect some features of cultural significance as per consultation with the Heritage Conservation Commission.

WORLD BANK SAFEGUARDS POLICY	POLICY FRAMEWORK	APPLICABLE	REASON FOR APPLICABILITY / NON-APPLICABILITY TO THE PROJECT
	historical, architectural, religious, aesthetic, or other cultural significance. Physical cultural resources may be located in urban or rural settings, and may be above or below ground, or under water. Their cultural interest may be at the local, provincial or national level, or within the international community.		
OP 4.12 - Involuntary Resettlement	Bank experience indicates that involuntary resettlement under development projects, if unmitigated, often gives rise to severe economic, social, and environmental risks: production systems are dismantled; people face impoverishment when their productive assets or income sources are lost; people are relocated to environments where their productive skills may be less applicable and the competition for resources greater; community institutions and social networks are weakened; kin groups are	Yes	The Policy is triggered because the project will involve involuntary resettlements during the acquisition of land for the construction of substations and relocation of PAPs in the existing footprints of the wayleave for the line upgrades. A Resettlement and Compensation Action Plan (RCAP) shall be prepared to manage these issues.

WORLD BANK SAFEGUARDS POLICY	POLICY FRAMEWORK	APPLICABLE	REASON FOR APPLICABILITY / NON-APPLICABILITY TO THE PROJECT
	dispersed; and cultural identity, traditional authority, and the potential for mutual help are diminished or lost. This policy includes safeguards to address and mitigate these impoverishment risks.		
OP 4.36 – Forests	The management, conservation, and sustainable development of forest ecosystems and their associated resources are essential for lasting poverty reduction and sustainable development, whether located in countries with abundant forests or in those with depleted or naturally limited forest resources. The objective of this policy is to assist borrowers to harness the potential of forests to reduce poverty in a sustainable manner, integrate forests effectively into sustainable economic development, and protect the vital local and global environmental services and values of forests.	Yes	The policy is triggered, as construction activities will involve opening up new areas and vegetation removal and this may result in the loss of significant trees.
OP 4.37 -	For the life of any dam, the	No	The policy is not triggered as it will not

WORLD BANK SAFEGUARDS POLICY	POLICY FRAMEWORK	APPLICABLE	REASON FOR APPLICABILITY / NON-APPLICABILITY TO THE PROJECT
Safety of Dams	owner is responsible for ensuring that appropriate measures are taken and sufficient resources provided for the safety of the dam, irrespective of its funding sources or construction status. Because there are serious consequences if a dam does not function properly or fails, the Bank is concerned about the safety of new dams it finances and existing dams on which a Bank-financed project is directly dependent.		involve the construction or maintenance of dams as defined by the Bank policy.
OP 7.50 - Projects on International Waterways	1. This policy applies to the following types of international waterways: (d) any river, canal, lake, or similar body of water that forms a boundary between, or any river or body of surface water that flows through, two or more states, whether Bank members or not; (e) any tributary or other body of surface water that is a	No	The policy is not triggered as it will not involve financing activities or subprojects lying within riparian areas of international waterways.

WORLD BANK SAFEGUARDS POLICY	POLICY FRAMEWORK	APPLICABLE	REASON FOR APPLICABILITY / NON-APPLICABILITY TO THE PROJECT
	component of any waterway described in (a) above; and (f) Any bay, gulf, strait, or channel bounded by two or more states or, if within one state, recognized as a necessary channel of communication between the open sea and other states--and any river flowing into such waters.		
OP 7.60 - Projects in Disputed Areas	Projects in disputed areas may raise a number of delicate problems affecting relations not only between the Bank and its member countries, but also between the country in which the project is carried out and one or more neighbouring countries. In order not to prejudice the position of either the Bank or the countries concerned, any dispute over an area in which a proposed project is located is dealt with at the earliest possible stage. The Bank may support a project in	No	The policy is not triggered, as it will not finance any activities in disputed areas or territories.

WORLD BANK SAFEGUARDS POLICY	POLICY FRAMEWORK	APPLICABLE	REASON FOR APPLICABILITY / NON-APPLICABILITY TO THE PROJECT
	a disputed area if the governments concerned agree that, pending the settlement of the dispute, the project proposed for country A should go forward without prejudice to the claims of country B.		

3.4 European Investment Bank Environmental and Social Standards

Table 4: EIB Environmental and Social Standards

Performance Standards		Objective	Applicability to the Project
S 1	Assessment and Management of Environmental and Social Impacts and Risks	The first standard underscores the importance of managing environmental and social impacts and risks throughout the life of an EIB project through the application of the precautionary principle. The standard's requirements allow for the development of an effective environmental and social management and reporting system that is objective and encourages continual improvements and developments. The standard includes requirements for stakeholder engagement and disclosure throughout the life of the project.	The Standard is applicable because the project has environmental and social risks which need to be taken care of.
S 2	Pollution Prevention and Abatement	The objective of the second standard is to avoid and minimise pollution from EIB-supported operations. It outlines a project-level approach to resource efficiency and pollution prevention and control in line with best available techniques and internationally disseminated practices.	The standard is applicable because the project implementation may result into contamination of soils and ground water from oils and other hydrocarbons if not well managed.
S 3	Biodiversity and Ecosystem	The EIB acknowledges the intrinsic value of biodiversity and that its operations may have a potential impact on biodiversity and ecosystems. This standard outlines the approach and measures the promoter has to take to protect and conserve all levels of biodiversity. The standard applies to all habitats (marine and terrestrial) whether or not previously disturbed or legally protected. It focuses on major threats and supports the	The Standard is applicable because it is traversing an area of significant ecological importance (Lusaka South National Park)

		sustainable use of renewable natural resources and the equitable sharing of benefits from the project's use of natural resources.	
PS 4	Climate-related Standard	EIB financing as a whole is aligned with EU climate policies, which should be taken into account at all stages of the project cycle, in particular regarding the assessment of the economic cost of greenhouse gas emissions and the climate vulnerability context. Specifically, project promoters must ensure that all projects comply with appropriate national and, where applicable, EU legal requirements, including multilateral agreements, related to climate change policy.	The standard is applicable because the project will require clearing trees to open up some areas which may affect the micro-climate of the region.
S 5	Cultural Heritage	Through its projects, the EIB recognises the central role of cultural heritage within individual and collective identity, in supporting sustainable development and in promoting cultural diversity. Consistent with the applicable international conventions and declarations, this standard aims at the identification, management and protection of tangible and intangible cultural heritage that may be affected by project activities. It emphasises the need for the implementation of a "chance-find procedure", which outlines the actions to be taken if previously unknown cultural heritage is encountered.	The Standard is applicable because the project is greenfield and ZESCO might find significant artefacts or any other cultural features which need to be handled according to the prescription of the standard
S 6	Involuntary Resettlement	EIB projects sometimes necessitate land acquisition, expropriation and/or restrictions on land use, resulting in the temporary or permanent resettlement of people from their original places of residence or	The standard is applicable because part of the project is traversing an area that is built up and the property owners will need to be relocated.

		their economic activities or subsistence practices. Standard 6 is rooted in the respect and protection of the rights to property and to adequate housing, and of the standard of living of all affected people and communities. It seeks to mitigate any adverse impacts arising from their loss of assets or restrictions on land use. It also aims to assist all affected persons to improve or at least restore their former livelihoods and living standards and adequately compensate for incurred losses.	
S 7	Rights and Interests of Vulnerable Groups	The EIB seeks to protect all vulnerable project-affected individuals and groups, whilst seeking that these populations duly benefit from EIB operations. The standard requires that there is full respect for the dignity, human rights, aspiration, cultures and customary livelihoods of vulnerable groups including indigenous peoples. It requires the free, prior and informed consent of affected indigenous groups.	The standard is not applicable because among the 17 PAPs in the area, there are no vulnerable groups. All individual private property owners have been engaged and are found to be literate, physically, mentally and emotionally fit and have livelihood activities that may be described as the middle to upper class.
S 8	Labour Standard	Good labour practices and the use of appropriate codes of conduct are important to ensure the fair treatment, non-discrimination and equality of opportunity of workers. This standard aims at ensuring that promoters of EIB projects comply with the core labour standards of the International Labour Organisation and with national labour and employment laws. The standard also requires the establishment, maintenance and improvement of worker-management relationships.	The standard is applicable because the project will have contractors working on sites which will require observing among other issues, child labour, and working hours for all employees.
S 9	Occupational and Public Health,	The EIB expects promoters to protect and secure public and	The standard is applicable because the project will have

	Safety and Security	occupational health, safety and security and promote the dignity of the affected community in relation to project-related activities, with particular attention to vulnerable groups. The standard also requires promoters to adhere to the international norms and relevant human rights principles when using security services.	contractors working on sites which will require observing high level of security, occupational health and safety.
S 10	Stakeholder Engagement	As a public institution, the EIB actively promotes the right to access to information, as well as public consultation and participation. Standard 10 requires promoters to uphold an open, transparent and accountable dialogue with all project affected communities and relevant stakeholders in an effective and appropriate manner. The value of public participation in the decision-making process is stressed throughout the preparation, implementation and monitoring phases of a project. The right to access to remedy, including through grievance resolution, is actively required.	The Standard is applicable because, the project is not stand alone but has other key stakeholders including the local communities, Government Agencies, Local NGOs and Contractors. ZESCO will have to ensure participatory and consultative approach at all decision making.

3.5 International Conventions, Protocols and Guidelines

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.

4.0 PROJECT DESCRIPTION

4.1 Location

4.1.1 Proposed Transmission Line Route

The proposed project area is located in the Lusaka and Chilanga Districts of Lusaka Province. The proposed 132kV line will originate from 132/33kV Waterworks Substation located along the new Tokyo Way. From Waterworks Substation, the proposed 132kV line will be in the existing 88kV wayleave towards Leopards Hill Substation for about 6km. The line will then leave the existing wayleave and turn South, running parallel to the eastern side of Tokyo Way, for about 3.2km entering the Lusaka South Multi-Facility Economic Zone (LSMFEZ). The proposed 132kV line then turns west and runs 16m into LSMFEZ and runs parallel to LSMFEZ perimeter wire fence landing outside LSMFEZ boundary. It will then continue to run outside and parallel to the LSMFEZ boundary up to the end of the property and thereafter land at LSMFEZ Substation. From LSMFEZ Substation, the proposed line runs south-west and joins the existing 330 and 88kV wayleave which comes from Leopards Hill Substation and stays Northern side and parallel to the 330kV line passing through the Lusaka National Park for about 7km.

The proposed line then leaves the existing wayleave, turns north - west and then enters Lilayi Game Reserve. It then runs parallel to the perimeter wire fence next to an existing gravel road. After the Lilayi Game Reserve the line traverses 4 private properties before it reaches Chawama Substation. From Chawama Substation the line traverses one private property (locally known as Miller Farm) into Chilanga Substation. The line leaves Chilanga Substation and takes up the 33kV wayleave to Mapepe. From Mapepe the proposed line again joins and runs adjacent to the existing 330kV line from Leopards Hill Substation for about 1.5km before passing through private farms and crossing Kafue Road. The Line continues after Kafue Road passing through private farms and the Lafarge quarry plant. The line again passes through private farms up to the Linda Road. Most of the private farms practice subsistence and commercial farming. From Linda Road the line joins the wayleave to Lusaka West Substation and runs on the Eastern side of the 88kV line. Refer to Appendix 1 Map of the Line Route.

4.1.2 Project Route Map / Geographical Coordinates

The map showing the transmission line route is presented in Appendix 1

4.2 Project Description

4.2.1 Raw Materials

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

- Steel for tower structures as depicted in Figure 2 below, concrete reinforcement, fence
- River/building sand and cement for concrete works;
- Stone and aggregate of various sizes for concrete;
- Timber of various sizes;
- Insulators, cables, bolts, nuts; and
- Conductors, busbars and transformers.

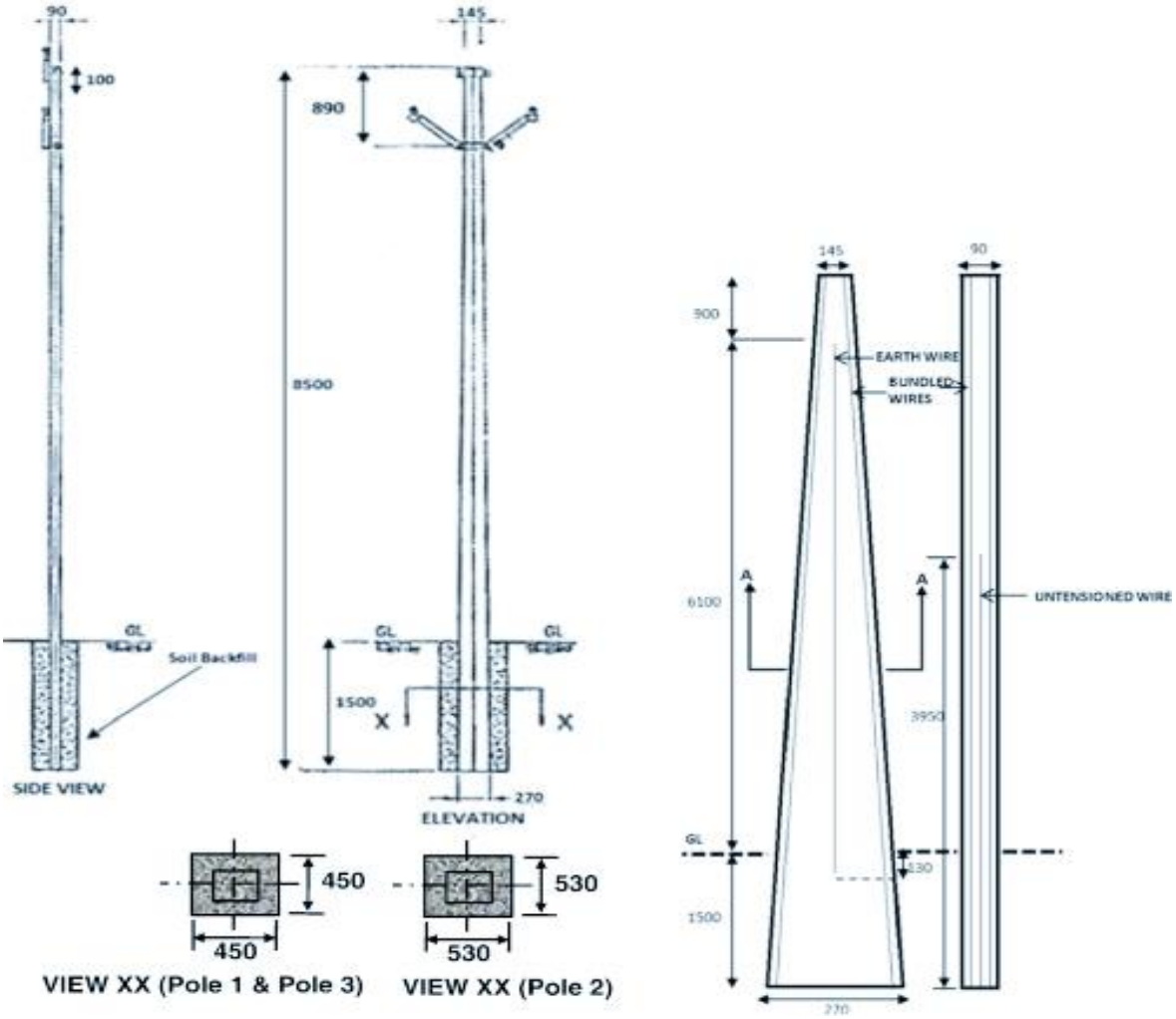

Figure 3: Illustration of Monopole Tower to be used

4.2.2 Products and By-products

The main product of the project is electric power that will be transmitted through the transmission line.
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.

4.3 Main Project Activities

4.3.1 Preparation Phase

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

(a) Reconnaissance Survey

A reconnaissance survey of the transmission line was conducted, with due consideration of environmental and social impacts. 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.

(b) Land and Wayleave Acquisition

Acquisition of wayleaves for the transmission line and substation sites shall be conducted through engagement of property owners and institutions through which the preferred line route shall traverse and obtaining consent from the affected parties. Any loss of property and livelihoods arising from this process shall be addressed in the Resettlement and Compensation Action Plan (RCAP) for this project.

(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 line. The level of training will be commensurate with the type of duties of the personnel. The training programme 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 environmental and occupational health and safety practices will be mandatory at the project site.

4.3.2 Construction Phase

The development of the Waterworks – LSMFEZ – Chawama – Chilanga – Lusaka West Substation 132kV transmission line involves the construction of 99 km of line with associated substation infrastructure. The Project will comprise construction of sub-transmission lines and associated substation works as follows:

Water Works to Chawama Substation

- Construct 18km of new 132kV (200MVA) single circuit, Kingbird conductor with OPGW, Monopole line from Water Works to LSMFEZ Substation;
- Construct new Chawama 132/11kV Substation (4 x 132kV Feeder Bays, 3 x 132/11kV 30MVA transformers Bays), associated switching room with 17 panels (3 x incomers / 2 x sections / 12 x feeder panels);
- Construct 2 x 11 kV Switching Stations, typically consisting of 3 x incomer circuit breakers, one bus-section and twelve feeder breakers, and associated 6 x 185mm2, 11kV underground cable, interconnecting the Switching Stations with Chawama Substation (approximately 3km / circuit totalling 18km); and
- Construct 18km of new 132kV (2 x 200MVA) double circuit, Kingbird conductor with OPGW, Monopole line from LS MFEZ to Chawama Substation.

Chawama to Chilanga Substation

- Construct new Chilanga 132/33/11kV Substation (2 x 132kV Feeder Bays, 2 x 132/33kV 90MVA transformer bays, 3 x 132/11kV 30MVA transformers Bays), 7 x 33kV outdoor feeder bays, associated switching room with 17 panels (4 x incomers / 3 x sections / 18 x feeder panels);
- Construct 2 x 11 kV Switching Stations, typically consisting of 3 x incomer circuit breakers, one bus-section and twelve feeder breakers, and associated 6 x 185mm2, 11kV underground cable, interconnecting the Switching Stations with Chilanga Substation (approximately 3km / circuit totalling 18km);
- Construct 9km of new 132kV (200MVA) single circuit, Kingbird conductor with OPGW, monopole line from Chawama to Chilanga Substation, allow for strain tower for future loop-inloop-out to Chilanga 2 Substation; and
- Decommission existing 33kV Lines from Chilanga to Chawama substation.

Chilanga to Lusaka West Substation

Lusaka West Substation upgrade includes the following scope of work:

- Lusaka West: Upgrade Lusaka West 330/132kV to 500MVA firm substation. Replace Lusaka West 2x 125MVA, 330/132kV with 3 x 250MVA, 330/132kV transformers;
- Add one by 330kV/132kV Transformer bay; and
- Upgrade 132kV busbar to double busbar with bus coupler.

The Chilanga – Lusaka west 132kV line works include the following scope of work:

- Equip 132 kV line bays (200 MVA) at Chilanga and Lusaka West; and
- Construct 50 km of new 132kV (200MVA) double circuit, Kingbird conductor with OPGW, Monopole line from Chilanga to Lusaka West Substation.

The width of the wayleave for the 132kV transmission line shall be 32m (16 m on either side of the centre line).

4.3.3 Operation Phase

The transmission line 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 transmission line. The transmission line 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 to ensure line security and public safety. During operation, routine maintenance of the line 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.

4.4 Project Costs and Financing

The total estimated capital expenditure to ensure the adequate functioning of the Project is broken down in Table 6 below.

Table 5: Breakdown of Project Costs

S/N	Construction of the Transmission Line Segments	Cost (USD million)
1	Waterworks – LS MFEZ	3.9
2	LS MFEZ – Chawama +Chawama Substation	20.8
3	Chawama – Chilanga + Chilanga Substation	22.2
4	Chilanga – Lusaka West	14.2
TOTAL		**61.1**

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

Table 6: Sources of Project Financing

Project Components	Total Project cost (Million USD)	Project Cost Financed by		
		IDA	EIB	Recipient
Construction of the Transmission Line	61.1	3.9	43	14.2

5.0 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.

5.1 Route Alternatives

The project considered three alternatives for the proposed transmission line to determine the best route, while taking into consideration the following:

i. Number of resettlement/displacement cases;
ii. Impacts on livelihoods of the PAPs;
iii. Impacts (negative) on biodiversity and ecological systems; and
iv. Most economical cost of implementation.

The map showing the described routes is shown in Appendix 1.

5.1.1 Alternative 1

The proposed 132kV line is expected to originate from 132/33kV Waterworks Substation located along Tokyo Way. From Waterworks Substation, the proposed 132kV line will be in the existing 88kV wayleave that goes to Leopards Hill Substation for about 6km. The proposed line will then leave the existing wayleave and turn south, running parallel to the eastern side of Tokyo Way, for about 3.2km before entering the Lusaka South Multi-Facility Economic Zone (LSMFEZ). The line then turns west and runs inside the LSMFEZ boundary, parallel to LSMFEZ perimeter, fence landing outside the LSMFEZ boundary. It will then continue to run outside and parallel to the LSMFEZ boundary up to the end of the property and thereafter land at LSMFEZ Substation, on the eastern side of LSMFEZ.

From LSMFEZ Substation, the proposed line will run south-west and join the existing 330 and 88kV wayleave, which comes from Leopards Hill Substation and stays on the northern side and parallel to the 330kV line passing through the Lusaka National Park for about 7km. The line then leaves the existing wayleave and turns north-west and enters Lilayi Game Reserve and runs parallel to the northern perimeter fence, adjacent to the gravel road, 16m inside the fence. After the Lilayi Game Reserve the line traverses four private properties before it reaches Chawama Substation. From Chawama Substation the line traverses one property into Chilanga Substation, which is adjacent to the Lafarge Cement Plant. The line leaves Chilanga Substation and takes up the 33kV wayleave to Mapepe. From Mapepe the proposed line again joins and runs adjacent to the 330kV line from Leopards Hill Substation for about 1.5km, after which it will traverse private farms and cross Kafue Road to Lafarge quarry plant. It would continue to traverse private farms up to Balmoral Road and join the wayleave to Lusaka West Substation, running on the Eastern side of the 88kV line.

This alternative is anticipated to result in the resettlement and/or loss of livelihoods for 69 PAPs. In addition the line in this alternative would traverse the Lusaka National Park and Lilayi Game Reserve at the peripheral therefore minimal disturbance to the ecological and biological system. Furthermore, this alternative covers a stretch of 99km which is technically and economically feasible for implementation.

Figure 4: Proposed Route within the Lusaka National Park

5.1.2 Alternative 2

Alternative 2 makes use of the existing wayleaves. From Waterworks Substation, it follows the 88kV wayleave to Leopards Hill Substation. The proposed line leaves that 88kV wayleave just before Leopards Hill Substation, turns to the west and crosses Leopards Hill Road to join the wayleave from Leopards Hill Substation through LSMFEZ, and cuts across the Lusaka National Park through to Mapepe Substation. At Mapepe Substation, it leaves the 330kV wayleave and joins the 33kV wayleave to Chilanga Substation. From Chilanga Substation it joins another 33kV wayleave passing through Chawama Substation. From Chilanga Substation it joins another 33kV wayleave passing through Chawama and leading to Coventry Substation. From Coventry Substation, it joins the 88kV wayleave to Lusaka West Substation.

This alternative is anticipated to result in the resettlement and/or loss of livelihoods for 700 PAPs. In addition the line traverses Lusaka National Park, an area of biological and/or ecological significance. However, it covers a stretch of 64km which is technically feasible for implementation but has a very high cost of resettlement.

5.1.3 Alternative 3

Alternative route 3 follows the same route as Alternative 1, from Waterworks Substation, all the way up to Chilanga Substation. This route required that the line runs parallel to the Railway line from Chawama to Chilanga. This route entails compensating structures that would be within the rail reserve including households in Lilayi Housing Development Estates. From Chilanga substation, it traverses land for TAP Zambia and two other private properties and crossing Kafue Road near the junction to Mimosa area. It then traverses private farms all the way up to Lusaka West Substation.

This alternative is anticipated to result in the resettlement and/or loss of livelihoods of 200 PAPs. In addition the line traverses Lusaka National Park and Lilayi Game Reserve, areas of biological and/or ecological significance. However, it covers a stretch of 78km which is technically and economically feasible for implementation but has a higher cost of resettlement compared to alternative 1.

5.1.4 Preferred Alternative

With full attention to the analysis of alternatives based on the selection criteria, as well as submissions received during the scoping exercise, **Alternative 1** was selected as the preferred option. This option had the least impacts on biological and ecological systems due to the orientation of the line in the protected areas. The route also had lowest number of impacts of resettlement and livelihood losses. Additionally, its technical and economic feasibility makes it a viable option. Alternative routes 2 and 3 are not preferred because they are in heavily built up areas and will result in massive resettlement/displacement. Additionally, the cost of compensation would significantly increase the project cost and extend the project duration.

5.2 Process and Technology

5.2.1 Underground Transmission Lines

Underground lines are also used in relaying power along a power line route; however, their environmental impact is much greater. Additionally, it is not economically viable to place a transmission line of this high voltage (132kV) underground as the cost is estimated ten (10) times more than for the conventional overhead transmission line.

In addition to the cost aspect, from the environmental point of view, it must be noted that underground transmission lines are oil-cooled, requiring sealed conductors significantly larger in diameter than overhead conductors which are air-cooled. The larger conductors require a larger wayleave to keep conductors apart. Of significance with this wayleave is that the line would need to be buried to a depth between 1.5m

and 2m, thereby generating significant spoil that will need to be disposed of. There is also a danger of water and soil contamination from leaks in the underground lines.

With due consideration of the cost implication, technical complexities and environmental concerns associated with underground transmission lines, this option will not be considered further in the ESIA.

5.2.2 Upgrade the Existing Distribution Lines to Sub-Transmission Lines and Associated Substations

An alternative to acquiring new wayleaves, constructing new transmission lines and developing new substation is to upgrade the existing transmission lines and associated substations. In order to carry out this, larger pylons would be required, as the existing towers would not be high and robust enough to carry larger conductors carrying a higher voltage (132 kV) than they are designed for. Added to this option, is the complication associated with shutting down a line for a significant period of time in order to carry out the upgrade. The supply and demand in the proposed project area is such that all existing lines are needed at any one given time to meet the current electricity demand.

In view of the foregoing, upgrading of the existing lines is not considered as means of optimising existing infrastructure.

Additionally, 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.

5.3 The Do-Nothing Option

If this option is selected, it will mean the proposed project not being implemented and all the negative environmental and social impacts to be evaluated in the ESIA would be avoided and the potential positive benefits lost.

Selection of this option would result in the stagnation or cessation of many developmental strategies and interventions that have been planned, especially those that are aimed at increased job creation and ultimately the contribution to poverty reduction in the proposed Project and surrounding areas. Furthermore, the power supply challenges of Lusaka City will not be addressed, hindering economic development and associated benefits.

5.4 Justification of Preferred Options

The justification of the preferred options is presented below:

Location Alternatives: The scoping phase concluded with the selection of alternative 1 as the preferred option based on the following: With full attention and appreciation from analysis of alternatives, as well as submissions received during the scoping exercise, Alternative 1 was selected as the preferred option. Alternative 1 will result into minimal displacement as

compared to the other options and will further facilitate evacuation of high voltage power to south west of the project area which is currently supplied by distribution lines. Therefore, this will not support socio-economic and infrastructural development activities. Alternative 1 is 99km long, affects 69 PAPs; Alternative 2 is 64km long, and would affect 700 PAPs; and alternative 3 which is 78 km long would affect 200 PAPs some of whom have encroached in the existing Chawama-Coventry 33kV wayleave. The environmental, socio-economic and technical considerations, aforementioned, justify the selection of alternative 1, on the basis of location, as the preferred option.

Process and Technology: Tubular steel poles were preferred to the steel lattice towers. This is because tubular steel poles reduce the installation and maintenance costs, as they 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 than lattice steel towers. The use of this technology is particularly appropriate for urban areas like Lusaka, where the establishment and maintenance of Rights of Way is a challenge.

The Project Implementation Option: As discussed in section 4.4 above, Alternative 1 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.

6.0 ENVIRONMENTAL BASELINE STUDY

6.1 Physical Environment

The physical environment of the Project area refers to the natural environment associated with the Waterworks – LSMFEZ – Chawama –Chilanga - Lusaka West 132kV Transmission Line. The physical environment includes: the geology, topography, soils, climate, and hydrology of the study area.

6.2 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 meta-sediments of the Katanga Super group.

Figure 5: 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 996+/-19 Ma (Hanson, 1990).The metasediments, which dominate in the central part of the area and underlay 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.

6.3 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 ooliths 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.

6.4 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 forming one of the tributaries of the Kafue River, and to the North east are many smaller rivers which end up into the Chongwe which is a tributary of the Zambezi River.

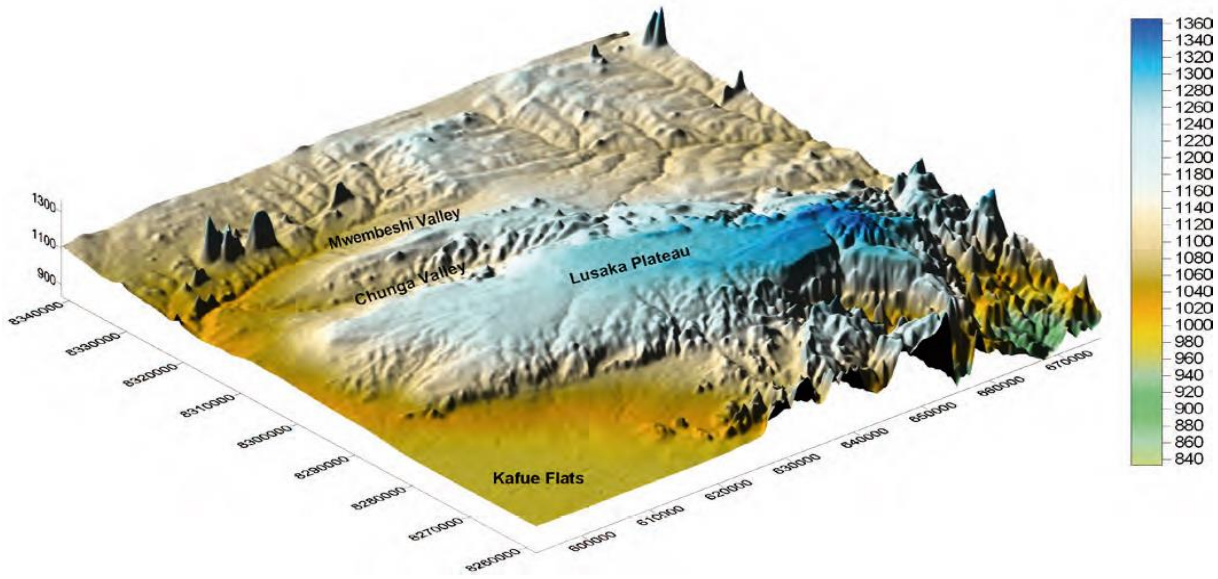

Figure 6: Block Diagram of the Lusaka Plateau (vertical exaggeration 26x)

6.5 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. This is the typical drainage structure due to the area being underlayed by predominantly limestone dolomite, which forms subsurface groundwater aquifers. 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. The main

streams which have their source from Lusaka are: the Ngwerere River which joins the Chongwe River which finally drains its water into the Zambezi River in the Lower Zambezi area and; the Chunga River taking the drainage to the northwest and joins the Mwembeshi River which pours its water into the Kafue Flats near Shibuyunji.

Due to the geological formation underlaying the area, Lusaka has very rich and productive ground water aquifers.

6.6 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.

6.7 Air Quality

Lusaka being the capital city is heavily congested by both human settlement and motor vehicle traffic. While there are a 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.

6.8 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.

6.9 Biological Environment

6.9.1 Fauna

Lusaka City has undergone steady and rapid urbanisation over the last sixty (60) years, and the indigenous fauna population has dwindled, except for the Lusaka National Park. 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 are confined to smallholder cattle ranches [e.g. Boran, Baila, Angoni (all Bos indicus) and Freisian]. 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.

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 crake), 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.

6.9.2 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 8. 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.

Figure 7: Vegetation Cover in the proposed wayleave and the nearby Road Network

6.10 Socio-Economic Environment

Following the increased power needs in Lusaka Province, recent network optimization studies 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 expected to be approximately 6.8 %. Therefore, the need to address the power needs of Lusaka Province and the associated socio-economic development cannot be overemphasised.

6.11 Human 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 represents an annual average population growth rate of 4.7% in the 2000-2010 inter - censual period the highest provincial population growth rate in the country. The high rate of population growth in the project area could be attributed to the high rates of migration from other provinces in the country as well as natural increase arising from high birth rates. 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. Refer to table 7 below for the population distribution of Lusaka Province by District.

However, the project area lies in Chilanga and Chongwe Districts, with a vast majority of it in Chilanga District (over 85 %). The districts account for 10.4 percent of the total population in Lusaka Province. The project area's proximity to Lusaka district, gives it strategic importance for infrastructure and economic development.

Table 7: 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	3.8
Luangwa	9,546	9,402	18,948	113,910	113,556	227,466	9.2
Lusaka	549,020	535,683	1,084,703	852,588	890,391	1,742,979	3.8
Chilanga.	29,184	27,489	56,673	52,790	52,080	104,871	4.6
Total	**856,910**	**832,704**	**1,689,614**	**1,379,981**	**1,419,822**	**2,582,344**	**4.0**

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

6.12 Settlement Patterns and Traditional Authority

The project area has both urban and traditional settlements. It is planned and zoned into residential, agricultural, industrial and commercial. The immediate project area is

generally sparsely populated and characterised by planned settlements. However, land is currently scarce because of the vast growing population.

State land is under the jurisdiction of the Ministry of Lands and Natural Resources, with the Chongwe and Chilanga District Councils as its agents. Private land is under the leasehold tenure. Other parts of the project area fall under the custody of Senior Chieftainess Nkomeshya Mukamambo II.

The line is anticipated to traverse a number of properties as described below:

Waterworks – LSMFEZ: private residential properties and LSMFEZ
LSMFEZ – Chawama – Chilanga: LSMFEZ, Lusaka National Park, Zambia Police Lilayi Training College, private residential properties, commercial and subsistence farms and Lilayi Game Reserve
Chilanga – Lusaka West: Lafarge Cement plant, meat and dairy processing, commercial and subsistence farms, quarrying, private residential properties.

6.13 Land Tenure

There are several Acts governing the administration of land, which include; the Lands Act, 1995 (CAP 292, CAP 289, CAP 288) for the allocation and alienation of land; Land Acquisition Act, 1995 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 Lands 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.

6.14 Land Use

The project area comprises mainly residential, agricultural, commercial and industrial zones. Agriculture is carried out at a subsistence and commercial scale. Commercial and industrial activities include quarrying at a large and small scale, cement production, tourism, meat processing, and dairy processing.

6.15 Agriculture

Crops grown on a commercial scale include soya beans, wheat, fodder for animal feed and maize. Vegetables, sweet potatoes, groundnuts, pumpkins, maize are grown on a subsistence scale.

Livestock reared in some parts of the project area include cattle, sheep, goats, poultry and pigs. Aquaculture is also practiced both at large and small scale.

The aforecaptioned agricultural activities are practiced in the Chawama – Chilanga – Lusaka West stretch of the Line.

6.16 Local Economy

The main stay of the economy in the project area is farming (Chawama – Chilanga – Lusaka West), tourism (LSMFEZ – Chilanga), industrial and commercial (LSMFEZ – Chilanga) and mining (Chilanga – Lusaka West). Formal employment is mainly provided by Government institutions and a few private sector firms. The Lusaka South Multi Facility Economic Zone has been planned as an industrial park to promote industrial and commercial activities.

The project area plays a critical role in the socio-economic status of adjoining rural and urban areas and thereby provides a ready market for agricultural and other goods.

6.17 Mining

Quarrying is the most significant mining activity in the project area. Oriental Quarries, Lions Group Quarry, and Kafue Quarries are among the largest producers of aggregates and quarry dust for construction purposes. Small scale mining of Laterite and Gypsum is also practiced. This is carried out mainly in the Chilanga – Lusaka West stretch of the the project area.

6.18 Water and Sanitation

The project area relies on both surface and ground water as sources of raw water. Most of the sources of water include private boreholes and shallow wells.

Three major types of sanitation services are utilized in the project area, namely, waterborne sewer systems, septic tanks, and pit latrines.

6.19 Health

There are number of challenges in health provision in the project area, among them are access to health facilities and the incidence of some diseases whose occurrence is driven by the state of the environment.

Health service delivery is through government clinics, health posts and private facilities as listed in the table 8 below. The main referral hospitals are Kafue District Hospital, Levy Mwanawasa University Teaching Hospital and the University Teaching Hospital.

Table 8: List of Health Facilities in the Project Area

No	Name of Facility	Facility Type	Facility Owner			No. of Beds	Catchment Population	No. of Out-reach Sites	Distance from HF to furthest outreach site(Km)	Distance of Facility from MHMO(Km)
1	Chilanga	RHC	GRZ			6	29,069	29	10	2
2	Kazimya	RHC	GRZ			1	21,790	9	15	32
3	Kris Katumba	RHC	GRZ			4	13680	10	23	40
4	Mt Makulu	RHC	GRZ			0	24210	8	12	5
5	Mwembeshi	RHC	GRZ			4	11260	13	35	60
6	Mwembeshi Prisons	HP	GRZ			0	1210	2	0	65
7	Makeni Konga	RHC	GRZ			0	12576	12	15	12
8	Mother of Mercy Hospital	UHC	Private			15	Under Chilanga	N/A	N/A	3
9	Zambia Army Appollo	RHC	Private(Zambia Army)			0	Under Kazimva	N/A	N/A	100
10	Mt Eugenia	Level 1 Hospital	ZAF			24	Uses District popn	N/A	N/A	80
11	ZNS-BB	RHC	ZNS			0	Under Kazimva	N/A	N/A	60
12	ZNS-LDB	HP	ZNS			0	Under Mt Makulu	N/A	N/A	67
13	ZNS Safari	HP	ZNS			0	Under Kazimva	N/A	N/A	35
14	ZNS Sopelo	RHC	ZNS			0	Under Kazimva	N/A	N/A	90
15	Larfage	HP	Private			0	Under Chilanga	N/A	N/A	8
16	Neri	HP	Private			0	Under Mt Makulu	N/A	N/A	23
17	Rafidin	HP	Private			0	Under Kazimva	N/A	N/A	41

18	Koinonia	HP	Private			0	Under Kazimva	N/A	N/A	34
19	Human Service Trust Hospital	Level 1 Hospital	Private			0	Uses District Popn	N/A	N/A	29
20	Chifwena	RHC	GRZ			0	Not Yet Operation	N/A	N/A	No Data
21	Nakachenje	RHC	GRZ			0	Not Yet Operation	N/A	N/A	No Data
22	Munyeu	HP	GRZ			0	Not Yet Operation	N/A	N/A	No Data

Note: **GRZ**-Government of the Republic of Zambia **RHC**-Rural Health Centre **HP**-Health Post

Source: Ministry Of Health-Zambia

Table 9: Key Services Offered by the Health Facilities

No.	Facility Name	Whether or not the health facility offers the following health services (Y = Yes; N=No)											
		HCT	PMCTC	MC	Delivery Site	TB Diagnostic Site	EMOC Site	Lab	Dental	X-Ray	CD4 Machine	Theater	MWS
1	Chilanga	Y	Y	N	Y	N	Y	N	N	N	N	N	N
2	Kazimva	Y	Y	N	Y	Y	N	N	N	N	N	N	N
3	Kris Katumba	Y	Y	N	N	N	N	N	N	N	N	N	N
4	Mt Makulu	Y	Y	Y	N	N	N	Y	N	N	N	N	Y
5	Mwembeshi	Y	Y	Y	Y	N	Y	Y	N	N	N	N	Y

HCT=HIV Counselling & Testing, **PMTCT**=Prevention of Mother to Child Transmission, **MC**= Male Circumcision, **EMOC**= Emergency Obstertric Care, **MWS**= Mother Waiting Shelter

Source: Ministry Of Health-Zambia

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

The prevalence of HIV/AIDS and STIs in the project area is high according to the statistics from the various health centers. Various HIV/AIDS and STIs programmes, such as Home Based Care, have been initiated by the Government and some NGOs.

Voluntary Counseling and Testing (VCT) and Anti-Retroviral Therapy (ART) services are provided. Refer to Table 10 for statistics on HIV/AIDS in the project area.

Table 10: HIV/AIDS Statistics in Lusaka Province

Indicator	Target	Current data
HIV prevalence rate (%)	<15.6	20.8
Proportion of 15-24 year old females with comprehensive, correct knowledge of HIV (%)		41.4

Proportion of 15-24 year old males with comprehensive, correct knowledge of HIV (%)		41.2
Ratio of school attendance of orphans and vulnerable children (10-14) years old	1	0.80
Malaria cases per 1000 population	≤255	185
Malaria fatality rate per 1000 population	11	32
Households with insecticide treated nets (%)		49.9

Source: UNDP Millennium development Goals, Provincial Profile, Lusaka Province 2013

The HIV prevalence rate in the province is estimated at 20.8%. Of those 21.3% (97,111) are on antiretroviral treatment. Additionally, the total number of people who know their HIV status increased from 146,695 in 2009 to 195,138 in 2010 representing an increase of 33%. Currently, the province has a total of 97 health facilities providing antiretroviral services to adult and children who are on treatment.

6.20 Education

Primary and secondary education institutions are found in the project area but they are however not sufficient to meet the needs of the populace. Schools include Baobab College, Kasamu, Lusaka West, Parklands, Rosebank, Kalundu and Makeni. No tertiary institutions exist and therefore such facilities are sought outside the project area.

6.21 Employment

The project area offers a wide range of economic activities offering employment to various occupational groups. The Formal Sector is responsible for employment of about less than 35 % of the population in the project area while the informal sector is responsible for employment of approximately 65 % (see table 11 below). Activities in the formal sector include the following; mining, real estate, hospitality, manufacturing, electricity services, agriculture and fisheries. While the informal sector employment activities include arts and entertainment, households as employers, trade, wholesale and retail distribution and transportation.

Table 11: Employment

FORMAL SECTOR		**INFORMAL SECTOR**	
Number	**Percentage**	**Number**	**Percentage**
326,263	34.3	624,512	65.7

Source: CSO, Labour Force Survey, 2012

6.22 Recreation

Recreation amenities in the project area include sports, national parks, game ranches, theme parks, restaurants, and night clubs. In the outskirts of the project area, recreation is provided through localized celebrations, games (especially football), and other ceremonies.

6.23 Infrastructure

Following the Government pronouncement of the creation of Chilanga as a district in 2011, numerous infrastructure development in various sectors have been planned such as the creation of health and education facilities, district administrative offices, roads, water and sanitation and energy. These plans are aimed 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 are met.

6.24 Cultural, Archaeological and Historical Environment

In order to ascertain the heritage resources present in the project area, the National Heritage Conservation Commission (NHCC) Register and the local people were consulted. The proposed transmission line does not traverse any sites declared as national monuments. Preliminary on-site consultations with local communities revealed that no PCR exist in the servitude of the proposed transmission line.

6.25 Tourism

The project area has limited tourist attractions which include Lusaka National Park, Mundawanga Botanical Gardens and Lilayi Game Reserve.

6.26 Transport and Communication

The project area is connected to two major trunk roads; Kafue and Mumbwa roads. Mumbwa and Kafue Roads connect to the west and south of the City Centre of Lusaka respectively.

The railway line passing through the project area provides a gateway to the Copperbelt, Northern and Southern provinces, and on to the Democratic Republic of Congo and Tanzania.

There are various telecommunications service providers, providing a wide range of digital and analogue solutions. Among them are Zamtel, MTN and Airtel, Vodafone, ZNBC, Muvi TV, Coppernet Solutions, Micro link Technologies and UUNET to mention but a few.

7.0 IDENTIFICATION OF IMPACTS

7.1 Physical Environment

The proposed project construction activities will result in some impacts on the physical environment as outlined in this section.

7.1.1 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. However, this impact is minimal or negligent.

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

7.1.2 Topography

The gentle undulating topography of the project area provides a favorable working condition. Therefore, there is no significant leveling that will be required other than in a few isolated places. The digging of burrow pits for sourcing building material such as sand and aggregate may have an adverse impact on the general land scape defining the topography of the study area.

Type of Impact: This is a negative, medium term, indirect, irreversible impact of negligible significance

7.1.3 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 line.

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

7.1.4 Vegetation Clearing and Climate

The project will entail clearing of natural vegetation in the Greenfield portion from LSMFEZ through to the National Park up to s aignificant portion of Miller's farm. These are Greenfield areas that are not built up and have remained undeveloped for a longer period of time. This impact is significant in as far as loss of vegetation cover is concerned.

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

7.1.5 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.

7.1.6 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, medium term, direct, impact of minor significance

7.1.7 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, medium term impact of minor 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 minor significance

7.1.8 Global Warming

As indicated by the IFC's Environmental, Health, and Safety Guidelines for Electric Power Transmission and Distribution systems, there are certain hazardous chemicals used in these systems that may contribute to global warming. One of these chemicals is Sulphur Hexafluoride (SF6), which is used as a gas insulator for electrical switching equipment and in cables, tubular transmission lines, and transformers. SF6 may be used as an alternative to insulating oils. However, SF6 is a greenhouse gas with a significantly higher global warming potential than CO_2. Should this chemical leak from electrical switching equipment, it would contribute to global warming.

Vacuum circuit breakers can be used as an alternative to SF6 in low voltage applications (11 kV and 33 kV). However, no alternative is available in high voltage (132kV and higher) applications.

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

7.2 Biological Environment

7.2.1 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 in the outskirts of the City. Further, no species of terrestrial fauna and avifauna that are rare or endangered were found in the project area. However, the line will traverse the Lusaka National Park threatening the habitat and species biodiversity.

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

7.2.2 Flora

Due to the 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. However, in the Greenfield segment, from LSMFEZ to Chilanga via Chawama, there will be additional 32m wayleave to the existing one. Cumulatively, it is anticipated developments around the LSMFEZ, a 132kv line in the National Park and an additional 132kv line will impact on the state of the national park in Long term.

Type of Impact: This is a negative, direct, long term, irreversible impact of medium significance. This is because, the area where the 132kv lines are to be located are on the edge of the National Park and not the breeding grounds for animals. Further, the cutting of tall trees and maintaining the grass would provide the necessary folder for the animals that move to the edge of the national park.

7.2.3 Protected Areas

Creation of the wayleave in the Lusaka National Park will result in the reduction in biomass, loss of habitat and species diversity, poaching and soil erosion.

Type of Impact: Negative, direct, long term, irreversible impact of moderate significance.

According to the screening procedures in the EIB Environmental and Social Handbook (version 9, 2013), Volume II: EIB Environmental Practices and Procedures, Degradation of Ecosystems and Loss of Habitats, section 177 (Table 10) and 202 (Box 1 below) respectively, these impacts on the Biological environment were arrived at on the basis that all key questions relating to the screening stage had a positive response. This coupled with expert judgment and the fact that the project will traverse two protected areas and therefore, generally raises significant biodiversity issues. Hence, a biodiversity assessment is required.

Box 1: When is a Biodiversity Assessment Required?

202. A project that requires an ESIA will de facto require a biodiversity assessment. However, an activity not requiring an ESIA but involving construction works or an intervention in the natural environment may still require a separate biodiversity assessment. The requirements detailed in the Section General Principles apply to all types of investments, including Framework and Global Loans.

However, certain types of projects do not, in general raise nature conservation issues and, therefore do not require a biodiversity assessment:

- Certain types of investments in urban areas (e.g. civil works in appropriately zoned locations);
- Investments in moveable assets, e.g. train sets, computers, etc.; and,
- Investments involving rehabilitation of existing fixed assets.

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Main concerns related to:	**Key questions that could be asked at the screening stage of the ESIA**
Degradation of ecosystem services (including impact on processes important for creating and / or maintaining ecosystems)	• Will the proposed operation directly or indirectly lead to serious damage or total loss of ecosystem or land-use type, thus leading to a loss of Ecosystem services? Will it affect the exploitation of ecosystems or land-use type so that the exploitation becomes destructive or unsustainable? **Yes. Line shall traverse Lusaka National Park and Lilayi Game Reserve** • Will the proposed operation damage ecosystem processes and services, particularly those on which local communities rely? **Yes** • Is the operation in any way dependent on ecosystem services? **No** • Can increased supply of ecosystem services contribute to the operation's objectives? **No** • Will the proposed operation result in emissions, effluents, and/or other means of chemical, radiation, thermal or noise emissions in areas providing key ecosystem services? **Yes** As regards processes important for creating and/or maintaining ecosystems: • Will the proposed operation change the food chain and interactions that shape the flow of energy and the distribution of biomass within the ecosystem? **Yes** • Will the proposed operation result in significant

	changes to water level, quantity, quality, and or the environmental flow? **No. There is no water body in the proximity of the project area** • Will the proposed operation result in significant changes to air quality or pollution? **No. No significant impacts are anticipated arising from project activities**
Loss and degradation of habitats (including the Natura 2000 network, habitat fragmentation and isolation)	• Will the operation lead to damage or loss of protected habitats or habitats of protected species? If so, what is the scale and character of damage? Can this damage be minimised? **Yes. This shall be limited to the footprint of the wayleave. Damage will be minimized through controlled vegetation clearance.** • If habitats are lost or altered, are there alternatives available to support the species populations concerned? **Yes.** • Will the proposed operation adversely affect any of the following: protected areas; threatened ecosystems outside protected areas; migration corridors identified as being important for ecological or evolutionary processes; areas known to provide important ecosystem services; or areas known to be habitats for threatened species or priority areas for conservation? **Yes** • Will the proposed operation involve creating linear infrastructure and lead to habitat fragmentation in areas providing key and other relevant ecosystem services or create barriers to movement of fauna? **Yes** • How seriously will this affect habitats and corridors, considering that they can also be adversely affected by climate change? **Impact is significant and will be managed through controlled vegetation clearance.** • Is the habitat traditionally used by local communities for natural goods or services? **No.** • Are there opportunities to establish or further develop green infrastructure as a part of the operation to support the operation's non-environmental and environmental goals (e.g. adaptation to climate change or increasing connectivity of protected sites)? **Yes. Minimize**

	the use of SF_6 in the electrical equipment
Loss of species diversity (including species protected under the Habitats Directive and the Birds Directive)	• Will the proposed operation have direct or indirect negative impact on the species of Community interest listed in Annex II and/or Annex IV or V, in particular, priority species from Annex II of the Habitats Directive or on the species covered by the Birds Directive? **No** • Will the proposed operation have direct or indirect negative impact on species listed in the IUCN Red Lists of Threatened Species and Ecosystems, the OSPAR List of threatened and Declining Species or the host country national red lists? **No** • Will the proposed operation cause a direct or indirect loss of a population of a species identified as priority in National Biodiversity Strategies and Action Plans (NBSAPs) and/or other sub-national biodiversity plans? **No** • Will the proposed operation alter the species-richness or species composition of habitats in the project footprint and area of influence? **Yes.** • Will the proposed operation affect sustainable use of a population of a species? **No significant impact is anticipated as the project works will be limited to the footprint of the wayleave** • Will the proposed operation surpass the maximum sustainable yield, the carrying capacity of a habitat/ecosystem or the maximum allowable disturbance level of populations, or ecosystem? **No** • Will the proposed operation increase the risk of invasion by alien species? **No**
Loss of genetic diversity	Will the proposed operation result in the extinction of a population of a particularly rare species, declining species or a species identified as one of Community interest or national interest, in particular of priority species from Annex II of the Habitats Directive, IUCN and OSPAR lists? **No** • Will the proposed operation result in the extinction of a population of a particularly rare species, declining species or those identified as

	priorities in NBSAPs and/or sub-national biodiversity plans? **No** • Will the proposed operation result in the fragmentation of an existing population leading to (genetic) isolation? **No**

7.3 Socio-Economic Impacts

7.3.1 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. 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 moderate significance

The project will involve involuntary resettlement, affecting approximately 100 households/firms, during the acquisition of land for wayleaves and substations. However, a Resettlement and Compensation Action Plan (RCAP) shall be prepared to provide: statistics of PAPs; affected properties and/or livelihood sources, compensation entitlement; and a mechanism for redress.

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

7.3.2 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 major 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, irreversible impact of major significance

7.3.3 Land Tenure

The existing land tenure system will not be disturbed for wayleave acquired. However, sites acquired for substations in customary land will necessitate the change of land tenure system to state.

Type of Impact: negative, direct, long term, irreversible impact of moderate significance.

7.3.4 Land Use

Land use in the acquired wayleave will be restricted for safety and integrity of the infrastructure. There shall be no structures (buildings) in the power line wayleave and farming will be restricted to low lying crops.

Type of Impact: negative, direct, long term, irreversible impact of moderate significance.

7.3.5 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, irreversible impact of moderate significance

7.3.6 Occupational Health and Safety

Most occupational health and safety issues during the construction, operation, maintenance and decommissioning of the transmission line 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, long term, irreversible impact of minor significance

7.3.7 Community Health and Safety

Community health and safety impacts arising from the Project 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, medium term, reversible impact of moderate significance

The operation of the transmission line may generate the following specific impacts:

- Electrocution
- Visual amenity
- Noise

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

7.3.8 Water and Sanitation

There will be enhancement of water and sanitation services such as automated boreholes and waterborne toilets for improved health.

Type of Impact: This is a positive, indirect, long term, irreversible impact of major significance

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, reversible impact of minor significance

7.3.9 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, irreversible impact of major significance

7.3.10 Tourism

The proposed project will increase electricity availability to support hospitality industries and tourism activities in and around the project area.

Type of Impact: This is a positive, direct, long term, irreversible impact of major significance

The line will traverse Lusaka National Park causing visual intrusion, destruction of the habitat and loss of biodiversity.

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

7.3.11 Transport and Communication

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

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

7.3.12 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, irreversible impact of major significance

7.3.13 Physical Cultural Resources

As indicated in Section 5.3.14 of the baseline study there are no known PCRs in the Project area and as such, no impacts on PCRs are anticipated. Nevertheless, this EIS includes "chance finds" procedures for any PCRs that may be in the project area.

7.3.14 Vulnerable and Disadvantaged People

The assessment of socio-economic impacts in this report provides an overview of impacts on the general population. However, vulnerable and disadvantaged people are likely to be displaced to facilitate implementation of the project. For specific assessments of the impacts on vulnerable and disadvantaged people, please refer to the Resettlement and Compensation Action Plan (RCAP) developed for the Waterworks – LS-MFEZ-Chawama - Chilanga -Lusaka West Substation RCAP.

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

8.0 EVALUATION OF SIGNIFICANCE OF IMPACTS

8.1 Method of Assessing the Significance of Potential Environmental Impacts

The assessment of the significance of impacts for a proposed development is by its nature, a matter of judgement. To deal with the uncertainty associated with judgement and ensure repeatable results, rating of impacts should consider a standardised and internationally recognised methodology adhering to ISO 14001, EIB and World Bank/IFC requirements.

For each predicted impact, criteria are applied to establish the **significance** of the impact based on likelihood and consequence without mitigation being applied, after which the most effective mitigation measures are put in place.

The criteria that contribute to the **consequence** of the impact are **intensity** (the degree to which pre-development conditions are changed), which also includes the **type** of impact (being either a positive or negative impact); the **duration** (length of time that the impact will continue); and the **extent** (spatial scale) of the impact. The sensitivity of the receiving environment and/or sensitive receptors is incorporated into the consideration of consequence by appropriately adjusting the thresholds or scales of the intensity, duration and extent criteria, based on expert knowledge. For each impact, the specialist applies professional judgement to ascribe a numerical rating for each criterion**Error! Reference source not found.** The consequence is then established using the formula:

Consequence = type x (intensity + duration + extent)

Depending on the numerical result, the impact's consequence would be defined as either extremely, highly, moderately or slightly detrimental; or neutral; or slightly, moderately, highly or extremely beneficial. These categories are provided in Table 17.

To determine the significance of an impact, the **probability** (or likelihood) of that impact occurring is also taken into account. In assigning probability, likelihood of occurrence is considered but also taking cognisance of uncertainty and detectability of the impact. The most suitable numerical rating for probability is selected from Table 16 below and applied with the consequence according to the following equation:

Significance = consequence x probability

Assigning of **probability** takes into account the **frequency and confidence,** as defined below:

Probability refers to the likelihood that an impact will occur.

Frequency refers to the regularity with which an impact occurs.

Confidence (see **Error! Reference source not found.** 19) refers to the degree of certainty of a prediction.

Confidence may be related to any of the impact assessment criteria (extent, intensity, duration or probability) and is not necessarily only related to probability. Confidence may be influenced by any factors that introduce uncertainty into a prediction.

Depending on the numerical result of this calculation, the impact would fall into a significance category of negligible, minor, moderate or major, and the type would be either positive or negative. Examples of these categories are provided in Table 18.

Once the significance of an impact occurring without mitigation has been established, professional judgment must be used to assign ratings for the same impact after the proposed mitigation has been implemented.

The tables below show the scales used to classify the above variables, and define each of the rating categories.

Table 13: Definition of Intensity Ratings

Rating	Criteria	
	Negative impacts (Type of impact = -1)	**Positive impacts** (Type of impact = +1)
7	Complete destruction (irreversible and irreplaceable loss) of natural or social systems, resources (e.g. species) and human health. No chance of these processes or resources ever being restored to their pre-impact condition.	Noticeable, sustainable benefits that improve the quality and extent of natural or social system or resources, including formal protection.

6	Very high degree of damage to natural or social systems or resources. These processes or resources may restore to their pre-project condition over very long periods of time (more than a typical human life time).	Great improvement to ecosystem or social processes and services or resources.
5	Serious damage to components of natural or social systems or resources and the contravention of legislated standards.	On-going and widespread benefits to natural or social systems or resources.
4	High degree damage to natural or social system components, species or resources.	Average to intense positive benefits for natural or social systems or resources.
3	Moderate damage to natural or social system components, species or resources.	Average, on-going positive benefits for natural or social systems or resources.
2	Minor damage to natural or social system components, species or resources. Likely to recover over time. Ecosystems and valuable social processes not affected.	Low positive impacts on natural or social systems or resources.
1	Negligible damage to individual components of natural or social systems or resources, such that it is hardly noticeable.	Limited low-level benefits to natural or social systems or resources.

Table 14: Definition of Duration Ratings

Rating	Criteria
7	**Permanent:** The impact will remain indefinitely.
6	**Beyond project life**: The impact will remain for some time after the life of the project.
5	**Project life:** The impact will cease after the operational life span of the project
4	**Long-term**: The impact will continue for 6-15 years.
3	**Medium-term:** The impact will continue for 2-5 years.
2	**Short-term:** The impact will continue for between 1 month and 2 years.
1	**Immediate**: The impact will continue for less than 1 month.

Table 15: Definition of Extent Ratings

Rating	Criteria
7	**International:** The effect will occur across international borders.
6	**National:** The impact will affect the entire country.
5	**Province/ Region:** The impact will affect the entire province or region
4	**Municipal Area:** The impact will affect the whole municipal area.
3	**Local:** The impact will extend across the site and to nearby properties.
2	**Limited:** The impact will be limited to the site.
1	**Very limited:** The impact will be limited to the footprint of the development and will not extend to the boundaries of the site.

Table 16: Definition of Probability Ratings

Rating	Criteria
7	**Certain/ Definite:** There are sound scientific reasons to expect that the impact will definitely occur.
6	**Almost certain/Highly probable:** It is most likely that the impact will occur.
5	**Likely:** This impact has occurred numerous times here or elsewhere in a similar environment and with a similar type of development and could very conceivably occur.
4	**Probable:** This impact has occurred here or elsewhere in a similar environment and with a similar type of development and could conceivably occur.
3	**Unlikely:** This impact has not happened yet but could happen.
2	**Rare/ improbable:** The impact is conceivable, but only in extreme circumstances. The possibility of the impact manifesting is very low as a result of design, experience or implementation of adequate mitigation measures.
1	**Highly unlikely/None:** The impact is expected never to happen or has a very low chance of occurring.

Table 17: Application of Consequence Ratings

Range		Significance rating
-21	-18	Extremely detrimental
-17	-14	Highly detrimental
-13	-10	Moderately detrimental
-9	-6	Slightly detrimental
-5	5	Negligible
6	9	Slightly beneficial
10	13	Moderately beneficial
14	17	Highly beneficial
18	21	Extremely beneficial

Table 18: Application of Significance Ratings

Range		Significance rating
-147	-109	Major - negative
-108	-73	Moderate - negative
-72	-36	Minor - negative
-35	-1	Negligible - negative
0	0	Neutral
1	35	Negligible - positive
36	72	Minor - positive
73	108	Moderate - positive
109	147	Major - positive

Despite attempts at ensuring objectivity and impartiality, environmental assessment remains an act of judgement and can never escape the subjectivity inherent in attempting to define significance. The determination of the significance of an impact depends on context (spatial and duration) and intensity of that impact. Since the rationalisation of context and intensity will ultimately be subject to prejudice, there can be no wholly objective measure by which to judge the components of significance, let alone how they are integrated into a single comparable measure.

Although these measures may not totally eliminate subjectivity, they provide an explicit context within which to review the assessment of impacts.

The specialists appointed to contribute to this impact assessment have empirical knowledge of their respective fields and are thus able to comment on the confidence they have in their findings based on the availability of data and the certainty of their findings.

Table 19: Definition of Confidence Ratings

Rating	Criteria
Low	Judgement is based on intuition and there some major assumptions used in assessing the impact may prove to be untrue.
Medium	Determination is based on common sense and general knowledge. The assumptions made, whilst having a degree of uncertainty, are fairly robust.
High	Substantive supportive data or evidence exists to verify the assessment.

Table 20: Evaluation of Significance of Impacts

ASPECT/ISSUE	POTENTIAL IMPACT	TYPE (POSITIVE/ NEGATIVE)	DURATION	INTENSITY	EXTENT (SPACIAL SCALE)	CONSEQUENCE	PROBABILILITY	SIGNIFICANCE
PHYSICAL ENVIRONMENT								
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 (-1)	Short term (2)	(3)	Local (3)	-8 (Slightly detrimental)	6	-48 (Minor Negative)
Topography	Change in topography from excavation and construction.	Negative (-1)	Medium term (3)	2	Limited (2)	-7 (Slightly detrimental)	4	-28 (Neglible Negative)
Soils	Excavation in places where the mono steel poles will be erected will upset the soil layout	Negative (-1)	short term (2)	2	Very Limited (1)	-5 (Negligible)	6	-30 Negligible Negative)
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 (-1)	Medium-term (3)	3	Local (3)	-9 (Slightly detrimental)	6	-54 (Minor Negative)
Noise	Noise pollution will arise from blasting, heavy duty construction equipment that shall be used in the stringing	Negative (-1)	Medium-term (3)	2	Local (3)	-8 (Slightly detrimental	6	-48 (Minor Negative)

	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							
	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 (-1)	Project Life (5)	1	Very Limited (1)	-7 (Slightly detrimental)	5	-35 (Negligible Negative)
Contribution to global warming	Use of SF6 in electrical equipment contributes to global warming if it leaks from equipment.	Negative (-1)	Project Life (5)	6	Internati onal (7)	-18 (extremely detrimental)	4	-72 (Minor Negative)
BIOLOGICAL ENVIRONMENT								
Terrestrial Fauna and Birds	Reduction on the population, habitat or biodiversity will be low. the ROW traverses land and property used as animal	Negative (-1)	Project Life (5)	4	Limited (2)	-11 (Moderately detrimental)	7	-77 (Moderate Negative)

	sanctuary or wildlife reserves							
Flora	Loss of vegetation (biomass) and biodiversity in creation of the ROW	Negative (-1)	Beyond Project Life (6)	(3)	Very Limited (1)	-10 (Moderately detrimental)	7	-70 (Minor Negative)
SOCIO - ECONOMIC ENVIRONMENT								
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 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 Proposed 132 kV Green field transmission line. 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	Negative (-1)	Short term(2)	(4)	National (6)	- 12 (moderately detrimental)	7	-84 (Moderate Negative)

	of the construction activities							
Land Tenure and Land Use	Utilization of the land within the wayleave will be restricted during the construction and operational phases. 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 (-1)	Project Life (5)	(4)	Local(3)	-12 (moderately detrimental)	7	-84 (Moderate Negative)
Local Economy	Increased investment and development of various sectors due to availability of power.	Positive (+1)	Beyond Project Life (6)	(7)	Province /Region (5)	+18 (Extremely beneficial)	7	+126 (Major Positive)
	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 (+1)	Project Life(5)	5	Internati onal (7)	+17 (Highly beneficial)	7	+119 (Major Positive)
Water and Sanitation	Development of water and sanitation services such as	Positive (+1)	Project Life (5)	7	Province/ Region(5	+17 (Highly beneficial)	6	+102 (Major Positive)

	building of automated boreholes that will supply the needed improved reliable water thereby providing better health.				)			
	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 (-1)	Short Term (2)	4	Local(3)	-9 (Slightly detrimental)	7	-63 (Minor Negative)
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 (-1)	Medium term (3)	(4)	Local(3)	-10 (Moderately detrimental)	6	-60 (Minor Negative)
Community Health and Safety	During construction phase, impacts will include, dust, noise, and vibration from construction vehicle transit, and communicable diseases such as HIV/AIDS and STIs associated with the influx of temporary construction	Negative (-1)	Medium term (3)	4	Province/ Region(5)	-12 (Moderately detrimental)	7	-84 (Moderate Negative)

	labour							
	The operation of the proposed Transmission Line may generate the following specific impacts: electrocution; electromagnetic interference; visual amenity; noise and ozone; and aircraft navigation safety.	Negative (-1)	Project life (5)	(5)	Limited(2)	-12 (Moderately detrimental)	4	-48 (Minor Negative)
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 (+1)	Project life (5)	(6)	Province/ region(5)	+16 (Highly beneficial)	5	+80 (Moderate Positive)
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 (-1)	Medium term (3)	(2)	Province / Region(5)	-10 (Moderately detrimental)	4	-40 (Minor Negative)
Involuntary Resettlement	Displacement and/or resettlement arising from project development and loss of livelihood	Negative (-1)	Permanent (7)	5	Limited (2)	-14 (highly detrimental)	6	-84 (Moderate Negative)
Vulnerable and disadvantaged groups	Greater risk of further impoverishment because of displacement and/or resettlement	Negative (-1)	Permanent (7)	5	Limited (2)	-14 (highly detrimental)	6	-84 (Moderate Negative)

Table 21: Key for Description of Impact Significance

IMPACT RATING	DESCRIPTION
Minor/ Negligible	An insignificant amount of negative impact, but requiring some mitigation; or positive impact requiring some attention to enhance it.
Moderate	A level of negative or positive impact with moderate significance that will either require mitigation or enhancement respectively
Major	A high level of adverse impact, of major significance and requiring intensive mitigation, without which authorities would reject implementation of the project; or A high level of positive impact that must prompt the project to be undertaken with enhancement measures.

9.0 PROPOSED MITIGATION MEASURES

9.1 Physical Environment

There are some anticipated negative impacts to be mitigated on the geology, soil, air quality, and, hydrology aspects of the project. To minimise the negative impacts, and enhance the positive impacts, the following mitigation measures have been recommended.

9.1.1 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.

9.1.2 Topography

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

9.1.3 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.

9.1.4 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.

9.1.5 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.

9.1.6 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.

9.1.7 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.

9.1.8 Global Warming

The project's technical specifications for electrical equipment, requires vacuum breakers instead of SF6 in all 11kV and 33kV equipment. Unfortunately no similar mitigation is possible for 132kV equipment. Mitigation for 132kV equipment entails a strict maintenance regime to ensure that no leakage occurs, as well as pressure gauges to monitor for possible leakages.

9.2 Biological Environment

9.2.1 Fauna

The area has significant biodiversity and population in terms of medium-sized and large mammals and reptiles. Awareness campaigns shall be conducted to all construction workers on the importance of conservation of wildlife. This shall be done in collaboration with the National Parks and Wildlife Services Department. Furthermore, other conservation strategies shall be supported and enhanced.

9.2.1.1 Birds and Bats

Where practical and feasible, the following mitigation measures should be applied to protect birds and bats against impacts of power lines:

- Align transmission corridors to avoid critical habitats (e.g. nesting grounds, bat foraging corridors, and migration corridors);
- Maintain 1.5 meter (60-inch) spacing between energized components and grounded hardware or, where spacing is not feasible, covering energized parts and hardware; and
- Install visibility enhancement objects such as marker balls, bird deterrents, or diverters in areas frequented by birds, especially large birds of prey.

9.2.2 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.

9.2.2.1 Vegetation Management

The project area consists of built-up commercial and residential areas, including farmland, and contains some natural vegetation cover. However, where the activities affect such vegetation, the Contractor shall ensure that all work is undertaken in a manner that minimizes the impacts, 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;
- No tree outside the area of works shall be burned for any purpose;
- Implement an integrated vegetation management approach (IVM). The selective removal of tall-growing tree species and the encouragement of low-growing grasses and shrubs is the common approach to vegetation management in transmission line rights-of-way. Alternative vegetation management techniques should be selected based on environmental and site considerations including potential impacts to non-target, endangered and threatened species;
- Remove invasive plant species, whenever possible, cultivating native plant species;
- Schedule activities to avoid breeding and nesting seasons for any critically endangered or endangered wildlife species;
- Observe manufacturer machinery and equipment guidelines, procedures with regard to noise, and oil spill prevention and emergency response;
- Avoid clearing in riparian areas;
- Avoid use of machinery in the vicinity of watercourses.

Where practical and feasible, apply the following measures for management of vegetation to minimise pesticide use:

- Provide those responsible for deciding on pesticides application with training in pest identification, weed identification, and field scouting;
- Use mechanical weed control and / or thermal weeding;
- Support and use beneficial organisms, such as insects, birds, mites, and microbial agents, to perform biological control of pests;
- Protect natural enemies of pests by providing a favourable habitat, such as bushes for nesting sites and other original vegetation that can house pest predators;
- Use animals to graze areas and manage plant coverage;
- Use mechanical controls such as traps, barriers, light, and sound to kill, relocate, or repel pests.

9.2.2.2 Pesticide Use

Where practical and feasible, apply the following mitigation measures to the use of pesticides:

- Train personnel to apply pesticides and ensure that personnel have received applicable certifications or equivalent training where such certifications are not required;

- Review the manufacturer's directions on maximum recommended dosage or treatment, as well as published reports on using the reduced rate of pesticide application without loss of effect, and apply the minimum effective dose;
- Apply pesticides based on criteria (e.g. field observations, weather data, time of treatment, and dosage) and maintain a pesticide logbook to record such information;
- Avoid the use of pesticides that fall under the World Health Organization Recommended Classification of Pesticides by Hazard Classes 1a and 1b;
- Avoid the use of pesticides that fall under the World Health Organization Recommended Classification of Pesticides by Hazard Class II if the project host country lacks restrictions on distribution and use of these chemicals, or if they are likely to be accessible to personnel without proper training, equipment, and facilities to handle, store, apply, and dispose of these products properly;
- Avoid the use of pesticides listed in Annexes A and B of the Stockholm Convention, except under the conditions noted in the Convention;
- Use only pesticides that are manufactured under license and registered and approved by the appropriate authority and in accordance with the Food and Agriculture Organization's (FAO) International Code of Conduct on the Distribution and Use of Pesticides;
- Use only pesticides that are labelled in accordance with international standards and norms, such as the FAO Revised Guidelines for Good Labelling Practice for Pesticides;
- Select application technologies and practices designed to reduce unintentional drift or runoff only as indicated in an Integrated Pest Management (IPM) program, and under controlled conditions;
- Maintain and calibrate pesticide application equipment in accordance with manufacturer's recommendations; and
- Establish untreated buffer zones or strips along water sources, rivers, streams, ponds, lakes, and ditches to help protect water resources.

Vegetation clearance during annual wayleave maintenance shall be limited to the 32 meter swath as prescribed by the ZESCO wayleave guidelines.

9.3 Socio - Economic

9.3.1 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 RCAP for the Project. Furthermore, vulnerable and disadvantaged PAPs shall be provided with additional resettlement assistance as may be deemed necessary.
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.

9.3.2 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.

9.3.3 Land Tenure

The project area is state, private and traditional owned land. On the state and private owned land, wayleave consents shall be acquired from the owners to allow ZESCO pass the line through their properties.

9.3.4 Land Use

Where acquisition of land will be required, land acquisition process shall be followed and adequate compensation shall be given as prescribed in the RCAP to be developed, pursuant to the provisions of the Lands and Lands Acquisition Act and the Urban and Regional Planning Act.

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 will be permitted. To ensure the safety of the infrastructure and the public, the wayleave shall be cleared annually.

9.3.5 Agriculture

Line route selection in farming areas shall be conducted in consultation with property owners to minimize the impacts on agricultural activities. Additionally, growing of low lying crops such as groundnuts, beans, sweet potatoes and maize in the wayleave under rain fed agriculture will be permitted.

Construction shall commence preferably after harvest, however, all crops and fruit/exotic trees destroyed shall be adequately compensated for.

9.3.6 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.

9.3.7 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 Project 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 cancelling acoustic devices should be considered as necessary to minimise noise.

9.3.8 Water and Sanitation

Portable toilets shall be provided 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.

9.3.9 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 a speed humps shall be put in place to minimize road incidents.

9.3.10 Physical and Cultural Resources

A Chance Find Management Plan (Appendix 4) has been developed to provide a procedure for dealing with any opportunistic physical resources finds during implementation of the proposed project.

Table 22: Measure of Significance of Impacts Post Mitigation

Aspect	Impact	Mitigation Measure	TYPE (POSITIVE/NEGATIVE)	DURATION	INTENSITY	EXTENT (SPACIAL SCALE)	CONSEQUENCE	PROBABILILITY	SIGNIFICANCE
PHYSICAL ENVIRONMENT									
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	Negative (-1)	Short term (2)	1	Very Limited (1)	-4 (Negligible)	2	-8 (Negligible Negative)
	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; and speed limits imposed;	Negative (-1)	Medium-term (3)	1	Very Limited (1)	-5 (Negligible)	2	-10 (Negligible Negative)

Aspect	Impact	Mitigation Measure	TYPE (POSITIVE/NEGATIVE)	DURATION	INTENSITY	EXTENT (SPACIAL SCALE)	CONSEQUENCE	PROBABILILITY	SIGNIFICANCE
		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.	Negative (-1)	Medium-term (3)	1	2 (Limited)	-6 (slightly detrimental)	2	-12 (Negligible Negative)
Contribution to global warming	Use of SF6 in electrical equipment contributes to	The project's technical specifications for electrical	Negative (-1)	Project Life (5)	1	3 (Local)	-9 (slightly detrimental)	2	-18 (Negligible negative)

Aspect	Impact	Mitigation Measure	TYPE (POSITIVE/NEGATIVE)	DURATION	INTENSITY	EXTENT (SPACIAL SCALE)	CONSEQUENCE	PROBABILILITY	SIGNIFICANCE
	global warming if it leaks from equipment.	equipment, requires vacuum breakers instead of SF6 in all 11kV and 33kV equipment. Unfortunately no similar mitigation is possible for 132kV equipment. Mitigation for 132kV equipment entails a strict maintenance regime to ensure that no leakage occurs, as well as pressure gauges to monitor for possible leakages.							
BIOLOGICAL ENVIRONMENT									

Aspect	Impact	Mitigation Measure	TYPE (POSITIVE/NEGATIVE)	DURATION	INTENSITY	EXTENT (SPACIAL SCALE)	CONSEQUENCE	PROBABILILITY	SIGNIFICANCE
Vegetation clearance and construction activities	Loss of habitats and biodiversity of fauna and flora.	Conservation awareness campaigns to be carried out;	Negative (-1)	Project Life (5)	2	Very Limited (1)	-8 (slightly detrimental)	4	-32 (Negligible Negative)
		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,							

Aspect	Impact	Mitigation Measure	TYPE (POSITIVE/NEGATIVE)	DURATION	INTENSITY	EXTENT (SPACIAL SCALE)	CONSEQUENCE	PROBABILILITY	SIGNIFICANCE
		and 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							
SOCIO-ECONOMIC ENVIRONMENT									
Increase in population in search of employment	Stress on social amenities	Priority for employment, unskilled and semi-skilled labour, during site preparation and construction stages shall be given to the local community,	Negative (-1)	Short term (2)	2	Municipal (4)	-8 (slightly detrimental)	2	-16 (Negligible Negative)

Aspect	Impact	Mitigation Measure	TYPE (POSITIVE/NEGATIVE)	DURATION	INTENSITY	EXTENT (SPACIAL SCALE)	CONSEQUENCE	PROBABILILITY	SIGNIFICANCE
		wherever possible. Provision of social services, including but not limited to, medical, water and sanitation							
	Spreading of communicable diseases	Conducting of health awareness talks to the workers and the community at regular intervals during project implementation. Provision of health care services and prevention strategies	Negative (-1)	Medium term (3)	2	Municipal Area (4)	-9 (Slightly detrimental)	4	-36 (Minor negative)
Site preparation, construction and operation	Provision of employment to locals	The local community shall be given priority	Positive (+1)	Project Life(5)	6	Municipal (5)	+16 (highly beneficial)	7	+112 (Major positive)

Aspect	Impact	Mitigation Measure	TYPE (POSITIVE/NEGATIVE)	DURATION	INTENSITY	EXTENT (SPACIAL SCALE)	CONSEQUENCE	PROBABILILITY	SIGNIFICANCE
activities		for employment throughout the project lifecycle							

Aspect	Impact	Mitigation Measure	TYPE (POSITIVE/NEGATIVE)	DURATION	INTENSITY	EXTENT (SPACIAL SCALE)	CONSEQUENCE	PROBABILILITY	SIGNIFICANCE
	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. Provision of personal protective equipment to all project staff and site visitors Appropriate signage and safety symbols shall be placed in respective areas to warn workers, visitors, and locals of any hazards that may exist	Negative (-1)	Project life (5)	1	Very Limited (1)	-7 (slightly detrimental)	2	-14 (negligible negative)

Aspect	Impact	Mitigation Measure	TYPE (POSITIVE/NEGATIVE)	DURATION	INTENSITY	EXTENT (SPACIAL SCALE)	CONSEQUENCE	PROBABILILITY	SIGNIFICANCE
Involuntary resettlement	Displacement and/or resettlement arising from project development and loss of livelihood	Development of a Resettlement and Compensation Action Plan (RCAP)	Negative (-1)	Short term (2)	2	Very Limited (1)	-5 (Negligible)	2	-10 (Negligible negative)
Vulnerable and disadvantaged groups	Greater risk of further impoverishment because of the implementation of the project	To be provided with additional resettlement assistance as may be deemed necessary.	Negative (-1)	Short term (2)	2	Very Limited (1)	-5 (Negligible)	2	-10 (Negligible negative)

10.0 ENVIRONMENTAL AND SOCIAL MANAGEMENT PLAN FOR THE PROJECT

Table 23: Environmental and Social Management Plan for the Project

Aspect	Impact	Mitigation Measure	Frequency of Monitoring	Time Frame	Performance Indicator	Responsible Person	Cost (US$)
PHYSICAL ENVIRONMENT							
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; and speed limits	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$)
		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 to below 80 decibels.	Contractor, Project Coordinator	100,000
Contribution to global warming	Use of SF6 in electrical equipment contributes to global warming if it leaks from equipment.	The project's technical specifications for electrical equipment requires vacuum breakers instead	Periodically, as per prescribed maintenance regime	Throughout construction and operational phases	Pressure gauge readings, with a target of zero reading.	Contractor/ZESCO operation and maintenance team	Embedded in Project and operation and maintenance Costs

Aspect	Impact	Mitigation Measure	Frequency of Monitoring	Time Frame	Performance Indicator	Responsible Person	Cost (US$)
		of SF6 in all 11kV and 33kV equipment. Unfortunately no similar mitigation is possible for 132kV equipment. Mitigation for 132kV equipment entails a strict maintenance regime to ensure that no leakage occurs, as well as pressure gauges to monitor for possible leakages.			Adherence to maintenance regime through scheduled		
Wayleave management	Potential conflicts of encroachment	Acquisition and numbering of wayleaves and acquisition of titles of substations. Scheduled wayleave	Periodically, as per prescribed in inspection schedule and maintenance regime	Throughout construction and operational phases	Level of encroachment with an anticipated target of no encroachment.	Contractor/ZESCO	Embedded in Project and operation and maintenance Costs

Aspect	Impact	Mitigation Measure	Frequency of Monitoring	Time Frame	Performance Indicator	Responsible Person	Cost (US$)
		inspection and maintenance					
BIOLOGICAL ENVIRONMENT							
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	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$)
		avoided, and 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					
SOCIO-ECONOMIC ENVIRONMENT							
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	Number of Local people employed especially as unskilled and semi-skilled labour with an anticipated engagement target of 80 percent	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	Record of communicable diseases with an anticipated reduction of	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.			disease prevalence		
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 in respective	Regular Intervals	Throughout project implementation	Appropriate signage and safety symbols placed.	Project Coordinator, Contractor	100,000

Aspect	Impact	Mitigation Measure	Frequency of Monitoring	Time Frame	Performance Indicator	Responsible Person	Cost (US$)
		areas to warn workers, visitors, and locals of any hazards that may exist					
Vulnerable and disadvantaged groups	Greater risk of further impoverishment because of the implementation of the project	To be provided with additional resettlement assistance as may be deemed necessary.	Periodically as prescribed in the transmission line RCAP	Throughout project resettlement and post resettlement, as prescribed in the RCAP	Measurement of output indicators such as, availability of shelter and replacement of infrastructure affected by the project	Project Implementation Unit	Embedded in resettlement costs
TOTAL							**850,000 + amounts embedded in Project Costs**

11.0 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 25 below.

11.1 STAKEHOLDER ENGAGEMENT METHODOLOGY

Zesco Limited recognizes that project of this nature impacts directly, indirectly, short term and long term on the well-being of the community. Therefore, the involvement of all stakeholder in long term decisions of the project cannot be overemphasized. Not only did ZESCO allow for participation, it also allowed for consultation. This allowed for stakeholders not only to have an input on all decisions but also take the responsibility of seeing to it that their concerns are adequately implemented. Prior to the meeting, ZESCO advertised atleast three times in print media and through the Zambia News and Information Services (ZANIS).

Engagement through Formal Meeting:

ZESCO organized a formal Scoping Meeting with all interested and affected parties during the scoping exercise. The Scoping Meeting considered a wider audience that included individuals and institutions that had a stake in the project, and those who were directly affected (the PAPs). During this meeting (which was held at Sandy's Creation), ZESCO had the opportunity to explain to its stakeholders in a simplified way the nature, scope, need for the project and how the project would be implemented. Further, ZESCO through its Environment and Social Analysis Unit (ESU) explained both the positive and adverse impacts of the project. Beyond this, ZESCO identified and shared the methods of enhancing the positive impacts and proposed realistic mitigations for the negative impacts. The formal meeting was moderated by the ZESCO Public Relations personnel ensuring fair opportunities were given to all to ask questions, seek clarifications, and make criticism and positive contributions.

During the meeting, ZESCO also highlighted the need for continuous process of consultation beyond project planning and implementation. All feedback from Stakeholders culminated into significant contributions for planning and implementation of this LTDRP project component.

One-on-one Engagement:

During the survey, a total of 17 PAPs whose property would be affected were identified. The PAPs were engaged on a one-on-one to inform them on the impacts of the project onto their livelihood and physical assets, come up with realistic and feasible alternatives, negotiations for the compensation packages and obtain consent for the Right of way for the Transmission Line. As proof of the engagement, consent forms were signed by the PAPs allowing ZESCO to go ahead with the Project survey and planning. The process is still ongoing and details of the

valuation of affected structures, disclosure, negotiations and compensation are given in the Resettlement and Compensation Action Plan (RCAP).

Engagement with the Government Agencies
ZESCO realizes the role of Government Institutions in the smooth implementation of the project. So far, ZESCO has had formal engagement with the Government Institutions namely: Lusaka City Council, Department of National Parks and Wildlife, Zambia Environmental Management Agency, Lusaka South Multy-Facility Economic Zone, Ministry of Lands, Energy Regulations Board and the District Agriculture Office. The
The

Table 24: Mitigation and Monitoring Budget

ACTIVITY	**IMPLEMENTING AGENCY**	**ESTIMATED COST US$**
Environmental, Health, and Safety Education Conducting environmental, health, and safety awareness campaigns to construction workers & the local community	**Ministry of Health / ZESCO** Project ECO: 1 x US$ 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
Subtotal		**8,200.00**
Natural Resources Management PCR Conservation	**National Heritage Conservation Commission (NHCC)** 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
Subtotal		**7,600.00**
Monitoring & Auditing Regular monitoring of implementation of mitigation measures	**ZESCO** 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
Subtotal		**17,000.00**
Statutory Review Fees EIA Review Fees to ZEMA	**ZESCO**	120, 000
Subtotal		**120,000.00**
Total Mitigation and Monitoring Budget		**152,800.00**
Total Cost of Mitigation Measures in ESMP		**850,000.00**
GRAND TOTAL		**1,002,800.00**

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13.0 APPENDICES

APPENDIX 1: MAP SHOWING THE PROPOSED ROUTE AND ALTERNATIVES

APPENDIX 2: STAKEHOLDER ENGAGEMENT PLAN

APPENDIX 3: MINUTES OF THE SCOPING MEETING

MINUTES OF THE SCOPING (STAKEHOLDER CONSULTATIVE) MEETING FOR THE ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT STUDY FOR THE LUSAKA TRANSMISSION AND DISTRIBUTION REHABILITATION PROJECT: CONSTRUCTION OF THE GREENFIELD WATERWORKS – CHAWAMA – CHILANGA – LUSAKA WEST 132KV TRANSMISSION LINE

DATE: THURSDAY 17TH MARCH, 2016
VENUE: SANDYS CREATION, KAFUE ROAD
TIME: 10 00 HRS

ATTENDANCE

The scoping meeting was attended by 180, and the list of attendees is attached as the appendix to these minutes

AGENDA

1. NATIONAL ANTHEM
2. OPENING PRAYER
3. WELCOME REMARKS & OFFICIAL OPENING
4. ZESCO PRESENTATION
    a. Project Presentation
    b. ESIA Process Presentation
5. QUESTION & ANSWER SESSION
6. VOTE OF THANKS
7. CLOSING PRAYER
8. NATIONAL ANTHEM

1.0 NATIONAL ANTHEM

The National Anthem was sung with the participation of all present.

2.0 PRAYER

An opening prayer was given by Mrs Elenestina Mwelwa at 10:18 hours.

3.0 OPENING REMARKS

The meeting was called to order by Mr Wilbroad Chanda, Project Manager - LTDRP, on behalf of Director Distribution and Customer Services, at 10.20 hrs. In his opening remarks, he recognized and acknowledged the presence of Her Royal Highness Senior Chieftainess Nkomeshya Mukamambo II, Government officials, representatives of various organisations and all stakeholders including the ZESCO team. He welcomed all and explained that the purpose of the scoping meeting was to engage stakeholders on the proposed development of the Greenfield Waterworks – LSMFEZ – Chawama – Chilanga –Lusaka West 132kV transmission line, an activity under the LTDRP. He urged the participants to be attentive to the presentations by ZESCO and participate actively

in the subsequent deliberations for clarity on whatever concerns they may have. Mr. Chanda stated that ZESCO Limited intended to rehabilitate the power transmission and distribution system in Lusaka Province with a view to improve the reliability of power supply. This would be achieved through the implementation of the Lusaka Transmission, Distribution and Rehabilitation Project (LTDRP). He indicated that the component, for which the scoping meeting was held as part of the Environmental and Social Impact Assessment (ESIA) process, was for the Greenfield Waterworks – Chawama – Chilanga – Lusaka West 132kV transmission line. The improvement of the quality and reliability of electricity supply within the transmission and distribution network was in line with the Government's efforts to increase access to electricity.

4.0 ZESCO 's Presentation Of The Project

The Site Manager, Mr. John Chirwa, gave a presentation on behalf of the LTDRP Project Manager, Mr. Wilbroad Chanda. He stated that there had been a rapid increase in power demand due to increased mining, industrial, commercial and agriculture sector investments, and rise in domestic load in Lusaka and Zambia at large. He further, acknowledged the impact of delayed investment in the electricity generation, and this compounded by the drought, had not corresponded to the load growth resulting in deficit in power generation capacity, and subsequent load management. In addition, he indicated that delayed investment in the rehabilitation and expansion of the transmission and distribution systems had further compromised the reliability and quality of power supply.

In view of the forgoing, the meeting was informed that ZESCO's strategic direction was focused on completing the power rehabilitation projects, building new generation plants, rehabilitation, upgrade and expansion of the transmission and distribution network in all four (4) of its operational divisions (Lusaka, Copperbelt, Northern and Southern). However, of significant importance was the commencement of these works in Lusaka Division as 40 % of the non-mining loads are concentrated in this area, implementation of Demand Side Management (DSM) strategies and proactive engagement with stakeholders and the clients.

Among the generation projects commissioned, as stated by the Site Manager, were: the Kariba North Bank, Kafue Gorge and Lunzua Power Station rehabilitation and upgrade; Victoria Falls Power Station rehabilitation (108MW); Itezhi Tezhi 120MW Power Station; and Kariba North Bank Extension (360MW). Generation projects yet to be concluded include: Kafue Gorge Lower (750MW); and upgrade of small hydro power stations such as Lusiwasi Lower, Lusiwasi Upper, Chishimba, Musonda, Mujila and Chikata.

He also, shed light on the notable transmission line projects being implemented, which included: the connection of North Western Province to the national grid at 132kV; Kafue Town – Muzuma - Victoria Falls regional transmission line upgrade, Supply to Kalumbila mine, ZIZABONA interconnector, Distribution and expansion reinforcement projects, Increased Access to Electricity Services Project and Lusaka Transmission and Distribution Rehabilitation Project, under which the component of the Greenfield Waterworks – LSMFEZ - Chawama – Chilanga – Lusaka West 132kV transmission line, for which this scoping meeting was called.

He noted that the aim of the LTDRP was to increase capacity of the sub transmission and distribution system in Lusaka, there by meeting the increased demand which has outstripped the system capacity. By doing so, the 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 schematic layout of the development plan for the Lusaka transmission network.

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

He explained that Lusaka transmission/distribution supply network was currently being supplied through two (2) substations at 330kV, these being Leopards Hill and Lusaka West Substation in the east and west of the City respectively. Furthermore, he stated that the two substations supply three main Bulky Supply Points (BSPs), which are Waterworks at 88kV, Roma and Coventry both at 132kV. In turn, these BSPs supply more than twenty substations at 33kV which then supply the 11kV distribution networks.

In his presentation, the Site Manager 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 the 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 for rehabilitation and reinforcement of the power transmission and distribution systems. He further added that with an annual growth rate of 6%, the power demand for Lusaka is projected to increase from 450MVA to about 1150MVA in 2030. Therefore, to counter the demand, ZESCO intended to add nine (9) additional BSPs and install twenty four (24) new 132kVA circuits.

The Site Manager then articulated the project's scope of works which he said would include rehabilitation and upgrading of the existing 132kV sub-transmission and distribution network. However, the specific works on the99km Greenfield Waterworks – LSMFEZ - Chawama – Chilanga – Lusaka West 132kVv transmission line would include:

Water Works to Chawama Substation

- Construction of 18km of new 132kV (200MVA) single circuit, Kingbird conductor with OPGW, Monopole line from Water Works to LSMFEZ Substation;
- Construction of a new Chawama 132/11kV Substation (4 x 132kV Feeder Bays, 3 x 132/11kV 30MVA transformers Bays), associated switching room with 17 panels (3 x incomers / 2 x sections / 12 x feeder panels);

- Construction of 2 x 11 kV Switching Stations, typically consisting of 3 x incomer circuit breakers, one bus-section and twelve feeder breakers, and associated 6 x 185mm2, 11kV underground cable, interconnecting the Switching Stations with Chawama Substation (approximately 3km / circuit totalling 18km); and

- Construct 18km of new 132kV (2 x 200MVA) double circuit, Kingbird conductor with OPGW, Monopole line from LS MFEZ to Chawama Substation.

Chawama to Chilanga Substation

- Construction of a new Chilanga 132/33/11kV Substation with (2 x 132kV Feeder Bays, 2 x 132/33kV 90MVA transformer bays, 3 x 132/11kV 30MVA transformers Bays), 7 x 33kV outdoor feeder bays, associated switching room with 17 panels (4 x incomers / 3 x sections / 18 x feeder panels);

- Construction of 2 x 11 kV Switching Stations, typically consisting of 3 x incomer circuit breakers, one bus-section and twelve feeder breakers, and associated 6 x 185mm2, 11kV underground cable, interconnecting the Switching Stations with Chilanga Substation (approximately 3km / circuit totalling 18km);

- Construction of a 9km of new 132kV (200MVA) single circuit, Kingbird conductor with OPGW, monopole line from Chawama to Chilanga Substation, allow for strain tower for future loop-inloop-out to Chilanga 2 Substation; and

- Decommission existing 33kV Lines from Chilanga to Chawama substation.

Chilanga to Lusaka West Substation

Lusaka West Substation upgrade includes the following scope of work:

- Lusaka West: Upgrade Lusaka West 330/132kV to 500MVA firm substation. Replacing of the Lusaka West 2x 125MVA, 330/132kV with 3 x 250MVA, 330/132kV transformers;

- Addition of one by 330kV/132kV Transformer bay; and

- Upgrading the existing 132kV busbar to double busbar with bus coupler.

The Chilanga – Lusaka west 132kV line works include the following scope of work:

- Equiping the 132 kV line bays (200 MVA) at Chilanga and Lusaka West; and

- Constructing a new 50 km 132kV (200MVA) double circuit, Kingbird conductor with OPGW, Monopole line from Chilanga to Lusaka West Substation.

The Site Manager stated that, despite the system incapacitation, ZESCO was currently facing challenges in improving its service delivery, including but not limted to: encroachments; unsynchronized planning between Lusaka City Council (LCC) and ZESCO planners; vandalism; and availability of the required substantial financial resources to implement projects.

He took cognisance of the requirements of the Environmental Management Act No. 12 of 2011, pursuant to Statutory Instrument No. 28 of 1997 – The EIA Regulations, to undertake an Environmental and Social Impact Assessment (ESIA) study for a project of this nature. Furthermore, he stated the financiers of the project regarded the approval of an ESIA study as condition precedence prior to financial disbursement.

The meeting was informed that the benefits of implementing the project would include: reduced power distribution losses by establishing the power injection points closer to the load centers; distribution of the loads on transmission and distribution sub-networks; increasing capacity of the system to satisfy long-term demand growth; and increased reliability of the distribution system thus reducing interruption frequency.

In his concluding remarks, the Site Manager stated that minimized load shedding, increased reliability in power supply and provision of additional capacity for new loads would lead to poverty alleviation and improve lives of the targeted citizenry.

ESIA Process Presentation

The Environmental and Social Impact Assessment (ESIA) process was presented by Mrs. Brenda Chizinga, Chief Environmental and Social Analyst of ZESCO's Environmental and Social Analysis Unit (ESU). She begun by stating that the principle legislation governing environmental management in Zambia was the Environmental Management Act of 2011, pursuant to Statutory Instrument No. 28 of 1997 – The Environmental Impact Assessment (EIA) Regulations, and that the said Regulations provided for requirements in carrying out ESIA study. It was mentioned that the ESIA study would also take into account the requirements of World Bank (WB) and European Investment Bank (EIB) environmental & social safeguard policies, as these two institutions were part of the financing structure.

Mrs Chizinga informed the meeting of the categories of electrical infrastructure which required ESIA studies and they included: 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. In view of the aforestated, it was therefore required that an ESIA study be conducted for the 99km Greenfield 132kV transmission line.

She further stated that the ESIA study would be a structured process, to identify, assess, evaluate and mitigate Project impacts on the environment to ensure sustainable resource utilization, in addition to fulfilling loan conditionalities and national laws and regulations.

Major issues for consideration on the ESIA study, as stated by Mrs Chizinga, would include: acquisition of 32m wayleave for the 132kV transmission line, acquisition of substation and switching station sites, displacement/resettlement of project affected parties and loss of livelihoods.

Critical to the ESIA process, as mentioned by Mrs Chizinga, is public participation which ensures that decisions are made in consideration of and to the benefit public needs and

preferences. It brings diverse viewpoints and values into the decision-making process, as well as enabling project developers to make better informed decisions through collaborative efforts. This builds mutual understanding and trust between the developers and the public they serve.

5.0 QUESTION AND ANSWER SESSION

QUESTION A

Dirk Muijs - Asked if ZESCO would avail a map showing the transmission line routes proposed to traverse his property, including the 330kV Kafue Gorge Lower and the 132kV Greenfield transmission lines and sought clarity as to additional lines were planned. He further requested ZESCO to re-engage him and other affected stakeholders in the vicinity of his property in view of the proposed 132kV line with a view of reaching consensus on the line orientations.

ANSWER A

ZESCO -A description of the line route was presented and the meeting was informed that a preliminary survey had been conducted. However, during detailed survey, further stakeholder engagement would be made to reach consensus on the final line alignment.

QUESTION B

Horace Kamanga - Wanted to know what radiation effects, if any, would arise from substations and transmission lines developed near populated communities.

Additionally, he noted that notices were served to residents in Chilanga regards the project and the need to relocate all existing infrastructure from the proposed wayleave, and as such wanted to find out if compensation would be made.

ANSWER B

ZESCO – Assured Mr Kamanga and all the stakeholders that ZESCO would uphold prudent engineering practices by ensuring that all set engineering standards, both locally and international, were adhered to. Further, ZESCO had domesticated the international radiation standards, which would be incorporated at planning, design and implementation stages. As a rule of thumb, dwelling beyond the wayleave was a sufficient safety clearance.

The notices served aimed to inform property owners of the proposed project and that any property affected would be duly compensated for. Independent licenced and registered valuation services would be acquired and form the basis of compensation.

QUESTION C

Life Mutaka - He sought clarification on who would compensate for the 12m land clearance between Tokyo Way and the proposed 132kV wayleave. The 12m clearance was anticipated to facilitate road expansion works which he believed would not be implemented by the Lusaka City Council (LCC).

ANSWER C

ZESCO responded by confirmed the implementation of the road expansion project through its correspondence with LCC, but could however state the timeline. Arising from aforestated, ZSECO would not be liable for payment of any compensation for the 12m clearance as it was not the developer of the road expansion project.

QUESTION D

Daniel Soko – wanted to know what happens in an event that ZESCO encroaches on private property or someone encroach into ZESCO wayleave.

ANSWER D

Ideally, in a case where ZESCO is traversing private property to develop its infrastructure, permission is sought for such infrastructure and compensation paid duly was applicable. However, where such infrastructure exists, usage is restricted as a safety precaution and to maintain the integrity of the infrastructure. Encroachment on such infrastructure is illegal, and the provisions of the law related to the management of such apply.

QUESTION E

Azan Miller - Sought clarification on how is compensation is determined for businesses and structures.

ANSWER E

ZESCO replied that for built structures, ZESCO engages the services of an independent licenced and registered valuer while for crops and exotic trees, the District Agricultural Coordinator's office in respective district is engaged to assess the value of the affected trees. Business loss arising from project activities is equally determined and compensated for accordingly.

QUESTION F

Chintu Mulendema – observed that only structures and fruit trees were compensated for and not the land taken up by the wayleave. He wanted to know why this was the case as the acquisition was compulsory, restricting the property owner of its usage. He further wanted to know if compensation is paid in one instalment once determined.

ANSWER F

ZESCO - Compensation determined is paid in full, and in one instalment. However, acquisition of wayleaves entail seeking permission from owners to traverse their property with the understanding land ownership is retained by the owner. However, certain circumstances may demand compensation based on reasonable justification.

QUESTION G

Leslie Mbula, Lusaka West – He thanked ZESCO for organizing such a meeting and acknowledging the importance of stakeholder engagement. However, he staed that in the 1990's, ZESCO placed an anchor pylon in his farm. He therefore asked as to whether ZESCO was likely to compensate him according to Article 16 of the Constitution of Zambia (1991) which provided for protection from deprivation of property but has was repealed and amended in the current Constitution under Article 61 Part 2 (c) which also provides for prompt payment of full and fair compensation to be made prior to assuming occupation or possession of the property.

ANSWER G

ZESCO responded that as the matter seemed to be historical and may have some other legal implications. Nonetheless, the issue can be managed based on the available documentation.

COMMENT A

Venancio Gomani, Road Development Agency (RDA) – Expressed concern over ZESCO's placement of its infrastructure in road reserves which entails large sums of money to reroute when implementing road expansion projects. He cited the L400 Road Infrastructure Development Project by RDA wherein a lot of money was paid to ZESCO to reroute the electricity cables in the road reserves. He further advised ZESCO to keep records of its underground cables which could not be located during the said project.

Regards the proposed project, Mr. Gomani advised ZESCO to avoid developing its infrastructure in road reserves and stressed the need for collaboration in such undertakings.

Question H

Joseph Daka, Lusaka West Resident – Stated that he was affected by the proposed project, and the impacts likely to arise from the project were crucial and needed to be addressed. He further requested ZESCO to put in place transport logistics when inviting people to such a gathering.

ANSWER H

ZESCO acknowledged Mr. Daka's sentiments and assured him that mitigation measures would be put in place to manage any impacts that would arise from the project, in consultation with various stakeholders. Regards transport logistics, future consideration would be made for those that would require such assistance.

COMMENT B

Hope Mambwe Banda, Department of Natural Resources, MLNREP - observed that the project would affect communities that were less privileged and in some cases illiterate. It was therefore imperative that ZESCO seeks avenues to transmit this information to such communities in a manner that they would comprehend.

ANSWER B

ZESCO acknowledged Ms Banda's concern and committed to engaging and disseminating information to communities in a form that they would grasp with the issues.

QUESTION I

Mr. Ian Miller, Lilyai Farm Lodge – Hoped earlier agreements with ZESCO regards the routing of the line in their property would be adhered to. He further wondered why ZESCO was conducting the Environmental and Social Impact Assessment (ESIA) study and did not engage and independent consultant to do it.

ANSWER I

ZESCO assured Mr Miller that the contents the Agreement were still binding and ZESCO would here to the provisions therein. It was explained that the existing legislation provided for the developer to conduct the ESIA study, however, the Zambia Environmental Management Agency (ZEMA) would supervise the all activities related to the study. Furthermore, the lending Agencies were aware of this occurrence and further ensured compliance of the said Study to their environmental and social safeguard policies.

Additionally, the meeting was informed that the formulation of ZESCO's Environment and Social Affairs Unit was proposed by the World Bank when the Corporation was carrying out Power Rehabilitation Projects. ZESCO carries out numerous projects, and as such engaging independent consultants would be too costly. Moreover, the collaboration with ZEMA ensures that the ESIA studies are carried out professionally, meeting the required standards.

QUESTION J

Richard Bafuna, Village Headman – Wanted to know what occurs in the event that property valuation is conducted in the absence of the property owner and if the owner would be at liberty to engage their own valuer if they were not satisfied with the valuation figure determined therein.

ANSWER J

ZESCO responded in the affirmative by stating that it was acceptable for property owners to engage valuers on condition that they were qualified and registered. This would provide a premise for negotiation.

QUESTION K

Morgan Zulu, Lusaka West Resident – Indicated that his house was in the vicinity of Lusaka West Substation and as such wanted to know if he would be affected, and if so whether he would be compensated for it.

ANSWER K

ZESCO - Once the detailed survey is concluded, all affected structures would be identified and property owners informed accordingly. Affected parties shall be duly involved in the compensation process.

QUESTION L

Reuben Phiri - Requested ZESCO to set up a desk to attend to the issues arising from the project.

ANSWER L

ZESCO – informed the meeting that the Project Office was located at Aquarius House along Katima Mulilo Road. at these premises, all issues concerning the project could be submitted there.

QUESTION M

Patrick Mvunga - Wanted to find out if ZESCO offers additional assistance for relocation aside from the compensation entitlement.

ANSWER M

ZESCO in response informed the meeting that transmission line projects are linear by nature and in most cases affected people do not relocate but instead would only move away from the wayleave swath and settle within the vicinity of their earlier settlements. However, where it is necessary to relocate people, additional assistance maybe provided.

QUESTION N

Mr. Ian Sikazwe-New Kasama – Observed the need for sound planning and collaboration with different Government agencies in the execution of their projects. He was concerned with the uptake of 12m of land by LCC and 32m by ZESCO for their various developments.

ANSWER N

ZESCO acknowledged his submission and confirmed the collaboration with LCC. The meeting was also informed that ZESCO had engaged the services of an independent consultant and through the Master Plan development short to long term projects have been categorised for implementation.

QUESTION O

Gaston Nkhoma and Mapepe - questioned ZESCO as to whether it had title for their wayleaves in private property and if compensation would be considered for existing infrastructure in such properties.

ANSWER O

ZESCO responded by stating that wayleaves are numbered in order to have a Right of Way for easy access during operation and maintenance of the power line and further restrict land usage for safety purpose and to protect the integrity of the infrastructure. ZESCO further informed the meeting that during bush-clearing in the wayleave is conducted in manner that minimises soil erosion by way of leaving vegetation to a permissible height.

QUESTION P

Morgan Zulu, Lusaka West – Asked if ZESCO informs people prior to construction of lines and associated infrastructure. He also wanted to know when the proposed project would commence and what the wayleave size of the line was and its distance from the existing lines to Lusaka West Substation.

ANSWER P

ZESCO in response informed the meeting that stakeholders are involved throughout the project cycle and that specific notices would be issued prior to construction. The commencement of the project is planned for third quarter of 2016 or the first quarter of 2017 and that the project would be implemented in segments. The meeting was also informed that the wayleave size for the 132kV line is 32m, 16m on either side of the centre line. The distance from existing lines is dependent on the voltage level, and prescribed allowances are such exist.

QUESTION Q

George Gasper Tembo – He notified ZESCO that in 1990 a high voltage power line traversed his property and proposed line is anticipated to traverse his property as well. In view of the foregoing, he wanted to know if ZESCO would consider compensating him for the approximately 70m wayleave in his property.

ANSWER Q

ZESCO acknowledged Mr. Tembo's concern and advised that the Corporation would consider his case once the detailed survey is concluded.

QUESTION R

Titus Chilongo, Millennium Challenge Account – Zambia, - Informed the meeting that MCAZ was developing the Lusaka Water Supply and Sanitation Drainage Project (LWSSDP) and as such stressed the need for collaboration in the development of the two projects to maximise benefits.

ANSWER R

ZESCO implored the need for the collaboration in developing the two projects, which had already begun, and committed to its continuous cooperation in the realisation of the projects benefits.

QUESTION S

Maxwell Sakala, ZACCI **-** Wanted to know if business houses shall be compensated in terms of business interruption

ANSWER S

ZESCO informed the meeting that in the planning and design of the proposed project, care will be taken not to disturb business operations. However, any loss suffered that maybe caused will be addressed accordingly.

CONCERN 1

Bendard Mukonde, Lusaka West – Stated that despite being invited to the meeting, he was not been able to understand what was being discussed because of his limited command of the English language. He asked for consideration to be made for future meetings to ensure that invited stakeholders are adequately communicated to and interact accordingly.

ANSWER TO CONCERN 1

ZESCO assured Mr. Mukonde and the meeting of enhancement measures in its involvement with stakeholders, especially in adequately communicating its activities through various means.

QUESTION T

Farouk Nosarka, Farouk Farms – Asked as to who should pay for land rates where ZESCO transmission lines are traverse, considering that he has two of such lines in his property.

ANSWER T

ZSECO responded by stating that the owner of the property pays the land rates as the title for land within the wayleaves is resides in the property owners name.

QUESTION U

Gloria Sampa, Lusaka West – wanted to know whether there would be compensation for bare land where there was no development.

ANSWER U

ZESCO – the law doesn't not provide for compensation of bare land in the acquisition of wayleave, nonetheless, exceptions made be made in justifiable circumstances.

COMMENT C

Trophius Kufanga, LCC- Advised that there is need to re-engage the Lusaka City Council regards the expansion of the Tokyo Way.

ANSWER COMMENT C

ZESCO stated that the Corporation had engaged LCC who confirmed the expansion of Tokyo Way, but would, however, re-engage them in view of Mr Kufanga's submission.

QUESTION V

Dora Selebeti, Lusaka West - Expressed concern that her house is located near the Lusaka West Substation and wanted to know whether ZESCO would demolish it before consent is granted.

ANSWER V

ZESCO - Indicated that the house would only be affected if it fell within the wayleave of the proposed line. Further confirmation of all affected structures would only be determined after the detailed survey was conducted after which affected households would be informed accordingly and involved throughout the compensation process.

QUESTION W

Steven Banda, ZAMTEL - Wanted to know how much of the existing ZESCO fibre network will be affected by the project.

ANSWER W

ZESCO in response notified the meeting that the proposed project will be on overhead lines and is not anticipated to affect the existing fibre network. Any such interruptions will be communicated and managed accordingly.

QUESTION X

Mrs. Jennipher Sikazwe, New Kasama – Asked as to what will be done to ensure that the power line wayleave is not turned into dumping sites.

ANSWER X

ZESCO answered by informing the meeting that ZESCO had begun engagements with the Lusaka City Council to ensure management of garbage in wayleave with the view to halt such activities.

QUESTION Y

Headman Mulendema, Busoli Royal Establishment - Wanted to know if compensation for structures on traditional and state land is the same.

ANSWER Y

ZESCO responded by stating that valuations of structures on traditional or state land is the same and that the assessment is based on the prevailing market value.

COMMENT Z

Her Royal Highness Senior Chieftainess Nkomeshya, Mukamambo II - Stressed the importance of the meeting, and continued stakeholder engagement in the development of the proposed project. She acknowledged that Lusaka was growing at a fast rate and as such the need for increased power supply could not be overemphasised.

She further implored ZESCO to engage stakeholders, especially traditional and local authorities, in route identification and selection, to ensure that the rights of the underprivileged were upheld. She also implored the need for equitable distribution of benefits accrued from the project to all stakeholders.

ANSWER Z

ZESCO – Thanked and acknowledged the submission of Her Royal Highness and assured her the concerns would be adequately addressed, especially regards the welfare of the vulnerable and underprivileged.

VOTE OF THANKS - Mr. Leslie Mbula

Thanked ZESCO for inviting stakeholders for the Scoping meeting to share their views and concerns relating to the development of the proposed project. He stressed the need for synergy with other stakeholders in achieving equitable benefits that would be accrued from the project. He applauded the efforts of ZESCO in engaging stakeholders in their activities and implored other parastatals to emulate the Corporation. He advised ZESCO to incorporate the submissions of stakeholders in the development of the proposed project, particularly compensation for loss of assets and livelihoods. He thanked Her Royal Highness, Senior Chieftainess Nkomeshya Mukamambo II, for her presence and valuable contribution at the Scoping meeting. We urged ZESCO to continue with the consultative process and wished the Corporation success in the implementation of the Project.

CLOSING PRAYER

The closing prayer was given by Mrs Elenestina Mwelwa

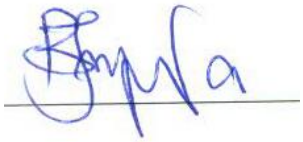
NATIONAL ANTHEM

Finally the national Anthem was sung and the meeting came to a close at exactly 13:35 hours.

WILBROAD CHANDA
Chairperson

_____
Signature
Date: 24 MARCH 2016

BONJE MUYUNDA
Secretary



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Signature
Date: 24 MARCH 2016

SCOPING (STAKEHOLDER CONSULTATIVE) MEETING FOR THE LUSAKA TRANSMISSION AND DISTRIBUTION REHABILITATION PROJECT: CONSTRUCTION OF THE GREENFIELD WATERWORKS-CHAWAMA-CHILANGA-LUSAKA WEST 132KV TRANSMISSION LINE

ATTENDANCE LIST

DATE: THURSDAY 17TH MARCH 2016

VENUE: SANDYS CREATION

NAME	ORGANISATION	MOBILE NUMBER	EMAIL ADDRESS	DATE
HRH- SENIOR CHIEFTAINESS NKOMESHYA MUKAMAMBO II	ROYAL ESTABLISHMENT OF THE SOLI	-	-	17.03.16
HOPE M BANDA	MLNRP	0974-007195	lavendarcherry@gmail.com	17.03.16
KNOXER CHIZA MUWOWO	CITIZEN	0950-774471	-	17.03.16
YOBE NYNLUDA	RDA	0977-937960	ynywenda@roads.gov.zm	17.03.16
REUBEN PHIRI	CITIZEN	0977-788171	-	17.03.16
VIVIENNE LESA	ZESCO	09765-698363	vlesa@zesco.co.zm	17.03.16
FRANCIS S	CITIZEN	0971-1998653	fsingand@gmail.com	17.03.16
M. WAMUSHI	CITIZEN	0979-388335	-	17.03.16
H. KATOTONA	ZNFU	0975-571508	-	17.03.16
HORACE KAMANGA	CITIZEN	0977-458534	horaeshavive1212@gmail.com	17.03.16
FRANCIS KATEULE	CITIZEN	0975-854400	-	17.03.16
CHRISTOPHER SINYANGWE	LS-MFEZ	0977-480998	sinyangwec@gmail.com	17.03.16
KELVIN BWEMBYA	LTDRP	0967-672418	kbngosa@yahoo.com	17.03.16
ELENESTINA M WELWA	ZESCO LTD	0968-849340	emmwelwa@zesco.co.zm	17.03.16
KILIAN SICHILIMA	CITIZEN	0976-004743	-	17.03.16
CHRISTOPHER MWEETWA	CITIZEN	0966-762534	christophermweetwa@yahoo.com	17.03.16
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APPENDIX 4: WAYLEAVE CONSENT FORMS

APPENDIX 5: GRIEVANCE REDRESS MECHANISM

APPENDIX 6: LIST OF PAPs AT WATER WORKS SUBSTATION

LUSAKA TRANSMISSION AND DISTRIBUTION REHABILITATION PROJECT (LTDRP): ACQUISITION OF WAYLEAVE FOR THE CONSTRUCTION OF WATER WORKS SUBSTATION

WATERWORKS SUBSTATION SITE AFFECTED PERSON'S CROPS

REF: 111233: ZESCO LTDRP: Package 1: CEEC: Waterworks Substation Site

NO.	NAME	CROP AFFECTED	NRC	PHONE NO.	DATE	SIGN
01	DOROTHY ZULU BANDA	MAIZE	114545/46/1	0977-112657	16/02/17	
02	LAWRENCE CHANGWE	11	136174/68/1	0971784924	16/02/17	
03	REBECCA MUYOBA MVULA	MAIZE	659422/11/1	0977-326007	16/02/17	
04.		MAIZE				
05	BRIDGET CHANDA SIHUMBWE	MAIZE	675403/11/1	0979-989790	16/02/17	
06	LOVENESS C' MULUBE	MAIZE/BEANS	0979623722	163053/31/1	16/02/17	
07	SIMUSHI NAKAMAI	CASAVA & MAIZE	0977782273	163116/82/1	16-02-17	PUMPKINS
08	KALEMBWE KAFWANKA	SWEET POTATOES	107780/18/1	0974-129180	16/02/17	
09	EVERISTO MWANZO	MAIZE/SWEET POTATOES/BEANS	626658/1111	0976-060648	16/02/17	
10	MUPELA JANE (JEAN)	MAIZE		0977-251612	16/02/17	
11.		MAIZE/PUMPKINS				

APPENDIX 7: ZEMA ENVIRONMENTAL IMPACT STATEMENT FORMAT

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 :

5.1Location Alternatives
5.2Process and technology
5.3Raw materials
5.4Product
5.5Demand Alternatives *(Production Capacity)*
5.6Justification 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:

6.1Topography
6.2Climate
- *Rainfall, Temperature, Humidity, Sunshine*

6.3Air quality
6.4Geology
6.5Hydrology
- *Surface water quality*
- *Groundwater quality*

6.6Hydrogeology
6.7Soils
6.8Land use
6.9Built 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 8: SATELITE IMAGE OF THE PROJECT AREA

APPENDIX 9: PCR CHANCE FINDS 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.