



ZESCO

# ZAMBIA-TANZANIA INTERCONNECTOR PROJECT

## ENVIRONMENTAL AND SOCIAL MANAGEMENT PLAN UPDATE

### ZAMBIA

WSP REF.: CA0027197.7329

DATE: AUGUST 30, 2024

VOLUME 1 – MAIN REPORT  
PRELIMINARY VERSION 2







ZESCO

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INTERCONNECTOR PROJECT**

ENVIRONMENTAL AND SOCIAL  
MANAGEMENT PLAN UPDATE

ZAMBIA

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AUGUST 2024

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# REVISION MANAGEMENT

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# ABBREVIATIONS AND ACRONYMS

AEWA:	African-Eurasian Migratory Water birds
ALARA:	As Low as Reasonably Achievable
AIDS:	Acquired Immune Deficiency Syndrome
ARV:	Antiretrovirals
BESA:	Biodiversity Extended Study Area
BMP:	Biodiversity Management Plan
CBD:	Convention on Biological Diversity
CLOs:	Community Liaison Officers
CFP:	Chance Find Procedure
CHMP:	Cultural Heritage Management Plan
CHSMP:	Community Health and Safety Management Plan
CHQ:	Critical Habitat Qualifying
CH:	Critical Habitat
CHMP:	Cultural Heritage Management Plan
C-ESMP:	Contractor's Environmental and Social Management Plan
CIGZambia:	Cities and Infrastructure for Growth Zambia
COMESA:	Common Market for Eastern and Southern Africa
DACA:	District AIDS Coordination Advisor
FCDO:	UK Foreign, Commonwealth and Development Office
FTW:	Fitness to work
EAAA:	Ecologically Appropriate Area of Analysis
EAPP:	Eastern Africa Power Pool
EHS:	Environment, Health and Safety
EHSGs:	Environmental, Health and Safety Guidelines
EIAs:	Environmental Impact Assessments
EPRP:	Emergency Preparedness and Response Plan
E&S:	Environmental and Social
ESHS:	Environmental, Social, Health and Safety
ERP:	Emergency Response Plan
EPRP:	Emergency Preparedness Response Plan
ESIA:	Environmental and Social Impact Assessment
ESMP:	Environmental and Social Management Plan
ESMS	Environmental and Social Management System

ESO:	Environmental Site Officer
ESS:	Environmental and Social Standards
ERT:	Emergency Response Team
HIV:	Human Immunodeficiency Virus
IAS:	Invasive Alien Species
IFC:	International Finance Corporation
IUCN:	International Union for Conservation of Nature
GBIF:	Global Biodiversity Information Facility
GBV:	Gender Based Violence
GBVAP:	Gender-Based Violence Action Plan
GIIP:	Good International Industry Practice
GRM:	Grievance Redress Mechanism
KPIs:	Key Performance Indicators
MoE:	Ministry of Energy
MSDS:	Materials Safety Data Sheets
NBI/NELSAP:	Nile Basin Initiative / Nile Equatorial Lakes Subsidiary Action Program
NHCC:	National Heritage Conservation Commission
NGOs/CBOs:	Non-Governmental Organizations
PACs:	Project Affected Communities
PACA:	Provincial AIS Coordination Advisor
PAPs:	Project Affected Persons
PEP:	Post-exposure prophylaxis
POC:	Potentially Oil-Contaminated
PIU:	Project Implementation Unit
PPMP:	Pollution Prevention Management Plan
PMU:	Project Management Unit
PPE:	Personal Protective Equipment
OHSMP:	Occupational Health and Safety Management Plan
OSC:	One Stop Centres
RAP:	Resettlement Action Plan
RHA:	Risk Hazard Assessment
ROW:	Right of Way
RMHPMP:	Residual material and hazardous products management plan
S&G:	Social and Gender
SADC	Southern African Development Community

SAPP:	Southern African Power Pool
SCAP:	Safeguards Corrective Action Plan
SDS:	Safety Data Sheets
SEP:	Stakeholder Engagement Plan
SHEQ:	ZESCO's Safety, Health Environment & Quality
SPDs:	Standard Procurement Documents
SOP:	Scope of Project
STDs:	Sexually Transmitted Diseases
STIs:	Sexually Transmitted Infections
TORs:	Terms of References
TANESCO:	Tanzania Electric Supply Company Limited
UNESCO:	United Nations Educational, Scientific and Cultural Organization
VCT:	Voluntary Counselling and Testing
VSU:	Victim Support Unit
WHO:	World Health Organization
WBG:	World Bank Group
ZEMA:	Zambia Environmental Management Agency
ZESCO:	ZESCO Limited
ZTK:	Zambia-Tanzania-Kenya
ZTIP:	Zambia-Tanzania Interconnector Project



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# SUMMARY

## INTRODUCTION

Abundant, diverse energy resources in Southern and Eastern Africa underpin significant potential benefits from regional energy sector integration. The growing need to address national electricity supply and demand imbalances, in the most cost-effective manner, boosted interest in cross-border electricity trade and resulted in the establishment of the Southern African Power Pool (SAPP) in 1995, and the Eastern African Power Pool (EAPP) in 2005, under the umbrellas of South African Development Community (SADC) and Common Market for Eastern and Southern Africa (COMESA), respectively.

The objectives of the SAPP and EAPP are to coordinate power pool operations and implement regional power trade. Increasing interconnections among the EAPP countries and the link to SAPP will create a large subcontinental market that could pave the way for greater regional integration in other sectors. While there are a few possible corridors for interconnecting SAPP and EAPP, the most advanced one is connecting Zambia-Tanzania-Kenya (also called “ZTK”). The link between Zambia and Tanzania (or Zambia-Tanzania Interconnector Project, or ZTIP) remains the last section to enable the SAPP and EAPP to be interconnected. Doing so will lead towards market expansion for participating countries, improvement in their energy security, facilitate the diversification of energy sources, enable the sharing of generation reserves, and optimize the cost of electricity supply through trade, both regionally and for participating countries such as Zambia, specifically.

ZESCO, as an intended implementing agency for the SOP2 Project, has started preparation of the Project and is supported by Cities and Infrastructure for Growth Zambia (CIGZambia) and the World Bank to finalize project planning with associated required technical, environmental and social studies. The World Bank has agreed in principle to provide the majority of the financing for the Project, with a budgetary estimate of \$280M including associated project management and capacity building costs. The Project is likely to be co-financed with smaller contributions from EU and UK Government through FCDO.

This report presents the outcomes of the ESMP developed to support and accompany the ESIA prepared on the preferred route option that was selected following an analysis of alternatives that considered technical, social, and environmental constraints.

The ESMP is divided in ten main chapters, including the introduction, project description, impacts and mitigation, specific management plans, institutional framework, training, monitoring plan, implementation schedule, cost summary, and finally references.

The Zambia-Tanzania Interconnector Project (ZTIP) has evolved considerably since its initiation in late 2013. The design of the ZTIP Project involves optimization directly aligned with the avoidance and reduction of associated impacts in combining the ZTIP alignment with exiting transmission line (in between Pensulo and Kasama) or in combining two single circuit lines in a single wayleave and mounted on the same pylons (combined with the Kasama-Nakonde single circuit 330kV line). The ZTIP main components are now:

- The Kasama-Nakonde section which consists of:
  - 212 km of a 330kV double-circuit transmission line from Kasama to Nakonde;
  - A new 330/132/66kV substation at Nakonde (including dynamic voltage support device [ $\pm 250$  MVar SVC or STATCOM]);
  - 15 km of a 400kV double-circuit transmission line from Nakonde to the Zambia – Tanzania border, operated at 330kV;
  - 12 km of a 132kV double circuit from Nakonde to cut into the Isoka-Nakonde line (loop in and out of 66kV Isoka - Nakonde line).

- The Pensulo-Kasama section which consists of:
  - 386 km of a 330kV single-circuit transmission line between the Pensulo and Kasama Substations, via the Mpika Substation; this line will be more or less parallel to an existing 330kV single-circuit transmission line (Pensulo to Mpika 186 km and Mpika to Kasama 200 km);
  - Expansion works on the existing substations at Pensulo, Mpika and Kasama;
  - Installation of Dynamic Voltage Support Device ( $\pm 250$  MVar SVC or STATCOM) and associated substation works at Pensulo Substation.

The configurations above have been confirmed by ZESCO and are presented in detail in the Project's Final Design Documents.

Pylon heights will vary in function of voltage level and technical requirements caused by local constraints such as topography, line spans, crossings of infrastructure, etc. Tower heights will range from 18m (minimal tower height for the 132kV line) to 60.8m (maximum height for the 400kV line).

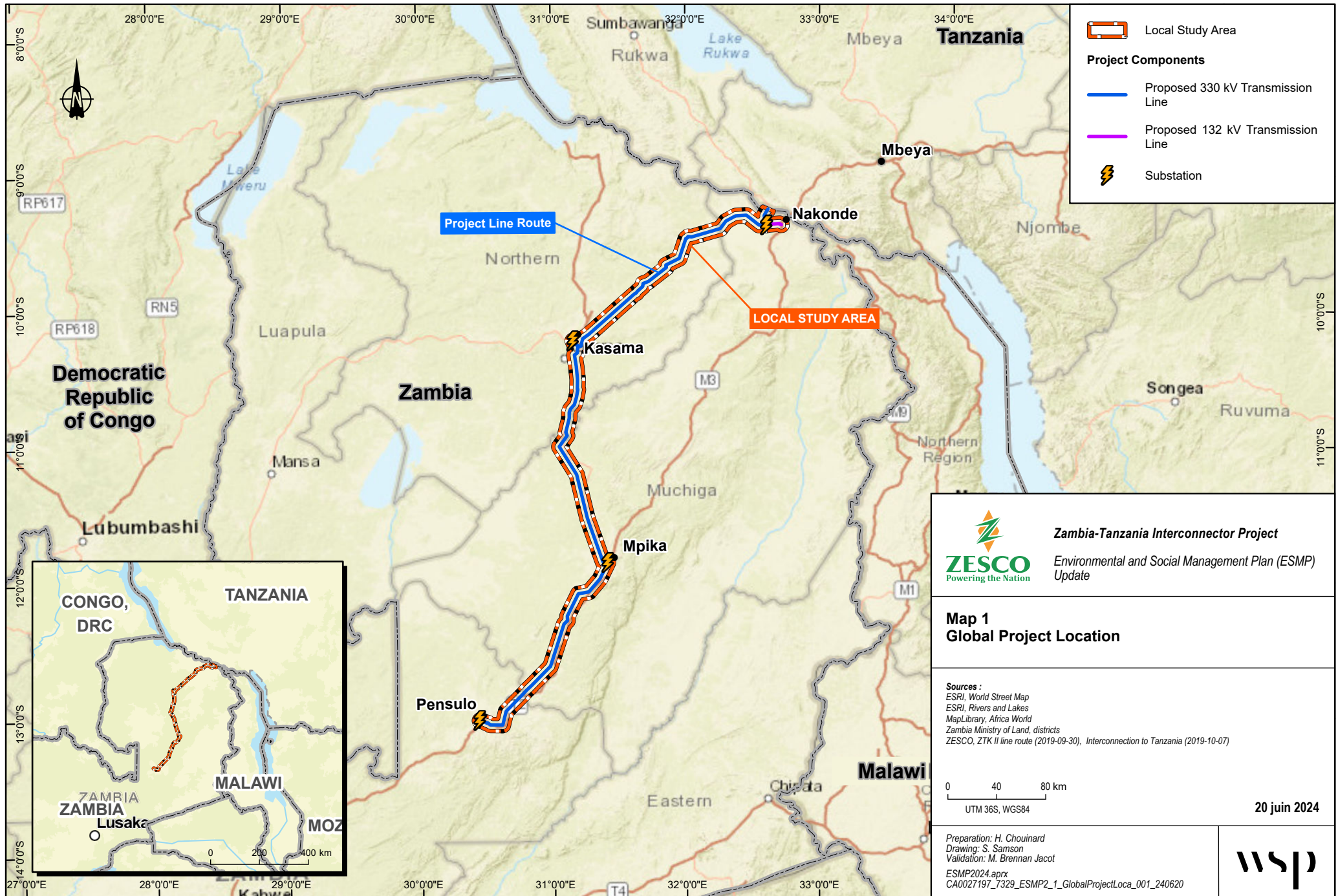
Width of the right-of way had to be determined to satisfy minimum technical requirements and comply with the standards by the Energy Regulation Board (ERB) Wayleave Code of Practice standards which ZESCO uses. ROW will vary according to the voltage level. However, width of the acquired wayleave varies along the alignment, depending on whether or not the project is paired with another ZESCO wayleave. The additional wayleaves required can be summarized as follows:


- 60 m for the double-circuit 400kV line between Nakonde and the Tanzanian border;
- 50 m when the new 330kV line wayleave is not paired with another existing wayleave;
- 35 m for 330kV line segments paired with the existing 330kV line present between Pensulo and Kasama;
- 32 m for the 132kV between the Nakonde substation and linking to the 66kV Isoka-Nakonde line.

## LOCATION




The transmission line will stretch between the Tanzanian border to Pensulo, crossing Serenje, Chitambo, Lavushimanda, Mpika, Kanchibiya, Kasama, Mungwi, Senga Hill and lastly Nakonde districts.

Global Project location is illustrated on the Map below.



 Local Study Area

**Project Components**

-  Proposed 330 kV Transmission Line
-  Proposed 132 kV Transmission Line
-  Substation

 **Zambia-Tanzania Interconnector Project**  
 Environmental and Social Management Plan (ESMP)  
 Update

**Map 1**  
**Global Project Location**

**Sources :**  
 ESRI, World Street Map  
 ESRI, Rivers and Lakes  
 MapLibrary, Africa World  
 Zambia Ministry of Land, districts  
 ZESCO, ZTK II line route (2019-09-30), Interconnection to Tanzania (2019-10-07)

0 40 80 km  
 UTM 36S, WGS84

20 juin 2024

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 ESMP2024.aprx  
 CA0027197\_7329\_ESMP2\_1\_GlobalProjectLoca\_001\_240620



Boundaries and measurements shown on this document must not be used for engineering or land survey delineation. A land register analysis conducted by a land surveyor was not undertaken.



## INVESTMENT COST

The Project costs have been estimated to USD 253,425,661,75. As for implementation schedule, activities starting from the start-up meeting of the construction contract to commissioning, are planned to require 24 months. Field construction activities are planned to begin at month 7, and therefore it will last 17 months.

## ENVIRONMENTAL AND SOCIAL MANAGEMENT STRATEGY TO MANAGE NEGATIVE AND POSITIVE IMPACTS IDENTIFIED

The environmental and social management strategy associated with the ZTIP and presented in this ESMP report is aligned with the mitigation hierarchy. Optimal project alternatives for each line route section have been selected, avoiding and reducing anticipated environmental and social impacts. Indeed, the ZTIP is planned to be mounted on same pylons of the Kasama-Nakonde 330kV line and shares part of its wayleave with the existing Pensulo-Kasama 330kV line, reducing the required additional land take.

The environmental and social management strategy for the implementation of the ZTIP is also based on the development of ZESCO's Safety, Health, Environment & Quality (SHEQ) Management System incorporating:

- Safety, Health, Environment & Quality policy.
- Identification of risks and impacts.
- Various specific management plans covering notably the following: biodiversity, cultural heritage, community health and safety, occupational health and safety, emergency preparedness and response, residual material and hazardous products, pollution prevention and gender-based violence.
- Resettlement Action Plan for the Pensulo-Kasama section.
- Resettlement and Compensation Action Plan for the Kasama-Nakonde section.
- Detailed management measures for all project phases.
- Stakeholder Engagement Plan.
- Community and Worker Grievance Mechanism.
- Environmental and social performance monitoring.

This system is aligned with mitigation hierarchy and will allow to assess risks and impacts and to manage them in compliance with national and World Bank requirements.

During pre-construction and construction phase, the Contractors will be responsible to implement most of the proposed management plans and measures and also to monitor environmental and social performance.

The various required management plans are developed and include:

- 1 Biodiversity Management Plan (BMP)** sets out the requirements to mitigate and manage potential impacts on fauna, flora and their habitats and in particular on Critical Habitat Qualifying (CHQ) species and Critical Habitat (CH) during the detailed design, pre-construction, construction and rehabilitation phases of the Project.
- 2 Cultural Heritage Management Plan (CHMP)** addresses the requirement of the ZTIP and its contractors to assess and manage risks and impacts related to heritage and culture. The CHMP will include the preparation of a project-specific, 'site ready' Chance Find Procedure (CFP), which enforce the reporting of any archaeological assets to the local authority within 48 hours of discovery. The CFP will set out the course of action to be followed in the event that any cultural heritage artefacts are discovered.

- 3 Community Health and Safety Management Plan (CHSMP)** addresses the requirement of the ZTIP and its contractors to assess and manage risks and impacts to community health and safety. It will include control measures at work sites that effectively reduce the transmission of communicable diseases between the project workforce and communities is imperative to protect family members and others from illness and these measures are described in the OHSMP.
- 4 Occupational Health and Safety Management Plan (OHSMP)** aims to prevent injuries and illness during worker activities and in the workplace (exterior and interior). The scope of the OHSMP is to include all potentially affected workers on the Project.
- 5 Emergency Preparedness and Response Plan (EPRP)** sets out standard operating procedures to be followed if such emergencies occur. It covers environmental risks, disasters and emergency events that could affect or pose an impending or immediate risk to human life, health, and safety, as well as properties and surrounding environment in the project area. This includes incidents or acts that could cause harm to the workers and or nearby communities in the area of influence of the Project.
- 6 Residual material and hazardous products management plan (RMHPMP)** identifies project-specific mitigation measures to be implemented by ZESCO and the Contractor to address waste and hazardous materials management procedures. The RMHPMP provide guidance to address the environmental obligations associated with the storage, handling, and management of residual and hazardous materials. The RMHPMP is intended to guide all waste management for the Project. Contractors and staff will conform with this RMHPMP. In some cases, contractors on the Project will be required to develop specific or tailored waste management plans for their work or contracts conforming with this RMHPMP.
- 7 Pollution prevention Management plan (PPMP)** will identify project-specific mitigation measures to be implemented by ZESCO and the Contractor to address potential impacts related to pollution issues. The PPMP will guide all pollution prevention measures for the Project. Contractors and staff will conform with the developed PPMPs.
- 8 Gender-Based Violence (GBV) Action plan** the two main objectives are to implement measures to prevent project-related GBV and measures to address any situations related to GBV. The framework of this action plan shall be covenanted in various binding documents of the construction Contractors, Supervising Engineer, and the GBV Service Provider.
- 9 Worker Grievance Redress Mechanisms** shall be prepared to comply with the WB's ESS 2 and the MoE Social Safeguard Framework as soon as the construction contract is awarded, but before the works start. This document serves to provide the official framework to be developed by the Contractor for the proposed actions associated with the submittal, recording, analysis, and treatment of employee's grievances associated with workplace concerns. ZESCO should also develop its own Worker Grievance Redress Mechanism applicable for both construction and operation phase. The objective is to respond to the complaints of project workers in a fast and transparent manner, and to ensure that they have avenues for presenting and addressing their grievances related to any aspect of the work on the ZTIP.

Responsibilities for the implementation and oversight of management measures are to be shared among several stakeholders, including relevant ministerial authorities, contractors, a Project Implementation Unit (PIU), and supervising engineers. Monitoring will be focused on, but not limited to, noise levels, electromagnetic fields, soil integrity, surface water quality, plant communities, integrity of aquatic habitats, wildlife poaching, bird collisions, social and economic advantages for local communities, community health and safety, gender-based violence and occupational health and safety.

Training and capacity building requirements for the successful implementation of the ESMP are provided as well as an implementation schedule and cost summary of associated mitigation and monitoring requirements.

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# 1 INTRODUCTION

This Environmental and Social Management Plan (ESMP) has been prepared for the Zambia-Tanzania Interconnector Project. The Zambia-Tanzania Interconnector connects the Southern African Power Pool (SAPP) and East Africa Power Pool (EAPP) for the first time. SAPP currently has 12 member countries, and EAPP has 13 member countries. The interconnector between Zambia and Tanzania is the critical point of connection between the two power pools and will in future facilitate power trading transactions between countries as far south as South Africa and as far north as Libya.

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## 1.1 REGIONAL BACKGROUND

Regional integration plays a vital role in Southern and Eastern Africa's economic growth and ability to weather economic downturns, and remains a political priority in both Southern and Eastern Africa, where the regional integration agenda has been driven by several regional economic cooperation and trade initiatives and blocs established since the 1990s. Abundant, diverse energy resources in Southern and Eastern Africa underpin significant potential benefits from regional energy sector integration. The growing need to address national electricity supply and demand imbalances, in the most cost-effective manner, boosted interest in cross-border electricity trade and resulted in the establishment of the Southern African Power Pool (SAPP) in 1995, and the Eastern African Power Pool (EAPP) in 2005, under the umbrellas of Southern African Development Community (SADC) and Common Market for Eastern and Southern Africa (COMESA), respectively.

The objectives of the SAPP and EAPP are to coordinate power pool operations and implement regional power trade. The SAPP is now the most advanced power pool on the continent and its role aligns with the SADC 1996 Protocol on Energy, which acts as a policy framework for effective use and development of energy in the region. The EAPP on the other hand, compared to SAPP, is nascent in its development but is making rapid advances to interconnect and reap the benefits of stronger regional integration. Increasing interconnections among the EAPP countries and the link to SAPP will create a large subcontinental market that could pave the way for greater regional integration in other sectors. With the planned interconnection of the EAPP and SAPP, both power pools are working on the harmonization of rules and procedures to enable mutually beneficial trade across the potentially largest interconnected geography in the world. Increased power trade between countries will work to deepen regional integration and build trust among countries.

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## 1.2 PROJECT BACKGROUND

While there are a few possible corridors for interconnecting SAPP and EAPP, the most advanced one is connecting Zambia-Tanzania-Kenya (also called "ZTK"). The ZTK corridor is a long stretch, but many sections of the transmission corridor have already been constructed, or have the financing secured and are awaiting construction. For example, the backbone section in Tanzania is completed, and the interconnection between Kenya and Tanzania is under construction. Therefore, the link between Zambia and Tanzania (or Zambia-Tanzania Interconnector Project, or ZTIP) remains the last section to enable the SAPP and EAPP to be interconnected. ZTIP is being contemplated as a series of the following two related projects:

- Scope of Project 1 (SOP1) is the first Project and its aim is to enhance the power transmission infrastructure within the southern regions of Tanzania, up to the border with Zambia, and the institutional capacity of the Tanzania Electric Supply Company Limited (TANESCO), it was approved on June 18, 2018, and is expected to be completed by 2025.
- Scope of Project 2 (SOP2) is the current Project (Zambia-Tanzania Interconnector Project) which aims to increase the firm capacity of the interconnection with Tanzania and enhance the transmission and distribution network capacity in the northern regions of Zambia, enabling access expansion. The full integration of SAPP and EAPP would create the largest geographic energy market in the world, from Cape to Cairo. The Zambia-Tanzania interconnector will lead towards market expansion for participating countries, improvement in their energy security, facilitate the diversification of energy sources, enable the sharing of generation reserves, and optimize the cost of electricity supply through trade, both regionally and for participating countries such as Zambia, specifically.

ZESCO, as an intended implementing agency for the SOP2 Project, has started preparation of the Project.

Cities and Infrastructure for Growth Zambia (CIGZambia) is a facility set up with the objective of providing high quality independent technical advice and assistance to Zambian government bodies and private sector organisations engaged in projects and programmes that will help harness the potential of Zambia's cities and towns to act as drivers for economic growth and job creation. CIGZambia is funded by the UK Foreign, Commonwealth and Development Office (FCDO). CIGZambia is currently assisting the Ministry of Energy to prepare Zambia's first Integrated Resources Plan (IRP) for the electricity sector and to close the financing gap to realise the IRP's objectives. A set of energy projects have been identified as requiring CIGZambia's support and the ZTIP is one of them, which are expected to raise financing and are aligned to the IRP.

The World Bank has agreed in principle to provide the majority of the financing for the Project, with a budgetary estimate of \$280M including associated project management and capacity building costs. The Project is likely to be co-financed with smaller contributions from EU and UK Government through FCDO.

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## 1.3 PROJECT DEVELOPMENT PROCESS

The Zambia-Tanzania Interconnector Project (ZTIP) has significantly evolved since its initiation in late 2013. The Project was then coordinated by the Nile Basin Initiative / Nile Equatorial Lakes Subsidiary Action Program (NBI/NELSAP). The original design aimed at connecting the cities of Mbeya (Tanzania) and Kasama (Zambia). This design was later reconsidered to reach the city of Kabwe in Zambia, allowing for improved interconnection of the respective countries' electrical networks. This alternative design kept the Mbeya to Kasama link but also included a link between Nakonde (in Zambia, near the Tanzania-Zambia border) and Mpika (Zambia), and an additional link between Mpika and Kabwe.

In 2015-16, the design was again revised for the section in Zambia, abandoning the Nakonde - Mpika link and replacing it by a link between Kasama and Mpika. In 2017, the design was further refined to reduce the length of the line without reducing the power transmission capacity. The Mpika-Kabwe section was shortened by relocating the end point of the line in Pensulo.

An environmental and social scoping report was then prepared in early 2017, to present the retained design for the Zambian section of the Project to the Zambia Environmental Management Agency (ZEMA). This scoping report included the proposed terms of reference for conduction of the present Environmental and Social Impact Assessment (ESIA) and Resettlement Action Plan (RAP), covering the retained Project design, and was submitted to ZEMA on June 1, 2017. The Scoping Report and corresponding Terms of Reference (ToRs) were then approved by ZEMA through a letter to ZESCO dated June 27, 2017. A draft ESIA and Environmental and Social Management Plan (ESMP) were then produced and submitted to ZESCO in October 2017.

The design was again revisited in 2019 and the following adjustments were made:

- A new alignment proposed between Mpika and Pensulo to reduce the overall length and the amount of required vegetation clearing. The revised alignment does not encroach on Kasanka National Park's bird migration area, avoids planned development land within the Lavushi Manda District Council, and avoids a farm block of concern;
- A new alignment proposed to avoid wetlands/dambo areas and farm holdings;
- A route adjustment south of Kasama to reduce the number of river crossings and to follow existing linear disturbance.

An ESIA, an ESMP and a revised RAP were produced to reflect the 2019 route refinement and updates related to decommissioning, cumulative impacts, gender-based violence, sexual exploitation and abuse, and aspects of the biological environment (i.e., birds, large mammals, bats, protected areas, etc.). These updates were completed in compliance with national requirements and with the outdated World Bank's Operational Policies. The ESIA was submitted to ZEMA on October 25, 2023, and a decision letter (ref.: ZEMA/EIA/EIS/EAC17/924) was delivered by ZEMA on March 19, 2024 (see Appendix 1-1).

In parallel, ZESCO conducted an Environmental Impact Statement (EIS) and a Resettlement and Compensation Action Plan (RCAP) of a second line from Kasama to Nakonde, as part of a project under a Chinese contractor (ICBC funding) based on a single circuit 330 kV line design which was approved by ZEMA in 2017 (see Decision letter of August 1, 2017, ref.: ZEMA/EIA/EIS/540 in Appendix 1-2). Structures affected by the project were compensated for, and the owners have since been relocated.

At that time, there were thus two proposals for the Kasama Nakonde stretch running parallel, the ICBC project and the ZTIP Phase II Project. The contract under the ICBC funding was cancelled in 2022 and it was therefore proposed that the ZTIP shall use the wayleave for the Kasama-Nakonde single circuit 330kV line under ICBC funding. The revised scope shall have both lines as a double circuit 330kV line on single structure.

ZEMA, on August 8, 2023, has granted ZESCO a No Objection to the extension of the validity of the Decision Letter for this line section (see Appendix 1-3). The alignment for the section in between Pensulo and Kasama remains the same. The ZTIP main components are now:

- The Kasama-Nakonde section which consists of:
  - 212 km of a 330kV double-circuit transmission line from Kasama to Nakonde;
  - A new 330/132/66kV substation at Nakonde (including installation of dynamic voltage support devices [ $\pm 250$  MVar SVC or STATCOM]);
  - 15 km of a 400kV double-circuit transmission line from Nakonde to the Zambia – Tanzania border;
  - 12 km of a 132kV double circuit from Nakonde to Isoka (loop in and out of 66kV Isoka - Nakonde line).
- The Pensulo-Kasama section which consists of:
  - 386 km of a 330kV single-circuit transmission line between the Pensulo and Kasama Substations, via the Mpika Substation; this line will be more or less parallel to an existing 330kV single-circuit transmission line (Pensulo to Mpika 186 km and Mpika to Kasama 200 km);
  - Expansion works on the existing substations at Pensulo, Mpika and Kasama;
  - Installation of Dynamic Voltage Support Device ( $\pm 250$  MVar SVC or STATCOM) and associated substation works at Pensulo Substation.

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## 1.4 REPORT OBJECTIVES AND CONTENTS

All project components are covered by a valid Decision letter by ZEMA. The completion of an updated Environmental and Social Impact Assessment and Environmental and Social Management Plan that meet the Zambian and World Bank's requirements is the main pre-condition for the submission to the Board of the World Bank for the funding of the ZTIP. A full update of these documents will be completed to meet the requirements of the Zambian standards (primarily set by the Zambian Environmental Management Agency (ZEMA)) and the most recent applicable World Bank Environmental and Social Standards (ESS) and associated environment, health and safety (EHS) guidelines (general and Electric Power Transmission and Distribution). This ESMP is derived from the ESIA and supporting specialist studies. Both the ESIA and the ESMP are integral part of the overall impact identification and management strategy.

The purpose of the ESMP is to provide a document that sets out how the main environmental, socioeconomic, and occupational health and safety (OHS) impacts, as identified in the Environmental Impact Assessment (EIA), will be managed across pre-construction, construction, and operation phases.

The ESMP identifies a set of measures and specific management plans with obligations and responsibilities of each one of the parties involved in the Project, as well as the methodology and procedures that must be followed.

Note that the ESMP will be a 'living document' that will be continually refined over the life of the Project to incorporate the most updated available information.

Before Project Implementation, a detailed Environmental and Social Management System (ESMS) shall be developed, including all tools designed to ensure compliance with policies relating to the Project's sustainable development. The ESMS will bring together all the measures to avoid, mitigate and compensate potential impact resulting from the project's pre-construction, construction and operation phases on the natural and social environments.

The main objectives of the ESMP are to:

- Describe management of mitigation measures and other environmental and social (E&S) measures to enhance E&S protection;
- Define specific environmental and social management plans and associated commitments to be developed by contractors and ZESCO;
- Identify responsibilities and timing for implementation of E&S management measures as well as costs for their implementation.

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## 1.5 REPORT STRUCTURE

The ESMP builds on information obtained in previous stages of the Project, including development of the ESIA which has involved desktop analyses, stakeholder consultations, and targeted field data collection studies. The ESMP is structured as follows:

- **Chapter 1 – Introduction:** outlines the context for the Project and ESIA;
- **Chapter 2 – Project Description:** provides a detailed description of Project components and activities covered by this ESMP;
- **Chapter 3 – Key Environmental and Social Impacts and Mitigation Measures:** summarizes impacts and provides an impact mitigation plan for the Project;
- **Chapter 4 – Specific Management Plans:** provides a clear framework to ensure compliance with the best international industry practices for Community Health and Safety, Biodiversity Management, the Grievance Redress, the Occupational Health and Safety, the Emergency Preparedness and Response, the Residual Material and Hazardous Products Management, and Cultural Heritage Management;
- **Chapter 5 – Institutional Framework:** provides a description of the institutional arrangements proposed for ensuring proper implementation of the ESMP; and ZESCO's environmental and social policies and commitments;
- **Chapter 6 – Institutional Capacity Building, Awareness Creation and Training Needs:** provides a high-level overview of the program aimed at strengthening institutional environmental and social capacity;
- **Chapter 7 – Monitoring Plan:** presents the environmental and social monitoring strategy developed to ensure proper follow-up and quantification of environmental and social effects of the Project, corrective action, management review and auditing;
- **Chapter 8 – Implementation Schedule:** provides an overview of the key logical steps necessary to ensure the efficient implementation of the ESMP, avoid redundant efforts, and allow for coordination of all key Project parties;
- **Chapter 9 – Cost Summary:** provides a summary of the preliminary ESMP costs.

As required by Zambian regulations, the ESMP is submitted as a standalone report.

## 2 PROJECT DESCRIPTION

### 2.1 OVERVIEW

The Zambia-Tanzania Interconnector Project connects the Southern African Power Pool (SAPP) and Eastern Africa Power Pool (EAPP) for the first time. SAPP currently has 12 member countries, and EAPP has 13 member countries. The interconnection between Zambia and Tanzania is the critical point of connection between the two power pools and will in the future facilitate power trading transactions between countries as far south as South Africa and as far north as Libya.

Currently, powerlines cover only a few regions of different countries and several networks are not connected. Table 2-1 and 2-2 respectively indicates the existing and projected regional interconnection of the EAPP and SAPP.

**Table 2-1 Regional Interconnection for the EAPP (Existing and Planned)**

Country	Voltage or MegaWatts	Status
Egypt and Jordania	600 MW	Existing
Egypt and Saudi Arabia	3000 MW	Proposed
Egypt and Sudan	6000 MW	Proposed
Ethiopia and Sudan	200 MW	Existing
Ethiopia and Sudan	6400 MW	Proposed
Ethiopia and Djibouti	180 MW	Existing
Ethiopia and Kenya	2000 MW	Commissioned in 2022
Uganda and Kenya	220 kV / 118 MW	Existing
Uganda and Kenya	300 MW	Existing
Uganda and Kenya	2060 MW	Proposed
Uganda and Tanzania	59 MW	Existing
Uganda and Tanzania	700 MW	Proposed
Uganda and Rwanda	250 MW	Existing
Uganda and DR-Congo	220 kV / 520 MW	Proposed
Tanzania and Kenya	400 kV (1520 MW)	To be commissioned in 2024
DR-Congo and Burundi	220 kV	Existing
DR-Congo and Rwanda	220 kV	Existing
DR-Congo and Tanzania	220 kV	Existing
Burundi, DR-Congo, and Rwanda	220 kV	Existing
DR-Congo and Burundi	220 kV	Existing

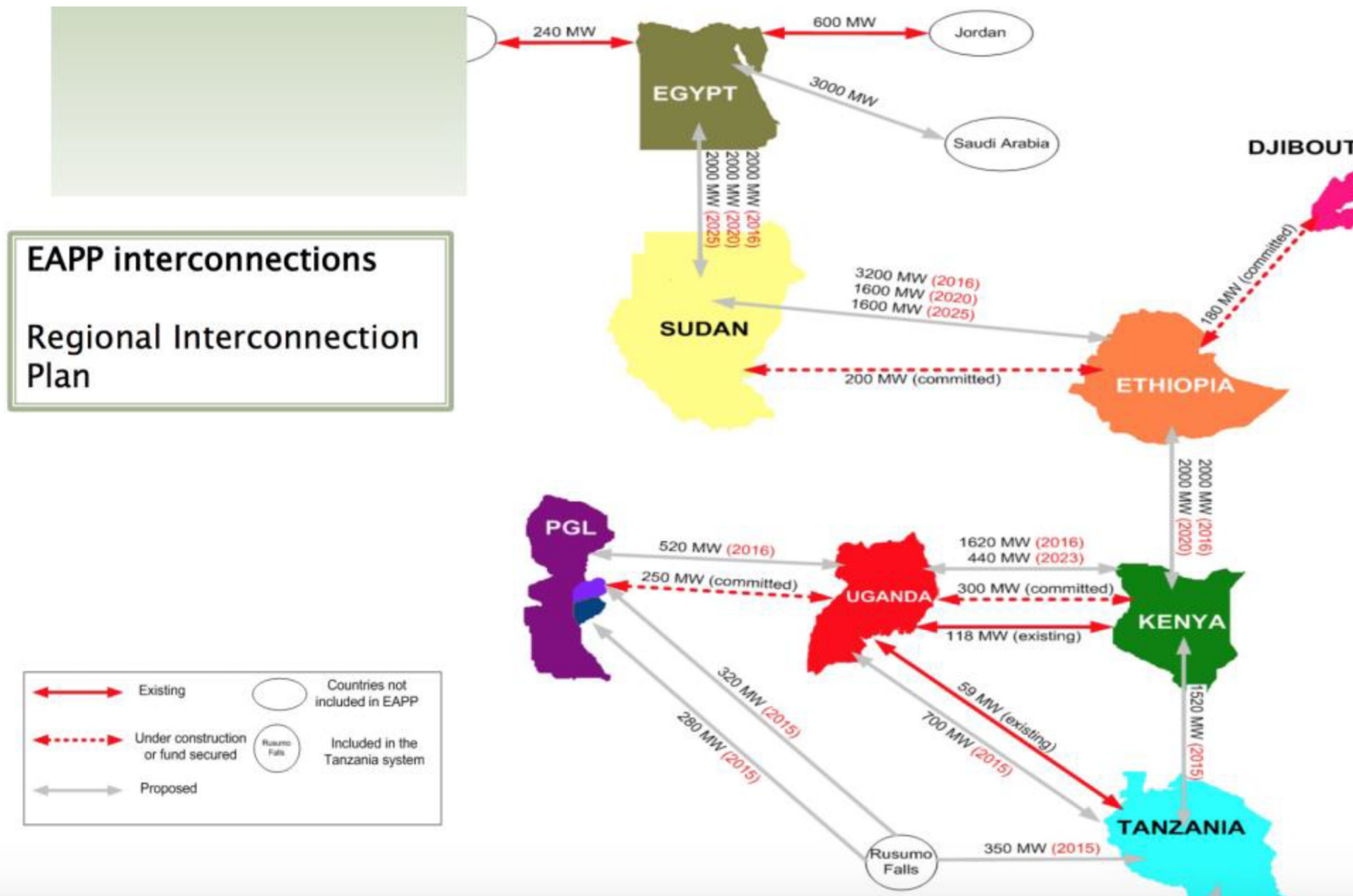
Reference: Medinilla et al. 2019.

**Table 2-2 Regional Interconnection for the SAPP (Existing and Planned)**

<b>Country</b>	<b>Voltage</b>	<b>Status</b>
Angola and Democratic Republic of Congo	To be determined	Planned
Angola and Namibia	To be determined	Planned
Bostwana and South Africa	3 X 132kV and 1 X 400kV	Existing
Bostwana and Zimbabwe	1 X 132kV and 1 X 400kV	Existing
Eswatini and South Africa	1 X 132kV and 1 X 400kV	Existing
Eswatini and Mozambique	1 X 400kV	Existing
Lesotho and South Africa	2 X 132kV	Existing
Malawi and Mozambique	400kV	Planned
Mozambique and South Africa	1 X 533kV, 1 X 220kV and 1X 110kV	Existing
Zambia and Democratic Republic of Congo	3 X 220kV	Existing
Zambia and Democratic Republic of Congo	2 X 330kV	Planned
Mozambique and Zambia	2 X 400kV	Planned
Mozambique and Zimbabwe	1 X 330kV	Existing
Namibia and South Africa	1 X 400kV	Existing
Tanzania and Zambia	2 X 330kV	Planned
Zambia and Zimbabwe	2 X 330kV	Existing

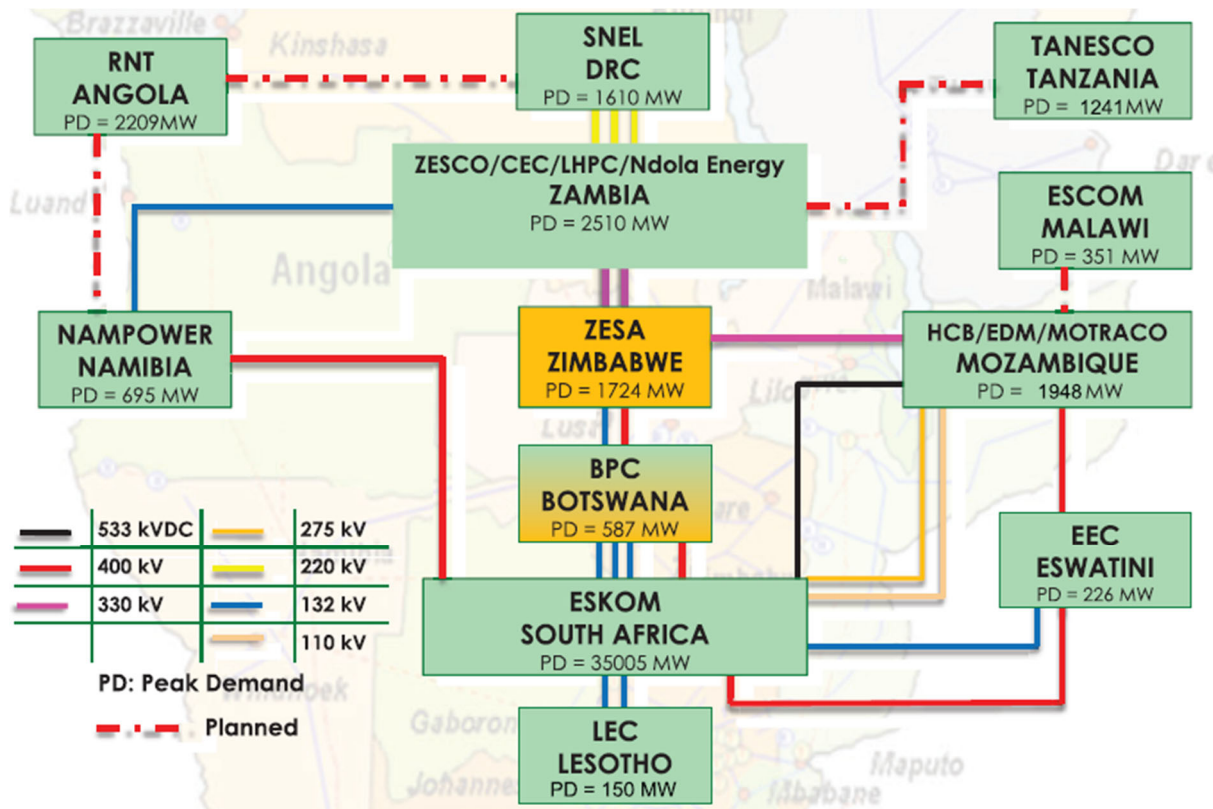
Reference: SAPP, 2021, with 2024 ZESCO LTD updates.

Figures 2-1 and 2-2 below respectively show the different interconnection projects between countries of the EAPP and the SAPP.



Reference: Medinilla et al. 2019.

**Figure 2-1 Existing and Projected Interconnection Powerlines in the Eastern Africa Power Pool**



Reference: Southern Africa Power Pool, 2021.

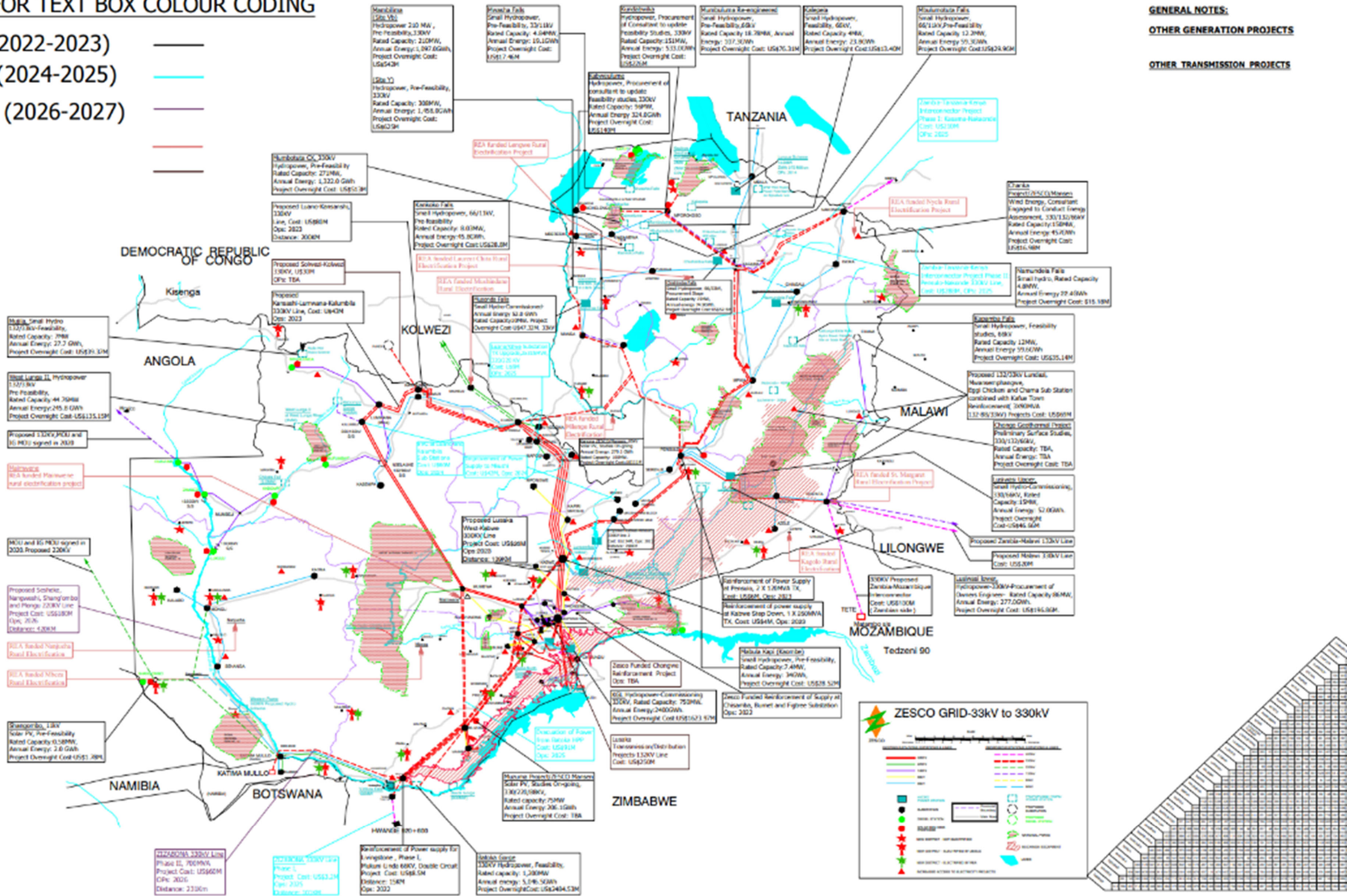
**Figure 2-2 Existing and Planned Interconnector Projects of the Southern African Power Pool**

At the regional level, interconnections help strengthen networks' reliability. Figure 2-3 shows Zambia's networks, which will be connected with the ZTIP.

**LEGEND FOR TEXT BOX COLOUR CODING**

- PHASE I (2022-2023) ———
- PHASE II (2024-2025) ———
- PHASE III (2026-2027) ———
- REA ———
- TBA ———

**GENERAL NOTES:**  
**OTHER GENERATION PROJECTS**  
**OTHER TRANSMISSION PROJECTS**



Reference: ZESCO.

**Figure 2-3 ZESCO Electricity Grid**



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## 2.2 PROJECT DESCRIPTION AND CONFIGURATION

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### 2.2.1 HISTORICAL OVERVIEW

The Zambia-Tanzania Interconnector Project (ZTIP) was initiated in September 2013, as well as a consulting services mandate awarded to WSP (at the time named GENIVAR) for the realization of the associated Environmental and Social Impact Assessment (ESIA) and Resettlement Action Plan (RAP). The global Project was initially limited to a 400kV interconnection between the substations of Mbeya (in Tanzania) and Nakonde in Zambia, and a 330kV line between Nakonde and Kasama (in Zambia) for a total approximate length of 300 km (100 km in Tanzania and 200 km in Zambia).

In 2014 and 2015, the scope of the global Project was revised to take into consideration an extension of the transmission line between Nakonde to Mpika and then to Kabwe in Zambia, which would allow for a better interconnection of the respective countries' electrical networks. Another revision completed in 2016 eliminated the link between Nakonde and Mpika and redirected it to link Kasama to Mpika. Another revision was performed in 2017 when technical studies concluded that a connection in Pensulo instead of Kabwe would yield comparable electricity transmission capacity and network interconnection, while also being approximately 250 km shorter. A last modification was made following acquired experiences and feedback from the implementation of a similar but separate 330kV transmission line project between Pensulo and Kasama and crossing the same area.

In 2021, when the most recent ESIA was completed by WSP, the Project considered the following global alignment:

- A double circuit 400kV line from Mbeya substation to a new substation in Tunduma in Tanzania, near the border with Zambia, where voltage will be stepped down to 330kV.
- A double circuit 330kV line that would continue south, crossing the border with Zambia and reaching the proposed Nakonde substation, in Zambia and continuing towards the southwest to the existing Kasama substation.
- A single circuit 330kV line that will continue further south to the existing Mpika substation, and finally to the existing Pensulo substation.
- A 132kV double circuit line from Nakonde substation which will loop in and out of the existing 66kV Isoka - Nakonde line.

This alignment amounted to 732.5 km of transmission line including 122.2 km at 400/330kV in Tanzania and 612 km at 330kV in Zambia.

The Project considered in the current ESIA update is similar to the above, except for the segment between the Nakonde and Kasama substations, which will now be a double circuit line inside the right-of-way acquired by ZESCO in between Kasama-Nakonde 330kV Project.

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## 2.2.2 GENERAL PROJECT DESCRIPTION FOR ZAMBIA

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### 2.2.2.1 CONTEXT

The ZTIP Project under study is developed through the facility set-up Cities and Infrastructure for Growth Zambia (CIGZambia). This organization's main objective is to provide high quality independent technical advice and assistance to Zambian government bodies and private sector organizations engaged in projects and programs that will help harness the potential of Zambia's cities and towns to act as drivers for economic growth and job creation. CIGZambia is funded by the UK Foreign, Commonwealth and Development Office (FCDO) and does not charge for its services.

Its main projects to date have been to support the electricity sector, with the main relevant completed projects being:

- 1 Assistance to the Ministry of Energy to prepare Zambia's first Integrated Resources Plan (IRP) for the electricity sector. The plan includes separate components relating to demand growth, generation, transmission, distribution and off-grid, and separate reports on cross-cutting impacts of climate, environment and social inclusion, implementation activities including financing and procurement, communications and monitoring and evaluation.

The IRP has now entered the implementation phase. Its main recommendations contain valuable information with respect to the future investments in generation, transmission and distribution that will impact ZESCO's own strategic and business plans.

- 2 Assistance to ZESCO on the ZESCO Financial Sustainability Project through strategic advisory services to stabilize its financial performance and credit-worthiness to the point where it can be considered a viable commercial counterpart to raise funding for its own existing and planned projects in power generation, transmission and distribution, and to purchase power from Independent Power Producers ('IPPs') that have signed, or may in future sign a Power Purchase Agreement with ZESCO. In recent years, ZESCO has experienced financial distress arising from sector challenges including insufficient tariffs, the relatively high cost of new power generation from IPPs and power imports, and the effects of climate change on Zambia's main hydro plants, amongst other factors. As a result, there has been a need to regain the confidence of financiers and investors who in normal circumstances would be in a position to finance the majority of the projects recommended in the IRP, with a particular emphasis for this assignment on the projects to be implemented by, or connected to, ZESCO.

In the current context, CIGZambia is supporting the Government of Zambia to implement the IRP and close the financing gap to realize the IRP's objectives. A set of energy projects have been identified as requiring CIGZambia's support, which are expected to raise financing and are aligned to the IRP. One of the specific projects identified is the **Zambia-Tanzania Interconnector Project**.

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### 2.2.2.2 PROJECT DESCRIPTION

The ZTIP Project involves construction and operation of 330kV electricity transmission lines mounted on steel lattice pylons linking the Nakonde substation with substations in Kasama, Mpika and Pensulo. The following configurations have been adopted for the entire Project:

- Nakonde – Kasama: two 330kV lines of alternating current mounted on one row of double circuit pylons over 212 km, for a 50 m ROW.
- Kasama – Mpika – Pensulo: one 330kV line of alternating current, mounted on one row of single-circuit pylons over 386 km (Pensulo to Mpika 186 km and Mpika to Kasama 200 km), for a 50 m ROW when the new 330kV line wayleave is not paired with another existing wayleave and 35m ROW for 330kV line segments when paired with the existing 330kV line.

Other recommended ZTIP Project characteristics include:

- For the Kasama-Nakonde section:
  - A 330/132-66/33kV substation at Nakonde (including installation of dynamic voltage support device [ $\pm 250$  MVar SVC or STATCOM]);
  - 15 km of a 400kV double-circuit transmission line from Nakonde to the Zambia – Tanzania border;
  - 12 km of a 132kV double circuit from Nakonde to Isoka (loop in and out of 66kV Isoka - Nakonde line);
  - Access and maintenance roads along wayleave, where necessary.
- For the Pensulo-Kasama section:
  - Expansion works on the existing substations at Pensulo, Mpika and Kasama;
  - Installation of Dynamic Voltage Support Device ( $\pm 250$  MVar SVC or STATCOM and associated substation works at Pensulo Substation;
  - Access and maintenance roads along wayleave, where necessary.

The configurations above have been confirmed by the Project Implementation Unit and financiers and are presented in detail in the Project’s Final Design Documents.

Unless specified otherwise, all Project description information in this chapter is based on the Line Route and Substation Reports and the Preliminary overhead line design Report prepared by WSP in November 2020 (WSP, 2020a, b, c) and the revised scope as submitted by ZESCO. Transmission line corner point coordinates and substation coordinates are provided in Appendix 2-1.

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### **2.2.3 PROPOSED LINE ROUTES**

The proposed line routes design took the following aspects into consideration:

- The preferred corridors selected in the analysis of alternatives (see ESIA Chapter 4);
- The location of the proposed Nakonde substation;
- The necessity to avoid, as much as possible, the crossing of built environment (villages, groups of buildings, etc.).

The proposed line route for the segment of the double-circuit 400kV line between the Nakonde substation and the Tanzanian border starts at the Nakonde substation and extends towards the northwest for approximately one kilometer and then turns north to cross the D1 Road. It continues towards the north for 7 km and then turns to the north-east and continues straight to the border.

The proposed 12 km double-circuit 132kV transmission line starts at the proposed Nakonde 330/132kV substation, extending east in a straight line traversing Nakonde ZAFFICO Pine Plantation for a distance of approximately 1.4 km before terminating on to the existing 66kV Isoka-Nakonde line. .

As for the main double-circuit 330kV line route, it starts at the proposed location of the Nakonde substation (see Map 2-1). It then follows a section of the south side of the D1 Road towards the northwest before turning west and following the southern side of the D3 Road. The proposed alignment then leaves the side of the D3 Road and descends in a straight line towards Kasama district traversing Mungwi, Chitimukulu and Kasama National Forests respectively. After crossing the D18 Road, the alignment turns towards the southwest to bypass Kasama’s built area from the south and crossing the M1 Road before turning towards the northwest and reaches the Kasama substation.

From Kasama, the proposed line continues south following the western side of the M1 Road as well as the alignment of a recently built 330kV Pensulo-Kasama line for about 11 km, before diverging towards the west to avoid the Bwikashi farm, with which negotiations proved difficult during the Pensulo-Kasama 330kV Project construction. The line then goes in a southwestern direction for about 3 km, where it makes an angle to head in a south-south-western direction. It crosses the Pensulo-Kasama 330kV Project at kilometer point (KP) 24 and continues in the same direction until it reaches Road M1 at KP 35 and veers in a southern direction. The Project follows Road M1 for approximately 5 km before crossing to its eastern side and then crossing the TAZARA railway to get to its eastern side. It follows the TAZARA railway and M1 Road until PK 77, where it veers to the south-south-east to follow Road RD56, avoiding Chambeshi to the east and south. From there, it joins again with the Pensulo-Kasama 330kV Project, crosses it and follows its western side until reaching the Mpika substation located in the southern part of the community (see Map 2-1).

For the last segment between Mpika and Pensulo, the proposed alignment follows a southwestern route corresponding, for the most part, to the previously selected corridor 8 (see Map 2-1). It veers west after Lake Lusiwasi, at the level crossing of the town of Kanona within Kanona National Forest, to connect to the Pensulo substation from the north-east.



Boundaries and measurements shown on this document must not be used for engineering or land survey delineation. A land register analysis conducted by a land surveyor was not undertaken.



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## 2.3 PROJECT COMPONENTS

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### 2.3.1 TRANSMISSION LINE

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#### 2.3.1.1 VOLTAGE LEVEL

The Project will be operated at 330kV from the Pensulo substation to the Nakonde substation, which is the standard high-voltage tension level in Zambia. However, the last section between the Nakonde substation and the Tanzanian border will be designed and built at 400kV, but operated at 330kV.

Note that in addition to the above, the Project also includes the construction of a line segment designed at 132kV between the Nakonde substation and linking to the 66kV Isoka-Nakonde line; this is part of ZESCO's scope, to reinforce the existing network and increase reliability and security of energy supply.

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#### 2.3.1.2 NUMBER OF CIRCUITS

The Project involves three distinct line segments.

- 1 The section between the Tanzanian border and the Nakonde substation will be a double-circuit 400kV line.
- 2 The section between Kasama and Nakonde will be a double circuit 330kV line.
- 3 The section between Pensulo and Kasama will be a single circuit 330kV line and it will be operated in pair with an existing Pensulo-Kasama 330kV single circuit line.

Overall, these components will form a double-circuit interconnection with the Tanzanian network, mounted on two distinct one-circuit lines for the section between Pensulo and Kasama and on one double circuit line for the section between Kasama and Nakonde.

The pylons configuration along the line will be adapted based on voltage level and number of circuits for each section.

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#### 2.3.1.3 TOWER TYPES

Technical studies recommend selection of a combination of guyed and self-supporting lattice steel towers, as they are commonly used in Zambia. However, ZESCO is presently opting to predominantly use self-supporting steel lattice towers at the 330kV voltage level and this will be adopted for this Project. Tower characteristics that are planned in double-circuit and single-circuit scenarios are presented in the Table 2-3 below. It should be noted that pylon heights vary in function of technical requirements caused by local constraints such as topography, line spans, crossings of infrastructure, etc. Aspects of self-supporting and guyed 330 kV single-circuit towers are illustrated on Figure 2-4 while Figure 2-5 illustrates a 330 kV double-circuit DC suspension tower. Figure 2-6 shows an example of a 440 kV double circuit transmission line. Pylons drawings are included in Appendix 2-2.

**Table 2-3 Tower Characteristics<sup>1</sup>**

Characteristics	Single-circuit, Rigid suspension, 330-kV	Double-Circuit DC suspension 330-kV	Double-Circuit DC suspension 400-kV	Double Circuit suspension 132 kV
Tower heights (m from top of foundations to top of pylons)	Standard: 31 Minimum: 26.5 Maximum: 37	Standard: 44.45	Standard: 50.3 Minimum: 44.3 Maximum: 60.8	Standard: 21 Minimum: 18 Maximum: 30
Average line span (m)	400	375	400	300
Locations	Kasama to Pensulo substations	Kasama to Nakonde substations	Nakonde substation to Tanzanian border	Nakonde new substation to Nakonde –Isoka(Loop in-Loop out)



Reference: Field mission<sup>2</sup>.

**Figure 2-4 Combined Use of Self-Supporting and Guyed Single-Circuit Towers**

<sup>1</sup> Reference: AECOM, 2017. Feasibility Study and Conceptual Design of Tanzania-Zambia Power Interconnection Study. Final Feasibility Study.  
<sup>2</sup> Reference: AECOM, 2017. Feasibility Study and Conceptual Design of Tanzania-Zambia Power Interconnection Study. Final Feasibility Study.



**Figure 2-5** Typical DC suspension double-Circuit Towers



**Figure 2-6** Example of a 440 kV Double-Circuit Transmission Line

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#### 2.3.1.4 PHASE CONDUCTORS

Conductors will be the Bison type (ACSR) for the single circuit (Pensulo-Kasama) and double circuit (Kasama-Nakonde) 330kV line. Their use is justified because of their high strength parameter, necessary for very long spans and heavy loads. A bundle of 2 conductors per phase is necessary.

For the 400kV double-circuit line between the Nakonde substation and the Tanzania border, the conductors will be BlueJay type (ACSR) in bundle of 2 conductor per phase.

For the 132kV double circuit line that will loop in and out of the 66kV Isoka-Nakonde line, the conductor will be a Wolf ACSR.

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#### 2.3.1.5 FOUNDATIONS

Foundation design will be subject to re-evaluation on completion of the site geotechnical investigations. Soil properties including actual quantities of foundations for each tower type located in these soil classifications will be estimated following a full review of the geotechnical results and quantified within the Price Schedules.

- Rock Socket / Rock Anchors where solid rock is encountered
- Concrete pad and chimney: generally based on the allowable bearing capacity of each soil type
- Special foundations either piled or raft type, where soils are particularly poor.

The contractor will be fully responsible for determining the soil classification at each tower location prior to installation.

A slab foundation with reinforced concrete body consists of reinforced concrete slabs buried about 3.0 m below the ground, one for each leg of the tower. Backfilling is done with dug up material excluding organic surface matter. This foundation is adequate for firm or rigid clay soils, firm or rigid laterite soils, medium to large grained alluvial formations lying above the water table, and diggable bedrock. In firm soils the slab may be poured directly into the dug-up soil to take advantage of the better capacity of intact soil. Wider footings will be required for foundations in loose soil or soil below the water table.

When bedrock is encountered that is too hard to be excavated by an excavator, rock-anchored concrete blocks will be required to support the towers. Reinforcement bars are driven and grouted into holes bored into the rock. This type of foundation is appropriate for locations where bedrock is found less than 3.0 m below the surface and is too hard for digging without hammer tools or blasting.

Concrete pylon foundations are commonly used in Zambia.

### 2.3.1.6 RIGHT-OF-WAY

#### REQUIRED RIGHT-OF-WAY

Width of the right-of way had to be determined to satisfy minimum technical requirements and comply with the standards used by ZESCO. ROW will vary according to the voltage level.

However, width of the acquired wayleave varies along the alignment, depending on whether or not the Project is paired with another ZESCO wayleave. The additional wayleaves required can be summarized as follows (AECOM, 2017):

- 60 m for the double-circuit 400kV line between Nakonde and the Tanzanian border;
- 50 m when the new 330kV line wayleave is not paired with another existing wayleave;
- 35 m for 330kV line segments paired with the existing 330kV line present between Pensulo and Kasama;
- 32 m for the 132kV between the Nakonde substation and linking to the 66kV Isoka-Nakonde line.

#### RIGHT-OF-WAY MANAGEMENT

The current ROW management practices in Zambia, according to ZESCO officials, are described in the following table. (Table 2-4).

**Table 2-4 Current ROW Management Practices in Zambia**

Item	Practices
ROW acquisition practices	The policy currently in place at ZESCO is to acquire the entire wayleave.
Uses allowed in the ROW	Growing of seasonal low laying crops; below 2 m in height (e.g., maize, wheat, etc.) is allowed.
Uses not permitted	Growing crops exceeding 2 m in height is not allowed. As per ZESCO policy, crop(s) destroyed during construction or maintenance will be compensated for.
Policy regarding service road minimization	The ZESCO environmental guidelines urge the Contractors to only create new access roads where there are no existing ones. They are always encouraged to use and maintain existing roads.

Also, in order to maximize chances of achieving the above-mentioned ROW requirements and reduce theft of steel bracing and grounding materials from towers to a minimum, experience from other projects in the region has shown that engaging local communities along the line in maintenance and monitoring of the line can be effective.

The Consultant's other recommendations are the following:

- Within the wayleave, all structures that could be a nuisance to the safety and reliability of the network should be removed;
- In addition, ZESCO, who will be responsible for maintenance, may find it advantageous to be on good terms with the users of the ROW and to give them responsibility for vegetation control in their respective section of the ROW. This type of agreement allows the individual to continue to operate (e.g., agriculture, livestock, etc.), as long as they do not pose a risk to the network's operation. For the operations manager, these agreements help to reduce the risk of theft and vandalism on the line.

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## **2.3.2 SUBSTATIONS**

Only one substation will need to be built for the Project, that is: the Nakonde Substation. All other substations are already built but will require the addition of some new equipment in relation with the new interconnector Project. Substations configuration drawings are available in Appendix 3-3 and substations coordinates are available in Appendix 3-1.

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### **2.3.2.1 NAKONDE SUBSTATION**

The proposed substation in Nakonde District is located within Chitamba village in Chieftainess Nawaitwika area, at an altitude of 1,500 m. The proposed configuration of the 330kV and 66kV switchgear is double busbar, single circuit breaker with bypass disconnecter. The 330kV busbar shall comprise of the following (WSP Scoping Report, 2020; rev. 3):

- Double 330kV Busbar with associated Busbar CVTs;
- Two (02) x 330kV / 66kV (132kV) Transformer Bays;
- One (01) x 30 MVar 330kV Busbar Shunt Reactor Bay;
- One (01) x 330kV Bus Coupler Bay;
- One (01) x Kasama 1 - 330kV Feeder Bay with 1 x 30 MVar 330kV Line Shunt Reactor;
- Space allocation for one (01) x Kasama 2 – 330kV Future Feeder Bay – part of ZTIP Phase 2 works;
- Space for two (02) additional Feeder Bays exiting to the west in the same direction as the two (02) Kasama bays;
- Space for two (02) 330kV feeder bays exiting to the east towards Tanzania – this will be for Tunduma 1 and Tunduma 2 feeders, which will also be included in the scope for ZTIP Phase 2.

High-level scope of works at Nakonde substation shall comprise of the following:

- Two (02) x Kasama - 330kV Feeder Bays each fully equipped with 1 x 30 MVar 330kV Line Shunt Reactor Bay;
- One (01) x Tunduma 1 - 330kV Feeder Bay fully equipped;
- One (01) x Tunduma 2 - 330kV Feeder Bay fully equipped;
- Two (02) X 60MVA, 330/132kV transformer Bays;
- Isoka and Nakonde 66kV Feeder Bays ;
- 330 and 66kV Busbars complete with Buscouplers;
- One (01) x  $\pm 250$  MVar SVC or STATCOM.

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### 2.3.2.2 KASAMA SUBSTATION

The existing Kasama substation is located close to Kasama Town within Simbeye village in Senior Chief Mwamba's area at an altitude of 1,335 m. The substation has sufficient space in the existing yard to accommodate the proposed ZTIP Phase 2; the substation yard is approximately 292 m x 251 m.

The configuration of 330kV switchgear is double busbar, single circuit breaker with bypass disconnecter. The 330kV busbar comprises of the following (WSP Scoping Report, 2020; rev 3):

- Double 330kV busbar with associated busbar CVTs;
- Two (02) x 330kV/66kV Transformer Bays;
- One (01) x 30 MVar 330kV Busbar Shunt Reactor Bay;
- One (01) x 330kV Bus Coupler Bay;
- One (01) x Mpika 1 - 330kV Feeder Bay with 2 x 30 MVar 330kV Line Shunt Reactors;
- Space for multiple Feeder/Busbar Shunt Reactor Bays;

The Kasama substation scope shall be as follows:

- Two (02) x Nakonde 330kV Feeder Bays each fully equipped with 1 x 30 MVar 330kV Line Shunt Reactor Bay;
- One (01) x Mpika 330kV Feeder Bay fully equipped with 1 x 30 MVar 330kV Line Shunt Reactor Bay;
- Two (02) x Mporokoso 330kV Feeder Bays unequipped.

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### 2.3.2.3 MPIKA SUBSTATION

The existing Mpika substation is located within Yowani village in Chief Chikwanda's area at an altitude of 1,375 m. The substation comprises of 330kV and 66kV (132kV) busbars. The substation yard is approximately 201 m x 204 m.

The configuration of 330kV switchgear is double busbar, single circuit breaker with bypass disconnecter. The 330kV busbar comprises of the following (WSP Scoping Report, 2020; rev. 3):

- Double 330kV busbar with associated busbar CVTs;
- Two (02) x 330kV / 66kV (132kV) Transformer Bays;
- One (01) x 30 MVar 330kV Busbar Shunt Reactor Bay;
- One (01) x 330kV Bus Coupler Bay;
- One (01) x Pensulo 1 - 330kV Feeder Bay with 30 MVar Line Shunt Reactor;
- One (01) x Kasama 1 - 330kV Feeder Bay;
- Space for two (02) x 330kV Feeder Bays – reserved for Pensulo 2 and Kasama 2.

The Mpika substation scope shall be as follows:

- One (01) x Kasama 330kV Feeder Bay fully equipped with 1 x 30 MVar 330 kV Line Shunt Reactor Bay;
- One (01) x Pensulo 330kV Feeder Bay fully equipped with 1 x 30 MVar 330kV Line Shunt Reactor Bay;

### 2.3.2.4 PENSULO SUBSTATION

The existing Pensulo substation is located within Pensulo area of Serenje District in Chief Kabamba's Chiefdom at an altitude of 1,570 m. The Pensulo substation comprises of 330kV and 66kV busbars; the existing substation yard is approximately 240 m x 214 m.

Configuration of existing 330kV switchgear is double busbar, single circuit breaker with bypass disconnecter. The existing 330kV double busbar system at Pensulo comprises of seven (7) useable bays (WSP Scoping Report, 2020; rev. 3):

- 330kV double busbar with associated 330kV CVTs;
- Three (03) x 330kV / 66kV Transformer Bays;
- One (01) x 330kV Bus Coupler Bay;
- One (01) x Msoro 330kV Feeder Bay with 1 x 30 MVar Line Reactor;
- One (01) x Kabwe 330kV Feeder Bay;
- One (01) x Mpika 1 (“Kasama” on SLD) - 330kV Feeder Bay with 2 x 30 MVar Line Reactors;
- One (01) x Spare 330kV Feeder Bay;
- Pensulo-Kabwe line 2.

Unlike Mpika and Kasama substations, the busbar phase spacing is 5 m.

- The Pensulo substation scope shall be as follows: One (01) x Mpika 330 kV Feeder Bay fully equipped with 1 x 30 MVar 330kV Line Shunt Reactor Bay;
- One (01) x  $\pm 250$  MVar SVC or STATCOM .

### 2.3.2.5 EQUIPMENT ASSOCIATED WITH PROPOSED BAYS

The following describes the general characteristics for the substations. The electrical characteristics of the substations will be as shown in Table 2-5 below (WSP Scoping Report, 2020; rev. 3):

**Table 2-5 Substation electrical characteristics**

Description	Characteristics	
	330kV (RMS)	400kV (RMS)
Rated voltage	330kV (RMS)	400kV (RMS)
Highest system voltage	362kV (RMS)	420kV (RMS)
Neutral earthing	Solidly earthed	Solidly earthed
Nominal frequency	50 Hz	50 Hz
Rated switching impulse withstand voltage	Switchyard equipment: 950kV peak Transformer and reactor: 1050kV peak	Switchyard equipment: 1050kV peak Transformer and reactor: 1175kV peak
Rated lighting impulse withstand voltage	Switchyard equipment: 1175kV peak Transformer and reactor: 1300kV peak	Switchyard equipment: 1425kV peak Transformer and reactor: 1550kV peak
Power-frequency withstand voltage	Switchyard equipment: 510kV peak (RMS) Transformer and reactor: 560kV peak (RMS)	Switchyard equipment: 570kV peak (RMS) Transformer and reactor: 625kV peak (RMS)

Description	Characteristics	
	Rated current	2500 A except circuit breakers that are 4000 A
Rated short-term withstand current	40 kA, 3 s/ 100 kA except circuit breakers that are 50 kA, 3 s/ 125 kA	40 kA, 3 s/ 100 kA except circuit breakers that are 50 kA, 3 s/ 125 kA
Minimum insulator creepage distance	31mm/kV ( $\varnothing - \varnothing$ )	31mm/kV ( $\varnothing - \varnothing$ )

The environmental characteristics, which will be stated in the substation general specification document, are the following (Table 2-6):

**Table 2-6 Substation environmental characteristics**

Ambient air temperature	Indoor	Outdoor
Maximum	+35°C	+45°C
24-hour average, max	+21°C	
Minimum	+5°C	-1°C
Humidity	90%	100%
Average annual rainfall		1100 mm
Altitude	2000 m (design)	2000 m (design)

Table 2-7 lists the size and number of line, busbar shunt reactors and neutral compensator reactors (NCR) at each substation.

**Table 2-7 Number of line, busbar shunt reactors and neutral compensator reactors (NCR) at each substation**

Substation	Line/Bay	Shunt reactors – single phase			Neutral compensator reactor	
		Rated/highest system voltage (kV)	Rating (kVar)	Number of units	Rated system voltage (kV)	Rating (kVar/ approx. $\Omega$ )
Penulo	Pen-Mpika 1 (existing)	362/ $\sqrt{3}$	3x10000	2	35kV	15 kVAR / 3 Taps approx. 900 $\Omega$ +/- 10%
Penulo	Pen-Mpika 2 (ZTIP phase 2)	362/ $\sqrt{3}$	3x10000	1	35kV	15 kVAR / 3 Taps approx. 900 $\Omega$ +/- 10%
Mpika	Mpika-Pen 1 (existing)	362/ $\sqrt{3}$	3x10000	1	35kV	15 kVAR / 3 Taps approx. 900 $\Omega$ +/- 10%
Mpika	Mpika-Pen 2 (ZTIP phase 2)	362/ $\sqrt{3}$	3x10000	1	35kV	15 kVAR / 3 Taps approx. 900 $\Omega$ +/- 10%
Mpika	Mpika-Kasama 1 (existing)	362/ $\sqrt{3}$	3x10000	1	35kV	15 kVAR / 3 Taps approx. 900 $\Omega$ +/- 10%
Mpika	Mpika-Kasama 2 (ZTIP phase 2)	362/ $\sqrt{3}$	3x10000	1	35kV	15 kVAR / 3 Taps approx. 900 $\Omega$ +/- 10%
Mpika	Busbar shunt reactor 1 (existing)	362/ $\sqrt{3}$	3x10000	1	N/A	N/A
Kasama	Kasama-Mpika 1 (existing)	362/ $\sqrt{3}$	3x10000	2	35kV	16 kVAR / 3 Taps approx. 1000 $\Omega$ +/- 10%
Kasama	Kasama-Mpika 2 (ZTIP phase 2)	362/ $\sqrt{3}$	3x10000	1	35kV	16 kVAR / 3 Taps approx. 1000 $\Omega$ +/- 10%
Kasama	Kasama-Nakonde 1 (ZTIP phase 2)	62/ $\sqrt{3}$	3x10000	1	35kV	16 kVAR / 3 Taps approx. 1000 $\Omega$ +/- 10%

Substation	Line/Bay	Shunt reactors – single phase			Neutral compensator reactor	
		Rated/highest system voltage (kV)	Rating (kVar)	Number of units	Rated system voltage (kV)	Rating (kVar/ approx. $\Omega$ )
Kasama	Kasama-Nakonde 2 (ZTIP phase 2)	362/ $\sqrt{3}$	3x10000	1	35kV	16 kVAR / 3 Taps approx. 1000 $\Omega$ +/- 10%
Kasama	Busbar shunt reactor 1 (existing)	362/ $\sqrt{3}$	3x10000	1	N/A	N/A
Nakonde	Nakonde-Kasama 1 (ZTIP phase 2)	62/ $\sqrt{3}$	3x10000	1	35kV	16 kVAR / 3 Taps approx. 1000 $\Omega$ +/- 10% - TBC
Nakonde	Nakonde-Kasama 2 (ZTIP phase 2)	362/ $\sqrt{3}$	3x10000	1	35kV	16 kVAR / 3 Taps approx. 1000 $\Omega$ +/- 10% - TBC
Nakonde	Busbar shunt reactor 1 (future)	362/ $\sqrt{3}$	3x10000	1	N/A	N/A

### 2.3.3 TEMPORARY FACILITIES

During construction, it will be necessary to establish temporary facilities and installations where required:

- Construction camps,
- Access roads,
- Laydown and storage areas,
- Concrete facilities, etc.

Construction activities are forecasted to include the following activities, as per detailed in the ESIA: site preparation, transportation and traffic circulation, construction (including tower erection, stringing works, etc.), and waste management and hazardous materials management. Those broad categories will be defined in more detail by the Contractor at the beginning of the assignment, during the pre-construction phase, when the Contractor will develop various construction plans.

The location and extent of these components are not yet known and will be the Contractor's responsibility.

## 2.4 PROJECT COSTS AND SCHEDULE

The budgetary estimate for the Project is \$285M, including associated project management and capacity building costs. The World Bank has agreed in principle to provide most of the financing for the Project.

The Project is likely to be co-financed with smaller contributions from the European Union (EU) and United Kingdom (UK) Government through the Foreign, Commonwealth and Development Office (FCDO). The Project will be implemented by ZESCO and incorporated within ZESCO's Transmission Division.

As for implementation schedule, activities starting from the start-up meeting of the construction contract to commissioning, are planned to require 24 months. The first months will be dedicated to preparation activities such as detailed survey, preparation of construction schedule, detailed design, etc. Field construction activities are planned to begin at month 7, and therefore it will last 17 months. Details of the construction schedule are provided in Appendix 2-4.

Some uncertainty remains however, regarding the preparation time that will be needed to reach the effective date of contract commencement. Among others, are delays for resettlement actions, which will be spread over a considerable period of time (estimate provided in standalone RAP). It is therefore not possible to predict with accuracy the beginning of construction activities without considering the implementation schedule for the Resettlement Action Plan (RAP).

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## **2.5 PROJECT REQUIREMENTS**

The Project will require various locally available construction materials for construction of the transmission line. Such locally sourced materials required for construction work include aggregates, gravel or crushed stone, sand and water. These will be sourced in areas within the footprint of the Project site.

Detailed Project requirements are not available at this stage of the Project design and will be detailed in construction plans by the Contractor, once a contractor has been selected. However, in line with ESS 1, sourcing of construction materials will be subject to environmental and social due diligence processes to ensure that such materials are sourced from compliant facilities. The due diligence process will be under the Contractor's responsibility, with oversight from the PIU.

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### **2.5.1 AGGREGATES, GRAVEL, AND SAND**

Aggregates, gravel, and sand will mostly be required for installation of pylon foundations. Required volumes are not known at this stage and are to be confirmed by the selected Contractor; however, these are estimated at 35,000 tonnes of aggregate, 15,000 tonnes of sand, and 20,000 tonnes of gravel. They will be sourced locally as much as possible, and if not, these will be transported by trucks to the Project site. Once the test results indicate their suitability for work, agreements can be made with the quarry or landowners for production to meet the Project requirements.

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### **2.5.2 WATER**

Water will also be required for Project construction work. The source of water for the construction work will be from the local suitable streams that cross the Project area or water boreholes. Required volumes of water will be confirmed ahead of construction by the Contractor, but it is currently estimated that approximately 400,000 liters of water may be required. The Contractor will need to obtain required water use permits.

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### **2.5.3 PERSONNEL**

Although the number of workers to be employed is not yet established, it is expected that at the peak of the construction phase, as many as 600 workers will be employed. Of the 600 employed during construction, approximately 120 shall work for the Project for the duration of the construction period via contracts with the prime Contractor and their subcontractors. It is estimated that approximately 20% of employees will be skilled and 80% will be unskilled. It is also expected that approximately 85% of employees will be local and 15% will be regional or international.

The types of positions that may be created during the construction include civil work and installation service supervision (local or external personnel), expert level pre-commissioning work (external personnel), design work (external personnel), administration (local and external personnel), and shipment, logistics, and local transportation (local and external personnel). Additionally, informal jobs may be created by the Project through the supply of food and consumables to contractor camp sites.

After construction, the Project will be managed by the existing workforce in ZESCO. Direct job creation during operation and maintenance is estimated to remain low because associated activities will be completed by the established organizational structure in place.

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## **2.5.4 CAMP SITES**

The Contractor shall provide, maintain and operate, under a competent Manager, such camps and facilities necessary for maintaining an efficient and safe working environment for housing, feeding and accommodation of all employees. The location, construction, operation and maintenance of such camps and facilities shall be subject to the approval of the Supervising Engineer. The Project will require two types of camp sites; substation and transmission line camps. The substation camps are normally nearest to the substations and the line site camps are far away from towns and substations (normally over 50 km).

Regardless of the approval of the Supervising Engineer, the Contractor shall comply with all local laws and regulations that affect the buildings, maintenance or operation of the camps, and shall be responsible for any or all damages or claims resulting from inadequate or improper location of facilities or operations. The camps shall be designed accordingly.

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## **2.5.5 LOCAL SUPPLIES AND SERVICES (FOOD, MEDICAL ATTENTION, AND FUEL)**

The most likely way to get food for workers is from nearby villages. Although it is anticipated that approximately 648 tonnes of food will be required (e.g., carbohydrates, fat, and proteins), the exact mechanisms for this provision still need to be determined in order to not impair local food resources.

Health treatments will be from District Hospitals on an as needed basis (i.e., monthly malaria treatment for 6 months of the year, for a two-year period, and treatment for STI's).

It is expected that approximately 2 million liters of diesel fuel will be required, which will be sourced in bulk.

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## **2.5.6 ELECTRICITY**

Power during construction will be supplied from generators. During operation, electricity will be taken on the ZESCO network.

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# **2.6 PROJECT ACTIVITIES**

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## **2.6.1 PRE-CONSTRUCTION PHASE**

The pre-construction phase will start once all studies are completed and the Project is ready to be implemented. The main activities being conducted at different stages include:

- Labour recruitment, including hiring of local and foreign workers.
- Land acquisition and resettlement of affected persons and assets, which will include displacement of economic activities.
- Site preparation: site preparation activities, including establishment of equipment storage yards and worker camps, vegetation clearing, removal of topsoil, excavation, earthworks and construction of access roads. The exact size and location of the storage yards and worker camps remain to be specified. The extent and configuration of vegetation clearing will require only strips of land to be cleared due to it being for line construction and certain access roads.

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## **2.6.2 CONSTRUCTION PHASE**

The construction phase will mainly involve the following activities:

- Transportation and traffic: road transportation of materials, equipment and workers to and from the site, including fueling and maintenance of vehicles and machinery.
- Construction activities: construction of the power transmission line and substations, including temporary facilities used during the work phase, such as borrow pits, as well as the erection of towers and stringing of conductors.
- Waste and hazardous materials management: management and storage of waste, hazardous substances and other materials to be removed, including hydrocarbons.
- Purchase of materials, goods and services: purchases required for the construction of the power transmission line and substations.
- Presence of workers: presence of the construction workforce, including hiring foreign and local skilled/unskilled workers, as well as the installation and operation of construction work camps.

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## **2.6.3 OPERATION PHASE**

The following activities are expected during the operation phase:

- Presence and operation of line, substations and access roads: presence and operation of facilities.
- Transportation and traffic: road transportation of materials and equipment, including vehicle fueling and maintenance.
- Maintenance and repairs: inspection, maintenance and repair of conductors, towers and structures in substations, as well as ROW maintenance.
- Waste and hazardous materials management: handling operations and storage of hazardous waste used during the operation, including oil used in transformers at substations.
- Purchase of materials, goods and services: purchases required for the operation of the substations and the transmission line.
- Presence of workers: hiring local and foreign workers, as appropriate, and presence of employees operating substations and during maintenance along the line.

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## **2.6.4 DECOMMISSIONING PHASE**

The Project, like other transmission lines, involves the construction of permanent electricity infrastructure, and therefore, it is not envisaged that the transmission line will be decommissioned soon. However, after the Project's operational design lifespan, a reassessment of the status of the transmission line shall be carried out. The decommissioning phase refers to all activities related to the proposed transmission line when it is no longer in use.

The following activities could be expected during the decommissioning phase:

- Decommissioning activities: dismantling of equipment, including lines, transmission towers, substations and other associated components; removal of temporary structures, landscaping, clearing of the ROW and access roads, filling in pylon locations, removal of construction materials and waste, levelling, sloping and revegetation.
- Transportation and traffic: traffic related to vehicle transport of materials, goods and workers associated with the decommissioning work, removal or handover of service roads and construction access roads.

- Waste and hazardous materials management: safe disposal of waste generated by dismantling of equipment.
- Purchase of materials, goods and services: purchases required for operation of the worker camps.
- Presence of workers: presence of the construction workforce, including hiring of foreign and local skilled/unskilled workers, as well as the installation and operation of construction work camps.

The proposed Project has a design lifespan of 50 years, after which the performance of the Project scales to diminishing. A detailed decommissioning plan should be prepared at the end of the Project life for approval by ZEMA before implementation. This plan shall contain at a minimum:

- Procedures for decommissioning,
- outcomes of consultations,
- Preliminary identification of potential impacts, and
- preliminary identification of mitigation measures.

The incorporation of remediation plans into the overall Project planning is essential because it allows proponents to understand the need to restore the environment to its original state or near its original state when decommissioning and remediation plans are being conceptualized.



# 3 KEY ENVIRONMENTAL AND SOCIAL IMPACTS AND MITIGATION MEASURES

## 3.1 ENVIRONMENTAL AND SOCIAL MITIGATION MEASURES

The proposed environmental and social measures to mitigate or maximize the Project’s impacts during the preconstruction, construction, operation and maintenance, and decommissioning phases are summarized in Tables 3-2 (pre-construction and construction), 3-3 (operation and maintenance), and 3-4 (decommissioning). For each potential impact, the proposed management measures are described, associated costs are assessed, and the parties responsible for their implementation are identified.

Key mitigation measures are proposed in these tables. However, these measures are supplemented by the proposed specific management plans described in Chapter 4 of the ESMP.

The mitigation measures provided in this chapter for terrestrial flora, avifauna, terrestrial fauna, aquatic habitats and associated fauna, land use and tenure, built environment, health and safety, gender and gender-based violence, and communities and social cohesion, together with the measures proposed in the specific management plans are also appropriate for reducing cumulative impacts with other current and future projects.

Additionally, several design measures, to be considered by the Supervising Engineer and Contractor and integrated in the detailed design of the project and , have been recommended. These are summarized in the section below to facilitate easy consideration and mainstreaming E&S considerations into the Design to be finalized and used.

### 3.1.1 SUMMARY OF DESIGN MEASURES

Environmental and social measures proposed to mitigate negative impacts to be included in the design are presented in Table 3-1.

**Table 3-1 Summary of Design Measures**

<b>Environmental and Social Components</b>	<b>Design measure</b>
Hydrography and water resources	<ul style="list-style-type: none"><li>– At large water and floodplain crossings, detailed design shall aim to minimize encroachment within the floodplain and select exact location for towers that will ensure minimal disturbances on local hydrology and floodplain.</li></ul>
Climate Change Resilience	<ul style="list-style-type: none"><li>– Assess local flood risk for substations and determine if flood monitoring and/or flood proofing is required.</li><li>– Consider impacts of extreme rainfall and flooding as well as drought impacts on soil stability for pylon and substation foundation design.</li><li>– Consider future temperature Projections in transmission line and substation design.</li><li>– Consider future wind Projections in pylon design.</li></ul>
Natural Habitat	<ul style="list-style-type: none"><li>– Limit powerline crossing in natural habitats.</li><li>– Promote the selection of areas of modified habitat for the installation of temporary work and storage areas.</li></ul>

Environmental and Social Components	Design measure
Avifauna	<ul style="list-style-type: none"> <li>– Where the powerline is parallel to another powerline, both should have the same elevation to avoid creating a larger obstacle.</li> <li>– In High, Medium-high, and Medium sensitivity habitats (see Maps 4-1 to 4-3) and according to observations made during pre-construction walkover surveys (see above), install bird flight diverters on both earth wires in a staggered pattern, using alternating colours and installation on the full-earth wire/ground wire span length.</li> <li>– Ensure the distance between conductors is above 3 m to avoid electrocution of large birds.</li> </ul>
Aquatic habitats and associated fauna	<ul style="list-style-type: none"> <li>– Tower siting inside wetlands will be avoided where possible, and access roads will be placed to avoid wetland areas.</li> <li>– Use longer spans between power lines, spanning across rivers and wetlands, to avoid erecting structures in these habitats.</li> <li>– To ensure minimal tree loss, the width of cleared areas should be reduced to a minimum where the line crosses riverine forests, including the Mungwi Forest Reserve. Clearing only 10 m of riverine forest vegetation to accommodate conductor stringing should be considered.</li> </ul>
Critical habitat	<ul style="list-style-type: none"> <li>– Avoid as much as possible infrastructure (including pylons siting) within wet grasslands and dambos considered critical for <i>Disa aequiloba</i>. Use longer spans between power lines to avoid erecting structures in these habitats.</li> <li>– Ensure no access roads are built and no temporary construction area are placed within wet grasslands and dambos considered critical for <i>Disa aequiloba</i></li> <li>– Avoid as much as possible infrastructure (including pylons siting) within rock outcrop habitat in Kasama Forest Reserve (<i>Euphorbia perplexa var kasamana</i> critical habitat). Use longer spans between power lines to avoid erecting structures in this habitat.</li> <li>– Ensure no access roads are built and no temporary construction area are placed within rock outcrop habitat in the Kasama Forest Reserve (<i>Euphorbia perplexa var kasamana</i> critical habitat).</li> <li>– Conduct line route optimization to avoid rock outcrops in proximity and within the Kasama Forest Reserve.</li> </ul>
Land use and tenure	<ul style="list-style-type: none"> <li>– Optimize ROW to avoid sensitive areas identified during detailed census such as cultural heritage resources.</li> <li>– Adjust the length of the span to avoid or reduce site-specific tower pad impacts. Select carefully tower locations to reduce impacts on land-uses</li> </ul>
Infrastructure	<ul style="list-style-type: none"> <li>– Use adequate measures during design to avoid potential interference with electrical appliances in households living near the powerline.</li> </ul>
Cultural and archeological Heritage	<ul style="list-style-type: none"> <li>– Conduct line route optimization to avoid rock outcrops in proximity and within the Mwela Rock Art site.</li> <li>– Monopole structures should be encouraged in case the transmission line passes through or near the Mwela Rock Art monument area since they have a thinner profile and a simpler presence than lattice structures.</li> <li>– Reroute the line route at the margins of the Mwela Rock Art site to reduce encroachment within the rock outcrops areas</li> <li>– In consultation with affected communities, find an optimized line route if the ROW encroaches into a sacred forest.</li> <li>– Adjust pylon spacing to avoid the cemeteries and sacred sites.</li> </ul>
Landscape	<ul style="list-style-type: none"> <li>– Choose subdued colours for the substations to harmonize them with their environment.</li> </ul>
Safety and Public Health	<ul style="list-style-type: none"> <li>– Install markers to minimize risk of low-flying aircrafts in aircraft pathways</li> <li>– Install downward-facing security lighting at the substations to help avoid or reduce light pollution.</li> </ul>

### 3.1.2 PRE-CONSTRUCTION AND CONSTRUCTION

Environmental and social measures proposed to mitigate negative impacts or enhance positive impacts during the preconstruction and construction phase are presented in Table 3-2.

**Table 3-2 Management Measures to be Implemented during the Pre-Construction and Construction Phases**

Potential Impacts Addressed	Sources of Impact	Management Measures	Responsibilities	Implementation Timing	Performance Indicators	Cost (USD)
Cross-cutting	Cross-cutting	Develop and implement Contractor's ESMP (C-ESMP) which will translate the present chapter's requirements into detailed actions to be carried out during construction works, including implementation of mitigation measures and environmental and social monitoring. The C-ESMP is to cover all elements under the Contractor's control (i.e., construction works), considers detailed specifications of activities to be conducted during construction, and specific locations where they will be conducted. Integrate requirements of WBG EHS Guidelines for Electric Power Transmission and Distribution (see Appendix 3-1).	Development: Contractor Approval: the C-ESMP should be reviewed and approved by the Client/Supervision Consultant (in consultation with the Design Engineers) and the World Bank before construction of the TL can proceed.	Development prior to and implementation during the construction phase.	No construction works undertaken before approval of Final C-ESMP. C-ESMP covers all construction-related impacts and mitigation measures listed in the present table and the specific management plans under the Contractor's responsibility.	Included in construction contract.
Cross-cutting	Cross-cutting	Develop and implement ZESCO's Safety, Health Environment and Quality (SHEQ) Management System incorporating the following elements: (i) policy, (ii) identification of risks and impacts, (iii) management programs, (iv) organizational capacity and competency, (v) emergency preparedness and response, (vi) stakeholder engagement, and (vii) monitoring and review. Implement the ESMS during construction and operation. See SHEQ Policy attached as Appendix 3-2.	Development and implementation: ZESCO	Development prior to and implementation during construction phase	No construction works to be undertaken before ESMS is approved.	\$250,000
Cross-cutting	Cross-cutting	Obtain all required permits and authorizations before initiating construction works, including the followings that are required for the construction of a transmission line: <ul style="list-style-type: none"> <li>- Construction permits from the Energy Regulation Board.</li> <li>- Environmental clearance from ZEMA which entails the completion of an EIA for the project as well as environmental project briefs for certain activities during construction including borrow pits.</li> <li>- Approval from local authorities to ensure the project aligns with their land use plans.</li> <li>- Approval for using the wayleave which involves negotiating with landowner and compensating them for the use of their land.</li> <li>- Approval from the National Heritage Conservation Commission for crossing Mwela Rock Site and any other heritage sites.</li> <li>- Permit from the Water Resources Management Authority for water abstraction as part of the project.</li> <li>- Approval from the Department of National Parks and Wildlife for crossing protected areas.</li> </ul> Implement all conditions of permits and authorizations.	ZESCO/Contractor	Obtain required permits prior to the construction phase and implement conditions before and during construction, as appropriate.	No construction works undertaken before all required permits and authorizations are secured.	Included in the construction contract.
Cross-cutting	Cross-cutting	Ensure environmental Project Briefs are submitted and approved for borrow sites.	Contractor	Submit Project Briefs for borrow sites and obtain authorizations prior to their exploitation.	No borrow sites exploited before all authorizations secured.	Included in the construction contract.
Temporary air quality deterioration	Site preparation Construction activities Transportation and circulation Worksite restoration.	Cover the bucket of trucks carrying bulk material and waste.	Implementation: Contractor Monitoring: Supervising Engineer	Throughout the construction phase	Driver to provide a completed checklist of truck verifications, including Bucket cover item.	Included in Contractor costs
		Limit speed to 20 km/h in sensitive areas, on unpaved roads, and on access roads in the work area, especially during dry and dusty periods.	Implementation: Contractor Monitoring: Supervising Engineer	Throughout the construction phase	Daily inspection by the Contractor of construction areas for excessive nuisance dust, noise, and air pollutants. Contractor/Supervising Engineer will maintain records of complaints on noise and air quality and follow up with corrective measures.	Included in Contractor costs
		Define a vehicle and machinery traffic strategy that limits the distance to cover and that avoids sensitive areas (residential areas, hospitals, schools). Inform drivers of this strategy and set up clear signage to promote compliance.	Implementation: Contractor Monitoring: Supervising Engineer	Throughout the construction phase	Traffic to enter construction area through one (and the same) entry point and exit through another (and same) exit point. At the exit point, implement a wheel washing system (if possible) or a series of speed bumps.	Included in Contractor costs

Potential Impacts Addressed	Sources of Impact	Management Measures	Responsibilities	Implementation Timing	Performance Indicators	Cost (USD)
		Use water for dust suppression on stockpiles, exposed soils and roads if dust generation is visible.	Implementation: Contractor Monitoring: Supervising Engineer	Throughout the construction phase	Daily inspection by the Contractor of construction areas for excessive nuisance dust, noise, and air pollutants. Contractor/Supervising Engineer to maintain records of complaints on noise and air quality, and follow-up with corrective measures.	Included in Contractor costs
		Locate activities most likely to generate dust (storage of excavated and backfill materials) away from sensitive areas.	Implementation: Contractor Monitoring: Supervising Engineer	Throughout the construction phase	Implement long slope for backfill dump sites and/or use burlap covers.	Included in Contractor costs
		Avoid handling soil/granular materials during periods of high winds (+ 2.5 m/s) and limit, where possible, the drop height to 2 m when depositing them (in truck buckets, on a pile, etc.).	Implementation: Contractor Monitoring: Supervising Engineer	Throughout the construction phase	Visual plumes of dust. Related to activity to be monitored.	Included in Contractor costs
		Cover the piles of materials containing fine particles with a tarpaulin, at least during periods of strong winds (+2.5 m/s) and loads of brittle material during transport. For piles that cannot be covered, spray them with water regularly.	Implementation: Contractor Monitoring: Supervising Engineer	Throughout the construction phase	Daily inspection by the Contractor of construction areas for excessive nuisance dust, noise, and air pollutants. Contractor/Supervising Engineer to maintain records of complaints on noise and air quality, and follow-up with corrective measures.	Included in Contractor costs
		When needed, erect speed calming structures such as humps along project roads, especially in inhabited/ residential areas	Implementation: Contractor Monitoring: Supervising Engineer	Throughout the construction phase	Calming structures installed in inhabited/ residential areas	Included in Contractor costs
		Develop and use a specific Code of Conduct for drivers to check errant behavior including speeding	Implementation: Contractor Monitoring: Supervising Engineer	Throughout the construction phase	Code of Conduct approved approved by Supervising Engineer prior to initiation of the construction phase.	Included in Contractor costs
		Conduct regular tool-box talks on safe and responsible driving	Implementation: Contractor Monitoring: Supervising Engineer	Throughout the construction phase	Register of tool-box talks conducted for each driver	Included in Contractor costs
		Develop and implement a Pollution Prevention Management Plan including measures to protect air quality	Implementation: Contractor Monitoring: Supervising Engineer and PIU	Prior to and throughout the construction phase	Pollution Prevention Management Plan approved by Supervising Engineer prior to initiation of the construction phase.	Included in Contractor costs
		Develop and implement a Residual Material and Hazardous Products Management Plan in compliance with WBG EHS Guidelines on waste management (see Appendix 3-3).	Implementation: Contractor Monitoring: Supervising Engineer	Development prior to, and implementation during, construction phase	Residual Material and Hazardous Products Management Plan approved by Supervising Engineer prior to initiation of the construction phase.	Included in Contractor costs
		Maintain equipment and machinery in good running condition, including brakes, mufflers, silencers, and catalyzers, and clean (power washed), free of leaks, excess oil and grease.	Implementation: Contractor Monitoring: Supervising Engineer	Throughout the construction phase	Daily inspection by the Contractor of all equipment and machinery used during construction.	Included in Contractor cost.
Ensure fire risk management at construction camp sites.	Implementation: Contractor Monitoring: Supervising Engineer	Throughout the construction phase	Fire risk management plan developed and implemented at work camps, fire risks and management measures communicated to workers. No uncontrolled fires near work camps.	Included in Contractor cost.		
Greenhouse gas emissions	Site preparation Construction activities Transportation and circulation Worksite restoration Waste and hazardous materials management.	Ensure that all equipment, vehicles, and machinery are in good working order, including mufflers and catalytic converters.	Implementation: Contractor Monitoring: Supervising Engineer	Throughout the construction phase	Daily inspection by the Contractor of all equipment and machinery used during construction.	Included in Contractor costs
		Prohibit idling of vehicles and machinery and require their complete shut down when not in use.	Implementation: Contractor Monitoring: Supervising Engineer	Throughout the construction phase	Daily inspection by the Contractor of construction areas for excessive nuisance dust, noise, and air pollutants. Contractor/Supervising Engineer to maintain records of complaints on noise and air quality, and follow-up with corrective measures.	Included in Contractor costs
		Prohibit the burning of waste generated by work activities and at the workers' camps.	Implementation: Contractor Monitoring: Supervising Engineer	Throughout the construction phase	Record of training sessions on topic to contractor personnel.	Included in Contractor costs

Potential Impacts Addressed	Sources of Impact	Management Measures	Responsibilities	Implementation Timing	Performance Indicators	Cost (USD)
		Use low-sulphur diesel to limit emissions of particulate matter and sulphur dioxide caused by combustion.	Implementation: Contractor Monitoring: Supervising Engineer	Throughout the construction phase	Keep records of low-sulphur fuel used vs. regular sulphur fuel used.	Included in Contractor costs
Increase in noise and vibration levels	Site preparation Construction activities Transportation and circulation Worksite restoration.	Include noise reduction near sensitive receptors within the worker training program	Implementation: Contractor Monitoring: Supervising Engineer	Prior to construction phase	Record of training sessions on topic to contractor personnel.	Included in Contractor costs
		Move the loudest equipment as far away from sensitive areas as possible. If this is not possible, set up temporary or permanent sound screens.	Implementation: Contractor Monitoring: Supervising Engineer	Throughout the construction phase	Social component: Record grievances received regarding noise issues. Loudest equipment and noisy activities identified	Included in Contractor costs
		Set up a noise monitoring program for the construction phase to ensure compliance with the IFC's EHS Guidelines regarding noise levels.	Implementation: Contractor Monitoring: Supervising Engineer	Prior to and throughout the construction phase	Noise monitoring program approved. Daily inspection by the Contractor of construction areas for excessive nuisance dust, noise, and air pollutants. Contractor/Supervising Engineer to maintain records of complaints on noise and air quality, and follow-up with corrective measures.	Included in Contractor costs
		If the noise emitted by the work does not respect the IFC's EHS Guidelines regarding noise levels, communities located near the work areas will be duly notified of the date, duration, source, and level of noise that will be emitted. Noise barriers will be installed where relevant.	Implementation: Contractor Monitoring: Supervising Engineer	Throughout the construction phase	Noisy activities identified and their timing communicated to surrounding communities No unannounced noisy works.	Included in Contractor costs
		Restrict noise and vibration generating activities near residential or institutional sensitive receptors between 7 a.m. and 7 p.m. Maintain noise levels at or below the IFC's EHS Guidelines regarding noise levels.	Implementation: Contractor Monitoring: Supervising Engineer	Throughout the construction phase	Daily inspection by the Contractor of construction areas for excessive nuisance dust, noise, and air pollutants. Contractor/Supervising Engineer to maintain records of complaints on noise and air quality, and follow-up with corrective measures.	Included in Contractor costs
		If blasting is required for a tower's installation, the local population will be advised in advance so as to prevent nuisances and injuries.	Implementation: Contractor Monitoring: Supervising Engineer	Throughout the construction phase	No unannounced blasting	Included in Contractor costs
		Develop and implement a Pollution Prevention Management Plan including noise management.	Contractor	Prior to and throughout the construction phase	Pollution Prevention Management Plan including noise management approved by Supervising Engineer prior to initiation of the construction phase.	Included in Contractor costs
		Soil erosion in erosion-prone areas	Site preparation Construction activities Transportation and traffic.	The contractor must fill ruts more than 20 cm deep as the work progresses.	Implementation: Contractor Monitoring: Supervising Engineer	Throughout the construction phase
Limit work during important climatic events (heavy rain, strong winds, etc.).	Implementation: Contractor Monitoring: Supervising Engineer			Throughout the construction phase	Keep records of weather events.	Included in Contractor costs
Operate machinery on land in a way that minimizes disturbance to the banks of watercourses.	Implementation: Contractor Monitoring: Supervising Engineer			Throughout construction phase	No machinery operations inside top-of-bank of watercourses.	Included in Contractor costs
Prepare and implement erosion and sediment control plan, particularly in areas identified as having high erosion potential.	Implementation: Contractor Monitoring: Supervising Engineer			Prior to construction phase	Erosion and sediment control plan approved by Supervising Engineer prior to initiation of Construction phase	Included in Contractor costs
Restrict transportation to the identified access by clearly marking out the limit of the ROW and access roads.	Implementation: Contractor Monitoring: Supervising Engineer			Throughout construction phase	Equipment and vehicle movements outside the line route ROW and access roads restricted to a minimum.	Included in Contractor costs
Restrict construction activities, materials and manpower movements to existing roads/tracks and ROW limits. Maximize use of recently opened roads for the construction of the 330kV Pensulo - Nakonde electricity transmission line.	Implementation: Contractor Monitoring: Supervising Engineer			Throughout construction phase	Equipment and vehicle movements outside the line route and access roads' ROW restricted to a minimum.	Included in Contractor costs
Soil compaction in work areas	Site preparation Construction activities	Level the surface of each pylon site to ensure drainage away from the base of the pylons.	Implementation: Contractor Monitoring: Supervising Engineer	Throughout the construction phase	Proponent approval verification records	Included in Contractor costs

Potential Impacts Addressed	Sources of Impact	Management Measures	Responsibilities	Implementation Timing	Performance Indicators	Cost (USD)
	Transportation and traffic.	Minimize the construction of new access roads. Promote the use of existing access roads for machinery and vehicle movements, increasing their width as necessary.	Implementation: Contractor Monitoring: Supervising Engineer	Throughout the construction phase	Existing access roads and tracks used for access, as much as possible.	Included in Contractor costs
		Limit, to the extent possible, the transport of materials and workers to roads/existing trails and/or identified accesses.	Implementation: Contractor Monitoring: Supervising Engineer	Throughout the pre-construction and construction phase	Limits of ROW and access roads marked prior to beginning of works in a given area	Included in Contractor costs
		Supply construction sites with granular materials from authorized quarries with a valid operating permit.	Implementation: Contractor Monitoring: Supervising Engineer	Throughout the construction phase	Verify chain-of-custody/invoices.	Included in Contractor costs
		De-compact soils following construction works with appropriate equipment.	Implementation: Contractor Monitoring: Supervising Engineer	Throughout the construction phase	Following construction, assessment of soil compaction in and around the ROW by the Supervising Engineer, and decompaction if necessary.	Included in Contractor costs
		Avoid vehicle or machinery traffic in areas where soils are highly saturated, such as dambos.	Implementation: Contractor Monitoring: Supervising Engineer	Throughout the construction phase	No vehicle or machinery traffic in areas where soils are saturated. Inspections in order to ensure authorized work periods are respected and wetlands and watercourses are not affected.	Included in Contractor costs

Potential Impacts Addressed	Sources of Impact	Management Measures	Responsibilities	Implementation Timing	Performance Indicators	Cost (USD)
Changes in soil chemical properties and risk of soil contamination	Site preparation Construction activities Transportation and traffic Waste and hazardous materials management	Use impervious surfaces for refueling areas and other fluid transfer areas. Provide adequate secondary containment for fuel storage tanks and for the temporary storage of other fluids such as lubricating oils and hydraulic fluids.	Implementation: Contractor Monitoring: Supervising Engineer	Throughout the construction phase	Secured storage of all hazardous materials. Inspections to ensure proper storage handling techniques are being followed.	Included in Contractor costs
		Use backfill materials free of contamination or of leachable waste; prior controls and analyses shall certify their quality.	Implementation: Contractor Monitoring: Supervising Engineer	Throughout the construction phase	Contractor to provide lab analyses results.	Included in Contractor costs
		Store hazardous materials (mainly used oil) in a manner that prevents interaction with each other or with the environment or from being tampered accidentally. Provision of secondary containment, drip trays or other overflow and drip containment measures, for hazardous materials containers at connection points or other possible overflow points.	Implementation: Contractor Monitoring: Supervising Engineer	Throughout the construction phase	Secured storage of all hazardous materials.	Included in Contractor costs
		Contain any spills onsite and clean up spills as soon as possible.	Implementation: Contractor Monitoring: Supervising Engineer	Throughout the construction phase	Emergency Preparedness and Response plan approved by Supervising Engineer prior to initiation of the construction phase.	Included in Contractor costs
		Characterize, remove, and dispose of soils contaminated with petroleum products or other hazardous materials at sites authorized by relevant authorities.	Implementation: Contractor Monitoring: Supervising Engineer	Throughout the construction phase	Emergency Preparedness and Response plan approved by Supervising Engineer prior to initiation of the construction phase.	Included in Contractor costs
		Store all ignitable, reactive, flammable, corrosive and toxic materials in clearly labelled containers. Storage locations for these materials will be equipped with secondary containment to prevent the release of chemicals to the environment in the event of a spill.	Implementation: Contractor Monitoring: Supervising Engineer	Throughout the construction phase	No ignitable, reactive, flammable, corrosive, or toxic materials stored elsewhere than in labelled containers. Residual Material and Hazardous Products Management Plan approved by Supervising Engineer prior to initiation of the construction phase.	Included in Contractor costs
		Conduct soil characterization studies while soils removal is required and where there is evidence of contamination, prior to work in substations, to properly plan the management of contaminated material.	Implementation: Contractor Monitoring: Supervising Engineer	Throughout the construction phase	Carry out before/after soil sampling. Decontaminate the contaminated soils; use national/international criteria for "determination of "clean-up" levels. Residual Material and Hazardous Products Management Plan approved by Supervising Engineer prior to initiation of the construction phase.	Included in Contractor costs
		Clearly delineate excavated soil storage areas and ensure their proper management according to applicable regulations, depending on whether they are contaminated or not.	Implementation: Contractor Monitoring: Supervising Engineer	Throughout the construction phase	Contractor to develop a Construction Plan detailing scope of works and estimated material, equipment, schedules and processes used in line with scope of works.	Included in Contractor costs
		Segregate and temporarily store excavated soils in order to use them as backfill when needed. Ensure that the organic soil layer is well separated from other soils to allow its reuse during restoration work of work areas.	Implementation: Contractor Monitoring: Supervising Engineer	Throughout the construction phase	Excavated soils properly stored.	Included in Contractor costs
		Mandate licensed companies to ensure the collection and management of waste and hazardous products.	Implementation: Contractor Monitoring: Supervising Engineer	Throughout the construction phase	Contractor to contract with licenced waste service provider	Included in Contractor costs
		Keep a spill containment kit including absorbents readily accessible onsite in the event of an accidental spill and ensure on-site staff is trained in its use.	Implementation: Contractor Monitoring: Supervising Engineer	Throughout the construction phase	Spill containment and cleanup equipment onsite.	Included in Contractor costs
		Control and reduce at the source of the production of waste and hazardous waste.	Implementation: Contractor Monitoring: Supervising Engineer	Throughout the construction phase	Production of waste and hazardous waste reduced to a minimum.	Included in Contractor costs
Oil water separators and grease traps should be installed and maintained as appropriate at refueling facilities, workshops, parking areas, fuel storage and containment areas.	Implementation: Contractor Monitoring: Supervising Engineer	Throughout construction phase	Presence of oil water separators and grease traps. Inspections to ensure proper storage handling techniques are being followed.	Included in the construction contract		

Potential Impacts Addressed	Sources of Impact	Management Measures	Responsibilities	Implementation Timing	Performance Indicators	Cost (USD)
		Develop and implement an Emergency Preparedness and Response Plan.	Development: Contractor Monitoring: Supervising Engineer	Development prior to, and implementation during, construction phase	Emergency Preparedness and Response plan approved by Supervising Engineer prior to initiation of construction phase	Included in Contractor costs
		Train workers on the correct transfer and handling of fuels and chemicals.	Implementation: Contractor Monitoring: Supervising Engineer	Prior to and throughout the construction phase	Evidence of adequate training.	Included in Contractor costs
Changes in hydrology	Site preparation Construction activities Transportation and traffic Waste and hazardous materials management	Implement mitigation measures regarding the local impairment of hydrological dynamics leading to disturbances and alteration of aquatic and semi-aquatic habitats (see Aquatic and semi-aquatic habitats and fauna).	Implementation: Contractor Monitoring: Supervising Engineer	Throughout the construction phase	Local hydrological dynamic maintained in all worksites impacting watercourses.	Included in Contractor costs
		At large water and floodplain crossings, detailed design shall aim to minimize encroachment within the floodplain and select exact location for towers that will ensure minimal disturbances on local hydrology and floodplain.	Detailed design consultant	Throughout the construction phase	Design considering hydrology and floodplain integrity	Included in Preparation engineer costs
		Always maintain hydrological connectivity upstream/downstream in work areas. When stream crossings are unavoidable, construct suitable culverts to ensure sufficient water supply to maintain a viable fish habitat.	Implementation: Contractor Monitoring: Supervising Engineer	Throughout the construction phase	Hydrological connectivity maintained in all worksites impacting watercourses.	Included in Contractor costs
		Avoid material piling, equipment and vehicle movement in rivers, floodplains, and wetland areas, such as dambos and communal grazing sites. If unavoidable, reduce access to a minimum.	Implementation: Contractor Monitoring: Supervising Engineer	Throughout the construction phase	No material piling in watercourses and wetland areas. Temporary access roads in identified sensitive areas minimized.	Included in Contractor costs
		Set and implement strict procedures for in-water works.	Implementation: Contractor Monitoring: Supervising Engineer	Throughout the construction phase	In-water work rules approved by Supervising Engineer prior to initiation of Construction phase.	Included in Contractor costs
		Conduct activities during the dry season to minimize disturbance of sensitive shoreline and wetland areas.	Implementation: Contractor Monitoring: Supervising Engineer	Throughout the construction phase	Activities in wet season minimized.	Included in Contractor costs
Modifications of surface water quality with a risk of contamination.	Site preparation Construction activities Transportation and traffic Waste and hazardous materials management	Limit transport of fine particles into watercourses/waterbodies beyond the immediate work area using a method appropriate for the affected area (i.e., sedimentation trap/barrier, turbidity curtain, etc.).	Implementation: Contractor Monitoring: Supervising Engineer	Throughout the construction phase	Visual verifications of sediment plumes in aquatic env. (daily verifications)	Included in Contractor costs
		Avoid crossing waterways, but if unavoidable, install a temporary bridge or culverts at the crossing point.	Implementation: Contractor Monitoring: Supervising Engineer	Throughout the construction phase	Use of temporary bridge or culvert when required	Included in Contractor costs
		Construct a designated, signposted, concrete wash down bay that is fully contained for all excess concrete and concrete wash down (e.g., plastic lined).	Implementation: Contractor Monitoring: Supervising Engineer	Throughout the construction phase	Washdown bay(s) built prior to the beginning of construction works in a given area. No concrete washdown elsewhere.	Included in Contractor costs
		Regularly maintain the concrete washout bay, by treating any water prior to releasing to natural systems.	Implementation: Contractor Monitoring: Supervising Engineer	Throughout the construction phase	Washout bay(s) regularly maintained. Water treated before releasing into the environment.	Included in Contractor costs
		Install silt barriers (e.g., fencing) when working in steep riparian areas and along wetlands to minimize potential sediments being transported to aquatic habitats.	Implementation: Contractor Monitoring: Supervising Engineer	Throughout the construction phase	Required silt barriers installed.	Included in Contractor costs
Modifications of groundwater quality with a risk of contamination.	Site preparation Construction activities Transportation and traffic Waste and hazardous materials management	Implement mitigation measures regarding the changes in soil chemical properties and risk of soil contamination.	Contractor	Throughout the construction phase	Before/after soils samples to verify consistency in composition and chemistry.	Included in Contractor costs
		Promptly pump any groundwater that could have been contaminated during excavation works;	Implementation: Contractor Monitoring: Supervising Engineer	Throughout the construction phase	Groundwater seepage pumped out during excavations.	Included in Contractor costs

Potential Impacts Addressed	Sources of Impact	Management Measures	Responsibilities	Implementation Timing	Performance Indicators	Cost (USD)
Permanent loss of natural habitat area and of its associated flora	Site preparation Construction activities Transportation and traffic Worksites' restoration	Undertake ROW vegetation cutting with the supervision of a botanist in order to confirm and detail the habitat losses.	Implementation: Contractor Monitoring: Supervising Engineer	Prior to construction phase	Area lost by habitat type	Included in Contractor costs
		Promote the selection of areas with less or no need to cut trees for the installation of temporary work and storage areas.	Implementation: Contractor Monitoring: Supervising Engineer	Prior to and throughout the construction phase	Temporary work and storage areas installed in already disturbed areas whenever possible.	Included in Contractor costs
		Ensure construction activities, including vehicle movements and material storage, remain within the ROW, temporary construction areas and identified access roads.	Implementation: Contractor Monitoring: Supervising Engineer	Throughout the construction phase	Number of encroachments outside identified rights-of-way. Visible and legible marking of rights-of-way and work zones	Included in Contractor costs
		Obtain authorization from relevant authorities for vegetation clearing and limit vegetation cutting to the strict minimum required.	Implementation: Contractor Monitoring: Supervising Engineer	Throughout the construction phase	Required permits obtained	Included in Contractor costs
		Clearly mark the extent of the ROW and temporary construction areas with stakes at intervals of 50 m or less. Identify and mark the vegetation to be preserved along sections of the ROW.	Implementation: Contractor Monitoring: Supervising Engineer	Throughout the construction phase	Limits of ROW marked prior to beginning of works in a given area.	Included in Contractor costs
		Establish a Compensation Plan for the loss of natural habitats, including plantation and restoration of natural miombo woodlands in the affected Forest Reserves (See details in BMP); Also promote the use of fruit trees that are important food sources for African Straw-coloured Fruit Bats, including <i>Ficus spp</i> , <i>Magnistipula butayeeii</i> , <i>Parinari curatellifolia</i> , <i>Syzygium cordatum</i> , <i>Syzygium guineense guineense</i> , <i>Syzygium guineense huillense</i> , <i>Uapaca kirkiana</i> , <i>Uapaca banguelensis</i> , and <i>Uapaca sansibarica</i> .	Implementation and monitoring: PIU In collaboration with Forestry Department	Throughout construction phase	Compensation plan developed prior to beginning of the construction phase. Compensation completed as per the plan, before the end of the construction phase. Number of hectares reforested Number of seedlings produced and planted. Rate of plantation success.	\$450,000 (Included in BMP) Final. budget should be determined in consultation with the Forest Department to ensure adequacy
		The Detailed Compensatory Plan and final budget (Reforestation/ Restoration) shall be developed in Consultation with Forestry Department.	Implementation and monitoring: PIU In collaboration with Forestry Department	Throughout construction phase	Compensation plan developed prior to beginning of the construction phase. Compensation completed as per the plan, before the end of the construction phase. Number of hectares reforested Number of seedlings produced and planted. Rate of plantation success.	Included in Compensation Plan cost
		Promote the use of native species for planting.	Implementation and monitoring: PIU	Throughout the construction phase	Number of native species used for planting Number of native species used in plantations Proportion of native vs. non-native species used for planting	Included in Compensation Plan cost
Rehabilitate and revegetate temporary access road and work areas as soon as possible using native vegetation species that are ecologically associated with local fauna	Implementation: Contractor Monitoring: Supervising Engineer	Throughout construction phase	Exposed soils rehabilitated as soon as possible following construction activities.	Included in Contractor costs		
Potential loss of critical habitat for <i>Disa aequiloba</i>	Site preparation. Construction activities	Undertake additional targeted surveys in the ROW and temporary construction areas to determine the presence <i>Disa Aequiloba</i> critical habitat and avoid these areas where it occurs.	Implementation and monitoring: PIU	Before start of construction	Additional targeted surveys completed in all natural wet grassland and dambos Number of specimens identified Number of specimens impacted by the Project	\$30,000 (Included in BMP)
		Implement a sensitization program in order to educate and increase local communities' awareness on natural resources protection and overharvesting.	Implementation: Contractor Monitoring: Supervising Engineer	Throughout the construction phase	Number of awareness sessions organized Existence of minutes of awareness sessions	\$30,000 (Included in BMP)
		Areas where <i>Disa aequiloba</i> specimens are found should be identified and warning signs should be placed to avoid any impairment of the specimens.	Implementation: Contractor Monitoring: Supervising Engineer	Throughout construction phase	Specimens within ROW are protected and maintained.	Included in Contractor costs
		Ensure no modification to local hydrology and drainage associated to wet grassland and dambos	Implementation: Contractor Monitoring: Supervising Engineer	Throughout construction phase	Specimens within ROW are protected and maintained.	Included in Contractor costs

Potential Impacts Addressed	Sources of Impact	Management Measures	Responsibilities	Implementation Timing	Performance Indicators	Cost (USD)
Potential loss of critical habitat for <i>Euphorbia perplexa</i> var. <i>kasamana</i>	Site preparation. Construction activities	Undertake additional targeted surveys in the ROW and temporary construction areas to determine the presence <i>Euphorbia perplexa</i> var. <i>kasamana</i> a critical habitat and avoid these areas where it occurs.	Implementation and monitoring: PIU	Before start of construction	Additional targeted surveys completed in all rock outcrops in and around Kasama Forest Reserve Number of specimens identified Number of specimens impacted by the Project	\$30,000 (Included in BMP)
		Avoid construction of temporary access roads in rock outcrops in Kasama;	Implementation: Contractor Monitoring: Supervising Engineer	Throughout construction phase	Minimal access road in the Kasama Forest Reserve	Included in Contractor costs
	Site preparation. Construction activities	Protect low-lying specimens of endemic <i>Euphorbia perplexa</i> var. <i>Kasamana</i> and other endemic <i>Euphorbia</i> sp. ( <i>Euphorbia jubata</i> and <i>Euphorbia speciosa</i> ). Where <i>Euphorbia perplexa</i> var <i>kasamasa</i> specimens are found should be identified and warning signs should be placed to avoid any impairment of the specimens.	Implementation: Contractor Monitoring: Supervising Engineer	Throughout construction phase	Specimens within ROW are protected and maintained.	Included in Contractor costs
Permanent loss of natural habitat area and associated flora within forest reserves.	Site preparation. Construction activities	Obtain salvage permit to cut down trees in the he Kasama, Amenshi, Chitimukulu, Mungwi, Nkole Mfumu, Kanona and Nakonde Forest Reserves	Implementation: Contractor Monitoring: Supervising Engineer In collaboration with Forestry Department	Throughout construction phase	All permits obtained	Included in Contractor costs
		Undertake a detailed Forestry assessment with the Forestry Department to identify standing tree volume and the number and species of trees affected in the Kasama, Amenshi, Chitimukulu, Mungwi, Nkole Mfumu, Kanona and Nakonde Forest Reserves and in the assessment of required compensation.	Implementation and monitoring: PIU In collaboration with Forestry Department	Before start of construction	Number and species of tress affected within each forest reserve.	Included in Contractor costs
		Compensate for lost habitats within the forest reserves by restoring and protecting similar natural habitat within the Forest Reserve (plantation of native species in deforested areas, fencing out of key areas, restoration of disturbed area). This shall be as part of the Compensation Plan for the loss of natural habitats.	Implementation and monitoring: PIU In collaboration with Forestry Department	Throughout construction phase	Compensation plan developed prior to the beginning of the construction phase. Compensation completed as per the plan, before the end of the construction phase. Number of hectares reforested Number of seedlings produced and planted. Rate of plantation success.	Included in Compensation Plan cost
		In consultation with Forestry Department and based on confirmation of their needs, provide full financial support for the development of management plans for the affected forest reserves; (Kanona, Nkole Mfulu, Mungwi Chitimukulu, Amenshi, Kasama and Nakonde Forest Reserves). Ensure local community forest groups are involved.	Implementation and monitoring: PIU In collaboration with Forestry Department, District Forest Officer, Community Forest Management Groups and any other relevant stakeholder.	Throughout construction phase	Forest Reserve Management Plan developed prior to the beginning of the construction phase.	105,000\$ (Included in BMP) Final. budget should be determined in consultation with the Forestry Department to ensure adequacy
		Reduce width to be cleared in riverine forests, and secondary and mature woodland located forest reserves (width reduced to 50 m).	Implementation: Contractor Monitoring: Supervising Engineer	Throughout construction phase	Vegetation clearing performed as required. Drainage pattern undisturbed.	Included in Contractor costs
		Within crossed forest reserves, prohibit any material piling, and reduce to a minimum the working areas. (Within the Kanona, Nkole Mfulu, Mungwi Chitimukulu, Amenshi, Kasama and Nakonde Forest Reserves)	Implementation: Contractor Monitoring: Supervising Engineer	Throughout construction phase	No material piling within forest reserves. Number and area of work areas outside the ROW within forest reserves.	Included in Contractor costs
		Restore borrow sites at the end of the work activities with native plant species representative of the initial conditions.	Implementation: Contractor Monitoring: Supervising Engineer	At the end of the construction phase	Restored borrow pits Native vegetation planted and maintained	Included in Contractor costs
Terrestrial habitat fragmentation and degradation in some areas along the ROW	Site preparation Construction activities Transportation and traffic Waste and hazardous materials management	Stick to designated access and avoid the storage of material inside natural habitats.	Implementation: Contractor Monitoring: Supervising Engineer	Throughout construction phase	Reduction of created access roads.	Included in Contractor costs
		Promote the selection of areas with bare soil, and less of a need for tree cutting, for temporary work and storage areas.	Implementation: Contractor Monitoring: Supervising Engineer	Throughout construction phase	Temporary work and storage areas installed in already disturbed areas whenever possible.	Included in Contractor costs

Potential Impacts Addressed	Sources of Impact	Management Measures	Responsibilities	Implementation Timing	Performance Indicators	Cost (USD)
		Undertake selective cutting of the vegetation in dambos and riparian habitat to keep low shrubby and herbaceous species that do not represent a risk for the powerline. As much as possible, conserve all the vegetation (trees, shrubs, herbaceous plants, and crops) present at the edge of watercourses and in erosion-prone areas	Implementation: Contractor Monitoring: Supervising Engineer	Throughout construction phase	Maintain vegetation in a 10 m shoreline and on steep slopes when compatible with ROW operation.	Included in Contractor costs
Potential introduction of invasive alien species	Site preparation Construction activities	Clean construction equipment properly before arriving in work areas and again when leaving if it is contaminated with invasive alien species (IAS).	Implementation: Contractor Monitoring: Supervising Engineer	Throughout the construction phase	Construction equipment cleared and exempt of invasive species as required.	Included in Contractor costs
	Transportation and traffic	Use appropriate clearing techniques in areas where invasive plant species have been identified (such as hand clearing rather than mechanized clearing).	Implementation: Contractor Monitoring: Supervising Engineer	Throughout construction phase	Hand clearing used in areas where invasive plant species are present.	Included in Contractor costs.
		Bury residues of invasive alien flora species (IAS) to reduce the risk of propagation to other areas.	Implementation: Contractor Monitoring: Supervising Engineer	Throughout the construction phase	IAS specimens managed as required.	Included in Contractor costs
Increased pressure on natural resources.	Site preparation Construction activities	Make chopped woody resources and residues available to local population in order to reduce additional pressure on natural resources	Implementation: Contractor Monitoring: Supervising Engineer	Throughout the construction phase	Chopped woody resources managed as required.	Included in Contractor costs
	Transportation and traffic Purchase of materials, goods, and services Presence of workers	Remove timber species of merchantable size in collaboration with the Forestry Department.	Implementation: Contractor Monitoring: Supervising Engineer	During pre-construction phase	Number of trees of commercial wood species cut down Consultation with the Forestry Department	Included in Contractor costs
		Minimize harvesting, destruction, or degradation of vegetation by workers through an environmental protection awareness program.	Implementation: Contractor Monitoring: Supervising Engineer	Throughout the construction phase	Number of awareness sessions organized Existence of minutes of awareness sessions	Included in Contractor costs
Potential impacts on species of conservation concern	Site preparation Construction activities Transportation and traffic Purchase of materials, goods, and services Presence of workers	Undertake ROW vegetation cutting with the supervision of a botanist to identify and relocate, if possible, species of conservation concern, including critical habitat species <i>Disa aequiloba</i> and <i>Euphorbia perplexa</i> var <i>kasamasa</i> as well as protect vegetation that does not represent a risk for the powerline. Any species of conservation concern that need to be cut will be located and its habitat will be fully described. This information will be integrated in the planning of reforestation program. If possible, collect seeds or cuttings from species of conservation concern	Implementation and monitoring: PIU	During construction phase	Botanist hired for ROW and wayleave clearance. Species of conservation concern identified and protected where possible. Reforestation program for compensation of cut individuals of species of conservation concern, prepared and implemented.	\$45,000 (Included in BMP)
		Any threatened or protected species that needs to be cut will be located and its habitat will be fully described. If possible, relocate specimens or collect cuttings or seeds of species of conservation concern..	Implementation: Contractor Monitoring: Supervising Engineer	During pre-construction phase	Botanist present during vegetation cutting Number of seeds of species of conservation interest collected	Included in Contractor costs
		Update BMP with loss calculations in order to indicate the amount of compensatory habitat required to facilitate more detailed planning and the number of threatened or protected species lost that need to be compensated a	Implementation and monitoring: PIU	After pre-construction phase	BMP developed and updated Number of trees cut Number of trees of threatened or protected species cut Number of trees planted and maintained	\$5,000 (Included in BMP)
		Develop tree and plant nurseries specifically for threatened and protected species affected by the vegetation clearing.	Implementation and monitoring: PIU	Prior to project implementation	Number of nurseries, species produced and number of plants	\$15,000 (Included in BMP)
Terrestrial habitat fragmentation and degradation in some areas along the ROW;	Site preparation Construction activities	Avoid timing of row clearing during seasonal large mammal migration	Implementation: Contractor Monitoring: Supervising Engineer	Throughout the construction phase		Included in Contractor costs
		Inform the Contractor's E&S specialists when endangered fauna species are observed in or close to project sites.	Implementation: Contractor Monitoring: Supervising Engineer	Throughout the construction phase	XXAll fauna species sitting declared and compiled	Included in Contractor costs
Increased hunting pressure on local fauna species	Construction activities Transportation and traffic Presence of workers	Implement biodiversity protection awareness program with workers. Prohibit workers from owning firearms and other hunting gear and raise awareness about endangered fauna species and the prohibition to engage in any kind of hunting or poaching through the Code of Conduct.	Contractor	Prior to construction phase	Biodiversity Protection Awareness Program developed and approved by Supervising Engineer prior to beginning of construction activities. Workers engaged in poaching activities sanctioned. No bush meat consumed in workers' camp or bought by workers.	Included in Contractor costs

Potential Impacts Addressed	Sources of Impact	Management Measures	Responsibilities	Implementation Timing	Performance Indicators	Cost (USD)
		Safeguard and clear all construction materials from worksites once construction is completed, particularly those used to reinforce structures i.e., steel wires, to avoid their use as wire snares.	Implementation: Contractor Monitoring: Supervising Engineer	Development prior to, and implementation during, construction phase	Hazardous materials management plan approved by Supervising Engineer prior to initiation of Construction phase Worksite inspection at the end of construction works/Absence of residual material in work areas	Included in Contractor costs
		Remove cut materials or cut them into pieces small enough not to interfere with animal movements.	Contractor	During pre-construction phase	Cut or removed materials	Included in Contractor costs
		Put in place safety and security measures to protect workers from wild animals such as lions	Implementation :Contractor Monitoring: Supervising Engineer	During pre-construction phase	Cut or removed materials	Included in Contractor costs
		Attach officers from the DNPW to the Project throughout the construction period to ensure worker's safety from wild animals.	Implementation: Contractor Monitoring: Supervising Engineer	Throughout the construction phase	DNPW officers present at construction site	Included in Contractor costs
Modification and degradation of bird habitats.	Site preparation Construction activities Transportation and traffic Purchase of materials, goods, and services Presence of workers	Undertake a pre-construction inspection (avifaunal walk-through) of the final powerline route alignment and road access routes to identify Priority species and Red List species that may be breeding within the ROW and its immediate surroundings (1 km radius) to ensure the impacts to breeding species (if any) are adequately managed.	Walk-through survey: Avifaunal Specialist; Monitoring: PIU	Two weeks prior to clearing in any given area within the ROW and for the duration of the construction process:	Bird nest surveys undertaken systematically prior to clearing. Active nests of identified species protected (no clearing/construction until nest is abandoned when chicks are mature).	\$20,000 (Included in BMP)
		Where a priority or threatened bird species are nesting, do not undertake tree clearing within a radius of 1 km. Wait until the nest is deserted. Weekly checks to verify nest activity.	Walk-through survey: Avifaunal Specialist; Monitoring: PIU	Two weeks prior to clearing in any given area within the ROW and for the duration of the construction process:	Active nests of identified species protected (no clearing/construction until nest is abandoned when chicks are mature).	Included in Contractor costs
		Compensate any loss of breeding/nesting sites by the creation of suitable habitats elsewhere, notably from enhancement of degraded habitats. — Involve an avifauna specialist in the implementation of compensation and additional conservation actions.	Avifaunal Specialist; Monitoring PIU	Throughout the construction phase	Breeding/nesting sites identified in bird survey and impacted by line are compensated.	\$25,000 (Included in BMP)
		Avoid, as much as possible, site preparation during peak breeding seasons for birds and, more specifically, the breeding periods of special status bird species present in the Project area.	Implementation: Contractor Monitoring: Supervising Engineer	At the start of site preparation and construction phases (inclusive of all Project components) to the completion of construction:	No site preparation work within high sensitivity habitats in the breeding seasons.	Included in Contractor costs
		Construction vehicles must utilize existing roads only. Speed restrictions must be enforced for all vehicles within the study area to limit fauna and avifaunal collisions. Develop and implement awareness initiatives to educate road users about the presence of fauna and avifaunal species utilizing the roads, particularly during dusk and dawn periods.	Contractor	Throughout the construction phase	Number of accidents recorded Number of complaints recorded and handled Number of awareness-raising sessions on birds Existence of minutes of awareness-raising sessions	Included in Contractor costs
		Undertake a pre-construction inspection (avifaunal walk-through, once the final tower positions have been pegged to identify spans of powerline that require the installation of bird flight diverters, with a specific focus on rivers, watercourses, waterbodies and dambos and High, Medium-High, and Medium sensitivity areas for birds (see Maps 4-1 to 4-3 in BMP).	Walk-through survey: Avifaunal Specialist; Monitoring: PIU	Two weeks prior to clearing in any given area within the ROW and for the duration of the construction process:	Active nests of identified species protected (no clearing/construction until nest is abandoned when chicks are mature).	Included in Contractor costs
Bird collisions with the powerlines.	Construction vehicles and traffic Labour/presence of workers	Undertake a pre-construction inspection (avifaunal walk-through, once the final tower positions have been pegged to identify spans of powerline that require the installation of bird flight diverters, with a specific focus on rivers, watercourses, waterbodies and dambos and High, Medium-High, and Medium sensitivity areas for birds (see Maps 4-1 to 4-3 in BMP).	Walk-through survey: Avifaunal Specialist; Monitoring: PIU	Two weeks prior to clearing in any given area within the ROW and for the duration of the construction process:	Active nests of identified species protected (no clearing/construction until nest is abandoned when chicks are mature).	Included in Contractor costs
Bird and bats collisions with the powerlines.	Construction activities.	In High, Medium-high, and Medium sensitivity habitats, illustrated in Maps 4-1 to 4-3 of the BMP, and according to observations made during pre-construction walkover surveys, place bird diverters on the earth wire/ground wire spans to make the line more visible to birds.	Implementation: Contractor Monitoring: Supervising Engineer	Throughout the construction phase	All line sections described in the BMP and recommended following walkthrough survey are equipped with bird diverters.	Included in Contractor costs
Priority species mortality as a result of collisions with motor vehicles.	Construction activities.	Construction vehicles must utilize existing roads only. Speed restrictions to be enforced for all vehicles within the study area to limit avifaunal collisions. Awareness initiatives to educate road users about the presence of avifaunal species utilizing the roads, particularly during dusk and dawn.	Implementation: Contractor Monitoring: Supervising Engineer	Throughout the construction phase	No bird mortality.	Included in Contractor costs
		Raise awareness on vehicle speed and collision risks. Speed restrictions to be enforced for all vehicles within the study area to limit avifaunal collisions.	Implementation: Contractor Monitoring: Supervising Engineer	Throughout the construction phase	No bird mortality.	Included in Contractor costs
Disturbance or destruction of bat roosts, particularly of Near	Site preparation. Construction activities.	Avoid clearing and construction during the rainy season near key sites.	Implementation: Contractor Monitoring: Supervising Engineer	Throughout the construction phase	No works at key sites during the rainy season.	Included in Contractor costs

Potential Impacts Addressed	Sources of Impact	Management Measures	Responsibilities	Implementation Timing	Performance Indicators	Cost (USD)
Threatened species potentially inside the Project area.		Undertake a pre-construction inspection on the final route alignment and access roads to identify any major bat roosts within or close to the areas to be cleared (see details in BMP)	Implementation: Bat specialist Monitoring: PIU	Throughout the construction phase	Bat roost surveys undertaken systematically prior to clearing.	\$20,000 (Included in BMP)
		Where major bat roosts (over 100 bats) of near-threatened species are identified, do not undertake tree clearing within a radius of 1 km. Wait until the roost is deserted. Come monthly to the roosting site to verify, not more often	Implementation: Bat specialist Monitoring: PIU	Throughout the construction phase	Active roosts of identified species protected (no clearing/construction until roost is abandoned).	Included in Contractor costs
Habitat alteration and degradation resulting in reduction of activity of bats, that provide important ecosystem services.	Site preparation. Construction activities. Transport and traffic. Presence of workers.	Record bat activity before clearing and construction at specific sites (see details in BMP).	Implementation: Bat specialist Monitoring: PIU	Prior to and throughout construction phase	Bat activity before and during construction identified and used as comparison to the operation phase.	\$15,000 (Included in BMP)
Local degradation of aquatic and semi-aquatic habitats and associated fauna and flora disturbances	Site preparation. Construction activities. Transport and traffic.	Maintain vegetated riparian strips within and around wetlands and on each side of stream crossings. Restore as soon as possible any disturbed areas in the riparian buffer zone.	Implementation: Contractor Monitoring: Supervising Engineer	Throughout the construction phase	Minimized vegetation clearings in wetlands and in a 50 m buffer zone at watercourse crossings. Disturbed riparian areas restored after conclusion of works.	Included in Contractor costs
		Do not allow any temporary access roads to be built inside wetland areas such as dambos during the construction phase.	Implementation: Contractor Monitoring: Supervising Engineer	Throughout the construction phase	Construction activities in wetlands performed only during the dry season.	Included in Contractor costs
		Avoid construction of temporary access roads along river banks, dambos, or in areas where soils are saturated.	Implementation: Contractor Monitoring: Supervising Engineer	Throughout the construction phase	Temporary access roads in identified sensitive areas minimized.	Included in Contractor costs
		Avoid any works and movement of vehicles in water courses during rainy season to avoid impacts on threatened fish species. If unavoidable, reduce access to a minimum length in wetlands and floodplains and select the most optimized site for the access considering human uses and areas of higher ecological integrity.	Implementation: Contractor Monitoring: Supervising Engineer	Throughout the construction phase	Minimized work near watercourses or wetlands.	Included in Contractor costs
		Fish rescue and removal will take place in all isolated work areas prior to in-water construction. All fish will be relocated to suitable habitats (preferably in the same waterbody, immediately upstream or downstream of the isolated work area) in collaboration with the Department of Fisheries and Aquaculture.	Implementation: Contractor Monitoring: Supervising Engineer	Throughout the construction phase	Rescue and relocation operations completed during in-water work. Number of fish relocated	Included in Contractor costs
		Avoid vegetation clearing in wetlands and riparian areas and on steep slopes. Only cut the tree strata in riparian areas within the ROW. Maintain shrubby vegetation compatible with the clearance required for the line.	Implementation: Contractor Monitoring: Supervising Engineer	During pre-construction activities	Integrity and strata composition of wetland and riparian habitat	Included in Contractor costs
		Dismantle temporary access roads built for the construction phase in temporary wetland areas. Perform this dismantlement during the dry season and dispose of materials outside wetland areas.	Implementation: Contractor Monitoring: Supervising Engineer	Throughout the construction phase	Dismantling temporary access roads completed Dismantling of temporary access roads in wetlands during the dry season.	Included in Contractor costs
		To ensure minimal tree loss, the width of cleared areas should be reduced to a minimum where the line crosses riverine forests, including the Mungwi Forest Reserve. Clearing only 10 m of riverine forest vegetation to accommodate conductor stringing should be considered.	Implementation: Contractor Monitoring: Supervising Engineer	Throughout the construction phase	Vegetation clearing performed as required. Width of vegetation cleared in riparian forests.	Included in Contractor costs
		Maintain fish passage when watercourse road crossings are unavoidable by utilizing clear span bridges or open-bottom culverts. Install diversion structures (canals, dikes, and coffer) that neither obstruct fish movements nor diminish habitat width to less than 2/3 of the current water bodies, including rivers, wetlands, etc.	Implementation: Contractor Monitoring: Supervising Engineer	Throughout the construction phase	Drainage capacity of installed culverts equal or higher than confirmed rainy season flow rate at each watercourse crossing.	Included in Contractor costs
		Protect vegetation along watercourses by delineating water crossings and restoring banks immediately after work.	Implementation: Contractor Monitoring: Supervising Engineer	Throughout the construction phase	Clearly delineated water crossings. Restored riverbanks.	Included in Contractor costs
		Ensure appropriate protection of the bangweulu wetlands watershed.	Implementation: Contractor Monitoring: Supervising Engineer	Throughout construction phase	All mitigation measures to preserve water quality and aquatic habitats are implemented Habitat and water quality in the Lukuly, Lwitikila and Chabeshi rivers.	Included in Contractor costs
		Do not operate heavy machinery in wetland areas with standing or running water.	Implementation: Contractor Monitoring: Supervising Engineer	Throughout construction phase	No heavy machinery operated in wetlands, standing or moving water.	Included in Contractor costs
Waste and hazardous material management		Do not throw debris in aquatic habitats and remove any debris introduced accidentally into the aquatic environment as soon as possible.	Implementation: Contractor Monitoring: Supervising Engineer	Throughout the construction phase	No debris in aquatic environments	Included in Contractor costs

Potential Impacts Addressed	Sources of Impact	Management Measures	Responsibilities	Implementation Timing	Performance Indicators	Cost (USD)
		Store hazardous material and vehicles away from wetlands and watercourses floodplains, respecting recommended buffer width. Apply the same distance for any refueling activity.	Implementation: Contractor Monitoring: Supervising Engineer	Throughout the construction phase	Distance between hazardous materials storage areas and water bodies Distance between fueling activities and water bodies Residual Material and Hazardous Products Management Plan approved by Supervising Engineer prior to initiation of construction phase	Included in Contractor costs
		Avoid material piling inside wetland areas and floodplains respecting recommended buffer width.	Implementation: Contractor Monitoring: Supervising Engineer	Throughout the construction phase	Distance between material storage areas and wetlands	Included in Contractor costs
	Construction vehicles and traffic	Use temporary wooded paths or mats for moving vehicles or machinery within wetlands to avoid the need for building a road.	Implementation: Contractor Monitoring: Supervising Engineer	Throughout the construction phase	No road building in permanent wetlands.	Included in Contractor costs
Impairment of hydrological dynamics leading to disturbances and alterations.	Site preparation Construction activities Transportation and traffic	Conduct activities during the dry season in areas close to aquatic habitats to minimize disturbance of sensitive shoreline and wetland areas.	Implementation: Contractor Monitoring: Supervising Engineer	Throughout the construction phase	Activities in the wet season reduced to the extent possible.	Included in Contractor costs
		Minimize encroachment of towers in wetlands and riparian areas.	Implementation: Contractor Monitoring: Supervising Engineer	Throughout the construction phase	Number of towers within wetland or riparian habitat.	Included in Contractor costs
		Maintain hydrologic connectivity between upstream and downstream work areas.	Implementation: Contractor Monitoring: Supervising Engineer	Throughout the construction phase	Normal water flow Hydrological connectivity maintained	Included in Contractor costs
		After termination of construction work, restore natural riverbed conditions (minor bed, natural obstacles, etc.).	Implementation: Contractor Monitoring: Supervising Engineer	Throughout construction phase, after conclusion of work activities in a given area	Natural river bed conditions restored as required.	Included in Contractor costs
Potential introduction of invasive alien species in aquatic and semi-aquatic habitats	Site preparation Construction activities Transportation and traffic	Avoid equipment and vehicle movements in watercourses, floodplains, and wetland areas. If necessary, delineate areas to avoid.	Implementation: Contractor Monitoring: Supervising Engineer	Throughout the construction phase	Avoided hydric environments clearly marked.	Included in Contractor costs
		Implement mitigation measures regarding potential introduction of invasive alien species in terrestrial habitats (see Habitats and flora).	Implementation: Contractor Monitoring: Supervising Engineer	Throughout the construction phase	See applicable indicators	Included in Contractor costs
Land use restrictions within the ROW.	Land acquisition	Notify landowners along the line route about the construction schedule and activities.	Implementation: Contractor Monitoring: Supervising Engineer	Prior to and throughout the construction phase	Number of awareness sessions organized Existence of minutes of awareness sessions	Included in Contractor costs
		Restrict, as much as possible, construction, storage, and dismantling activities within the limits of the ROW. Ensure validation with community authorities of any area, required for work, located outside the right of way.	Implementation: Contractor Monitoring: Supervising Engineer	Throughout the construction phase	Encroachment areas outside the right-of-way Existence of minutes of validation meetings with local authorities	Included in Contractor costs
Loss of arable, grazing, and pastoral lands.	Land acquisition Population resettlement	Construct or relocate structures prior to the beginning of works or provide temporary space during the transition period to minimize impacts on activities and ensure continued access to services by the population.	Implementation: Contractor Monitoring: Supervising Engineer	Prior to construction phase	Number of structures relocated or built Number of temporary premises provided Number of complaints registered and handled.	Included in Contractor costs
		Optimize ROW to avoid sensitive areas identified during detailed census such as cultural heritage resources.	Implementation : Supervising Engineer and Contractor Monitoring : PIU	During detailed design phase	ROW optimized to avoid sensitive sites	Included in Supervising Engineer and Contractor costs
		Adjust the length of the span to avoid or reduce site-specific tower pad impacts. Select carefully tower locations to reduce impacts on land-uses	Implementation : Supervising Engineer and Contractor Monitoring : PIU	During detailed design phase	Tower location optimized to avoid sensitive sites	Included in Supervising Engineer and Contractor costs
		Validate with traditional authorities the location of temporary areas to be used during construction activities.	Implementation: Contractor Monitoring: Supervising Engineer	Throughout construction phase	Always obtain local leaders' approvals prior to establishing temporary work areas.	Included in Contractor costs
Disruption of farming activities by construction works	Site preparation	Plan construction activities to be carried out outside the growing and harvesting season. Validate the agricultural calendar with communities before construction.	Implementation: Contractor Monitoring: Supervising Engineer	Prior to construction phase	Construction schedule taking into account the agricultural calendar Existence of an agricultural calendar validation report issued by the technical agricultural services	Included in Contractor costs
		Pay careful attention to the choice of a tree fall zone to minimize crop damage.	Implementation: Contractor Monitoring: Supervising Engineer	During pre-construction activities	Number of complaints registered and processed	Included in Contractor costs

Potential Impacts Addressed	Sources of Impact	Management Measures	Responsibilities	Implementation Timing	Performance Indicators	Cost (USD)
Increased traffic and disturbance of traffic flow	Construction activities Transportation and traffic Presence of workers	Travel to and from the construction sites should be done during low traffic periods.	Implementation: Contractor Monitoring: Supervising Engineer	Throughout the construction phase	Number of complaints registered and processed	Included in Contractor costs
		Develop and implement traffic and transportation management plan.	Implementation: Contractor Monitoring: Supervising Engineer	Prior to and throughout the construction phase	Existence of a traffic and transportation management plan	Included in Contractor costs
		Coordinate with TAZARA and TAZAMA so that the line's installation work will be done without interrupting their operations.	Implementation: Contractor Monitoring: Supervising Engineer	Throughout the construction phase	Proper authorizations obtained from TAZAMA and TAZARA prior to commencement of works near their installations.	Included in Contractor costs

Potential Impacts Addressed	Sources of Impact	Management Measures	Responsibilities	Implementation Timing	Performance Indicators	Cost (USD)
Increase in traffic and traffic perturbation	Transportation and traffic.	Travelling to and from the construction sites should be done during low traffic periods, limiting use of local roads and village roads, especially during rainy days.	Implementation: Contractor Monitoring: Supervising Engineer	Throughout the construction phase	No transportation activities at peak traffic times.	Included in Contractor costs
Damage to existing infrastructure	Site preparation Construction activities Transportation and traffic	Prepare an inventory of the infrastructure and urban furniture within the study area to rehabilitate those damaged during construction work.	Implementation: Contractor Monitoring: Supervising Engineer	Prior to and throughout the construction phase	Existence of an inventory of infrastructures and urban furniture Number of complaints recorded and handled	Included in Contractor costs
		Plan construction activities in collaboration with local authorities to minimize damage to existing infrastructures and the relocation of any infrastructure that needs to be moved.	Implementation: Contractor Monitoring: Supervising Engineer	Prior to and throughout the construction phase	Existence of coordination protocols with local authorities Number of complaints recorded and handled	Included in Contractor costs
		Rehabilitate damaged infrastructure as soon as possible after construction.	Implementation: Contractor Monitoring: Supervising Engineer	Throughout the construction phase	Damaged infrastructure rehabilitated after construction.	Included in Contractor costs
Need for relocation of certain infrastructure.	Land acquisition Resettlement	Relocation of infrastructures that need to be relocated.	Implementation: Contractor Monitoring: Supervising Engineer	Throughout construction phase	No infrastructure services completely cut by construction works. Demolished infrastructure rebuilt quickly.	Included in Contractor costs
Relocation of houses and other buildings located within the ROW.	Land acquisition Resettlement	Update and implement the RAP to provide compensation measures and assistance to affected households and landowners.	Implementation and Monitoring: PIU	Prior to construction phase	RAP implementation report Relocations and compensations to be completed prior to the beginning of construction. Number of complaints recorded and handled	TBD
		Consider the recruitment of an NGO that supports PAPs in their resettlement.	Implementation and Monitoring: PIU	Prior to construction phase	Contract with an NGO to support PAPs	Included in RAP implementation costs
Creation of short-term jobs for local communities	Purchase of materials, goods, and services Labour/presence of workers	Implement, specific training program to bridge any gaps that may exist between the skills required and the abilities of local candidates.	Implementation: Contractor Monitoring: Supervising Engineer	Prior to and throughout the construction phase	Number of training sessions organized Existence of training session minutes	Included in Contractor costs
		Develop a Workers' Recruitment Action Plan to encourage the recruitment of local workers with the involvement of community leaders and other stakeholders, to ensure transparency and to avoid conflicts among job seekers.	Implementation: Contractor Monitoring: Supervising Engineer	Prior to construction phase	Labor Recruitment Action Plan approved by Supervising Engineer prior to initiation of the construction phase	Included in Contractor costs
		Prioritize the workforce and local service providers in order to better involve local populations and businesses in the Project. Include measures promoting employment and women-owned businesses.	Implementation: Contractor Monitoring: Supervising Engineer	Prior to and throughout the construction phase	Number and ratio of local staff	Included in Contractor costs
Disruption of livelihood activities	Land acquisition Population resettlement Site preparation Construction activities Transportation and traffic	Involve traditional leaders in the resettlement process.	Implementation and Monitoring: PIU	Prior to construction phase	Traditional leaders involved in local environmental and social committees Traditional leaders involved in local resettlement committees	Included in RAP implementation costs
		Maintain access to businesses and services during the works.	Implementation: Contractor Monitoring: Supervising Engineer	Throughout the construction phase	Number of temporary access points created Number of complaints recorded and handled.	Included in Contractor costs
		Assist PAPs in planting of native plant species having a use value to maximize livelihood advantages. Assist communities to revegetate with compensation money. Select species in collaboration with local communities.	Implementation and Monitoring: PIU	Prior to and throughout the construction phase	Number of native species with use value used for plantations Number of plants of native species with use value used for plantations Minutes of meetings with local communities to select species	Included in RAP implementation costs
		Undertake clearing only when consent of each owner has been obtained to clear plantations or cut trees in the ROW.	Implementation: Contractor Monitoring: Supervising Engineer	Prior to construction phase	PAPs sign compensation forms	Included in Contractor costs
Increased pressure on natural resources contributing to communities' livelihood	Site preparation Transportation and traffic Presence of workers	Implement mitigation measures to compensate reduction of ecosystem services for local communities and increased pressure on natural resources	Permanent loss of natural habitat area and of its associated flora	Prior to construction phase	See indicators for Habitats and flora	Included in Contractor costs

Potential Impacts Addressed	Sources of Impact	Management Measures	Responsibilities	Implementation Timing	Performance Indicators	Cost (USD)
Risk of increased incidences of GBV, STDs and HIV/AIDS	Presence of workers Construction Work	Develop and implement a Community Health and Safety Management Plan.	Implementation: Contractor Monitoring: Supervising Engineer	Prior to and throughout the construction phase	Existence of a community health and safety plan	Included in Contractor costs
		Establish a voluntary and confidential STI screening program, including HIV/AIDS, for workers (to be included in subcontractor contracts).	Implementation: Contractor, NGOs Monitoring: Supervising Engineer	Prior to and throughout the construction phase	STI screening program in place and communicated Number of voluntary STI screenings performed	Included in Contractor costs
		Prepare and implement an STI and HIV/AIDS prevention program for both communities and workers, including strict prohibition of sexual abuse and sexual intercourse with partners younger than 18 years of age (underage sex), this along with other requirements will be included in the Code of Conduct for Workers.	Implementation: Contractor, NGOs Monitoring: Supervising Engineer	Prior to and throughout the construction phase	HIV/AIDS prevention program developed and approved by Supervising Engineer prior to beginning of construction activities.	Included in Contractor costs
		Prepare and implement a social awareness program comprising of induction trainings and bi-weekly toolbox talks for all workers, covering health and safety, the Code of Conduct, HIV/STDs, SEAH, Sexual and Reproductive Health and Rights (SRHR), and alcohol abuse, GBV and the grievance mechanism. STD and HIV/AIDS prevention program including a strict prohibition of sexual abuse and sexual intercourse with partners younger than 18 years of age (underage sex), this along with other requirements will be included in the Code of Conduct for Workers.	Implementation: Contractor Monitoring: Supervising Engineer	Throughout construction phase	All workers sensitized on HIV/AIDS and other STDs at beginning of employment. All Subcontractors and workers sensitized on prohibition of sexual abuse, underage sex, and consequences of infraction at beginning of employment. All communities sensitized on HIV/AIDS, other STDs as well as on the grievance mechanism prior to the beginning of any construction works in their vicinity. GBV Management Plan approved by Supervising Engineer prior to initiation of the construction phase	Included in Contractor costs
		Ensure all Contractors, including site supervisors and workers, including supervising engineers, are aware of the Social Awareness Program, covering health and safety, the Code of Conduct, HIV/STDs, SEAH, Sexual and Reproductive Health and Rights (SRHR), and alcohol abuse, GBV and the grievance mechanism Implement the GBV Management Plan.	Implementation: Contractor Monitoring: Owner's Engineer	Throughout construction phase	All Contractors, including site supervisors and workers, including supervising engineers, sensitized on the Social Awareness Program at the beginning of employment. All Subcontractors and workers sensitized on prohibition of sexual abuse, underage sex, and consequences of infraction at beginning of employment.	Included in the construction contract.
		Ensure members of communities are aware of the social awareness program as well as grievance mechanisms, and not only the community's leadership.	Implementation: Contractor Monitoring: Owner's Engineer	Throughout construction phase	Community leaders as well as women in the communities received training on SEAH, SRHR and GBV, prior to the beginning of any construction works in their vicinity.	Included in the construction contract.
		Include all gender associated risks in the Code of Conduct – refer to the GBV Management Plan, including SRHR and GBV issues.	Implementation: Contractor Monitoring: Owner's Engineer	Throughout construction phase	Code of Conduct adapted with a gender perspective and GBV measures are in place.	Included in the construction contract.
		Requirements to produce regular E&S reports to assess compliance with Gender Based Violence Management Plan and other E&S measures. Monitoring should be done by an independent and qualified third party.	Implementation: Contractor and PIU Monitoring: Supervising Engineer	Prior and throughout construction phase	Monitoring and evaluation report on Gender Based Violence Management Plan and other E&S measures by an independent and qualified third party.	Included in the construction contract.
		Locate worker camps at a minimum distance of 1 km from towns and villages and select the most suitable location with the help of village headmen.	Implementation: Contractor and PIU Monitoring: Supervising Engineer	Throughout construction phase	Distance between worker camps and other human settlements always kept at 1 km or more.	Included in Contractor costs

Potential Impacts Addressed	Sources of Impact	Management Measures	Responsibilities	Implementation Timing	Performance Indicators	Cost (USD)
Occupational health and safety hazards and risks.	Site preparation. Construction activities Transportation and traffic. Waste and hazardous materials management. Purchase of materials, goods, and services. Presence of workers.	Consistently apply a formal and documented risk assessment process conducted by a competent and experienced team of professionals at the planning stage of the construction activities to embed occupational health and safety considerations in the decision process. Methodology of risk assessment shall be based on the ALARA principal, e.g., reduce risks "As Low as Reasonably Achievable". In the context of operation, this should include controlling site access and egress while embedded in the site security protocols.	Implementation: PIU and Contractor	Prior to and throughout the construction phase	Risk assessment completed and updated.	Included in Contractor costs
		Provide a training specific to the construction site to the workforce as well as any employee, Contractor, Subcontractor, or visitor accessing the construction site. Training specific to construction site shall be provided before being on-site.	Implementation: Contractor Monitoring: Supervising Engineer	During onboarding of new employees and as warranted throughout the construction phase based on changing conditions or in response to accidents, incidents, injuries, or near misses.	Records of completed training	Included in Contractor costs
		Based on the risk assessment, develop and implement clear work procedures for high risks activities such as working at heights, confined spaces (excavated ditches), hot works, energizing the line.	Implementation: Contractor Monitoring: Supervising Engineer	Prior to construction phase Throughout construction phase	Work procedures developed and followed during construction works	Included in Contractor costs
		Develop and implement an audit and inspection program tailored to the risks specific to construction sites, including risks specific to the current Project.	Implementation: Contractor Monitoring: Supervising Engineer	Throughout the construction phase	OHS audit and inspection program approved by Supervising Engineer prior to initiation of construction phase Records of audits and inspections completed	Included in Contractor costs
		Ensure all accidents, incidents, injuries, or near misses reported and investigated while formally monitoring the implementation and communication of control and/or preventive measures.	Implementation: Contractor Monitoring: Supervising Engineer	Throughout the construction phase	Record keeping of all accidents, incidents and near misses reported, and proof of investigation and implementation of preventative measures.	Included in Contractor costs
		Report severe and serious incidents to PIU and WB within 24-48 hours of occurrence.	Implementation: Contractor Monitoring: Supervising Engineer	Throughout the construction phase	Severe and serious incident reported within 24-48 hours	Included in Contractor costs
		Copies of the identity documents of all workers should be kept by the Contractor to ensure compliance with the minimum age and be available upon inspection	Implementation: Contractor and PIU Monitoring: Supervising Engineer	Prior to construction phase Throughout construction phase	Availability of copies of identity documents of all workers.	Included in Contractor costs
		Ensure that the PPE requirements in the Occupational Health, Safety and Security Management Plan to be developed, include an obligation to provide PPE suitable for female workers (diverse range of body shapes and sizes).	Implementation: Contractor Monitoring: Supervising Engineer	Prior to construction phase Throughout construction phase	Availability of female adapted PPE	Included in Contractor costs
Accidents and physical injuries involving workers or residents.	Site preparation. Construction activities Transportation and traffic. Waste and hazardous materials management. Purchase of materials, goods, and services. Presence of workers.	Secure equipment and demarcate any excavation work areas.	Implementation: Contractor Monitoring: Supervising Engineer	Throughout the construction phase	Equipment and excavation work areas properly secured.	Included in Contractor costs
		Clearly delineate construction areas with signs and fences (where necessary).	Implementation: Contractor Monitoring: Supervising Engineer	Throughout the construction phase	Construction areas properly secured.	Included in Contractor costs
		Hire security workers in order to ensure the safety of workers and community members, as well as prevent theft and vandalism.	Implementation: Contractor, Supervising Engineer, and PIU	Prior to and throughout the construction phase	Security guards on duty full time (24hrs) whenever camp is in operation.	Included in Contractor costs
		Maintain worker camps in clean and healthy condition with separate sanitary facilities and sleeping areas provided for men and women as prescribed by international worker health standards such as the IFC-EBRD Joint Guidance Note on Worker Accommodations (Appendix 3-4).	Implementation: Contractor, Supervising Engineer, and PIU	Throughout the construction phase	Camps maintained in satisfactory condition.	Included in Contractor costs
		Develop and implement an Occupational H&S management plan to protect every worker involved in construction activities, even temporary workers.	Implementation: Contractor Monitoring: Supervising Engineer	Prior to beginning of construction phase	OHS management plan approved by Supervising Engineer prior to initiation of Construction phase.	Included in Contractor costs
		Require all Contractors and Subcontractors to comply with relevant WB health and safety requirements and ZESCO 's corporate policy.	Implementation: PIU & Contractor	Prior to beginning of construction phase	WB H&S requirements and ZESCO corporate policy integrated in Contractor and Subcontractor contracts.	Included in Contractor costs
		Supply drinking water and maintain its quality to ensure sanitation at the construction sites.	Implementation: Contractor Monitoring: Supervising Engineer	Throughout the construction phase	Supply of constant good quality drinking water at the worksites.	Included in Contractor costs

Potential Impacts Addressed	Sources of Impact	Management Measures	Responsibilities	Implementation Timing	Performance Indicators	Cost (USD)
Risks of accidents and physical injuries involving residents.	Construction activities.	Prepare and implement a Community Health and Safety Plan with the following elements: (i) location of sources of materials, (ii) disposal area of construction debris, (iii) arrangements for traffic management, (iv) fencing the substations and the towers, (v) and measures for avoiding the occurrence of incidents and injuries to members of the public associated with the operation of the moving equipment.	Implementation: Contractor Monitoring: Supervising Engineer	Prior to beginning of construction phase	Community H&S plan approved by Supervising Consultant prior to initiation of Construction phase.	Included in Contractor costs
Risk of accidents due to project-related traffic	Construction vehicles and traffic	Control speed of transport vehicles. Limit speed to 20 km/h inside villages and install signposts where relevant.	Implementation: Contractor Monitoring: Supervising Engineer	Throughout the construction phase	Number of accidents recorded Number of complaints recorded and handled	Included in Contractor costs
		Limit the duration of temporary road lane closings to a minimum and take adequate measures to direct users to the bypass lanes.	Implementation: Contractor Monitoring: Supervising Engineer	Throughout the construction phase	Area and duration of temporary closures Number of complaints recorded and handled	Included in Contractor costs
		Provide adequate signage to inform the public of access restrictions and temporary and permanent detours to bypass work areas and built infrastructure.	Implementation: Contractor Monitoring: Supervising Engineer	Throughout the construction phase	Adequate signage and markings	Included in Contractor costs
		Consider the use of traffic marshalls at busy junctions.	Implementation: Contractor Monitoring: Supervising Engineer	Throughout the construction phase	Traffic coordination from a marshall at busy junctions	Included in Contractor costs
Increased pressure on community health services	Presence of workers	Require Contractor(s) to provide health care services to their employees. All employees should be registered with NHIMA and the monthly cost should be covered by the Contractor(s).	Implementation: Contractor Monitoring: Supervising Engineer	Throughout construction phase	Availability of health care services throughout the construction phase.	Included in the Contractor costs
		Contractors should have in their camp or temporary facilities a medical clinic, with basic medicines, a qualified nurse or doctor and one or more ambulances depending on the distance from the camp.	Implementation: Contractor Monitoring: Supervising Engineer	Throughout the construction phase	XX	Included in Contractor costs
		Assess the capacity of the local health care facilities. Make sure to have a contract with health care facilities and closest hospital making sure the treatments available are covering for typical workers health injuries	Implementation: Contractor Monitoring: Supervising Engineer	Throughout the construction phase	Availability of health care services throughout the construction phase.	Included in Contractor costs
Increased stress related to nuisances	Site preparation. Construction activities Transportation and traffic. Waste and hazardous materials management. Purchase of materials, goods, and services. Presence of workers.	Reduce nuisances especially near settled areas with adequate noise, dust, air, and water pollution reduction measures such as timely servicing of vehicles to ensure they are in good condition, sensitization of drivers on safety issues (e.g., speed limits when transporting goods), watering of access roads, proper disposal of used oils, etc. (see environmental protection measures in other sections).	Implementation: Contractor Monitoring: Supervising Engineer	Throughout the construction phase	Number of complaints registered and handled	Included in Contractor costs
		Develop, implement and follow-up on Grievance Redress Mechanism	See GRM for details on responsibilities.	Prior to and throughout the construction phase	GRM approved by Supervising Engineer prior to initiation of the construction phase.	Included in the construction contract. Provision for the GRM focal points \$75,000 (allowance to the GRM focal points, fuel, and vehicle rental).
		Locate access roads and lay down areas away from residences to the extent possible.	Implementation: Contractor Monitoring: Supervising Engineer	Throughout the construction phase	Daily inspection by the Contractor of access roads for excessive noise. Contractor/Supervising Engineer to maintain records of complaints on noise and vibration levels, and follow-up corrective measures.	Included in Contractor costs
		Notify landowners along the line route and the main public transportation routes about the construction schedule and activities.	Implementation: Contractor Monitoring: Supervising Engineer	Throughout the construction phase	Landowners duly notified about construction schedule and activities.	Included in Contractor costs
Risk of poor working conditions for construction workers	Presence of workers	Provide drinking water and ensure its quality at construction sites.	Implementation: Contractor Monitoring: Supervising Engineer	Throughout the construction phase	Drinking water available	Included in Contractor costs
		Provide sanitation facilities (one toilet for fifteen workers) at camps, substations, and tower erection points.	Implementation: Contractor Monitoring: Supervising Engineer	Throughout the construction phase	Sanitation facilities in camps and construction sites	Included in Contractor costs
		Provide separate accommodation and sanitation facilities in work camps in order to satisfy both gender needs.	Implementation: Contractor Monitoring: Supervising Engineer	Throughout the construction phase	Separate accommodation and sanitation facilities for both sexes and ensure lightning	Included in Contractor costs
		Develop and implement a Workers' Grievance Redress Mechanism	Implementation: Contractor Monitoring: Supervising Engineer	Prior to and throughout the construction phase	approved by Supervising Engineer prior to initiation of the construction phase	Included in Contractor costs

Potential Impacts Addressed	Sources of Impact	Management Measures	Responsibilities	Implementation Timing	Performance Indicators	Cost (USD)
Work-related injury or health effect	Site preparation Exploitation of borrow pits Construction activities for the transmission line Construction activities for substations Management of hazardous products and residual materials Construction vehicles and traffic	Equip workers with PPE and require their effective use in work areas of high dust and noise levels (masks, ear plugs, etc.).	Implementation: Contractor Monitoring: Supervising Engineer	Throughout the construction phase	Number of PPE available and actually used; Number of work-related accidents recorded	Included in Contractor costs
		Provide training specific to construction site to the workforce as well as any employee, Contractor, Subcontractor, or visitor accessing the construction site. Access to the construction site will be denied without confirmation that the training session has been completed.	Implementation: Contractor Monitoring: Supervising Engineer	Throughout the construction phase	Number of training sessions specific to the construction site All workers on site received training Minutes of site-specific training sessions	Included in Contractor costs
		Ensure International Chemical Safety Cards (ICSC) or Material Safety Data Sheets (MSDS) or equivalent data/information is readily available in English to exposed workers and first aid personnel.	Implementation: Contractor Monitoring: Supervising Engineer	Throughout the construction phase	Number of PPE available and actually used; Number of work-related accidents recorded	Included in Contractor costs
		Develop and implement an Occupational Hygiene, Health, and Safety Plan to protect every worker involved in construction activities, even temporary workers.	Implementation: Contractor Monitoring: Supervising Engineer	Prior to and throughout the construction phase	Existence of an occupational health and safety plan Number of work incidents reported	Included in Contractor costs
		Remove construction debris generated on-site immediately after construction activities, sort them and manage them in accordance with applicable national regulation. If possible, favour the reuse of wooden debris by local populations.	Implementation: Contractor Monitoring: Supervising Engineer	Throughout the construction phase	No debris left on site Quantity of wood debris handed over to the public	Included in Contractor costs
Tension with surrounding communities and social acceptability.	Land acquisition Resettlement Site preparation. Construction activities Transportation and traffic. Waste and hazardous materials management. Purchase of materials, goods, and services. Presence of workers. Recruitment	Develop, implement, and maintain a Stakeholder Engagement Plan.	Implementation: Contractor - PIU Monitoring: Supervising Engineer	Prior to and throughout construction phase	Documentation of all information and engagement activities (MoM and signature lists).	Included in Contractor costs Responsibility under ZESCO: \$85,000
		Maintain ongoing communication with communities and traditional leaders. Ensure that they are involved in the process of population relocation.	Implementation and monitoring: PIU	Prior to construction phase	Traditional leaders involved in local environmental and social committees Traditional leaders involved in local resettlement committees	Included in Contractor costs
		Follow a strict "official" recruitment process whereby all workers need to present their application through official offices.	Implementation: Contractor - PIU Monitoring: Supervising Engineer	Throughout the construction phase	No recruitment outside official offices.	Included in Contractor costs
		All workers require written contracts and should be given a copy	Implementation: Contractor - PIU Monitoring: Supervising Engineer	Throughout the construction phase	Availability of all written contracts to all employees.	Included in Contractor costs
Tensions between local populations and outside workers	Purchase of materials, goods, and services Presence of workers	Locate worker camps at distance from towns and villages in order to limit interactions between workers and the community. Select the most suitable location with the help of community leaders	Implementation: Contractor Monitoring: Supervising Engineer	Throughout the construction phase	Distance between workers' camps and towns and villages	Included in Contractor costs
		Sensitize workers to the cultural realities of the area and train workers on appropriate social behaviours.	Implementation: Contractor Monitoring: Supervising Engineer	Prior to and throughout the construction phase	Number of awareness-raising sessions on cultural realities and appropriate behaviors Existence of minutes of awareness-raising sessions	Included in Contractor costs
Risk of sexual abuse by workers and especially child abuse.	Presence of workers	Increase security in the Project area (police presence, lighting, and signage) during the construction phase.	Implementation: Contractor Monitoring: Supervising Engineer	Throughout the construction phase	Number of security guards hired Number of recorded acts of violence, theft or vandalism	Included in Contractor costs
		Favour the employment of local workers to reduce the risk of sexual harassment and violence caused by migrant workers.	Implementation: Contractor Monitoring: Supervising Engineer	Prior to and throughout the construction phase	Number of local employees Existence of a labor recruitment and influx management plan	Included in Contractor costs
		Sensitize all Contractors, workers, and communities on the Social Awareness Program, including explanations on risks posed by STDs, sanctions, etc. Ensure that a grievance redress mechanism as well as a GBV Action Plan are in place and implemented.	Contractor	Prior to and throughout the construction phase	Number of awareness-raising sessions on the STI/HIV/AIDS program Existence of minutes of awareness-raising sessions	Included in Contractor costs
		GBV induction training to be delivered to all personal to be involved in the construction work phase.	Contractor	Prior to and throughout the construction phase	Training records	Included in Contractor costs
		Maintain construction camps safe and secure for women and vulnerable groups.	Implementation: Contractor Monitoring: Owner's Engineer	Throughout construction phase	Camps designed with a gender perspective, including sufficient lighting, gender-segregated locker rooms and latrines, etc.	Included in the construction contract.

Potential Impacts Addressed	Sources of Impact	Management Measures	Responsibilities	Implementation Timing	Performance Indicators	Cost (USD)
		Develop and implement a Gender-Based Violence Management Plan.	Contractor	Prior to and throughout the construction phase	Existence of a plan to assess and manage the risks of gender-based violence and harassment.	Included in Contractor costs
		<p>Immediately report any suspected case of sexual abuse or underage sex to the supervising engineer and PIU. Management of such cases should be based on the following principles:</p> <ul style="list-style-type: none"> <li>– Immediate suspension of employment for accused workers;</li> <li>– Trigger grievance redress mechanism processes if not already done and invite an impartial observer to follow the process.</li> </ul> <p>If accusations are found to be justified, the Lead Contractor shall:</p> <ul style="list-style-type: none"> <li>– Immediately cease employment of the accused worker and report criminal offences to appropriate authorities for prosecution;</li> <li>– Compensate the affected person and community according to an agreement to be negotiated using a grievance redress mechanism. These compensations may not take a monetary form and shall be validated as fair by the impartial observer.</li> </ul> <p>If accusations are found not to be justified, the Lead Contractor shall reinstate the worker in its regular tasks with compensation for lost income during suspension.</p> <p>The first sexual abuse and/or underage sex complaint or event treated in front of a grievance committee (which may involve one or more workers) where accusations of sexual abuse and/or underage sex are found to be justified shall attract the following consequences for the Lead Contractor, in addition to those listed above:</p> <ul style="list-style-type: none"> <li>– Warning from the PIU about consequences of any additional cases;</li> <li>– Obligation to submit a remedial plan to be approved by the PIUa.</li> </ul> <p>The second instance where a sexual abuse and/or underage sex complaint treated in front of a grievance committee finds accusations to be justified shall trigger immediate suspension of all construction work. National legal process must also be applied.</p> <p>Put in place the Code of Conduct for workers</p> <p>Refer to the GBV Management Plan</p>	Contractor	Throughout the construction phase	Number of reports of sexual abuse Complaints recorded and handled appropriately	Included in Contractor costs
Increase in vulnerability to financial abuse due to the sums of money given to PAPs as compensation for lost assets	Land acquisition Resettlement	Provide training to women and vulnerable groups regarding finances and compensation to avoid financial abuse.	Implementation and monitoring: PIU	Prior to construction phase	Number of training courses held List of participating women Existence of training meeting minutes	Included in Contractor costs
Difficulties in asserting their rights during the compensation and decision-making processes due to language barriers, sociocultural norms, or limited access to available support resources.	Land acquisition Resettlement	Ensure appropriate consideration of women and vulnerable persons in decision-making.	Implementation: Contractor Monitoring: Supervising Engineer	Prior to construction phase	Presence of women and vulnerable persons at meetings with PAPs	Included in Contractor costs
		Ensure the involvement of women in negotiations related to compensation aspects so as to ensure that they are stakeholders in the process of allocating and distributing these compensations.	Implementation and monitoring: PIU	Prior to construction phase	Presence of women and vulnerable persons at meetings with PAPs In-kind compensation registered in the name of all spouses concerned	Included in Contractor costs
Women being sidetracked from the compensation and decision-making processes.	Land acquisition. Resettlement	Perform close monitoring during RAP inventories and ensure women are compensated for their assets and included in the negotiation process for compensation.	Implementation and monitoring: PIU	Prior to construction phase	Proportion of female PAPs vs. total PAPs compensated under the final RAP, similar to preliminary RAP.	Included in the RAP.
		ZESCO's Consent for Compensation/Disclosure form, included in the RAP should be adapted for more than one signature in case of household in unions, including polygamous marriages.	Implementation and monitoring: PIU	Prior to construction phase	Compensation payments issued in the names of all spouses or single heads of households as relevant.	Included in the RAP.
Land use and compensation disputes	Land acquisition Site preparation Setting up of construction sites Construction activities for the transmission line Construction activities for substations	Support the most vulnerable households (youth, women, persons with disabilities) and individuals in organizing their resettlement.	Implementation and monitoring: PIU	Prior to construction phase	Number of vulnerable households and PAPs Support activities carried out	Included in RAP implementation costs

Potential Impacts Addressed	Sources of Impact	Management Measures	Responsibilities	Implementation Timing	Performance Indicators	Cost (USD)
Increased marginalization of women, youth and persons with disabilities during the employment process	Presence of workers	Encourage the recruitment of female workers, with equal payment for male and female workers, for equivalent jobs. Set targets for unskilled workforce and rationale for target.	Implementation: Contractor Monitoring: Supervising Engineer	Prior to and throughout the construction phase	At least 30% of women employees. At least 30% of youth employees youth (persons aged 19 to 35). At least 5% of persons with disability employees. No wage inequalities.	Included in Contractor costs
		Provide opportunities to women in income-generating activities during construction, e.g., provision of catering services, selling local products, etc., with price limits in order not to cause inflation.	Implementation and monitoring: PIU	Throughout the construction phase	Number of women providing services or products Percentage of women's businesses/groups as service providers	Included in Contractor costs
		Organize women in groups and provide training for specific line of service providing such as catering and food production, and others as identified as opportunities for this group and PWD.	Implementation and monitoring: PIU	Prior to and throughout the construction phase		Included in Contractor costs
Disturbance of women and vulnerable groups' livelihood activities resulting in a risk of impoverishment	Land acquisition Resettlement Construction activities	Prioritize vulnerable households and people regarding access to social measures and programs.	Implementation and monitoring: PIU	Prior to and throughout the construction phase	Number of vulnerable households and PAPs with access to social measures and programs	Included in RAP implementation costs
		As part of the RAP monitoring program, identify the most vulnerable households and individuals and ensure close monitoring of their health and integration into host communities.	Implementation and monitoring: PIU	During the RAP monitoring period	Number of vulnerable households and PAPs Activities carried out to monitor their health and integration	Included in RAP implementation costs
Potential disturbance or destruction of archaeological sites and/or objects	Site preparation Construction activities Transportation and Traffic	Develop and implement a Cultural Heritage Management Plan.	Implementation: Contractor Monitoring: Supervising Engineer	Prior to and throughout the construction phase	Cultural Heritage management plan approved by Supervising Engineer prior to initiation of construction phase	Included in Contractor costs
		Prepare and implement chance find procedures, including supervision of excavation works by an archeologist.	Implementation: Contractor Monitoring: Supervising Engineer	Prior to and throughout the construction phase	Existence of a procedure for incidental findings Number of reports of chance finds	Included in Contractor costs
		Report any accidental discovery to the worksite manager, who will report it to competent authorities.	Contractor	Throughout the construction phase	Number of reports of chance finds Interruption of work carried out	Included in Contractor costs
Potential destruction of physical cultural resources within the Mwela Rock Art site;	Site preparation Construction activities Transportation and Traffic	Conduct line route optimization to avoid rock outcrops in proximity and within the Mwela Rock Art site.	Implementation : Supervising engineer	During detailed design phase	Line route optimized to avoid rock outcrops	Included in Supervising Engineer costs
		Develop and implement a Cultural Heritage Management Plan.including specific measures for the Mwela Rock Art site.	Implementation: Contractor Monitoring: Supervising Engineer	Prior to and throughout the construction phase within the Mwela Rock Art site	Cultural Heritage management plan approved by Supervising Engineer prior to initiation of construction phase	Included in Contractor costs
		Locate and demarcated/fenced all physical cultural resources and rock arts in proximity of access roads, work areas and wayleave.	Implementation: Contractor Monitoring: Supervising Engineer	Prior to and throughout the construction phase within the Mwela Rock Art site	Physical cultural resources and rock arts demarcated or fenced	Included in Contractor costs
		Conduct all works within the Mwela Rock Art site with an archeologist from the NHCC.	Implementation: Contractor Monitoring: Supervising Engineer	Prior to and throughout the construction phase within the Mwela Rock Art site	Presence of an archeologist from the NHCC	Included in Contractor costs
		Identify access roads and work areas with the presence of an archeologist from the NHCC. A dedicated Transport Management Plan and strict work procedures within the site should be developed and implemented.	Implementation: Contractor Monitoring: Supervising Engineer	Prior to and throughout the construction phase within the Mwela Rock Art site	Access roads and work areas validated by an archeologist. Transport management Plan for the Mwela Rock Art site developed and implemented	Included in Contractor costs
		Establish a Compensation Plan for the reduction of the tourism status of the site	Implementation: ZESCO	Throughout the construction phase within the Mwela Rock Art site	If applicable, establish a Compensation Plan and pay compensation to NHCC.	TBD
		Continuously monitor project activities and excavations of areas greater than 1 meter	Implementation: Contractor Monitoring: Supervising Engineer	Throughout the construction phase within the Mwela Rock Art site	Continuous monitoring of excavation works greater than 1 meter	Included in Contractor costs
Cover excavated materials within the Mwela Rock Art Site with erosion control blankets	Implementation: Contractor Monitoring: Supervising Engineer	Throughout the construction phase within the Mwela Rock Art site	No sign of erosion within the site	Included in Contractor costs		

Potential Impacts Addressed	Sources of Impact	Management Measures	Responsibilities	Implementation Timing	Performance Indicators	Cost (USD)
		Strictly implement waste management within the site. All rubble should be removed from the site.	Implementation: Contractor Monitoring: Supervising Engineer	Throughout the construction phase within the Mwela Rock Art site	No waste left on the site	Included in Contractor costs
		Conduct training and induction for workers on safe practices within the site	Implementation: Contractor Monitoring: Supervising Engineer	Prior to and throughout the construction phase within the Mwela Rock Art site	Register of training. Training completed for all staff including drivers	Included in Contractor costs
		Rehabilitate all disturbed areas within the Mwela Rock Art site after completion of works.	Implementation: Contractor Monitoring: Supervising Engineer	After construction works finalized within the site	Areas rehabilitated to their original state.	Included in Contractor costs
Potential disturbance or destruction of burial sites and/or sacred sites	Land acquisition Resettlement Site preparation Construction activities Transportation and traffic	In consultation with affected communities, find an optimized line route if the ROW encroaches into a sacred forest.	Detailed design consultant	During line detailed design	Number of sacred forests in the ROW	Included in Preparation engineer costs
		Provide financial and logistical assistance for the pacification rituals and the relocation of known burial grounds, sacred sites, or any other cultural sites of importance to communities if needed.	Implementation and monitoring PIU	Prior to construction phase	Number of community cultural sites affected Number of rituals and relocations carried out	Included in Contractor costs
		Favour allowing the cemeteries and sacred sites to remain inside the ROW as preferred by the communities. If displacement is unavoidable, initiate discussions with respective communities to reach an agreement on an acceptable process, cost, and relocation site.	Implementation and monitoring PIU	Prior to construction phase	Number of community cultural sites affected Number of rituals and relocations carried out	Included in RAP implementation costs
		Adjust pylon spacing to avoid the cemeteries and sacred sites.	Detailed design consultant	During line detailed design	Number of cemeteries or sacred sites affected	Included in Preparation engineer costs
		After discussion and agreement with the concerned communities, implement the agreed measures to remedy any unavoidable disturbance of cemeteries and sacred sites.	Implementation and monitoring PIU	Prior to construction phase	Number of cemeteries or sacred sites affected Existence of consultation meetings with communities to discuss measures to be applied	Included in Contractor costs
		Consult with village leaders before carrying out work to make a final check on the potential presence of sacred sites and rituals affiliated with them.	Implementation: Contractor Monitoring: Supervising Engineer	Prior to construction phase	Existence of minutes of consultation with village chiefs to verify the presence of sacred sites	Included in Contractor costs
		Acquire the land rights where the cemetery and graves will be relocated. Transfer these rights to the families concerned.	Implementation and monitoring PIU	Prior to construction phase	Acquired and transferred land rights	Included in RAP implementation costs
Potential disturbance of cultural activities and celebrations	Site preparation Construction activities Transportation and traffic	Plan activities so that they are carried out outside periods when cultural activities important to communities are planned. Validate the cultural calendar with communities before construction.	Implementation: Contractor Monitoring: Supervising Engineer	Prior to construction phase	Existence of construction activity schedules that take into account important cultural activities Existence of cultural calendar validation minutes for communities	Included in Contractor costs
Temporary degradation of the landscape at worksite.	Site preparation Construction activities Transportation and traffic	Prior to the start of construction work, document the existing environment using videos and photos. The information gathered must be used to restore the site to its original state, with the exception of the ROW.	Implementation: Contractor Monitoring: Supervising Engineer	Prior to construction phase	Pre-work photos and videos of construction sites Restoration plan adapted to the initial conditions captured	Included in Contractor costs



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### **3.1.3 OPERATION**

E&S measures proposed to mitigate negative impacts or enhance the positive impacts during the operation phase are presented in Table 3-3.



**Table 3-3 Management Measures to be implemented during the Operation Phase**

Potential Impacts Addressed	Sources of Impact	Management Measures	Responsibilities	Implementation Timing	Performance Indicators	Cost (USD)
Cross-cutting	Cross-cutting	Continue implementation of ESMS throughout the operation phase	ZESCO	Project lifetime	Reporting executed as per scheduled in ESMS.	ZESCO operation budget
Temporary air quality deterioration	Presence and operation of line, substations and access roads Maintenance and repairs Transportation and circulation	Ensure that all equipment, vehicles, and machinery are in good working order, including mufflers, catalytic converters, brakes, silencers, and clean (power washed), free of leaks, and excess oil and grease.	ZESCO	Project lifetime	Monthly inspections of vehicles and equipment.	ZESCO operation budget
		Restrict speed on loose surface roads to 20 km/h during dry or dusty conditions and install signposts where relevant.	ZESCO	Project lifetime	Contractor/Supervising Engineer to maintain records of complaints on noise and air quality, and follow-up with corrective measures.	ZESCO operation budget
Greenhouse gas emissions.	Presence and operation of line, substations and access roads Maintenance and repairs Management of hazardous products and residual materials Transportation and circulation Waste and hazardous materials management	Use reduced sulphur diesel to limit emissions of particulate matter and sulphur dioxide caused by combustion.	ZESCO	During the operation and maintenance phase	Low-sulphur diesel available at all times and used by all vehicles and machinery.	ZESCO operation budget
Increase in noise and vibration levels.	Presence and operation of line, substations and access roads Maintenance and repairs Transportation and circulation	Ensure that all motor equipment and machinery are in good working order and that they are equipped with high-performance silencers and in good condition.	ZESCO	During the operation and maintenance phase	Existence of up-to-date. for all equipment on site.	ZESCO operation budget
		Comply with IFC's EHS Guidelines regarding noise levels	ZESCO	During the operation and maintenance phase	Existence of national ambient or international standards such as those of the IFC.	ZESCO operation budget
		Ensure regular maintenance to reduce sources of humming noise, such as conductor mounting hardware that requires tightening.	ZESCO	During the operation and maintenance phase	Sources of hum identified and equipment involved monitored.	ZESCO operation budget
		Develop and implement a Pollution Prevention Management Plan including noise management.	ZESCO	Prior to and during the operation and maintenance phase	Existence of a Pollution Prevention Management Plan including noise management.	65,000
		Restrict noise and vibration generating activities near residential or institutional sensitive receptors to the period considered as daytime (between 7 a.m. and 7 p.m.).	ZESCO	Project lifetime	National noise standards respected.	ZESCO operation budget
Changes in soil chemical properties and risk of soil contamination.	Presence and operation of line, substations and access roads Maintenance and repairs Management of hazardous products and residual materials Transportation and circulation	Develop and implement a Residual Materials and Hazardous Product Management Plan that strictly respects waste management practices in accordance with the national regulations and the environmental and social management plan (ESMP).	ZESCO	Prior to and during the operation and maintenance phase	Existence of a Residual Materials and Hazardous Products Management Plan.	\$75,000
		Keep a spill containment kit readily accessible in the event of an accidental spill and ensure on-site staff is trained in its use.	ZESCO	Project lifetime	Spill containment and cleanup equipment onsite.	ZESCO operation budget
		Train workers on the correct transfer and handling of fuels and chemicals and in response to spills.	ZESCO	Project lifetime	Evidence of adequate training.	ZESCO operation budget
		Use impervious surfaces for refueling areas and other fluid transfer areas. Provide adequate secondary containment for fuel storage tanks and for the temporary storage of other fluids such as lubricating oils and hydraulic fluids.	ZESCO	Project lifetime	Implementation of proper refueling procedures.	ZESCO operation budget
		Install oil water separators and grease traps at refueling facilities, workshops, parking areas, fuel storage, and containment areas.	ZESCO	Project lifetime	Presence of oil water separators and grease traps. Inspections to ensure proper storage handling techniques are being followed.	ZESCO operation budget
		Control and reduce at the source of the production of waste and hazardous waste.	ZESCO	Project lifetime	Waste production minimized.	ZESCO operation budget
		Develop and implement an Emergency Preparedness and Response Plan. This plan must include an emergency response in case of fire (including at substations), major soil erosion, and seismic events.	ZESCO	Prior to beginning of operations	Emergency Preparedness and Response Plan adopted prior to beginning of the operation phase.	\$60,000 for development and purchase of spill kits
		Inspect all equipment that may contain contaminants, such as transformers, regularly to detect, among others, signs of leaks or spill.	ZESCO	Project lifetime	Large stationary equipment inspected twice a year.	ZESCO operation budget
		Store all ignitable, reactive, flammable, corrosive, and toxic materials in clearly labelled containers. Storage locations for these materials will be equipped with secondary containment to prevent the release of chemicals to the environment in the event of a spill.	ZESCO	Project lifetime	No ignitable, reactive, flammable, corrosive, or toxic materials stored elsewhere than labelled containers. Secondary containment provided.	ZESCO operation budget
		Store hazardous materials (mainly used oil and gas) in a manner that prevents interaction with each other or with the environment or from being tampered accidentally. Provision of secondary containment, drip trays or other overflow and drip containment measures, for hazardous materials containers at connection points or other possible overflow points.	ZESCO	Project lifetime	Secure storage of all hazardous materials.	ZESCO operation budget

Potential Impacts Addressed	Sources of Impact	Management Measures	Responsibilities	Implementation Timing	Performance Indicators	Cost (USD)
Modifications of surface water quality with a risk of contamination; Modifications of groundwater quality with a risk of contamination.	Presence and operation of line, substations and access roads Maintenance and repairs Management of hazardous products and residual materials Transportation and circulation	Implement mitigation measures regarding the risk of soil contamination (see Soils and agricultural potential).	ZESCO	During the operation and maintenance phase	See applicable indicators.	Included in costs for implementation of the RMHWMP
		Avoid destabilization of shores and sediments or other pollutants rejection in watercourses during road and wayleave maintenance.	ZESCO	During the operation and maintenance phase	Maintenance frequency of permanent access roads. Stream crossing inspection report.	ZESCO operation budget
Modification of natural runoff patterns	Presence and operation of powerline and substations	Only excavate the lower third of ditches during drainage ditch maintenance in order to maintain ditch slope stability.	ZESCO	During the operation and maintenance phase	Adequately landscaped ditches. Access road inspection reports.	ZESCO operation budget
Maintenance of vegetation in an early stage of regeneration	Presence and operation of line, substations and access roads materials management Maintenance and repairs	Use mechanical method for vegetation control instead of chemical herbicides inside the ROW.	ZESCO	During the operation and maintenance phase	Mechanical method of vegetation control applied. No herbicides used.	ZESCO operation budget
		Areas where endangered species are found should be identified and warning signs should be placed to avoid any impairment of the specimens if they do not represent a serious risk to the transmission line.	ZESCO	During the operation and maintenance phase	Warning signs in place.	ZESCO operation budget
		Undertake selective control of the vegetation in dambos and riparian habitat, including Mungwi Forest Reserve to keep low shrubby species that do not represent a risk for the powerline. As much as possible, conserve all the vegetation (trees, shrubs, herbaceous plants, and crops) present at the edge of watercourses and in erosion-prone areas.	ZESCO	Project lifetime	Scrubby and herbaceous cover maintained all along the wayleave.	ZESCO operation budget
Potential introduction of invasive alien species	Presence and operation of line, substations and access roads Maintenance and repairs Transportation and circulation	Implement an IAS monitoring program following project construction and site re-vegetation in sensitive areas, such as forested patches and montane grasslands and swamps. Consider conducting monitoring at the same time as ROW management.	ZESCO	Project lifetime	IAS monitoring program ready at the beginning of operational phase. Monitoring conducted at least every 5 years.	Included in monitoring costs
Local reduction of density for species of higher use value in given areas	Maintenance and repairs Presence of workers	Undertake monitoring of natural resources exploitation and implement a sensitization program in order to educate and increase local communities' awareness on natural resources protection.	ZESCO	During the operation and maintenance phase	Natural resource exploitation monitoring report. Number of awareness-raising sessions on natural resource protection. Existence of minutes of awareness-raising sessions.	Included in implementation monitoring costs
		Dispose of organic material removed from the ROW properly and in collaboration with local communities.	ZESCO	During the operation and maintenance phase	Organic materials removed from the right-of-way. Evidence of communication with local communities.	ZESCO operation budget
Impairment of natural habitats and associated flora communities	Presence and operation of line, substations and access roads Maintenance and repairs Transportation and circulation	Undertake selective control of the vegetation in order to keep low shrubby and herbaceous species that do not represent a risk for the power line (species that cannot grow more than 2 m in height).	ZESCO	During the operation and maintenance phase	Selective vegetation control carried out.	ZESCO operation budget
		Develop and implement the BMP	ZESCO	Prior to and during the operation and maintenance phase	Existence of a Biodiversity Management Plan (BMP). See biodiversity-related indicators.	Included in monitoring costs
		Maintain all work inside the access road and ROW footprints to reduce encroachment on natural habitats	ZESCO	Project lifetime	No maintenance nor repair works outside ROW and access roads.	ZESCO operation budget
		Clearly mark the extent of vegetation control in the ROW. Identify and mark the vegetation to be preserved along sections of the ROW.	ZESCO	Project lifetime	ROW limits clearly marked.	ZESCO operation budget
		Make chopped woody resources and residues available to local population in order to reduce additional pressure on natural resources.	ZESCO	Project lifetime	Chopped woody resources and residues not in the ROW.	ZESCO operation budget
Loss of ecosystem services provided to communities by natural habitats	Presence and operation of line, substations and access roads Maintenance and repairs Transportation and circulation	Coordinate with local authorities to allow local population to benefit from woody material cleared from the ROW.	ZESCO	During the operation and maintenance phase	Community agreements for the use of wood resources.	ZESCO operation budget
Disturbance of large mammal migrations.	Maintenance and repairs	Minimize ROW maintenance activities along and during seasonal migration routes for large mammals	ZESCO	Project lifetime	ROW management activities minimized along migration routes during migration seasons of large mammals.	ZESCO operation budget

Potential Impacts Addressed	Sources of Impact	Management Measures	Responsibilities	Implementation Timing	Performance Indicators	Cost (USD)
Bird collisions and risks of electrocution	Presence and operation of line, substations and access roads	Maintenance of mitigation measures (bird flight diverters) must be realized for the operational life span of the powerlines and associated substations, and the equipment within the substation yards.	ZESCO	Project lifetime	Mitigation measures in good working order, thereby preventing bird mortality.	ZESCO operation budget
		Collaborate with land planning authorities to prevent implementation of infrastructure or land uses near the electrical infrastructure that may constitute an attraction for birds such as landfills.	ZESCO	Project lifetime	Yearly coordination meetings with local authorities.	ZESCO operation budget
		Ensure the distance between conductors is above 3 m to avoid electrocution of large birds.	Supervising Engineer	During detailed design	Distance between conductors greater than 3 m.	Included in Preparation engineer costs
		Identify site-specific mitigation reactively if avian induced faulting is observed.	ZESCO; Avifaunal Specialist; Local NGO.	Project lifetime:	Number of avian induced faulting. Mitigation measures implemented.	ZESCO operation budget
		Apply same design when two lines are side by side.	ZESCO.	Design	Same design is applied.	Included in Project design.
Bird electrocution	Operation of substations	Monitoring of bird electrocutions encountered during routine inspection of the substation yards ZESCO substation Managers.	ZESCO	Project lifetime	Data to be included: number of mortalities, species involved, and location. Mitigation measures developed and implemented if required.	ZESCO operation budget
		Installation of bird flight diverters to also lower bat mortality rates.	Implementation: Contractor; Monitoring: Supervising Engineer.	Throughout construction phase	All line sections recommended following walk-through survey are equipped with bird diverters.	Included in Contractor costs
Priority species mortality as a result of collisions with motor vehicles.	Maintenance and repairs.	Raise awareness on vehicle speed and collision risks. Speed restrictions to be enforced for all vehicles within the study area to limit avifaunal collisions.	Implementation: All ZESCO staff, Environmental Control Officer, Avifaunal Specialist.	Project lifetime	No bird mortalities.	ZESCO operation budget
Modification and alteration of bird habitats, with associated modifications in fauna communities	Maintenance and repairs	Schedule ROW management activities to avoid breeding and nesting seasons of bird species with special status.	ZESCO; avifaunal specialist	Project lifetime	ROW management activities minimized during nesting seasons of bird species with special status.	ZESCO operation budget
Disturbances of the water's physical and chemical characteristics causing modifications in aquatic habitats and associated fauna	Presence and operation of line, substations, and access roads Maintenance and repairs Management of hazardous products and residual materials	Implement mitigation measures regarding the risk of groundwater and surface water contamination (see Water resources).	ZESCO	During the operation and maintenance phase	No major contamination of water resources.	Included in costs for implementation of the RMHWMP
		Use mechanical method for vegetation control inside the ROW. Forbid use of chemical pesticides to control vegetation in the ROW	ZESCO	Project lifetime	No chemical products used in maintenance of ROW and wayleave.	ZESCO operation budget
		Avoid the destabilization of shores, and sediment or other pollutant rejection in watercourses during road and wayleave maintenance.	ZESCO	Project lifetime	Careful road maintenance.	ZESCO operation budget
Disturbance of wetlands specialist species and species of conservation interest	Presence and operation of line, substations, and access roads Maintenance and repairs Transportation and circulation Presence of workers	Oversee activities permitted in the ROW, including the development of cultivated fields along watercourses or in wetlands.	ZESCO	During the operation and maintenance phase	Number of inspections carried out to control activities in the right-of-way. Number of cultivated fields bordering watercourses or in wetlands.	ZESCO operation budget
		Clearly mark sensitive areas, especially riparian ecotones, before each maintenance clearing period.	ZESCO	During the operation and maintenance phase	Sufficient visible and legible signage.	ZESCO operation budget
Potential introduction of invasive alien species (IAS) in aquatic and semi-aquatic habitats	Maintenance and repairs Transportation and circulation Presence of workers	Implement the invasive alien species Monitoring Program in aquatic and semi-aquatic habitats.	ZESCO	During the operation and maintenance phase	Existence of an IAS monitoring program in aquatic and semi-aquatic habitats. Number of IAS species detected. Areas affected by IAS.	Included in monitoring costs
Movement barrier for aquatic fauna within watercourses	Presence and operation of line, substations, and access roads	Ensure regular maintenance of permanent access roads and related ditches and culverts to prevent the water crossings from becoming insurmountable obstacles for the aquatic fauna. Maintenance will also prevent soil erosion leading to sediment input into aquatic habitats.	ZESCO	Project lifetime	Hydrological connectivity maintained in all worksites impacting watercourses. No signs of erosion.	\$10,000 per year

Potential Impacts Addressed	Sources of Impact	Management Measures	Responsibilities	Implementation Timing	Performance Indicators	Cost (USD)
Land use restriction within the ROW	Presence and operation of line, substations, and access roads Maintenance and repairs	Consider the presence of the line and substations in planning urban developments or other projects.	ZESCO	During the operation and maintenance phase	Number of meetings with local authorities. Existence of minutes of meetings with local authorities.	ZESCO operation budget
		Allow certain agricultural activities that do not disturb the operation of lines in the ROW and do not compromise the safety of users (maximal height of vegetation of 2 m).	ZESCO	Project lifetime	Grazing and low-lying crops allowed in ROW.	ZESCO operation budget
Occasional encroachment of machinery on crops for maintenance purposes	Presence and operation of line, substations, and access roads Maintenance and repairs Transportation and circulation Presence of workers	Plan maintenance activities to be carried out outside the growing and harvesting season. Validate the agricultural calendar with communities before construction.	ZESCO	During the operation and maintenance phase	Construction schedule taking into account the agricultural calendar. Existence of agricultural calendar validation certificates issued by technical agricultural services.	ZESCO operation budget
		Compensate for damage to property or assets during maintenance, including damage to crops.	ZESCO	During the operation and maintenance phase	Number of assets damaged and compensated for during maintenance activities. Number of complaints registered and handled.	\$5,000 per year
Radio and television signal interruption	Presence and operation of line, substations, and access roads	Use adequate measures during design to avoid potential interference with electrical appliances in households living near the powerline.	Preparation consultant	During detailed design	Measures to avoid interference integrated into design. Number of complaints recorded and handled.	Included in Preparation consultant costs
Collision with low-flying aircrafts	Presence and operation of line, substations and access roads	Install markers to minimize risk of low-flying aircrafts in aircraft pathways	Preparation consultant	During detailed design	Markers installed in aircraft where there are low-flying aircrafts pathways.	Included in Preparation consultant costs
Creation of jobs	Presence and operation of line, substations, and access roads Maintenance and repairs Transportation and circulation Presence of workers Purchase of materials, goods, and services	Disclose information on newly created business opportunities.	ZESCO	Prior to operation and entire Project lifetime	Information published from the beginning of the operation phase.	ZESCO operation budget
		Implement, where possible, a specific training program to bridge any gaps that may exist between the skills required and the abilities of local candidates.	ZESCO	Project lifetime	Target 25% of local labour for skilled tasks.	ZESCO operation budget
		Apply human resource policies favoring local labor.	ZESCO	Project lifetime	Target 90% of local labour for unskilled tasks.	ZESCO operation budget
Increased quality of public services	Presence and operation of line, substations, and access roads	Rural electrification: optimize projects for each individual community to be connected, by selecting electricity uses that will bring the most benefits to the community, such as schools, health services, and trading centers.	REA	Prior to operation and entire Project lifetime	Rural electrification projects launched at the beginning of operation.	REA budget
Increase in food security	Presence and operation of line, substations, and access roads	Rural electrification: study the opportunity to install grain mills or other agricultural infrastructure in some communities where needed.	REA	Prior to operation and entire Project lifetime	Studies launched at the beginning of operation.	REA budget
Increased reliability of water provision	Presence and operation of line, substations, and access roads	Rural electrification: study the possibility of providing water provision infrastructure	REA	Prior to operation and entire Project lifetime	Studies launched at the beginning of operation.	REA budget
Risk of electrocution caused by equipment breakdown, illegal connections, steel thefts, and other forms of unsafe contact	Presence and operation of line, substations, and access roads Maintenance and repairs	Implement a sensitization program with affected communities to raise awareness on health and safety in the presence of a high-voltage line (risks of electrocution, electromagnetic risks, behaviour, and prevention). Educate local populations on safe behavior in the presence of a high-voltage powerline such as bushfire, slash and burn practices under and close to the powerline.	ZESCO	Prior to operation and entire Project lifetime	Target: no electrocutions over the line's lifecycle.	See Training Program
		Develop and implement an Emergency Preparedness and Response Plan in case of infrastructure breakdowns, especially near roads or residential areas (in case of fire, major soil erosion or seismic events).	ZESCO	Prior to operation and entire Project lifetime	Emergency plans adopted from onset of operation phase.	\$60,000
		Install and maintain warning signs and anti-climbing devices on electrical towers and on the fences surrounding electrical substations. Raise awareness about electrocution risks and those associated with electromagnetic fields.	ZESCO	Project lifetime	Signs installed from onset of operation phase.	n/a (project costs)
		Monitor and control illegal connections	ZESCO	Project lifetime	Target: 0 illegal connections.	ZESCO operation budget
		Develop and implement a Community Health and Safety Management Plan.	ZESCO	Prior to and throughout the operation and maintenance phase	Existence of a community health and safety management plan.	\$40,000
Theft of equipment and vandalism, community members safety	Presence and operation of line, substations, and workers' camp, presence of workers	Hiring of security personnel.	ZESCO	Project lifetime	Target: 0 acts of vandalism or theft.	ZESCO operation budget
Exposure to disease	Presence of workers	Prepare a Community Health and Safety Management Plan.	ZESCO	Prior to construction and entire Project lifetime	Community Health and Safety Plan to be available to guide Contractors prior to the beginning of construction.	ZESCO operation budget

Potential Impacts Addressed	Sources of Impact	Management Measures	Responsibilities	Implementation Timing	Performance Indicators	Cost (USD)
Increased stress related to nuisances	Presence and operation of powerline and substations	Implement a strategy at the local community level to monitor ROW and avoid their transformation into a landfill. Raise awareness of local populations regarding solid waste management.	ZESCO	Throughout the operation and maintenance phase	Number of awareness sessions organized. Existence of minutes of awareness sessions. Number of incidents reported.	Included in costs associated with the monitoring program
		Install downward-facing security lighting at the substations to help avoid or reduce light pollution.	ZESCO	During detailed design	Downlighting. Number of complaints recorded and handled.	See costs during construction
		Notify landowners along the line route about the maintenance schedule and activities.	ZESCO	Throughout the operation and maintenance phase	Number of awareness sessions organized. Existence of minutes of awareness sessions.	ZESCO operation budget
Risk of poor working conditions for maintenance workers	Labour/presence of workers	Develop and implement a Workers' Grievance Reporting and Redress Management Plan.	ZESCO	Prior to and throughout the operation and maintenance phase	Existence of a grievance management mechanism for workers. Number of worker complaints registered and processed.	\$25,000
Occupational health and safety hazards and risks	Presence and operation of the line, substations, and access roads. Transportation and circulation. Maintenance and repairs. Waste and hazardous materials management. Purchase of materials, goods, and services. Presence of workers.	Maintain a minimal working distance to the energized components during maintenance work.	ZESCO	Throughout the operation and maintenance phase	Number of work incidents reported. Minimum distance applied.	ZESCO operation budget
		Develop and implement an Occupational Health and Safety Management Plan with clear working procedures to protect every worker involved in maintenance activities.	ZESCO	Prior to and throughout the operation and maintenance phase	Existence of an occupational health and safety management plan and working procedures. Number of work incidents reported.	\$75,000
		Ground all conducting objects (for example, fences and metallic structures) installed near powerlines to prevent shock.	ZESCO	Prior to the operation and maintenance phase	All conductive objects are earthed. Number of incidents reported.	See construction costs
		Equip workers with PPE and require their effective use in work areas of high dust and noise levels (masks, ear plugs, etc.).	ZESCO	Throughout the operation and maintenance phase	Number of PPE available and actually used. Number of work-related accidents recorded.	Included in the OHSP costs
		Consistently apply a formal and documented risk assessment process conducted by a competent and experienced team of professionals at the planning stage of the operation activities to embed occupational health & safety considerations in the decision process. Methodology of risk assessment shall be based on the ALARA principal, e.g., reduce risks "As Low as Reasonably Achievable". In the context of operation, this should include controlling site access and egress while embedded in the site security protocols.	ZESCO	At the planning stage of the operation activities and as conditions change	Risk assessment completed.	ZESCO operation budget
		An audit and inspection program tailored to the risks specific to operations, including but not limited to risks specific to substations, maintenance employees, emergency repairs, and any other critical risks that apply to the various work environments and categories of activities required to operate a powerline.	ZESCO	Throughout the operation phase	Records of audits and inspections being performed.	ZESCO operation budget
		All accidents, incidents, injuries, or near misses reported and investigated while formally monitoring the implementation and communication of control and/or preventive measures.	ZESCO	Throughout the operation phase	Record keeping of all accidents, incidents, and near misses reported, and proof of investigation and implementation of preventive measures.	ZESCO operation budget
		Training specific to construction site to be provided to the workforce as well as any employee, Contractor, Subcontractors or visitor accessing the site. Training specific to construction site shall be provided before being on-site.	ZESCO	During onboarding of new employees and as warranted throughout the operation phase based on changing conditions or in response to accidents, incidents, injuries, or near misses.	Record of training completed.	ZESCO operation budget
Frustrations within local communities regarding the Project and related activities	Presence and operation of the line, substations, and access roads. Presence of workers	Develop and implement a communication plan and a grievance redress mechanism.	ZESCO	Prior to and throughout the operation and maintenance phase	Existence of a community communication plan. Existence of a complaints management mechanism.	Included in the SEP costs
Tension between local populations and outside workers	Presence of workers	Develop, implement, and maintain the Stakeholder Engagement Plan and GRM during Project operation.	ZESCO	Prior to operation and entire Project lifetime	Community Engagement Plan ready for implementation prior to beginning of operations.	ZESCO operation budget
		Develop and implement a Code of Conduct for workers.	ZESCO	Prior to and throughout the operation and maintenance phase	Existence of a code of conduct for workers and subcontractors.	\$25,000
		Sensitize workers to the cultural realities of the area and train workers on the appropriate social behaviours.	ZESCO	Prior to and throughout the operation and maintenance phase	Number of awareness-raising sessions on cultural realities and appropriate behaviors. Existence of minutes of awareness-raising sessions.	\$25,000

Potential Impacts Addressed	Sources of Impact	Management Measures	Responsibilities	Implementation Timing	Performance Indicators	Cost (USD)
Increased in gender-based violence, including sexual exploitation and abuse and sexual harassment	Presence of workers	Develop and implement a Gender-Based Violence Management Plan.	ZESCO	Prior to and throughout the operation and maintenance phase	Existence of a plan to assess and manage the risks of gender-based violence and harassment.	\$30,000
Creation of job and business opportunities for women	Presence of workers	Encourage the recruitment of women for operation and maintenance-related work and promote their empowerment by promoting the granting of equivalent wages to men for equivalent work.	ZESCO	Throughout the operation and maintenance phase	Number of women recruited. Wages paid to women vs. men for equivalent work.	ZESCO operation costs
Potential destruction of physical cultural resources within the Mwela Rock Art site;	Transportation and traffic Maintenance and repairs.	Develop and implement a Cultural Heritage Management Plan.including specific measures for the Mwela Rock Art site.	ZESCO	Throughout the operation and maintenance phase	Cultural Heritage management plan developed.	ZESCO operation costs
		Conduct all works within the Mwela Rock Art site with an archeologist from the NHCC.	ZESCO	Throughout the operation and maintenance phase	Presence of an archeologist from the NHCC.	ZESCO operation costs
		Develop and implement a dedicated Transport Management Plan and strict work procedures within the site.	ZESCO	Throughout the operation and maintenance phase	Transport management Plan and work procedures within the Mwela Rock Art site developed and implemented.	ZESCO operation costs
		Establish a Compensation Plan for the reduction of the tourism status of the site	ZESCO	Throughout the operation and maintenance phase	If applicable, establish a Compensation Plan and pay compensation to NHCC.	TBD
		Strictly implement waste management within the site. All rubble should be remove from the site.	ZESCO	Throughout the operation and maintenance phase	No waste left on the site.	ZESCO operation costs
		Conduct training and induction for workers on safe practices in the site	ZESCO	Throughout the operation and maintenance phase	Register of training. Training completed for all staff including drivers.	ZESCO operation costs
Permanent alteration to the landscape	Presence and operation of line substations and access roads Maintenance and repairs	Choose subdued colours for the substations to harmonize them with their environment.	Detailed design consultant	During detailed design	Substations are well integrated within their environment, without bright colors.	See construction costs

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### **3.1.4 DECOMMISSIONING**

E&S measures proposed to mitigate negative impacts or enhance positive impacts during the decommissioning phase are presented in Table 3-4. Given the uncertainty regarding precisely when and how decommissioning is to take place, these measures should be considered conceptual. Furthermore, it is not possible to determine the cost of uncertainty regarding market values at the time of decommissioning, the timing of which is still unknown.



**Table 3-4 Management Measures to be implemented during the Decommissioning Phase**

Environmental and/or Social Components	Potential Impacts Addressed	Sources of Impact	Management Measure	Responsibilities	Implementation Timing	Performance Indicators	Costs
All	Cross-cutting	Cross-cutting	Develop and implement a decommissioning worksite ESMP which will translate the requirements of the revised ESIA and ESMP to be prepared immediately before decommissioning into detailed actions to be carried out during decommissioning works, including implementation of mitigation measures and environmental and social monitoring. The worksite ESMP is to cover all elements under the Contractor's control (i.e., decommissioning works), consider detailed specifications of activities to be conducted during decommissioning and specific locations where they will be conducted. Integrate requirements of WBG EHS Guidelines for Electric Power Transmission and Distribution (see Appendix 3-1), or other relevant requirements at the time of decommissioning.	Development: Contractor Approval: PIU	Prior to decommissioning phase	No decommissioning works undertaken before approval of Final Worksite ESMP. Worksite ESMP covers all decommissioning-related impacts and mitigation measures listed in the present table.	Included in decommissioning contract
All	Cross-cutting	Cross-cutting	Implement ZESCO's Safety, Health Environment and Quality (SHEQ) Management System incorporating the following elements: (i) policy; (ii) identification of risks and impacts; (iii) management programs; (iv) organizational capacity and competency; (v) emergency preparedness and response; (vi) stakeholder engagement; and (vii) monitoring and review. Implement the ESMS during decommissioning. See SHEQ Policy attached as Appendix 3-2.	Development and implementation: ZESCO	Prior to decommissioning phase	No decommissioning works undertaken before ESMS is in operation.	Unknown
All	Cross-cutting	Cross-cutting	Obtain all required permits and authorizations before initiating decommissioning works. Implement all their conditions.	Implementation: Contractor	Prior to decommissioning phase	No decommissioning works undertaken before all required permits and authorizations are secured.	Included in the decommissioning contract.
Air quality Soils Hydrography and water resources	Temporary air quality deterioration. Changes in soil chemical properties and risk of soil contamination. Modifications of surface water quality with a risk of contamination. Modifications of groundwater quality with a risk of contamination.	Site preparation. Decommissioning activities. Waste and hazardous materials management.	Develop and implement a Waste and Hazardous Waste Management Plan in compliance with WBG EHS Guidelines on waste management (see Appendix 3-3), or other relevant requirements at the time of decommissioning.	Development: Contractor Approval: Supervising Engineer and PIU	Prior to decommissioning phase	Waste and hazardous waste management plan approved by Supervising Engineer prior to initiation of decommissioning phase.	Included in the decommissioning contract.
Soils Hydrography and water resources	Changes in soil chemical properties and risk of soil contamination. Modifications of surface water quality with a risk of contamination. Modifications of groundwater quality with a risk of contamination.	Waste and hazardous materials management	Develop and implement Residual Materials and Hazardous Products Management Plan.	Development: Contractor Approval: Supervising Engineer and PIU	Prior to decommissioning phase	Hazardous materials management plan approved by Supervising Engineer prior to initiation of decommissioning phase.	Included in the decommissioning contract.
Soils Hydrography and water resources Aquatic habitats and associated fauna Safety and public health, Workers' health and safety	Changes in soil chemical properties and risk of soil contamination. Modifications of surface water quality with a risk of contamination. Modifications of groundwater quality with a risk of contamination. Local degradation of aquatic and semi-aquatic habitats and associated fauna and flora disturbances. Risk of accidents and physical injuries involving local workers and residents.	Site preparation. Decommissioning activities. Waste and hazardous materials management. Transportation and traffic.	Develop and implement an Emergency Preparedness and Response s Plan.	Development: Contractor Approval: Supervising Engineer and PIU	Prior to decommissioning phase	Emergency measures plan approved by Supervising Engineer prior to initiation of decommissioning phase.	Included in the decommissioning contract.
Safety and public health Workers' health and safety	Occupational health and safety hazards and risks.	Site preparation. Decommissioning activities. Transportation and traffic. Waste and hazardous materials management. Purchase of materials, goods and services. Presence of workers.	Consistently apply a formal and documented risk assessment process conducted by a competent and experienced team of professionals at the planning stage of the decommissioning activities to embed occupational Health & Safety considerations in the decision process. Methodology of risk assessment shall be based on the ALARA principal, e.g., reduce risks "As Low as Reasonably Achievable". In the context of operation, this should include controlling site access and egress while embedded in the site security protocols.	Implementation: PIU and Contractor	Prior to beginning of decommissioning phase	Risk assessment completed.	Included in the decommissioning contract.

Environmental and/or Social Components	Potential Impacts Addressed	Sources of Impact	Management Measure	Responsibilities	Implementation Timing	Performance Indicators	Costs
Safety and public health Workers' health and safety	Occupational health and safety hazards and risks.	Site preparation. Decommissioning activities. Transportation and traffic. Waste and hazardous materials management. Purchase of materials, goods and services. Presence of workers.	An audit and inspection program tailored to the risks specific to decommissioning sites, including risks specific to the current Project.	Implementation: PIU and Contractor	Throughout the decommissioning phase	Records of audits and inspections completed.	Included in the decommissioning contractor.
Safety and public health Workers' health and safety	Occupational health and safety hazards and risks.	Site preparation. Decommissioning activities. Transportation and traffic. Waste and hazardous materials management. Purchase of materials, goods and services. Presence of workers.	All accidents, incidents, injuries or near misses reported and investigated while formally monitoring the implementation and communication of control and/or preventive measures.	Implementation: PIU and Contractor	Throughout the decommissioning phase	Record keeping of all accidents, incidents and near misses reported and proof of investigation and implementation of preventative measures.	Included in the decommissioning contractor.
Safety and public health Workers' health and safety	Occupational health and safety hazards and risks.	Site preparation. Decommissioning activities. Transportation and traffic. Waste and hazardous materials management. Purchase of materials, goods and services. Presence of workers.	Training specific to decommissioning site to be provided to the workforce as well as any employee, contractor, subcontractors or visitor accessing the Project site. Training specific to decommissioning site shall be provided before being on-site.	Implementation: PIU & Contractor	During onboarding of new employees and as warranted throughout the decommissioning phase based on changing conditions or in response to accidents, incidents, injuries or near misses.	Record of training completed.	Included in the decommissioning contractor.
Soils Land use Employment and economic development	Soil erosion in erosion-prone areas. Soil compaction in work areas Land use restrictions within the ROW. Disruption of farming activities by construction works. Temporary disruption of activities related to tourism and recreation.	Decommissioning activities. Transportation and traffic.	Restrict transportation to the identified access by clearly marking out the limit of the ROW and access roads.	Implementation: Contractor Monitoring: Supervising Engineer	Throughout decommissioning phase	Limits of ROW and access roads marked prior to beginning of works in a given area.	Included in the decommissioning contract.
Soils Land use Terrestrial flora Terrestrial fauna	Soil erosion in erosion-prone areas. Soil compaction in work areas. Land use restrictions within the ROW. Disruption of farming activities by decommissioning works. Permanent loss of natural habitat area and of its associated flora. Terrestrial habitat fragmentation and degradation in some areas along the ROW. Modification of species composition in flora and fauna communities present in the Project area. Changes in protected and IUCN-designated threatened species populations.	Decommissioning activities. Transportation and traffic.	Restrict decommissioning activities, materials and manpower movements to existing roads/tracks and ROW limits.	Implementation: Contractor Monitoring: Supervising Engineer	Throughout decommissioning phase	Equipment and vehicle movements outside the line route and access roads' ROW restricted to a minimum.	Included in the decommissioning contract.
Air quality Noise and vibrations Hydrography and water resources Safety and public health	Temporary air quality deterioration. Greenhouse gas emissions. Increase in noise and vibration levels. Changes to surface water quality with a risk of contamination. Changes to groundwater quality with a risk of contamination. Increased stress related to nuisances.	Site preparation. Decommissioning activities. Transportation and traffic.	Maintain equipment and machinery in good running conditions, including brakes, mufflers, silencers, and catalyzers and clean (power washed), free of leaks, excess oil and grease.	Implementation: Contractor Monitoring: Supervising Engineer	Throughout decommissioning phase	Daily inspection by the Contractor of all equipment and machinery used during decommissioning.	Included in the decommissioning contract.

Environmental and/or Social Components	Potential Impacts Addressed	Sources of Impact	Management Measure	Responsibilities	Implementation Timing	Performance Indicators	Costs
Air quality Noise and vibrations Safety and public health	Temporary air quality deterioration. Greenhouse gas emissions. Increase in noise and vibration levels. Increased stress related to nuisances.	Decommissioning activities.	Prohibit idling of vehicles on-site. Generators and machinery will be shut down when not in use.	Implementation: Contractor Monitoring: Supervising Engineer	Throughout decommissioning phase	Daily inspection by the Contractor of decommissioning areas for idling onsite, excessive nuisance dust, noise and air pollutants. Contractor/Supervising Engineer to maintain records of complaints on noise and air quality, and follow-up with corrective measures.	Included in the decommissioning contract.
Air quality Safety and public health	Temporary air quality deterioration. Increased stress related to nuisances.	Site preparation. Decommissioning activities. Transportation and traffic Worksites' restoration.	Stockpiles of fine materials will be covered during period of high winds.	Implementation: Contractor Monitoring: Supervising Engineer	Throughout decommissioning phase	Daily inspection by the Contractor of decommissioning areas for excessive nuisance dust, noise and air pollutants. Contractor/Supervising Engineer to maintain records of complaints on noise and air quality, and follow-up with corrective measures.	Included in the decommissioning contract.
Air quality Safety and public health	Temporary air quality deterioration. Increased stress related to nuisances.	Decommissioning activities. Transportation and traffic.	Cover excavated materials with erosion control blankets and loads of brittle material during transport.	Implementation: Contractor Monitoring: Supervising Engineer	Throughout decommissioning phase	Daily inspection by the Contractor of decommissioning areas for excessive nuisance dust, noise and air pollutants. Contractor/Supervising Engineer to maintain records of complaints on noise and air quality, and follow-up with corrective measures.	Included in the decommissioning contract.
Air quality Safety and public health	Temporary air quality deterioration. Increased stress related to nuisances.	Decommissioning activities.	Use water for dust suppression on stockpiles, exposed soils and roads if dust generation is visible.	Implementation: Contractor Monitoring: Supervising Engineer	Throughout decommissioning phase	Daily inspection by the Contractor of decommissioning areas for excessive nuisance dust, noise and air pollutants. Contractor/Supervising Engineer to maintain records of complaints on noise and air quality, and follow-up with corrective measures.	Included in the decommissioning contract.
Air quality Safety and public health	Temporary air quality deterioration. Greenhouse gas emissions. Increased stress related to nuisances.	Decommissioning activities.	Restrict speed on loose surface roads to 20 km/h during dry or dusty conditions and install signposts where relevant.	Implementation: Contractor Monitoring: Supervising Engineer	Throughout decommissioning phase	Daily inspection by the Contractor of decommissioning areas for excessive nuisance dust, noise and air pollutants. Contractor/Supervising Engineer to maintain records of complaints on noise and air quality, and follow-up with corrective measures.	Included in the decommissioning contract.
Noise and vibrations Safety and public health	Increase in noise and vibration levels. Increased stress related to nuisances.	Site preparation. Decommissioning activities. Transportation and traffic.	Restrict noise and vibration generating activities near residential or institutional sensitive receptors to between 7 a.m. and 7 p.m. Maintain noise levels at or below national thresholds.	Implementation: Contractor Monitoring: Supervising Engineer	Throughout decommissioning phase	Daily inspection by the Contractor of decommissioning areas for excessive nuisance dust, noise and air pollutants. Contractor/Supervising Engineer to maintain records of complaints on noise and air quality, and follow-up with corrective measures.	Included in the decommissioning contract.
Soils Hydrography and water resources	Soil erosion in erosion-prone areas. Surface water contamination.	Decommissioning activities. Transportation and traffic.	Operate machinery on land in a way that minimizes disturbance to the banks of watercourses.	Implementation: Contractor Monitoring: Supervising Engineer	Throughout decommissioning phase	No machinery operations inside top-of-bank of watercourses.	Included in the decommissioning contract.
Soils Hydrography and water resources	Soil erosion in erosion-prone areas. Modifications of surface water quality with a risk of contamination.	Site preparation. Decommissioning activities. Transportation and traffic.	Prepare and implement erosion and sediment control plans, particularly in areas identified as having high erosion potential.	Development: Contractor Approval: Supervising Engineer and PIU	Prior to decommissioning phase	Erosion and sediment control plan approval by Supervising Engineer prior to initiation of decommissioning phase.	Included in the decommissioning contract.

Environmental and/or Social Components	Potential Impacts Addressed	Sources of Impact	Management Measure	Responsibilities	Implementation Timing	Performance Indicators	Costs
Soils	Soil compaction in work areas.	Decommissioning activities	Avoid vehicle or machinery traffic in areas where soils are highly saturated with water.	Implementation: Contractor Monitoring: Supervising Engineer	Throughout decommissioning phase	No vehicle or machinery traffic in areas where soils are saturated with water. Inspections to ensure authorized work periods are respected, and that wetlands and watercourses are not affected.	Included in the decommissioning contract.
Soils Hydrography and water resources	Changes in soil chemical properties and risk of soil contamination. Modifications of surface water quality with a risk of contamination. Modifications of groundwater quality with a risk of contamination.	Waste and hazardous materials management	All ignitable, reactive, flammable, corrosive, and toxic materials will be stored in clearly labelled containers.	Implementation: Contractor Monitoring: Supervising Engineer	Throughout decommissioning phase	No ignitable, reactive, flammable, corrosive or toxic materials stored elsewhere than in labelled containers.	Included in the decommissioning contract.
Soils Hydrography and water resources	Changes in soil's chemical properties and risk of soil contamination. Modifications of surface water quality with a risk of contamination. Modifications of groundwater quality with a risk of contamination.	Waste and hazardous materials management.	Hazardous materials must be stored in a manner that prevents interaction with each other or with the environment, or from being tampered with accidentally. Provision of secondary containment, drip trays or other overflow and drip containment measures, for hazardous materials containers at connection points or other possible overflow points.	Implementation: Contractor Monitoring: Supervising Engineer	Throughout decommissioning phase	Secure storage of all hazardous materials.	Included in the decommissioning contract.
Soils Hydrography and water resources	Changes in soil's chemical properties and risk of soil contamination. Modifications of surface water quality with a risk of contamination. Modifications of groundwater quality with a risk of contamination.	Waste and hazardous materials management.	Use impervious surfaces for refueling areas and other fluid transfer areas. Provide adequate secondary containment for fuel storage tanks and for the temporary storage of other fluids such as lubricating oils and hydraulic fluids.	Implementation: Contractor Monitoring: Supervising Engineer	Throughout decommissioning phase	Secure storage of all hazardous materials. Inspections to ensure proper storage handling techniques are being followed.	Included in the decommissioning contract.
Soils Hydrography and water resources	Changes in soil's chemical properties and risk of soil contamination. Modifications of surface water quality with a risk of contamination. Modifications of groundwater quality with a risk of contamination.	Waste and hazardous materials management.	Provide portable spill containment and cleanup equipment on site and training in the equipment deployment.	Implementation: Contractor Monitoring: Supervising Engineer	Throughout decommissioning phase	Spill containment and cleanup equipment onsite.	Included in the decommissioning contract.
Soils Hydrography and water resources	Changes in soil's chemical properties and risk of soil contamination. Modifications of surface water quality with a risk of contamination. Modifications of groundwater quality with a risk of contamination.	Waste and hazardous materials management.	Train workers on the correct transfer and handling of fuels and chemicals and in response to spills.	Implementation: Contractor Monitoring: Supervising Engineer	Throughout decommissioning phase	Evidence of adequate training.	Included in the decommissioning contract.
Soils Hydrography and water resources	Changes in soil chemical properties and risk of soil contamination Modifications of surface water quality with a risk of contamination. Modifications of groundwater quality with a risk of contamination.	Waste and hazardous materials management	Control and reduce at the source of the production of waste and hazardous waste.	Implementation: Contractor Monitoring: Supervising Engineer	Throughout decommissioning phase	Production of waste and hazardous waste reduced to a minimum.	Included in the decommissioning contract.
Soils	Soil compaction in work areas.	Transportation and traffic	Decompact soils following decommissioning with appropriate equipment.	Implementation: Contractor Monitoring: Supervising Engineer	Throughout decommissioning phase	Following decommissioning, assessment of soil compaction in and around the ROW by the Owner's Engineer, and de-compaction if necessary.	Included in the decommissioning contract.
Soils Terrestrial flora Landscape	Soil erosion in erosion-prone areas. Loss of organic layer in areas where excavation and backfilling activities are held. Impairment of flora communities. Temporary degradation of the landscape at worksite.	Decommissioning activities	Revegetate areas of bare and disturbed soils as soon as possible with native species.	Implementation: Contractor Monitoring: Supervising Engineer	Throughout decommissioning phase	Bare and disturbed areas revegetated as required.	Included in the decommissioning contract.
Hydrography and water resources Aquatic habitats and associated fauna	Changes in hydrology. Impairment of hydrological dynamics leading to disturbances and alterations.	Decommissioning activities	Always maintain hydrological connectivity upstream/downstream in work areas. When stream crossings are unavoidable, construct suitable culverts to allow sufficient water supply to maintain viable fish habitat.	Implementation: Contractor Monitoring: Supervising Engineer	Throughout decommissioning phase	Hydrological connectivity maintained in all worksites impacting watercourses.	Included in the decommissioning contract.

Environmental and/or Social Components	Potential Impacts Addressed	Sources of Impact	Management Measure	Responsibilities	Implementation Timing	Performance Indicators	Costs
Hydrography and water resources Aquatic habitats and associated fauna	Changes in hydrology. Modifications of surface water quality with a risk of contamination. Local degradation of aquatic and semi-aquatic habitats and associated fauna and flora disturbances.	Decommissioning activities	Avoid material piling, equipment and vehicle movement in rivers, floodplains, and wetland areas, such as dambos and communal grazing sites. If unavoidable, reduce access to the extent possible.	Implementation: Contractor Monitoring: Supervising Engineer	Throughout decommissioning phase	No material piling in watercourses and wetland areas.	Included in the decommissioning contract.
Hydrography and water resources Aquatic habitats and associated fauna	Changes in hydrology Modifications of surface water quality with a risk of contamination. Local degradation of aquatic and semi-aquatic habitats and associated fauna and flora disturbances.	Decommissioning activities	Set and implement strict procedures for in-water works.	Implementation: Contractor Monitoring: Supervising Engineer	Throughout decommissioning phase	In-water works rules approved by Supervising Engineer prior to initiation of decommissioning phase.	Included in the decommissioning contract.
Hydrography and water resources	Changes in hydrology Modifications of surface water quality with a risk of contamination	Decommissioning activities	Conduct activities during the dry season to reduce disturbance of sensitive shoreline and wetland areas.	Implementation: Contractor Monitoring: Supervising Engineer	Throughout decommissioning phase	Activities in wet season reduced to the extent possible.	Included in the decommissioning contract.
Hydrography and water resources	Modifications of surface water quality with a risk of contamination	Decommissioning activities	Install silt barriers (e.g., fencing) when working in steep riparian areas and along wetlands to minimize potential sediments being transported to aquatic habitats.	Implementation: Contractor Monitoring: Supervising Engineer	Throughout decommissioning phase	Required silt barriers installed	Included in the decommissioning contract.
Hydrography and water resources	Modifications of groundwater quality with a risk of contamination.	Decommissioning activities	Promptly pump any groundwater that could have been contaminated during excavation works.	Implementation: Contractor Monitoring: Supervising Engineer	Throughout decommissioning phase	Groundwater seepage pumped out during excavations.	Included in the decommissioning contract.
Terrestrial flora Terrestrial fauna Avifauna	Restoration of natural habitat area and of its associated flora Reduction of fragmentation of terrestrial habitat and degradation in some areas along the ROW. Restoration of natural habitat for vulnerable species, <i>Ansellia Africana</i> , and other species of conservation concern such as <i>Pterocarpus angolensis</i> . Restoration of natural habitat for fruit bats, specifically the Near-Threatened African Straw-coloured Fruit Bat. Restoration of ecosystem services.	Decommissioning activities (revegetation).	Establish a revegetation plan to recreate natural habitats in the Project footprint.  Promote the use of native species and include the plantation and resettlement of <i>Pterocarpus angolensis</i> , <i>Ansellia Africana</i> , and any other species of conservation concern impacted in the ROW.  Also promote the use of fruit trees that are important food sources for African Straw-coloured Fruit Bats, including <i>Ficus spp</i> , <i>Magnistipula butayei</i> , <i>Parinari curatellifolia</i> , <i>Syzygium cordatum</i> , <i>Syzygium guineense guineense</i> , <i>Syzygium guineense huillense</i> , <i>Uapaca kirikiana</i> , <i>Uapaca banguelensis</i> , <i>Uapaca sansibarica</i> .	Implementation: Contractor Monitoring: Supervising Engineer	At the end of decommissioning phase	Revegetation plan developed prior to beginning of decommissioning phase. Vegetation cover in the Project footprint.	Included in the decommissioning contract.
Terrestrial flora Terrestrial fauna	Permanent loss of natural habitat area and of its associated flora Potential impacts on vulnerable species, <i>Ansellia Africana</i>	Site preparation.	Clearly mark the extent of the decommissioning ROW with stakes at intervals of 50 m or less. Identify and mark the vegetation to be preserved along sections of the ROW.	Implementation: Contractor Monitoring: Supervising Engineer	Throughout decommissioning phase	Limits of ROW marked prior to beginning of works in a given area.	Included in the decommissioning contract.
Terrestrial flora Terrestrial fauna Avifauna Aquatic habitats and associated fauna	Terrestrial habitat fragmentation and degradation in some areas along the ROW. Local degradation of aquatic and semi-aquatic habitats and associated fauna and flora disturbances.	Site preparation. Decommissioning activities.	Conserve all the vegetation (trees, shrubs, herbaceous plants, crops) present at the edge of watercourses and in erosion-prone areas.	Implementation: Contractor Monitoring: Supervising Engineer	Throughout decommissioning phase	Maintain vegetation in a 10m shoreline and on steep slopes when compatible with ROW operation.	Included in the decommissioning contract.
Terrestrial flora Terrestrial fauna	Potential introduction of invasive alien species. Modification of species composition in fauna communities present in the Project area.	Decommissioning activities. Transportation and traffic.	Inspect and clean machinery and equipment properly after working in areas known to be infested with invasive alien flora species.	Implementation: Contractor Monitoring: Supervising Engineer	Throughout decommissioning phase	Decommissioning equipment cleaned as required.	Included in the decommissioning contract.
Terrestrial flora Terrestrial fauna	Potential introduction of invasive alien species. Modification of species composition in fauna communities present in the Project area.	Site preparation. Decommissioning activities.	Burn residues of invasive alien flora species to reduce the risk of propagation to other areas.	Implementation: Contractor Monitoring: Supervising Engineer	Throughout decommissioning phase	IAS specimens managed as required.	Included in the decommissioning contract.

Environmental and/or Social Components	Potential Impacts Addressed	Sources of Impact	Management Measure	Responsibilities	Implementation Timing	Performance Indicators	Costs
Air quality Terrestrial flora Terrestrial fauna Landscape	Temporary air quality deterioration. Permanent loss of natural habitat area and of its associated flora. Temporary degradation of the landscape at worksite.	Site preparation. Decommissioning activities. Worksites' restoration.	Rehabilitate and revegetate temporary access road and work areas as soon as possible using native vegetation species that are ecologically associated with local fauna.	Implementation: Contractor Monitoring: Supervising Engineer	Throughout decommissioning phase	Exposed soils rehabilitated as soon as possible following decommissioning activities.	Included in the decommissioning contract.
Avifauna Terrestrial fauna	Habitat fragmentation and degradation for IUCN-designated near threatened species potentially present inside the Project area.	Decommissioning activities	Inform the Contractor's E&S Specialist when endangered fauna species are observed in or close to Project sites.	Implementation: Contractor Monitoring: Supervising Engineer	Throughout decommissioning phase	Contractor's E&S Specialists aware of endangered fauna sightings.	Included in the decommissioning contract.
Avifauna	Displacement as a result of disturbance of the resident Red List avifauna. Direct mortality of Red List species (i.e., nestlings of tree or ground nesting birds, nestlings in nets on towers) as a result of decommissioning activities.	Site preparation Decommissioning activities	Where a threatened bird species is nesting, do not undertake tree clearing within a radius of 1 km. Wait until the nest is deserted. Weekly checks to verify nest activity.	Implementation: Contractor Monitoring: Supervising Engineer	Throughout decommissioning phase	Active nests of identified species protected (no clearing/decommissioning until nest is abandoned when chicks are mature).	Included in the decommissioning contract.
Aquatic habitats and associated fauna	Local degradation of aquatic and semi-aquatic habitats and associated fauna and flora disturbances. Local impairment of hydrological dynamics leading to disturbances and alteration of aquatic habitats. Creation of wetlands.	Site preparation Decommissioning activities	Maintain fish passage when road crossings of watercourses are unavoidable by utilizing clear span bridges or open-bottom culverts. Install diversion structures (canals, dikes, and coffer) that neither obstruct fish movements nor diminish habitat width to less than 2/3 of the current water bodies, including rivers, wetlands, etc.	Implementation: Contractor Monitoring: Supervising Engineer	Throughout decommissioning phase	Drainage capacity of installed culverts equal or higher than confirmed rainy season flow rate at each watercourse crossing.	Included in the decommissioning contract.
Aquatic habitats and associated fauna	Local degradation of aquatic and semi-aquatic habitats and associated fauna and flora disturbances. Impacts on vulnerable <i>Oreochromis macrochir</i> habitats.	Site preparation Decommissioning activities	Maintain vegetated buffer zones within and around wetlands and along both sides of watercourse crossings. Restore as soon as possible any disturbed areas in the riparian buffer zone.	Implementation: Contractor Monitoring: Supervising Engineer	Throughout decommissioning phase	Minimize vegetation clearing in wetlands and in a 50 m buffer zone at watercourse crossings. Disturbed riparian areas restored after conclusion of works.	Included in the decommissioning contract.
Aquatic habitats and associated fauna	Local degradation of aquatic and semi-aquatic habitats and associated fauna and flora disturbances. Local impairment of hydrological dynamics leading to disturbances and alteration of aquatic habitats. Impacts on vulnerable <i>Oreochromis macrochir</i> habitats.	Site preparation Decommissioning activities	Do not allow any temporary access roads to be built inside wetland areas during the decommissioning phase.	Implementation: Contractor Monitoring: Supervising Engineer	Throughout decommissioning phase	Decommissioning activities in wetlands performed only during the dry season.	Included in the decommissioning contract.
Aquatic habitats and associated fauna	Local degradation of aquatic and semi-aquatic habitats and associated fauna and flora disturbances. Local impairment of hydrological dynamics leading to disturbances and alteration of aquatic habitats. Impacts on vulnerable <i>Oreochromis macrochir</i> habitats.	Site preparation Decommissioning activities	Avoid equipment and vehicle movements in rivers, floodplains and wetland areas. If unavoidable, reduce access to a minimum length in wetlands and floodplains and select the most optimized site for the access considering human uses and areas of higher ecological integrity.	Implementation: Contractor Monitoring: Supervising Engineer	Throughout decommissioning phase	Minimized work near watercourses or wetlands.	Included in the decommissioning contract.
Aquatic habitats and associated fauna	Local degradation of aquatic and semi-aquatic habitats and associated fauna and flora disturbances. Impacts on vulnerable <i>Oreochromis macrochir</i> habitats.	Site preparation Decommissioning activities	Conduct activities in works areas close to aquatic habitats during the dry season to reduce disturbance of sensitive shoreline and wetland areas.	Implementation: Contractor Monitoring: Supervising Engineer	Throughout decommissioning phase	Activities in the wet season minimized.	Included in the decommissioning contract.
Aquatic habitats and associated fauna	Local degradation of aquatic and semi-aquatic habitats and associated fauna and flora disturbances. Local impairment of hydrological dynamics leading to disturbances and alteration of aquatic habitats. Impacts on vulnerable <i>Oreochromis macrochir</i> habitats.	Site preparation Decommissioning activities	Do not operate heavy machinery in wetland areas with standing or running water.	Implementation: Contractor Monitoring: Supervising Engineer	Throughout Decommissioning phase	No heavy machinery operated in wetlands and standing or moving waters.	Included in the decommissioning contract.

Environmental and/or Social Components	Potential Impacts Addressed	Sources of Impact	Management Measure	Responsibilities	Implementation Timing	Performance Indicators	Costs
Aquatic habitats and associated fauna	Local degradation of aquatic and semi-aquatic habitats and associated fauna and flora disturbances.	Decommissioning activities	After completion of decommissioning work, restore natural river bed conditions (minor bed, natural obstacles, etc.).	Implementation: Contractor Monitoring: Supervising Engineer	Throughout Decommissioning phase, after conclusion of work activities in a given area	Natural river bed conditions restored as required.	Included in the decommissioning contract.
Aquatic habitats and associated fauna	Local degradation of aquatic and semi-aquatic habitats and associated fauna and flora disturbances. Local impairment of hydrological dynamics leading to disturbances and alteration of aquatic habitats. Impacts on vulnerable <i>Oreochromis macrochir</i> habitats.	Decommissioning activities Transportation and traffic	Use wetland mat or bridge for vehicle and machinery movement inside permanent wetlands to avoid the need for building a road.	Implementation: Contractor Monitoring: Supervising Engineer	Throughout decommissioning phase	No road building in permanent wetlands.	Included in the decommissioning contract.
Land use	Loss of arable, grazing, and pastoral lands Disruption of farming activities by decommissioning works	Resettlement	Validate with local Leaders which temporary areas are to be used during decommissioning activities.	Implementation: Contractor Monitoring: Supervising Engineer	Throughout decommissioning phase	Always obtain local Leaders' approval prior to establishing temporary work areas.	Included in the decommissioning contract.
Employment and economic development	Inflation risk	Purchase of materials, goods, and services	Adopt procurement and labour policies promoting local products and services, when available.	Development: PIU	Prior to the decommissioning phase	Procurement policies developed and included in Contractor contract.	Included in PIU operating budget.
Infrastructure	Increased traffic and disturbance of traffic flow	Decommissioning activities	Coordinate with TAZARA and TAZAMA so that decommissioning work will be done without interrupting their operations.	Implementation: Contractor Monitoring: Supervising Engineer	Throughout decommissioning phase	Proper authorizations obtained from TAZAMA and TAZARA prior to commencement of works near their installations.	Included in the decommissioning contract.
Safety and public health	Increased stress-related disturbances (noise, dust, and air pollution)	Site preparation Decommissioning activities Transportation and traffic	Locate access roads and lay down areas away from residences to the extent possible.	Implementation: Contractor Monitoring: Supervising Engineer	Throughout decommissioning phase	Daily inspection by the Contractor of access roads for excessive noise. Contractor/Supervising Engineer to maintain records of complaints on noise and vibration levels, and follow-up corrective measures.	Included in the decommissioning contract.
Safety and public health	Increased stress-related disturbances (noise, dust, and air pollution)	Site preparation Decommissioning activities Transportation and traffic	Notify landowners along the line route and the main public transportation routes about the decommissioning schedule and activities.	Implementation: Contractor Monitoring: Supervising Engineer	Throughout decommissioning phase	Landowners duly notified about decommissioning schedule and activities.	Included in the decommissioning contract.
Safety and public health and Gender Aspects	Increased stress-related disturbances (noise, dust, and air pollution)	Site preparation Decommissioning activities Transportation and traffic	Implement and follow-up on grievance redress mechanism and ensure GBV is taken into account in the GRM.	Implementation: Supervising Engineer Coordination: PIU	Throughout decommissioning phase	Grievance mechanism functional throughout the decommissioning phase.	Unknown
Safety and public health Workers' health and safety	Risk of accidents and physical injuries involving local workers and residents	Site preparation Decommissioning activities Transportation and traffic	Secure equipment and demarcate any excavation work areas.	Implementation: Contractor Monitoring: Supervising Engineer	Throughout decommissioning phase	Equipment and excavation work areas properly secured	Included in the decommissioning contract.
Safety and public health Workers' health and safety	Accidents and physical injuries involving residents	Site preparation Decommissioning activities Transportation and traffic	Place signs and fences around decommissioning areas, where necessary.	Implementation: Contractor Monitoring: Supervising Engineer	Throughout decommissioning phase	Decommissioning areas properly secured.	Included in the decommissioning contract.
Safety and public health Workers' health and safety	Risk of accidents and physical injuries involving local workers and residents Adherence to labor standards and well-being of workers	Decommissioning activities	Require all Contractors and Subcontractors to comply with relevant WB health and safety requirements and ZESCO's corporate policy.	Implementation: PIU & Contractor	Prior to beginning of decommissioning phase	WB H&S requirements and ZESCO corporate policy integrated in Contractor and Subcontractors' contracts.	Included in the decommissioning contract.
Safety and public health Workers' health and safety	Risk of accidents and physical injuries involving local workers and residents	Decommissioning activities Presence of workers	Develop and implement an H&S management plan to protect every worker involved in decommissioning, even temporary workers.	Implementation: Contractor Monitoring: Supervising Engineer	Prior to beginning of decommissioning phase	H&S management plan approved by Supervising Engineer prior to initiation of decommissioning phase.	Included in the decommissioning contract.
Safety and public health Workers' health and safety	Risk of accidents and physical injuries involving local workers and residents	Decommissioning activities Presence of workers	Supply drinking water and maintain its quality to ensure sanitation at the decommissioning sites.	Implementation: Contractor Monitoring: Supervising Engineer	Throughout decommissioning phase	Supply of constant good quality drinking water at the worksites.	Included in the decommissioning contract.
Safety and public health Gender aspects	Risk of increased incidences of GBV, STDs and HIV/AIDS	Presence of workers	Locate worker camps at a minimum distance of 1 km from towns and villages.	Implementation: Contractor Monitoring: Supervising Engineer	Throughout decommissioning phase	Distance between workers' camps and other human settlements always kept at 1 km or more.	Included in the decommissioning contract.

Environmental and/or Social Components	Potential Impacts Addressed	Sources of Impact	Management Measure	Responsibilities	Implementation Timing	Performance Indicators	Costs
Safety and public health Gender aspects	Risk of increased incidences of GBV, STDs and HIV/AIDS	Presence of workers	Favour hiring of local workers.	Implementation: Contractor Monitoring: Supervising Engineer	Throughout decommissioning phase	Foreign workers hired only when locals are not available and/or qualified. An estimated 85% of the workforce is local, 15% national and international.	Included in the decommissioning contract.
Communities and social cohesion	Tension with outside workers	Presence of workers	Follow a strict "official" recruitment process whereby all workers need to present their application through official offices.	Implementation: Contractor Monitoring: Supervising Engineer	Throughout decommissioning phase	No recruitment outside official offices.	Included in the decommissioning contract.
Communities and social cohesion Gender aspects	Disturbance of women subsistence activities. Marginalization of women, youth and persons with disabilities during employment process. Increased marginalization of vulnerable groups.	Presence of workers.	Encourage the recruitment of female workers, with equal payment for male and female workers, for equivalent jobs. Set targets for unskilled workforce and rationale for target.	Implementation: Contractor Monitoring: Supervising Engineer	Throughout decommissioning phase	At least 30% of women employees. At least 30% of youth employees youth (persons aged 19 to 35). At least 5% of persons with disability employees. No wage inequalities.	Included in the decommissioning contract.
Communities and social cohesion Gender aspects	Disturbance of women subsistence activities. Marginalization of women, youth and persons with disabilities during employment process. Increased marginalization of vulnerable groups.	Presence of workers.	Organize women in groups and provide training for specific line of service providing such as catering and food production, and others as identified as opportunities for this group and PWD.	Implementation: Contractor Monitoring: Supervising Engineer	Throughout decommissioning phase	Percentage of women's businesses/groups as service providers	Included in the decommissioning contract.
Safety and public health Gender aspects	Risk of increased incidences of GBV, STDs and HIV/AIDS	Presence of workers.	Repare and implement a social awareness program made of induction trainings for all workers and to cover the various work-related measures (health and safety) but also the Code of Conduct, HIV/STDs, SEAH, Sexual and Reproductive Health and Rights (SRHR), and alcohol abuse, GBV and the grievance mechanism. STD and HIV/AIDS prevention program including a strict prohibition of sexual abuse and sexual intercourse with partners younger than 18 years of age (underage sex), this along with other requirements will be included in the Code of Conduct for Workers.	Implementation: Contractor Monitoring: Supervising Engineer	Throughout decommissioning phase	Social Awareness program developed and approved by Supervising Engineer prior to beginning of decommissioning activities.	Included in the decommissioning contract.
Safety and public health Gender aspects	Risk of increased incidences of GBV and STDs and HIV/AIDS.	Presence of workers.	Ensure members of communities are aware of the social awareness program as well as grievance mechanisms, and not only the community's leadership.	Implementation: Contractor Monitoring: Supervising Engineer	Throughout decommissioning phase	Community leaders as well as women in the communities received training on SEAH, SRHR and GBV.	Included in the decommissioning contract.
Safety and public health Gender aspects	Risk of increased incidences of GBV and STDs and HIV/AIDS.	Presence of workers.	Include all gender associated risks in the Code of Conduct – refer to the GBV Management Plan, including SRHR and GBV issues.	Implementation: Contractor Monitoring: Supervising Engineer	Throughout decommissioning phase	Code of Conduct adapted with a gender perspective and GBV measures are in place.	Included in the decommissioning contract.
Safety and public health Gender aspects	Risk of increased incidences of GBV, STDs and HIV/AIDS	Presence of workers	Sensitize all Contractors, workers and communities on the STD and HIV/AIDS program, including explanations on risks posed by STDs, sanctions, etc., as well as on grievance mechanism in place.	Implementation: Contractor Monitoring: Supervising Engineer	Throughout decommissioning phase	All workers sensitized on HIV/AIDS and other STDs at beginning of employment. All Subcontractors and workers sensitized on prohibition of sexual abuse, underage sex, and consequences of infraction at beginning of employment. All communities sensitized on HIV/AIDS, other STDs, as well as on the grievance mechanism prior to the beginning of any decommissioning works in their vicinity.	Included in the decommissioning contract.
Safety and public health Gender aspects	Risk of increased incidences of GBV, STDs and HIV/AIDS	Presence of workers	Screen health of potential employees as part of the recruitment process.	Implementation: Contractor Monitoring: Supervising Engineer	Throughout decommissioning phase	Health screenings implemented prior to hiring, and regularly during employment.	Included in the decommissioning contract.
Safety and public health Workers' health and safety and Gender Aspects	Risk of accidents and physical injuries involving local workers and residents.	Presence of workers.	Maintain construction camps safe and secure for women and vulnerable groups.	Implementation: Contractor Monitoring: Supervising Engineer	Throughout decommissioning phase	Camps designed with a gender perspective, including sufficient lighting, gender-segregated locker rooms and latrines, etc.	Included in the decommissioning contract.

Environmental and/or Social Components	Potential Impacts Addressed	Sources of Impact	Management Measure	Responsibilities	Implementation Timing	Performance Indicators	Costs
Safety and public health Workers' health and safety	Risk of accidents and physical injuries involving local workers and residents	Presence of workers	Maintain workers camps in clean and healthy condition as prescribed by international worker health standards such as the IFC-EBRD Joint Guidance Note on Worker Accommodations (Appendix 3-4), or other relevant standards at the time of decommissioning.	Implementation: Contractor Monitoring: Supervising Engineer	Throughout decommissioning phase	Camps maintained in satisfactory condition.	Included in the decommissioning contract.
Safety and public health Workers' health and safety Safety and public health	Increased pressure on community health services	Presence of workers	Require Contractor(s) to provide health care services to their employees.	Implementation: Contractor Monitoring: Supervising Engineer	Throughout decommissioning phase	Availability of health care services throughout decommissioning phase.	Included in the decommissioning contract.
Safety and public health Workers' health and safety Gender aspects	Risk of increased incidences of STDs and HIV/AIDS Risk of sexual abuse by workers and especially child abuse Accidents and physical injuries involving workers or residents	Presence of workers Decommissioning works	Require Contractor(s) to hire security workers to ensure the safety of workers and community members, as well as to prevent theft and vandalism.	Implementation: Contractor, Supervising Engineer, and PIU	Throughout decommissioning phase	Security guards on duty full time (24hrs) whenever camp is in operation.	Included in the decommissioning contract.
Safety and public health Workers' health and safety Gender aspects	Risk of increased incidences of STDs and HIV/AIDS. Risk of sexual abuse by workers and especially child abuse. Accidents and physical injuries involving workers or residents.	Presence of workers. Construction works.	Ensure that the PPE requirements in the Occupational Health, Safety and Security Management Plan to be developed, include an obligation to provide PPE suitable for female workers (diverse range of body shapes and sizes).	Implementation: Contractor, Supervising Engineer, and PIU	Prior and throughout decommissioning phase	Availability of female adapted PPE	Included in the decommissioning contract.
Safety and public health Workers' health and safety Gender aspects	Risk of increased incidences of STDs and HIV/AIDS. Risk of sexual abuse by workers and especially child abuse. Accidents and physical injuries involving workers or residents.	Presence of workers. Construction works.	Requirements to produce regular E&S reports to assess compliance with Gender Based Violence Management Plan and other E&S measures. Monitoring should be done by an independent and qualified third party.	Implementation: Contractor, Supervising Engineer, and PIU	Prior and throughout decommissioning phase	Monitoring and evaluation report on Gender Based Violence Management Plan and other E&S measures by an independent and qualified third party.	Included in the decommissioning contract.
Safety and public health	Risks of accidents and physical injuries involving residents	Decommissioning activities	Mainly the Community Health and Safety Plan with the following elements: (i) location of sources of materials, (ii) disposal area of construction debris, (iii) arrangements for traffic management, (iv) fencing the substations and the towers, (v) and measures for avoiding the occurrence of incidents and injuries to members of the public associated with the operation of the moving equipment.	Implementation: Contractor Monitoring: Supervising Engineer	Prior to beginning of decommissioning phase	Community H&S plan approved by Supervising Consultant prior to initiation of decommissioning phase.	Included in the decommissioning contract.
Communities and social cohesion Gender aspects	Land use and compensation disputes, reviving old quarrels (land resource and power conflict) Tension with outside workers	Presence of workers Land access Resettlement Displacement of economic activities	Maintain the Stakeholder Engagement Plan	Implementation: Contractor, Supervising Engineer, and PIU	Prior to and throughout decommissioning phase	Communications with affected communities maintained throughout the decommissioning phase.	Included in the decommissioning contract.
Communities and social cohesion Gender aspects	Gender-Based Violence Land acquisition Resettlement	Presence of workers Land access Decommissioning activities	Reactivate the GRM and GBV action plan during decommissioning.	See action plan for details on responsibilities.		See action plan for details on monitoring.	Provision for the GBV Services Provider \$75,000 mainly for cost of transportation to rural areas.
Communities and social cohesion Gender aspects	Risk that tolerated agriculture activities are not being compensated during decommissioning	Land access	Compensate for tolerated agriculture activities in the wayleave and implement land entry and exit agreement with traditional authorities.	Implementation: PIU	Prior to decommissioning phase	Signed land entry and exit agreement with traditional authorities.	Included in the RAP.
Communities and social cohesion Gender aspects	Women being sidelined from the land access procedures and decision-making processes.	Land access	ZESCO's Consent for Compensation/Disclosure form, included in the RAP should be adapted for more than one signature in case of household in unions, including polygamous marriages.	Implementation: PIU	Prior to decommissioning phase	Signed land entries issued in the names of all spouses or single heads of households as relevant.	Included in the RAP.
Communities and social cohesion Gender aspects	Disturbance of women subsistence activities Marginalization of women during employment process Increased marginalization of vulnerable groups.	Presence of workers	Encourage the recruitment of female workers, with equal payment for male and female workers, for equivalent jobs.	Implementation: Contractor Monitoring: Supervising Engineer	Throughout decommissioning phase	Percentage of women employees. No wage inequalities.	Included in the decommissioning contract.
Communities and social cohesion	Tension with outside workers and risk for corruption	Presence of workers.	Follow a strict "official" recruitment process whereby all workers need to present their application through official offices.	Implementation: Contractor Monitoring: Supervising Engineer	Throughout decommissioning phase	No recruitment outside official offices.	Included in the decommissioning contract.
Communities and social cohesion	Tension with outside workers and risk for corruption	Presence of workers.	All workers require written contracts and should be given a copy	Implementation: Contractor Monitoring: Supervising Engineer	Throughout decommissioning phase	Availability of all written contracts to all employees.	Included in the decommissioning contract.

Environmental and/or Social Components	Potential Impacts Addressed	Sources of Impact	Management Measure	Responsibilities	Implementation Timing	Performance Indicators	Costs
Cultural and Archeological Heritage	Potential destruction of physical cultural resources within the Mwela Rock Art site;	Site preparation Decommissioning activities Transportation and Traffic	Develop and implement a Cultural Heritage Management Plan, including specific measures for the Mwela Rock Art site.	Implementation: Contractor Monitoring: Supervising Engineer	Prior to and throughout the construction phase within the Mwela Rock Art site	Cultural Heritage management plan approved by Supervising Engineer prior to initiation of construction phase	Included in Contractor costs
			Conduct all works within the Mwela Rock Art site with an archeologist from the NHCC.	Implementation: Contractor Monitoring: Supervising Engineer	Prior to and throughout the construction phase within the Mwela Rock Art site	Presence of an archeologist from the NHCC	Included in Contractor costs
			Identify access roads and work areas with the presence of an archeologist from the NHCC. A dedicated Transport Management Plan and strict work procedures within the site should be developed and implemented.	Implementation: Contractor Monitoring: Supervising Engineer	Prior to and throughout the construction phase within the Mwela Rock Art site	Access roads and work areas validated by an archeologist. Transport management Plan for the Mwela Rock Art site developed and implemented	Included in Contractor costs
			Strictly implement waste management within the site. All rubble should be remove from the site.	Implementation: Contractor Monitoring: Supervising Engineer	Throughout the construction phase within the Mwela Rock Art site	No waste left on the site	Included in Contractor costs
			Conduct training and induction for workers on safe practices in the site	Implementation: Contractor Monitoring: Supervising Engineer	Prior to and throughout the construction phase within the Mwela Rock Art site	Register of training. Training completed for all staff including drivers	Included in Contractor costs
			Rehabilitate all disturbed areas within the Mwela Rock Art site after completion of works.	Implementation: Contractor Monitoring: Supervising Engineer	After construction works finalized within the site	Areas rehabilitated to their original state.	Included in Contractor costs

## 4 SPECIFIC MANAGEMENT PLANS

The environmental and social management strategy required for the ZTIP implementation to ensure alignment with national and WB requirements integrates multiple management measures and also various procedures and management plans that are specific to some anticipated environmental and social issues that have been identified through the ESIA. ZESCO, as part of its commitments to the World Bank and also to its own environmental and social policies, has developed some of the required components of this environmental and social management strategy, including:

- A Stakeholder Engagement Plan, including a community grievance redress mechanism;
- A Labor Management Procedure;
- An Environmental and Social Commitment Plan.

Contractors will also need to review and integrate ZESCO Environment and Social (E&S) management policies, procedures, and commitments, in addition to any National or International requirements relevant to their (the contractor's) work scope and responsibilities.

This chapter outlines the additional specific management plans that are required for the ZTIP implementation, including:

- 1 Biodiversity Management Plan (BMP);
- 2 Cultural Heritage Management Plan (CHMP);
- 3 Community Health and Safety Management Plan (CHSMP);
- 4 Occupational Health and Safety Management Plan;
- 5 Emergency Preparedness and Response Plan;
- 6 Residual Material and Hazardous Products Management Plan;
- 7 Pollution Prevention Management Plan;
- 8 Gender-Based Violence (GBV) Management Plan;
- 9 Worker Grievance Redress Mechanisms;
- 10 Code of Conduct.

The above plans will be developed and implemented by the Project proponent in accordance to:

- National laws and requirements;
- World Bank requirements applicable to the Project; and
- The environmental and social management plans and procedures prepared by ZESCO.

It is to be noted, as specified in Chapter 5, that ZESCO will be developing a Project Implementation Unit (PIU) office solely dedicated to implementing the ZTIP.

It is anticipated that all of the above-cited management plans, will be developed and implemented exclusively or in part by the Contractors for their respective scope of work during the pre-construction and construction phases. (see Table 4-1 below). The Operations Phase management plans will be developed and implemented by ZESCO (or their contractors/consultants) for this phase.

**Table 4-1 Responsibilities for the Development and Implementation of the Specific Management Plans**

No.	Plan	Pre-construction/Construction Phase		Operation Phase	
		Development of a Detailed Plan	Implementation	Development of Detailed Plan	Implementation
1	Biodiversity Management Plan (BMP)	PIU/Contractor	PIU/Contractor	ZESCO	ZESCO
2	Cultural Heritage Management Plan (CHMP)	Contractor	Contractor	ZESCO	ZESCO
3	Community Health and Safety Management Plan (CHSMP)	Contractor	Contractor	ZESCO	ZESCO
4	Occupational Health and Safety Management Plan (OHSMP)	Contractor	Contractor	ZESCO	ZESCO
5	Emergency Preparedness and Response Plan (EPRP)	Contractor	Contractor	ZESCO	ZESCO
6	Residual Material and Hazardous Products Management Plan (RMHPMP)	Contractor	Contractor	ZESCO	ZESCO
7	Pollution Prevention Management Plan (PPMP)	Contractor	Contractor	ZESCO	ZESCO
8	Worker Grievance Redress Mechanisms	PIU/Contractor	PIU/Contractor	ZESCO	ZESCO
9	Gender-Based Violence Action Plan	PIU/Contractor	PIU/Contractor	ZESCO	ZESCO

The structure of each specific management plan framework discussed in the following sections is outlined in the following manner:

- 1 Introduction:** Provides an overview of the Project, its objectives, and the associated environmental and social issues at a high level.
- 2 Objectives:** A brief statement explaining the goal or intended outcome of the plan, clarifying its scope.
- 3 Requirements:** Provide links to relevant documents, standards, or guidelines that support the plan.
- 4 Management Measures and Actions:** Focuses mainly on prevention measures to prevent risks from occurring and protective measures to reduce the impact of those risks if they occur.
- 5 Roles and Responsibilities:** Identifies the roles and responsibilities of individuals, groups, entities, and any other stakeholders involved in executing the plan.
- 6 Monitoring:** The specific management plans will be reviewed periodically and adapted throughout the implementation of the Project. The responsibilities for the development and implementation of these plans will vary according to the plans and phases of the Project. The following table identifies the responsibilities for developing and implementing plans during the pre-construction/construction and operational phases.

## 4.1 BIODIVERSITY MANAGEMENT PLAN

### 4.1.1 INTRODUCTION

The Biodiversity Management Plan (BMP) sets out the requirements to mitigate and manage potential impacts on fauna, flora and their habitats and in particular on Critical Habitat, protected areas and natural Habitat during the detailed design, pre-construction, construction and rehabilitation phases of the Project.

It is ZESCO's responsibility to develop and implement the BMP.

Main potential impacts on biodiversity that need to be appropriately managed are:

- Permanent loss of natural habitat areas and associated flora;
- Potential loss of critical habitat for two critical habitat triggering flora species
- Encroachment of the transmission line in seven forest reserves
- Habitat fragmentation and degradation for bird and terrestrial mammal species, including species of conservation concern;
- Direct mortality of birds through collisions with the earth wire/ground wire, including priority species and species of conservation concern;

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### **4.1.2 OBJECTIVES**

The objective of this plan is to ensure that the biodiversity issues are fully integrated into the Project implementation. It outlines the approach to be taken by the PIU and ZESCO to meet obligations regarding the long-term conservation of important biodiversity features. It establishes the biodiversity management objectives and the rationale and actions that will enable a No Net Loss/Net Gain (NNL/NG) outcome.

The BMP is effective throughout the Project planning, construction, and operation phases. It is a living document that will be updated as results of additional studies and consultations become available, the Project's design becomes detailed, and the Project monitors its impacts and assesses mitigation effectiveness.

The document first discusses potential impacts of the Project on critical habitat, identifying potential interactions all biodiversity features that qualify as critical habitat according to WB ESS 6 and IFC PS 6 (see Critical Habitat Assessment, Appendix 5-14 of the ESIA). Specific management strategies for critical habitat triggering values are presented, including management objectives, key management measures, residual impacts, and compensation or additional conservation actions to achieve net gain.

The potential impacts on protected areas and natural habitats are then discussed and mitigation measures are identified. Also, the management of Project-related impacts on avifauna and terrestrial mammals is detailed.

Roles and responsibilities for BMP implementation are described as monitoring measures for BMP implementation. Finally, a timeline and a budget are proposed to fill potential gaps and ensure BMP implementation.

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### **4.1.3 REQUIREMENTS**

The BMP will be developed with consideration to:

- Relevant ZESCO environment and social management policies and commitments;
- National requirements; and
- World Bank requirements.

Contractors will need to review ZESCO's E&S management policies and commitments in addition to any National or International requirements relevant to their (contractor's) work scope and responsibilities.

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#### **4.1.3.1 NATIONAL**

##### **WATER RESOURCES MANAGEMENT ACT, 2011**

The Act provides for the ownership, control and use of water. It delegates management of water resources through Catchment Councils established under the Act, consisting of the water users of the catchment. It further provides for the equitable, reasonable and sustainable use of water resources in Zambia.

This Act establishes a regulatory and administrative framework for the management, development, conservation, protection and preservation of the water resource in Zambia and provides with respect to water rights and the equitable and sustainable use of water resources and related matters.

##### **FOREST ACT, NO. 4 OF 2015**

An Act to provide for the establishment and declaration of National Forests, Local Forests, joint forest management areas, botanical reserves, private forests and community forests; provide for the participation of local communities, local authorities, traditional institutions, non-governmental organizations and other stakeholders in sustainable forest management; provide for the conservation and use of forests and trees for the sustainable management of forest ecosystems and biological diversity; establish the Forest Development Fund; provide for the implementation of the United Nations Framework Convention on Climate Change, Convention on International Trade in Endangered Species of Wild Flora and Fauna, the Convention on Wetlands of International Importance, especially as Water Fowl Habitat, the Convention on Biological Diversity, the Convention to Combat Desertification in those Countries experiencing Serious Drought and/or Desertification, particularly in Africa and any other relevant international agreement to which Zambia is a party; repeal and replace the Forests Act, 1999; and provide for matters connected with, or incidental to, the foregoing.

This Act concerns the management and conservation of forest resources and, to some extent, the protection of biological diversity and, generally, the environment in Zambia. It consists of 107 sections divided into 11 Parts: Preliminary (I); Forestry Department (II); Forest Management and Development (III); Forest Management Plans and Conservation Orders (IV); Protected Flora (V); Regulation of Forest Produce (VI); Marking of Timber (VII); The Forest Development Fund (VIII); Enforcement (IX); Offence.

##### **FOREST (CARBON STOCK MANAGEMENT) REGULATIONS, S. I. NO. 66 OF 2021**

The regulations provide a framework for participating in forest carbon stock management and define activities eligible for Projects in carbon stock management. Section 19 prohibits double counting of emission targets. Section 22 requires a permit order to include environmental, social and fiduciary safeguards in the Project design. The regulations further prescribe the obligations of orders of forest carbon stock management permits.

##### **ENVIRONMENTAL MANAGEMENT (LICENSING) REGULATIONS, S. I. NO. 112 OF 2013**

The Regulations provide for the licensing of pollution sources. These include established plants or the movement of materials. It repeals and replaces Statutory Instrument No. 71 of 1993; Statutory Instrument No. 125 of 2001; Statutory Instrument No. 72 of 1993, and all other permitting requirements.

##### **NATURAL RESOURCES CONSERVATION ACT, CAP 315, 1970**

The Act relates to the monitoring of natural resource conservation and utilisation outside forest reserves and national parks, as well as control of bush fires and powers of Minister to make regulations.

## **ZAMBIA WILDLIFE ACT NO.14 OF 2015**

An Act to governing the affairs of the Zambia Wildlife Authority; establish the Department of National Parks and Wildlife in the Ministry responsible for tourism; provide for the establishment, control and management of National Parks, bird and wildlife sanctuaries and for the conservation and enhancement of wildlife ecosystems, biological diversity and objects of aesthetic, pre-historic, historical, geological, archeological and scientific interest in National Parks; provide for the promotion of opportunities for the equitable and sustainable use of the special qualities of public wildlife estates; provide for the establishment, control and co-management of Community Partnership Parks for the conservation and restoration of ecological structures for non-consumptive forms of recreation and environmental education; provide for the sustainable use of wildlife and the effective management of the wildlife habitat in Game Management Areas; enhance the benefits of Game Management Areas to local communities and wildlife; involve local communities in the management of Game Management Areas; provide for the development and implementation of management plans; provide for the regulation of game ranching; provide for the licensing of hunting and control of the processing, sale, import and export of wild animals and trophies; provide for the implementation of the Convention on International Trade in Endangered Species of Wild Fauna and Flora, the Convention on Wetlands of International Importance especially as Waterfowl Habitat, the Convention on Biological Diversity, the Lusaka Agreement on Cooperative Enforcement Operations Directed at Illegal Trade in Wild Fauna and Flora and other international instruments to which Zambia is party; repeal the Zambia Wildlife Act, 1998; and provide for matters connected with, or incidental to, the foregoing.

## **ZAMBIA WILDLIFE (PROTECTED ANIMALS) ORDER, S. I. NO. 42 OF 2016**

The Zambia Wildlife (Protected Animals) Order, S.I. No. 42 of 2016 revokes the National Parks and Wildlife (Protected Animals Order and 1993) and lists the animals that should not be hunted without a licence. The order has been made in accordance with the provisions of section 36 of the Zambia Wildlife Act No. 14 of 2015, which gives the minister responsible for wildlife the power to specify protected animals that cannot be hunted without a licence.

## **NATIONAL PARKS AND WILDLIFE (GAME ANIMALS) ORDER, S. I. NO. 41 OF 2016**

The Zambia Wildlife (Game Animals) Order, S. I. No. 41 of 2016 specifies animals considered as game management animals and prohibits hunting such animals without a licence. The order further revokes the Zambia Wildlife (Game Animals) Order No. 10 of 2015.

## **FISHERIES ACT, NO.22 OF 2011**

An Act to provide for the appointment of the Director of Fisheries and fisheries officers and provide for their powers and functions; promote the sustainable development of fisheries and a precautionary approach in fisheries management, conservation, utilisation and development; establish fisheries management areas and fisheries management committees; provide for the regulation of commercial fishing and aquaculture; establish the Fisheries and Aquaculture Development Fund; repeal and replace the Fisheries Act, 1974; and provide for matters connected with, or incidental to, the foregoing.

## **WATER SUPPLY AND SANITATION ACT NO. 28 OF 1997**

This Act regulates water supply and sewerage utilities to protect consumers from unjustified tariffs.

## **CONVENTION ON BIOLOGICAL DIVERSITY**

The Convention on Biological Diversity (CBD) is an international convention (to which Zambia is a signatory) and represents a commitment to sustainable development. The Convention has three main objectives: the conservation of biological diversity, the sustainable use of its components, and the fair and equitable sharing of the benefits from the use of genetic resources (<http://www.cbd.int/convention/guide/>). The convention makes provisions (in a general policy guideline) for maintaining and restoring biodiversity. In addition to this, the CBD is an ardent supporter of thorough assessment procedures (Strategic Environmental Assessments (SEAs) and Environmental Impact Assessments (EIAs)) and requires that Parties apply these processes when planning activities that will have a biodiversity impact.

An important principle encompassed by the CBD is the precautionary principle, which essentially states that where serious environmental threats exist, lack of full scientific certainty should not be used as a reason for delaying management of these risks. The burden of proof that the impact will not occur lies with the proponent of the activity posing the threat. In addition, the Aichi Biodiversity Targets (CBD, 2011) address several priority issues, i.e., the loss of biodiversity and its causes, reducing direct pressure on biodiversity, safeguarding ecosystems, species, and genetic diversity, and participatory planning to enhance the implementation of biodiversity conservation. Each of these is relevant in the case of powerline and substation infrastructure development and biodiversity conservation through all Project phases, from planning to the implementation of mitigation measures for existing developments.

## **THE AGREEMENT ON THE CONSERVATION OF AFRICAN-EURASIAN MIGRATORY WATER BIRDS**

The Agreement on the Conservation of African-Eurasian Migratory Water birds (AEWA) is an intergovernmental treaty dedicated to the conservation of migratory waterbirds and their habitats across Africa, Europe, the Middle East, Central Asia, Greenland, and the Canadian Archipelago. The AEWA covers 255 species of birds ecologically dependent on wetlands for at least part of their annual cycle, including many species of divers, grebes, pelicans, cormorants, herons, storks, rails, ibises, spoonbills, flamingos, ducks, swans, geese, cranes, waders, gulls, terns, tropic birds, auks, frigate birds, and even the South African penguin. The core activities carried out under AEWA are described in their Action Plan, which is legally binding for all countries that have joined the Agreement. The AEWA Action Plan details the various measures to be undertaken by Contracting Parties and Non-Party Range States (Zambia included) to guarantee the conservation of migratory waterbirds within their national boundaries. These include species and habitat protection, and the management of human activities, as well as legal and emergency measures.

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### **4.1.3.2 WORLD BANK REQUIREMENTS**

## **ESS 6 - BIODIVERSITY CONSERVATION AND SUSTAINABLE MANAGEMENT OF LIVING NATURAL RESOURCES**

The ESS 6 recognizes that protecting and conserving biodiversity and sustainably managing living natural resources are fundamental to sustainable development. Biodiversity is defined as the variability among living organisms from all sources, including inter alia, terrestrial, marine, and other aquatic ecosystems, and the ecological complexes of which they are a part; this includes diversity within species, between species, and of ecosystems.

ESS6 requires to avoid adverse impacts on biodiversity and habitats. When avoidance of adverse impacts is not possible, measures to minimize adverse impacts and restore biodiversity in accordance with the mitigation hierarchy must be implemented. Where significant risks and adverse impacts on biodiversity have been identified, the Borrower will develop and implement a Biodiversity Management Plan.

This ESS addresses all habitats, categorized as ‘modified habitat’, ‘natural habitat’, and ‘critical habitat’, along with ‘legally protected and internationally and regionally recognized areas of biodiversity value’. The ESS requires a differentiated risk management approach to habitats based on their sensitivity and values:

- In natural habitat, mitigation measures must achieve no net loss and, where feasible, preferably a net gain of biodiversity over the long term.
- In critical habitats, a mitigation strategy will be designed to achieve net gains in the biodiversity values for which the critical habitat was designated.
- In protected areas, additional programs must be implemented to promote and enhance the conservations aims and effective management of the area.

## 4.1.4 MANAGEMENT MEASURES AND ACTIONS

### 4.1.4.1 MANAGEMENT OF CRITICAL HABITAT AND KEY BIODIVERSITY VALUES

Critical habitats are a subset of modified or natural habitats. Modified, natural and critical habitat refers to the biodiversity value of the area as determined by species, ecosystems, and ecological processes. In the Biodiversity Extended Study Area (BESA), results show that four species trigger critical habitats (Table 4-2). Habitats supporting species triggering critical habitat criteria in the Ecologically Appropriate Area of Analysis (EAAA) are Miombo woodland within Mutinondo Wilderness Area and Bwingi Fumu Forest Reserve, natural undisturbed wet grasslands and dambos, rock outcrop in the Kasama Forest Reserve for *Euphorbia perplexa var kasamana*, thin soils and rock crevices on Muchinga Escarpment in Serenje. Table 4-2 details potential interactions with these high biodiversity values. The complete critical habitat assessment is available in ESIA Appendix 5-14.

**Table 4-2 Potential Interactions of Critical Habitat Qualifying Biodiversity Features with the Project**

Biodiversity Feature	Potential Interaction with the Project	Key Impacts	Mitigation Strategy
<i>Encephalartos schmitzii</i>	<p>In Zambia, vulnerable <i>Encephalartos schmitzii</i> occurs along the Muchinga Escarpment in the Muchinga province. It's considered restricted-range.</p> <p>In the BESA, it would occur as a disjunct population in wet Miombo woodlands of Bwingi Mfumu Forest Reserve, about 20 km to the east of the proposed line (Lishomwa Mulongwe, Principal Research Officer, Forestry Department, personal communication). It was not observed during the field surveys, but GBIF has a record of the species from the Mutinondo Wilderness area.</p> <p>These two areas were determined to be critical habitat for the species.</p> <p>Its presence in the LSA, which is west of the escarpment, is unlikely; hence, no impacts from the Project on the species are anticipated.</p>	<p>Project not located within CH for this species.</p> <p>No direct or indirect impact.</p>	NA
<i>Disa aequiloba</i>	<p>This endangered species is known only in 10 locations which are far apart from each other and in Angola, DRC, Tanzania and Zambia (IUCN SSC East African Plants Red List Authority, 2019). The species was not observed during surveys but is known to be present in the region (Lishomwa Mulongwe, Principal Research Officer, Forestry Department, personal communication).</p> <p>In the BESA, this species has a single occurrence from GBIF, east of the line, near the Mutinondo Wilderness Area. The species grows in different wetlands habitats such as swamp areas, dambo, wet grassland, and wet meadows. It is mainly threatened by the expansion of tea plantations and potato farming.</p> <p>Natural undisturbed wet grasslands and dambos within the BESA can potentially host the species and would constitute a critical habitat.</p>	<p>Potential impact in wet dambos crossed by the line, although presence not confirmed.</p> <p>Indirect impact from increased accessibility, leading to increased habitat degradation and potential harvesting pressure.</p>	See Action Plan for <i>Disa aequiloba</i>
<i>Euphorbia perplexa var kasamana</i>	<p>The <i>Euphorbia perplexa var. Kasamana</i> is known only from Zambia, north of Kasama (Phiri, 2015). This small shrub characterised with spines to 10 mm long was observed in the Kasama forest reserve, on the rocky outcrops of the Mwela Rock Art Site. It was collected during the walkover surveys in September 2019.</p> <p>Although its precise extent of occurrence is unknown, it is assumed that the species must have a restricted range (less than 50,000 km<sup>2</sup>). The rock outcrops in the Kasama forest reserve are considered critical habitat for the species</p>	<p>4,8 ha of rock outcrop are found in the ROW.</p> <p>Potential loss and damage to the habitat during construction.</p>	See Action Plan <i>Euphorbia perplexa var kasamana</i>

Biodiversity Feature	Potential Interaction with the Project	Key Impacts	Mitigation Strategy
<i>Gladiolus serenjensis</i>	<p>This herb grows on thin soils and rock crevices in the Muchinga Escarpment, Serenje District (Phiri, 2005). The species was not observed during surveys but is, in fact, thought to be restricted to in hilly areas on thin soil in Serenje (Dr Mulongwe, Principal Research Officer, Forestry Department, personal communication). In the BESA, this species has a single occurrence from GBIF, east of Pensulo and of the Kanona forest reserve, near the Kundallila Falls. Although its precise extent of occurrence is unknown, it is assumed that the species must have a restricted range (less than 50,000 km<sup>2</sup>).</p> <p>Thin soils and rock crevices on Muchincha Escarpment in Serenje are identified as critical habitats for this species.</p> <p>Its presence in the LSA, which is west of the escarpment, is unlikely; hence, no impacts from the Project on the species are anticipated.</p>	<p>Project not located within CH for this species.</p> <p>No direct or indirect impact.</p>	NA

#### 4.1.4.2 ACTION PLAN FOR *DISA AEQUILOBA*

##### KEY IMPACTS

- Potential loss and degradation of wetland habitat, constituting potential critical habitat for the species.

##### MANAGEMENT OBJECTIVES

- Complete detailed design while avoiding as much as possible infrastructure (including pylons siting) within wet grasslands and dambos considered critical for the species.
- Avoid as much as possible works and temporary infrastructure within wet grasslands and dambos.
- Compensation for habitat and specimens lost to reach net gain for *Disa aequiloba*.

##### KEY MANAGEMENT MEASURES FOR *DISA AEQUILOBA*

##### AVOIDANCE

- Undertake additional targeted surveys in the ROW and temporary construction areas to determine the presence *Disa Aequiloba* critical habitat and avoid these areas where it occurs.
- Avoid as much as possible infrastructure (including pylons siting) within wet grasslands and dambos considered critical for the species. Use longer spans between power lines to avoid erecting structures in these habitats.
- Ensure no access roads are built and no temporary construction areas are placed within wet grasslands and dambos considered critical for the species.
- Promote the selection of areas of modified habitat for the installation of temporary work and storage areas.
- Ensure construction activities, including vehicle movements and material storage, remain within the ROW, temporary construction areas and identified access roads.
- Clearly mark the extent of the ROW and temporary construction areas with stakes at intervals of 50 m or less. Identify and mark the vegetation to be preserved along sections of the ROW.
- Conduct activities during the dry season to reduce disturbance of sensitive wetland areas;
- Undertake selective cutting of the vegetation in dambo areas in order to keep low-growing species that do not represent a risk to the powerline.

- During construction and maintenance, areas where *Disa aequiloba* specimens are found should be identified and warning signs should be placed to avoid any impairment of the specimens.

## MINIMIZATION

- Undertake ROW vegetation cutting under the supervision of a botanist to identify and relocate threatened or protected species, if possible.
- Any threatened or protected species that needs to be cut will be located and its habitat will be fully described. If possible, relocate specimens or collect cuttings or seeds of species of conservation concern.
- Restore borrow sites at the end of the work activities with native plant species representative of the initial conditions.
- Ensure no modification to local hydrology and drainage associated with wet grasslands and dambos.
- Clean construction equipment properly before arriving in work areas and again when leaving if it is contaminated with invasive alien species.
- Implement a sensitization program in order to educate and increase local communities' awareness on natural resources protection and overharvesting.

## RESIDUAL IMPACT

A total of 322 ha of wetland is found within the Project ROW. As wetlands are dominated by herbaceous species, they will not be affected by ROW clearing. The loss of wetland habitat is expected to be minimal, especially if careful attention is put into avoiding infrastructure in this habitat type.

Although the majority of wetlands have been transformed for agricultural purposes, natural patches of wetland are susceptible to support *Disa aequiloba*. Targeted surveys of natural wetland areas to determine if the species is present are needed in order to detail further mitigation measures and determine the residual impact on this species.

As *Disa aequiloba* is a herbaceous species, its presence within the right-of-way can be largely protected and maintained during construction and operation of the line. With the application of avoidance and minimization measures provided above, the project will not lead to a significant loss of the species or its habitat.

## COMPENSATION MEASURES AND ADDITIONAL CONSERVATION ACTIONS TO ACHIEVE NET GAIN

These are to be determined following the additional targeted surveys of *Disa aequiloba* within the ROW.

Potential compensation measures and conservations actions are:

- Restoration and protection of natural wet grasslands and dambos.
- Develop nurseries specifically for the species in collaboration with orchid specialists.
- Support a reintroduction program in suitable habitats.

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### 4.1.4.3 ACTION PLAN FOR *EUPHORBIA PERPLEXA* VAR *KASAMANA*

*Euphorbia* sp. are spiny succulent plants that are found on rock outcrops and in sandy areas. *Euphorbia perplexa* var. *kasamana* is a low-lying species that rarely reaches more than 0.5 m, the vegetation high allowed within the transmission line ROW. During construction and maintenance activities, efforts should be made to maintain and protect these plant specimens. Rocky outcrops in the Kasama Forest Reserve are the area where the species was observed and to which particular attention should be paid.

## KEY IMPACTS

- Potential loss and degradation of rock outcrop habitat, constituting critical habitat for the species.

## MANAGEMENT OBJECTIVES

- Complete detailed design while avoiding as much as possible infrastructure (including pylons siting) within rock outcrop habitat in Kasama FR, considered critical for the species.
- Avoid work and temporary infrastructure within rock outcrop habitat in Forest Reserve.
- Compensation for habitat and specimens lost to reach net gain for *Euphorbia perplexa var kasamana*.

## KEY MANAGEMENT MEASURES FOR *EUPHORBIA PERPLEXA VAR KASAMANA*

### AVOIDANCE

- Assess feasible technical options to avoid the crossing of rock outcrops in proximity and within the Kasama Forest Reserve.
- Avoid as much as possible infrastructure (including pylons siting) within the rock outcrop habitat in Kasama forest reserve. Use longer spans between power lines to avoid erecting structures in this habitat.
- Ensure no access roads are built and no temporary construction areas are placed within rock outcrop habitat in the Kasama forest reserve.
- Undertake additional targeted surveys in the ROW and temporary construction areas to determine the presence *Euphorbia perplexa var kasamana* critical habitat and avoid these areas where it occurs.
- During construction and maintenance, protect low-lying specimens of endemic *Euphorbia perplexa var. Kasamana* and other endemic Euphorbia sp. (*Euphorbia jubata* and *Euphorbia speciosa*).
- Do not cut or damage specimens of *Euphorbia perplexa var kasamana* where specimens are found should be identified and warning signs should be placed to avoid any impairment of the specimens.
- Promote the selection of areas of modified habitat for the installation of temporary work and storage areas.
- Ensure construction activities, including vehicle movements and material storage, remain within the ROW, temporary construction area and identified access roads.
- Clearly mark the extent of the ROW and temporary construction areas. Avoid all encroachment outside of the ROW.
- Avoid construction of temporary access roads in rock outcrops in Kasama FR.

### MINIMIZATION

- Undertake ROW vegetation cutting with the supervision of a botanist in order to identify and relocate, if possible, threatened or protected species.
- Any threatened or protected species that needs to be cut will be located and its habitat will be fully described. If possible, relocate specimens or collect cuttings or seeds of species of conservation concern.
- Restore borrow sites at the end of the work activities with native plant species representative of the initial conditions.
- Clean construction equipment properly before arriving in work areas and again when leaving if it is contaminated with invasive alien species.

## RESIDUAL IMPACT

A total of 4,8 ha of rock outcrop is found within the Project ROW in the Kasama forest reserve.

Undertake targeted surveys of the area to determine to detail mitigation measures to reduce the residual impact on this species.

As *Euphorbia perplexa* var. *Kasamana* is a low-lying species, it is expected that specimens and the habitat within the right-of-way can be largely protected and maintained during construction and operation of the line. With the implementation of avoidance and minimization measures provided above, the project will not lead to a significant loss of the species or its habitat.

However, if feasible technical options to avoid the crossing of rock outcrops in proximity and within the Kasama forest reserve are identified, this would further prevent any residual impact.

## **COMPENSATION MEASURES AND ADDITIONAL CONSERVATION ACTIONS TO ACHIEVE NET GAIN**

These are to be determined following the additional targeted surveys of *Euphorbia perplexa* var. *kasamana* within the ROW.

Potential compensation measures and conservation actions are:

- Restoration and protection of rock outcrop vegetation.
- Develop nurseries specifically for the species in collaboration with *Euphorbia* specialists.
- Support a reintroduction program in suitable habitats.

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### **4.1.4.4 NATURAL HABITATS**

Natural habitats are areas composed of viable assemblages of plant and/or animal species of largely native origin and/or where human activity has not essentially modified an area's primary ecological functions and species composition, whereas modified habitats are areas that may contain a large proportion of plant and/or animal species of non-native origin, and/or where human activity has substantially modified an area's primary ecological functions and species composition.

A total of 307,5 ha of what can be considered as natural habitat, which secondary and mature woodland, as well as riverine forest, are found in the ROW and will need to be cut. Although considered natural habitat, it is important to note that most riverine forests are degraded and that the integrity of the secondary woodland in the Project area is low due to clearing for fuelwood, charcoal, and building materials and annual wildfires.

It is estimated that a minimum of 361 ha of natural miombo woodland (considering 85% plantation success) can be replanted or restored elsewhere to achieve no net loss of natural habitat.

A study of miombo woodland in the Northern Province showed an average tree density between 242 stem/ha and 184 stem/ha in old-growth woodland and coppice (Chidumayo, 1987). The average between these two values (213 stem/ha) was used to estimate the number of stems potentially affected by the Project in natural habitats because the most woodland affected is secondary woodland. Tree loss within natural habitats is estimated at 76,900 trees.

## **MANAGEMENT OBJECTIVES**

According to ESS6 requirements, any conversion or degradation of natural habitat should be mitigated according to the mitigation hierarchy and mitigation and compensation measures should be designed to achieve no net loss of natural habitat.

## KEY MANAGEMENT MEASURES FOR NATURAL HABITAT

### AVOIDANCE

- Limit powerline crossing in natural habitats.
- Use longer spans between power lines, spanning across rivers and wetlands, to avoid erecting structures in these habitats.
- Promote the selection of areas of modified habitat for the installation of temporary construction work and storage areas.
- Ensure construction activities, including vehicle movements and material storage, remain within the ROW and identified access roads.
- Clearly mark the extent of the ROW. Avoid all encroachment outside of the ROW.

### MINIMIZATION

- Inspect and clean construction equipment.
- Bury residues of invasive alien flora species.
- Make woody resources available to local populations.
- Minimize the construction of new access roads. Promote the use of existing access roads for machinery and vehicle movements, increasing their width as necessary.
- Rehabilitate and revegetate temporary access roads and work areas as soon as possible using native vegetation species that are ecologically associated with local fauna.
- Clearly mark sensitive areas, especially riparian ecotones, before each maintenance clearing period.
- Adhere to the stipulated wayleave size when clearing vegetation to avoid cutting trees unnecessarily.

### COMPENSATION MEASURES TO ACHIEVE NO NET LOSS OF NATURAL HABITAT

- In collaboration with the Forestry Department, plan for compensatory plantations or restoration of at least 361 ha of miombo woodland (estimation of 76 900 trees).
- The Detailed Compensatory Plan and budget (Reforestation/ Restoration) shall be developed in Consultation with Forestry Department.
- Undertake ROW vegetation cutting with the supervision of a botanist to confirm and detail the habitat losses and to identify and relocate threatened or protected species, if possible.
- Any threatened or protected species that needs to be cut will be located and its habitat will be fully described. If possible, collect seeds from species of conservation concern.
- This BMP shall be updated with loss calculations in order to indicate the amount of compensatory habitat required to facilitate more detailed planning and the number of threatened or protected species lost, that need to be compensated.
- Promote the use of native species for planting.
- Plan compensatory reforestation activities to maintain ecological connectivity between habitats.
- Develop tree nurseries specifically for threatened and protected species affected by the vegetation clearing.

- The rehabilitation or creation of habitat should consider climate adaptation. Planting schemes shall consider the use of resilient native species, adapted to future climate conditions. The potential increase in flooding and drought should be considered when selecting plant species and locations for compensation implementation. Furthermore, subject to feasibility, compensation for wetland habitat can also be designed to achieve flood alleviation benefits.
- The success of compensatory restoration within the Project corridor or at designated sites will be monitored. Survival rates of vegetation planted during reforestation will be assessed. Particular attention will be given to species of conservation concern or of use value that may have been planted. This monitoring can be done in coordination with the Forestry Department. Monitoring shall continue during the operation phase.

Overall, it is recommended that compensation be carried out by habitat restoration or enhancement in areas within the study area (in proximity to the affected habitats) where long-term protection can be achieved. Areas to be considered are existing protected areas, such as the affected forest reserves or other forest reserves in the vicinity of the line. Local communities should also be consulted to identify potential sites for reforestation to identify areas that would be locally supported. The compensation plan, including detailed offset design, must be developed by ZESCO's Project Implementation Unit (PIU) before beginning the construction phase, and compensation must be completed as per the plan before the end of the construction phase.

ZESCO shall examine the possibility and may provide financial and logistical support to an existing reforestation scheme in the Study Area. This will include planting of areas affected by erosion and restoration of degraded forests in the Study Area. Support provided by ZESCO may include the procurement and distribution of native trees for planting, maintenance, and monitoring of the planted areas, etc.

Reforestation should follow these main steps prior to starting:

- Identification of species to be favored for reforestation. The use of a variety of native species will need to be promoted. Identification of species to be favored for reforestation should consider the following selection criteria:
  - Identification of nursery sites and preferential sites for reforestation;
  - Training of local communities in nursery techniques and plantation techniques in the natural environment;
  - Implementation of nurseries and planting of plants.

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#### 4.1.4.5 PROTECTED AREAS

Presence of protected areas and internationally designated areas, such as national parks, forest reserves and IBAs was considered during the comparative analysis phase in order to avoid impacts on them as much as possible.

Seven forest reserves are crossed by the transmission line, some of them because an effort was made to follow as existing powerlines. They include Kasama (2.9 km), Amenshi (0.3 km), Chitimukulu (3.2 km), Mungwi (0.4 km), Nkole Mfumu (4.4 km), Kanona (30.7 km) and Nakonde (1.4 km) Forest Reserves. However, these forest reserves have been degraded by human activities and infrastructure to varying degrees.

Habitat types within the ROW have been mapped based on satellite imagery interpretation. Table 4-3 presents the habitat types within the affected areas inside the forest reserves. Kanona Forest Reserve and Nkole Mfumu Forest Reserve are the forest reserves with the more natural habitats affected, i.e., riverine forest and mature and secondary woodland. The passage of the line inside the Kanona Forest Reserve will lead to the clearing of 62.1 ha of mature and secondary miombo woodland. These more natural forests constitute disjunct patches interlaced with agricultural areas and other degraded woodland. In the Nkole Mfumu Forest Reserve, although mature stands of forest are present in the Project's wayleave, these are relic patches within an area of disturbed forest. Furthermore, this section of the Forest Reserve is already fragmented by another transmission line, as well as by the TAZARA railway. The Nkole Mfumu Forest Reserve comprises some vast unfragmented mature forests to the east, which the Project will not affect.

As per the ERB Wayleave Code of Practice, wayleave width in Forestry Areas should be wider (78 m for a 330kV line) to prevent any danger to the line. However, to reduce impacts on habitats found within forest reserves and considering tree height in typical miombo woodland is not high, it was decided to maintain the 50 m ROW. As presented in Table 4-3, the clearing of the ROW will lead to the loss of 20.4 ha of mature and secondary woodland. This represents a loss of 0.01% of the total woodland within the Forest Reserve.

**Table 4-3 Habitat Types in the ROW in the Different Forest Reserves Affected**

Habitat Type/Landuse	Kasama Forest Reserve	Amenshi Forest Reserve	Chitimukulu Forest Reserve	Mungwi Forest Reserve	Nkole Mfumu Forest Reserve	Kanona Forest Reserve	Nakonde Forest Reserve
Agriculture	0.06	1.08	2.29	-	1.13	20.91	-
Build-environment	0.01	-	-	-	-	0.26	-
Fallow land	-	-	7.12	-	0.64	10.53	-
Grassland - Open area	0.11	-	-	-	-	5.46	-
Rock Outcrop	4.78	-	-	-	-	-	-
Riverine forest	-	-	-	0.74	-	1.81	-
Wetland	0.24	-	-	1.41	-	6.41	-
Plantation	-	-	-	-	-	-	4.18
Degraded Woodland	-	-	-	-	-	-	0.34
Woodland-Mature	-	-	-	-	4.72	20.46	-
Woodland-Secondary	9.08	-	6.75	-	15.64	41.64	-
<b>Total</b>	<b>14,28</b>	<b>1,08</b>	<b>16,16</b>	<b>2,15</b>	<b>22,13</b>	<b>107,48</b>	<b>4,52</b>
<b>Total natural habitat</b>	<b>9,08</b>	<b>0</b>	<b>6,75</b>	<b>0,74</b>	<b>20,36</b>	<b>63,91</b>	<b>0</b>

## MANAGEMENT OBJECTIVES

In line with ESS 6, in circumstances where a proposed Project is located within a legally protected area, additional programs, as appropriate, shall be implemented to promote and enhance the conservation aims and effective management of the area.

Projects proposed inside legally protected or internationally recognized areas should result in tangible benefits to the conservation objectives of that area, and the presence of the Project should gain clear conservation advantages. This can be achieved by implementing programs that, for example, provide support for forest reserve management, address alternative livelihoods for affected communities, or support and/or carry out research needed for the conservation aims of the protected area.

If no management plan exists for the protected or designated area, the client should consider supporting the development of one with the suitable government agencies and conservation organizations. This type of activity might also suffice as an “additional program”.

## KEY MANAGEMENT MEASURES AND ADDITIONAL CONSERVATION PROGRAMS FOR FOREST RESERVES

It is important to note that all management measures applicable to natural habitats will also apply to natural habitats located within the forest reserves. Additional measures are, however, the following:

- Obtain salvage permit to cut down trees in the Kasama, Amenshi, Chitimukulu, Mungwi, Nkole Mfumu, Kanona and Nakonde Forest Reserves.
- In consultation with Forestry Department and based on confirmation of their needs, provide full financial support for the development of management plans for the affected forest reserves. Ensure local community forest groups are involved.

- In consultation with Forestry Department and based on confirmation of their needs, support any other capacity building plans/ arrangements to strengthen the management of the affected FRs.
- Reduce width to be cleared in riverine forests, and secondary and mature woodland located in forest reserves (width reduced to 50 m).
- Avoid construction of temporary access roads in secondary and mature miombo within forest reserves.

## COMPENSATION MEASURES TO ACHIEVE NO NET LOSS

No net loss of natural habitat is required and will apply to some habitats impacted within the forest reserves, such as the mature and secondary miombo woodland and the riverine forests. See compensation measures to achieve no net loss on natural habitats above. Specifically for the forest reserves:

- Collaborate with the relevant Forestry Departments to identify the number and species of trees affected in the Kasama, Amenshi, Chitimukulu, Mungwi, Nkole Mfumu, Kanona and Nakonde Forest Reserves and the assessment of required compensation.
- Compensate for lost habitats within the forest reserves by restoring and protecting similar natural habitats within the forest reserves (plantation of native species in deforested areas, fencing out of key areas, restoration of disturbed areas). This shall be part of the Compensation Plan for the loss of natural habitats.

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### 4.1.4.6 PROJECT-RELATED IMPACTS TO AVIFAUNA

Many threatened avifauna species are potentially present in the Project area and several of these bird species and others are susceptible to collisions with transmission lines. Since potential impacts could be significant and must be appropriately managed, mitigation and compensation measures are detailed in this BMP.

All species recorded during the rapid bird surveys have the potential to be displaced by the proposed ZTIP as a result of habitat transformation and disturbance, including threatened or near threatened species, according to International Union for Conservation of Nature (IUCN). However, many of these species have persisted despite existing disturbance within the study area. This resilience, coupled with the fact that similar habitats (except for the riverine forests) are available throughout the broader area, means that the displacement impact is unlikely to be of regional or national significance. Typically, construction activities associated with a new powerline could have an impact on breeding populations of various bird species, particularly large raptors that may be utilizing the existing infrastructure or breeding in the immediate vicinity. Large raptors breed roughly between March and November. The most critical period within this time span is from March to August, when the eggs are incubated, and again from September to November when the young birds are almost ready to fledge.

During operation, collisions of birds with transmission lines are the largest threat posed by powerlines to birds (van Rooyen, 2004). A total of 60 species present and potentially present within the BESA are considered priority species, namely because of their susceptibility to powerline-associated impacts. These include species listed in the IUCN Red List, Bateleur (*Terathopius ecaudatus*)-EN, Tawny Eagle (*Aquila rapax*)-VU and Steppe Eagle (*Aquila nipalensis*)-EN, the Crowned Eagle (*Stephanoaetus coronatus*)- NT, the Martial Eagle (*Polemaetus bellicosus*)-EN, the Pallid Harrier (*Circus macrourus*) - NT, the Lappet-faced Vulture (*Torgos tracheliotos*) – EN, the White-backed Vulture (*Gyps africanus*)- CR, the White-headed Vulture (*Trigonoceps occipitalis*)-CR, the Southern Ground-hornbill (*Bucorvus leadbeateri*) – VU, and species on the regional red-list the African Marsh-Harrier (*Circus ranivorus*) and the Bar-winged Weaver (*Ploceus angolensis*) (Willems & Leonard, 2019).

## KEY MANAGEMENT MEASURES AVIFAUNA

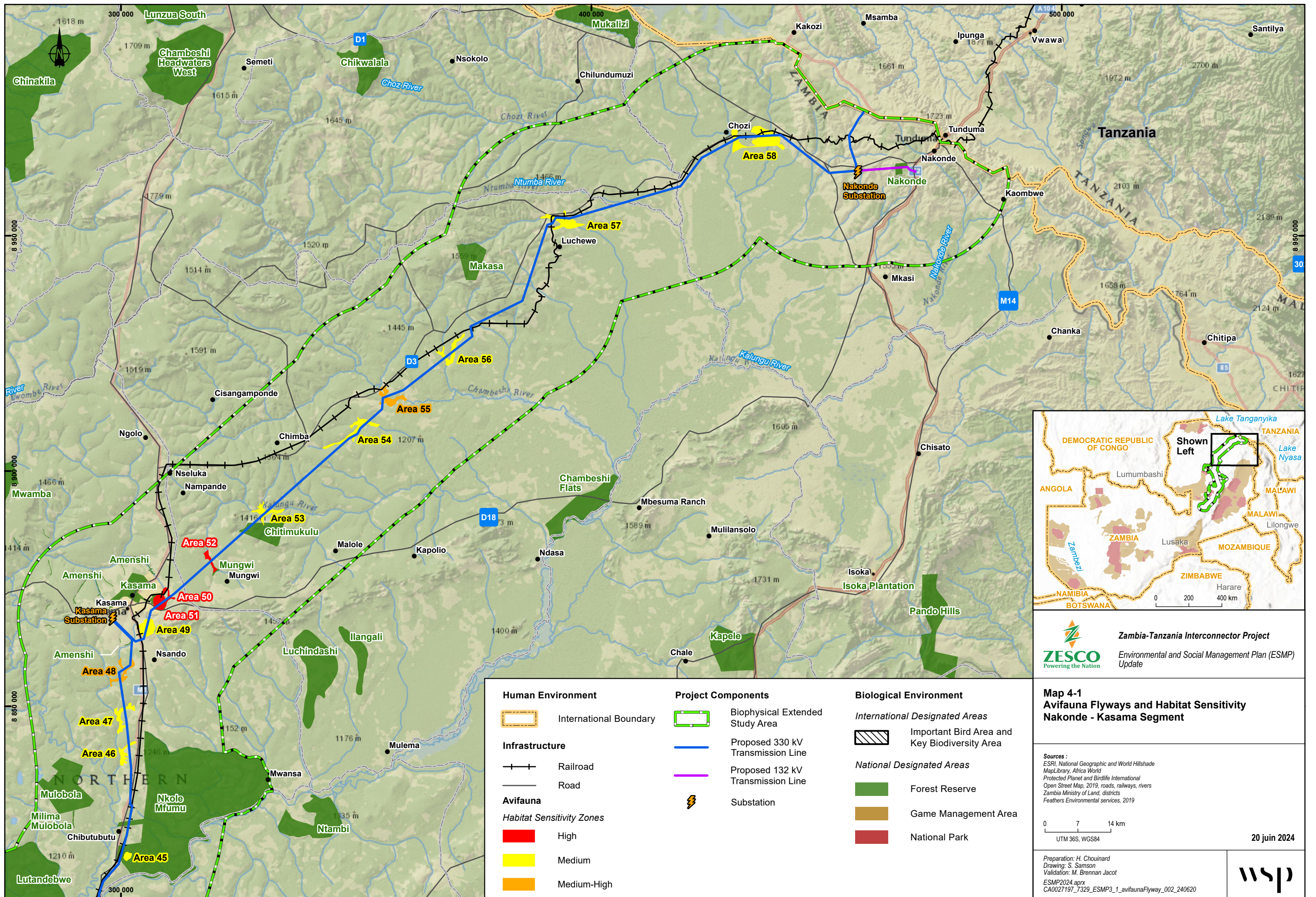
### AVOIDANCE

- Avoid, as much as possible, site preparation during peak breeding seasons for birds and, more specifically, the breeding periods of special-status bird species present in the Project area.

- Undertake a pre-construction inspection (avifaunal walk-through) of the powerline route alignment and road access routes to identify special status species that may be breeding within the ROW and its immediate surroundings (1 km radius) to ensure the impacts to breeding species (if any) are adequately managed.
- Where a priority or threatened bird species is nesting, do not undertake tree clearing within a radius of 1 km. Wait until the nest is deserted. Weekly checks to verify nest activity.
- Undertake a pre-construction inspection (avifaunal walk-through) once the final tower positions have been pegged to identify spans of powerline that require the installation of bird flight diverters, with a specific focus on rivers, watercourses, waterbodies, and dambos and in High, Medium-High, and medium-sensitivity areas for birds.
- If a threatened species is nesting, do not undertake tree clearing. Consult the Forest Department Authorities and National Park Service for guidance on actions to be taken. Wait until the nest is deserted. Weekly checks to verify nesting activity.

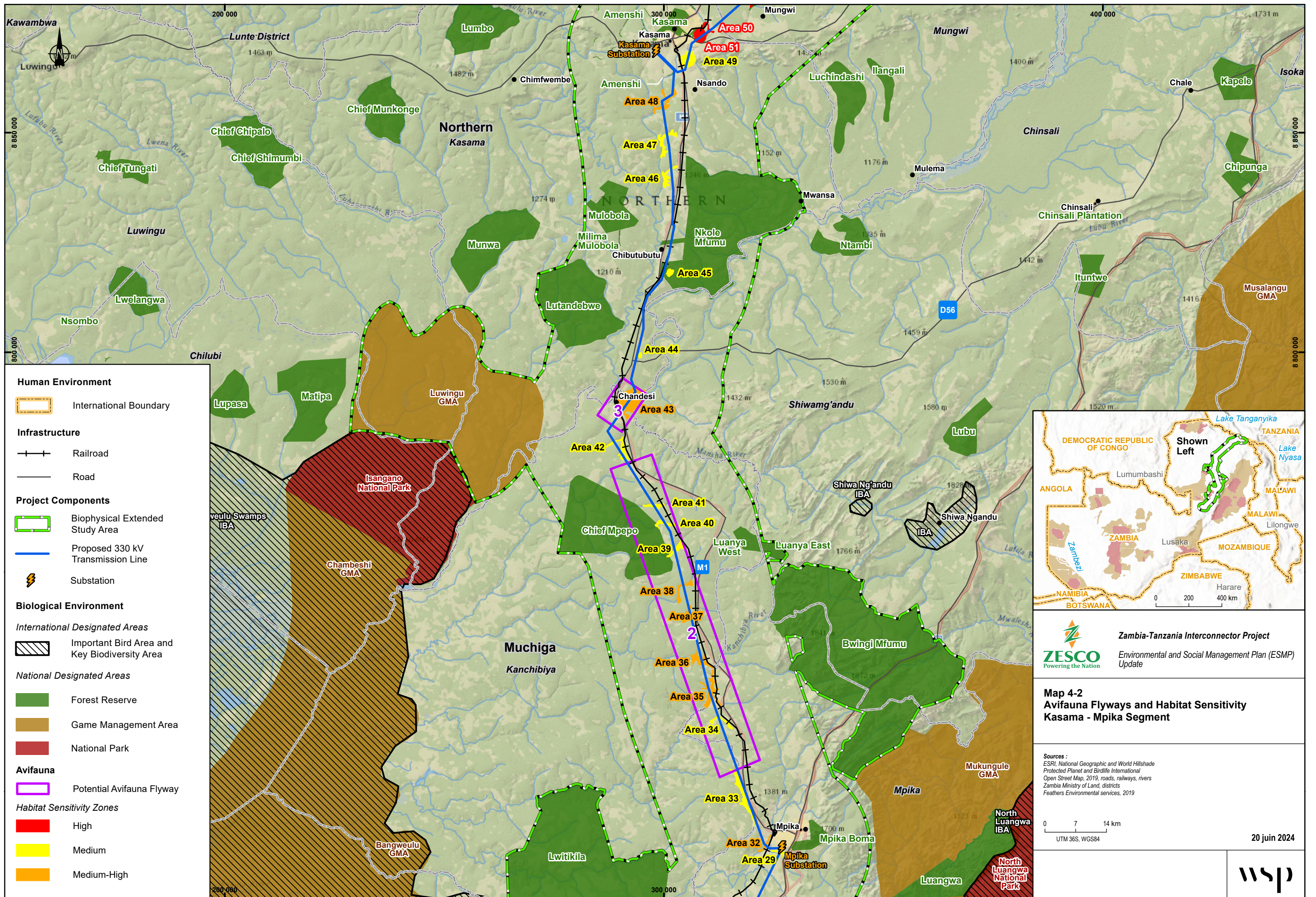
## MINIMIZATION

- Raise awareness on vehicle speed and collision risks.
- Apply the same design when two lines are side by side.
- Avoid maintenance activities during breeding and nesting seasons.
- Monitor avian-induced faulting. If on-going quality of supply impacts are recorded once the proposed transmission line is operational, it is recommended that these impacts be assessed by a qualified avifaunal specialist and site-specific mitigation be applied reactively.
- In High, Medium-High, and Medium sensitivity habitats, ensure land planning by local authorities avoids the implementation of infrastructure or land uses that may constitute an attraction for birds, such as landfills. To do so, ZESCO shall inform local authorities of potential collision risks for birds and encourage the planned transmission line to be integrated into local planning tools.
- In High, Medium-high, and Medium sensitivity habitats, illustrated in Maps 4-1 to 4-3, and according to observations made during pre-construction walkover surveys (see above), install bird flight diverters on both earth wires in a staggered pattern, using alternating colours and installation on the full earth wire/ground wire span length. Partial marking (i.e., installing bird flight diverters on the middle 60% of the earth wire span) appears to displace rather than reduce collisions. Research conducted in South Africa showed an apparent increase in dead birds under unmarked sections of marked earth wire spans (Shaw, 2013). Bird flight diverters shall be positioned at 10 m intervals on each earth wire/ground wire.
- Bird flight diverters are to be maintained on sections of the powerline during the operational life span of the powerline.



Boundaries and measurements shown on this document must not be used for engineering or land survey delineation. A land register analysis conducted by a land surveyor was not undertaken.





**Human Environment**

- International Boundary

**Infrastructure**

- Railroad
- Road

**Project Components**

- Biophysical Extended Study Area
- Proposed 330 kV Transmission Line
- Substation

**Biological Environment**

*International Designated Areas*

- Important Bird Area and Key Biodiversity Area

*National Designated Areas*

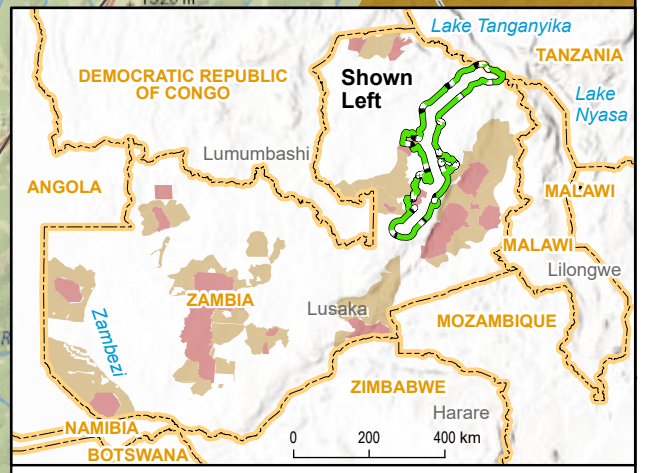
- Forest Reserve
- Game Management Area
- National Park

**Avifauna**

- Potential Avifauna Flyway

**Habitat Sensitivity Zones**

- High
- Medium
- Medium-High



**ZESCO** Powering the Nation

**Zambia-Tanzania Interconnector Project**  
Environmental and Social Management Plan (ESMP) Update

**Map 4-2**  
**Avifauna Flyways and Habitat Sensitivity**  
**Kasama - Mpika Segment**

**Sources :**  
ESRI, National Geographic and World Hillshade  
Protected Planet and Birdlife International  
Open Street Map, 2019, roads, railways, rivers  
Zambia Ministry of Land, districts  
Feathers Environmental services, 2019

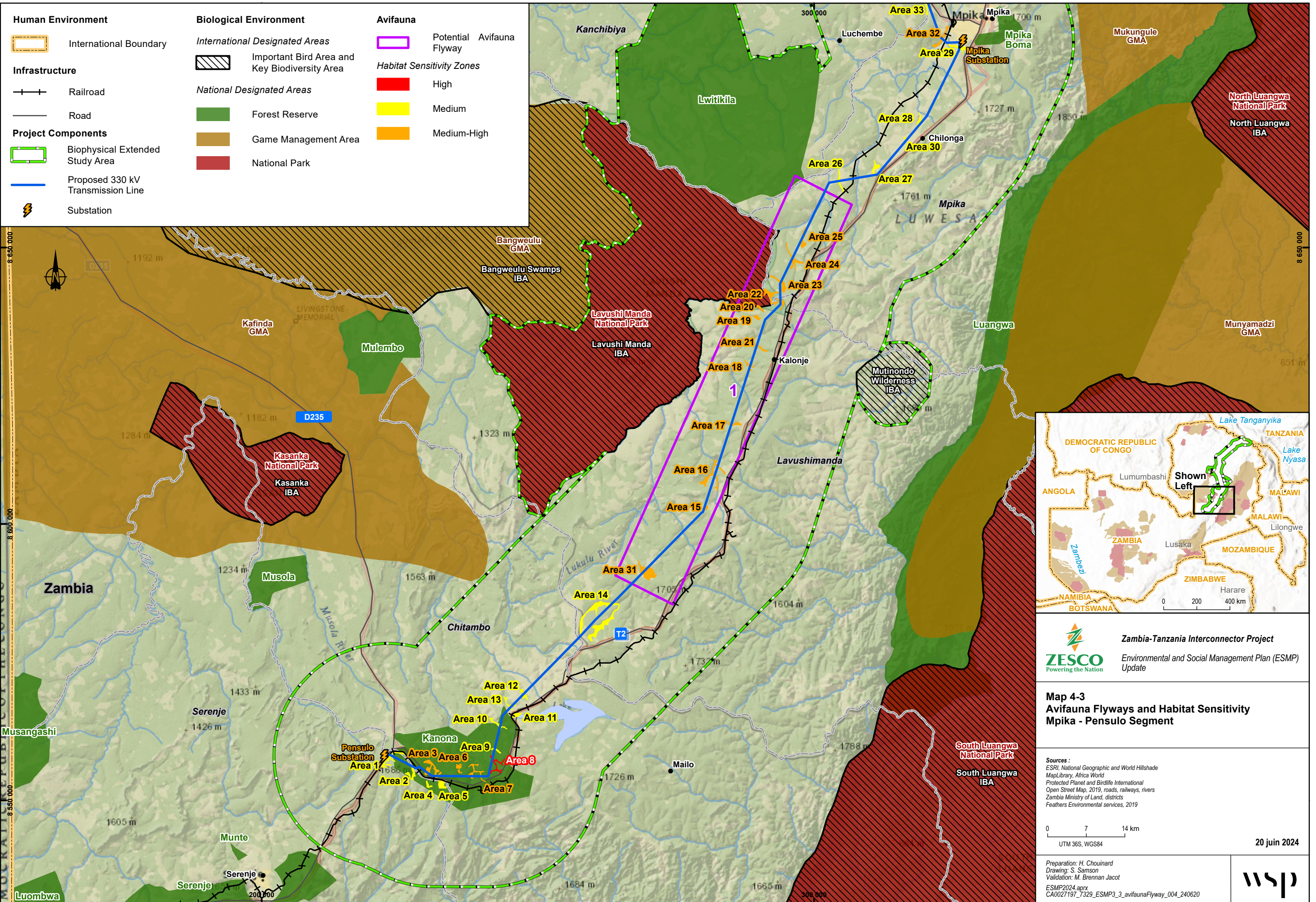
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Boundaries and measurements shown on this document must not be used for engineering or land survey delineation. A land register analysis conducted by a land surveyor was not undertaken.





**Human Environment**

- International Boundary

**Infrastructure**

- Railroad
- Road

**Project Components**

- Biophysical Extended Study Area
- Proposed 330 kV Transmission Line
- Substation

**Biological Environment**

*International Designated Areas*

- Important Bird Area and Key Biodiversity Area

*National Designated Areas*

- Forest Reserve
- Game Management Area
- National Park

**Avifauna**

- Potential Avifauna Flyway

*Habitat Sensitivity Zones*

- High
- Medium
- Medium-High



**Zambia-Tanzania Interconnector Project**  
**ZESCO** Powering the Nation  
 Environmental and Social Management Plan (ESMP) Update

**Map 4-3**  
**Avifauna Flyways and Habitat Sensitivity**  
**Mpika - Pensulo Segment**

**Sources :**  
 ESRI, National Geographic and World Hillshade MapLibrary, Africa World Protected Planet and Birdlife International Open Street Map, 2019, roads, railways, rivers Zambia Ministry of Land, districts Feathers Environmental services, 2019

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 UTM 36S, WGS84

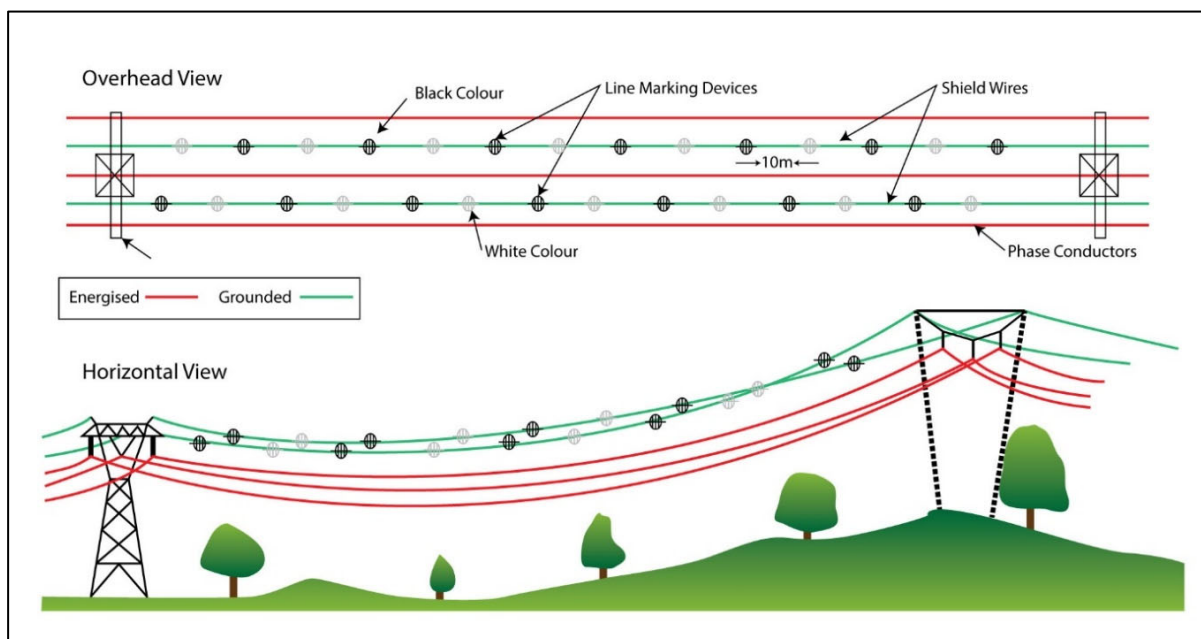
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Preparation: H. Chouinard  
 Drawing: S. Samson  
 Validation: M. Brennan Jacot  
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The length of transmission line needing protection for each bird sensitivity area and the estimated number of bird diverters are presented in Table 4-4.



Source: Feathers Environmental Services, 2019.

**Figure 4-1** Typical Installation of Bird Diverters

**Table 4-4** Estimated number of bird diverters per bird habitat sensitivity area

Habitat Sensitivity Zone	Sensitivity	Length needing protection	Start PK (km)	End PK (km)	Segment	Average span	Number of spans needing protection	Estimated number of bird diverters
Area 1	Medium	1615,4	182,4	184,0	Mpika - Pensulo	400	5	400
Area 2	Medium	504,6	179,0	179,5	Mpika - Pensulo	400	2	160
Area 3-4-5	Medium/Medium-High	4041,7	172,7	176,7	Mpika - Pensulo	400	10	800
Area 6-7	Medium-High	5022,9	165,6	170,6	Mpika - Pensulo	400	13	1040
Area 8	High	3042,4	161,4	164,5	Mpika - Pensulo	400	8	640
Area 9	Medium	321,4	159,8	160,1	Mpika - Pensulo	400	1	80
Area 10	Medium	1158,7	155,1	156,3	Mpika - Pensulo	400	3	240
Area 11-13	Medium	2148,3	150,6	152,8	Mpika - Pensulo	400	6	480
Area 12	Medium	992,0	148,0	149,0	Mpika - Pensulo	400	3	240
Area 14	Medium	8529,0	125,1	133,6	Mpika - Pensulo	400	22	1760
Area 15	Medium-High	1131,4	100,6	101,7	Mpika - Pensulo	400	3	240

Habitat Sensitivity Zone	Sensitivity	Length needing protection	Start PK (km)	End PK (km)	Segment	Average span	Number of spans needing protection	Estimated number of bird diverters
Area 16	Medium-High	6934,9	90,6	97,6	Mpika - Pensulo	400	18	1440
Area 17	Medium-High	827,3	84,9	85,7	Mpika - Pensulo	400	3	240
Area 18	Medium-High	1390,7	73,7	75,1	Mpika - Pensulo	400	4	320
Area 19-20	Medium-High	2312,1	63,9	66,2	Mpika - Pensulo	400	6	480
Area 21	Medium-High	1022,1	70,2	71,2	Mpika - Pensulo	400	3	240
Area 22-23	Medium-High	5542,6	57,1	62,6	Mpika - Pensulo	400	14	1120
Area 24	Medium-High	2238,7	52,3	54,6	Mpika - Pensulo	400	6	480
Area 25	Medium-High	3724,0	46,6	50,3	Mpika - Pensulo	400	10	800
Area 26	Medium	460,4	35,5	36,0	Mpika - Pensulo	400	2	160
Area 27	Medium	2474,7	26,9	29,4	Mpika - Pensulo	400	7	560
Area 28	Medium	1932,3	15,4	17,4	Mpika - Pensulo	400	5	400
Area 29	Medium	617,8	0,9	1,5	Mpika - Pensulo	400	2	160
Area 29b	Medium	305,7	197,3	197,7	Kasama - Mpika	400	1	80
Area 30	Medium	609,9	20,0	20,6	Mpika - Pensulo	400	2	160
Area 31	Medium-High	2087,3	115,8	117,9	Mpika - Pensulo	400	6	480
Area 32	Medium-High	509,2	195,8	196,3	Kasama - Mpika	400	2	160
Area 33	Medium	14079,2	177,1	191,2	Kasama - Mpika	400	36	2880
Area 34	Medium	447,5	164,8	165,3	Kasama - Mpika	400	2	160
Area 35	Medium-High	6650,2	155,3	161,9	Kasama - Mpika	400	17	1360
Area 36	Medium-High	5097,1	148,3	153,4	Kasama - Mpika	400	13	1040
Area 37	Medium-High	2017,3	138,6	140,6	Kasama - Mpika	400	6	480
Area 38	Medium-High	1691,8	133,5	135,2	Kasama - Mpika	400	5	400
Area 39	Medium	951,6	125,3	126,2	Kasama - Mpika	400	3	240
Area 40	Medium	1763,2	117,9	119,6	Kasama - Mpika	400	5	400
Area 41	Medium	1109,5	113,9	115,0	Kasama - Mpika	400	3	240

Habitat Sensitivity Zone	Sensitivity	Length needing protection	Start PK (km)	End PK (km)	Segment	Average span	Number of spans needing protection	Estimated number of bird diverters
Area 42	Medium	4949,6	97,0	102,0	Kasama - Mpika	400	13	1040
Area 43	Medium-High	6596,5	82,3	88,9	Kasama - Mpika	400	17	1360
Area 44	Medium	1496,8	73,6	75,1	Kasama - Mpika	400	4	320
Area 45	Medium	2148,6	52,6	54,8	Kasama - Mpika	400	6	480
Area 46	Medium	4477,8	29,6	34,1	Kasama - Mpika	400	12	960
Area 47	Medium	4991,8	21,7	26,8	Kasama - Mpika	400	13	1040
Area 48a	Medium-High	858,6	15,4	16,3	Kasama - Mpika	400	3	240
Area 48b	Medium-High	3285,3	10,0	13,3	Kasama - Mpika	400	8	640
Area 49	Medium	3943,1	198,8	202,7	Nakonde - Kasama	375	11	825
Area 50-51	High	4409,3	191,6	196,0	Nakonde - Kasama	375	12	900
Area 52	High	639,8	180,2	180,8	Nakonde - Kasama	375	2	150
Area 53	Medium	3643,5	162,8	166,5	Nakonde - Kasama	375	10	750
Area 54	Medium	8774,9	135,4	144,2	Nakonde - Kasama	375	24	1800
Area 55	Medium-High	4294,0	126,4	130,7	Nakonde - Kasama	375	12	900
Area 56	Medium	6619,2	107,2	113,8	Nakonde - Kasama	375	18	1350
Area 57	Medium	6169,3	66,7	72,9	Nakonde - Kasama	375	17	1275
Area 58	Medium	10406,82355	19,44	29,84	Nakonde - Kasama	375	28	2100
<b>Total (bird diverters)</b>								<b>36690</b>

- Implement a bird mortality monitoring program (and training) in partnership with experts and local communities or NGOs that will review mitigation measures according to their efficiency and develop specific mitigation measures for species that are involved in bird mortality.
  - Determine mortality rates of priority species within High, Medium-High, and Medium sensitivity zones (see Maps 4-1 to 4-3).
  - Surveys should also be conducted in low-sensitivity zones to confirm this class's classification as a low-risk area.
  - Survey protocols to be developed according to best practice guidelines in conjunction with ZESCO environmental officers.

- A mortality registry, to be managed by ZESCO environmental officers, shall be developed to compile all collision and electrocution mortalities, detailing species, age of carcass, location of carcass relative to the nearest tower, closest tower numbers and GPS location, etc.
- The efficacy and durability of mitigation devices (e.g., bird flight diverters, perch deterrents, and insulation) should be assessed in a sample of areas where they have been installed, and alternative specific mitigation measures should be developed for species that are continually affected by collisions and electrocutions.
- To conduct this bird mortality monitoring, a training program specific to bird and powerline interactions shall be developed in addition to the collection and management of mortality data. Training shall be provided to local NGO representatives and ZESCO environmental officers to capacitate representatives with the required skills to conduct mortality monitoring surveys and data management tasks.
- The surveys shall be carried out quarterly for the first five years of operation of the ROW by an avifaunal specialist, local NGO and ZESCO representatives.
- Monitoring shall lead to the development of guidance documents by an avifaunal specialist in conjunction with ZESCO environmental officers and local NGO representatives and species experts.

## COMPENSATION MEASURES AND ADDITIONAL CONSERVATION ACTIONS FOR AVIFAUNA

- Compensate any loss of breeding/nesting sites by creating suitable habitats elsewhere, notably by enhancing degraded habitats.
- Involve an avifauna specialist in the implementation of compensation and additional conservation actions.
- Collaborate with an NGO for the selection and implementation of conservation activities specific to the endangered and critically endangered vultures and eagles.

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### 4.1.4.7 PROJECT-RELATED IMPACTS TO TERRESTRIAL FAUNA

Construction of the transmission line will lead to habitat loss for certain large mammals and increase habitat fragmentation in the study area. During the operation phase, vegetation clearing and maintenance within the ROW will reduce habitat quality and maintain fragmentation. Impact on migration routes should be minimal, although increased noise may disturb species present in the area.

The main impacts on bats will be related to habitat fragmentation and degradation in some areas along the ROW, which will lead to the loss of food sources (fruit trees) and could also lead to the loss or disturbance of roosting and breeding sites.

The main bat migration known in the study area is the African Straw-coloured Fruit Bat, which can cover large distances for feeding. It is unlikely the proposed powerline will interact with this migration flyway. In fact, bat collisions with the transmission line are unlikely as bats generally have exceptional obstacle avoidance capabilities.

## KEY MANAGEMENT MEASURES FOR TERRESTRIAL FAUNA

### AVOIDANCE

- Avoid timing of row clearing during seasonal large mammal migration: it is recommended that vegetation clearing within the ROW be conducted during the early dry season, which coincides with low vegetation flush in the Miombo ecoregion, a period where large mammal migration is less likely.
- Avoid clearing and construction near Nachikufu Caves and Thorn Tree Guest House during the rainy season for minimal disturbance to bats, since Nachikufu Caves house a colony of bats that breeds during the rainy season and African Straw-coloured Fruit Bats are known to be present in most Zambian roosts only during the rainy season.

- Pre-construction inspection to identify bat roosts:
  - Undertake a pre-construction inspection on the final route alignment and access roads to identify any major bat roosts within or close to the areas to be cleared.
  - Places to be checked include holes in large, hollow trees, inside caves and rock crevices, under bridges and in large culverts under roads. Bats can also roost in foliage in large trees. Indirect evidence to look for is the presence of piles of droppings, urine stains on rocks inside and at the exits of potential roosts.
  - Local bat experts to be hired to identify species in major roosts.
  - Specific places to be surveyed for bat roosts are:
    - Along the line route, near and in Kasama forest reserve, check for African Straw-coloured Fruit Bats, which are big bats that roost in large numbers in tall trees and can be located by the noise they make during the day and the individual bats hanging in and flying around within the trees;
    - In rocky outcrops in Kasama forest reserve; particularly check for large caves or crevices among the rocks that might house Striped Leaf-nosed Bats or Smithers's Horseshoe Bats.
  - Where major bats roost (over 100 bats), especially near where threatened species are identified, do not undertake tree clearing within a radius of 1 km. Also, inspect all large trees (live or dead) with hollows for the presence of bats. Do not cut trees that are in use by bats nor the surrounding trees. Wait until the roost is deserted. Come monthly to the roosting site to verify, not more often.

## MINIMIZATION

- Record bat activity before and during construction using a bat detector or visual count at specific sites with known major bat roosts, namely Nachikufu Caves and Thorn Tree Guest House in Kasama. This should be done in both the dry season and the wet season; two seasons before construction and two seasons during construction.
- Safeguard and clear all construction materials: all construction materials, particularly those used to reinforce structures, i.e., steel wires, should be safeguarded and cleared from worksites.
- Remove cut materials or cut them into pieces small enough not to interfere with animal movements.
- Prohibit workers from owning firearms and other hunting gear and raise awareness about endangered fauna species and the prohibition to engage in any kind of hunting or poaching.
- Implement a biodiversity protection awareness program with workers to sensitize them on:
  - The identity and behaviour of species likely to be encountered and prohibit workers from owning firearms and other hunting gear;
  - The procedures for reporting animal sightings and protocols to follow when confronted by dangerous animals;
  - The ills of illegal harvests and trade of wildlife;
  - The risks of human-induced fire to local wildlife.
- Put in place safety and security measures to protect workers from wild animals such as lions
- Attach officers from the DNPW to the Project throughout the construction period.
- Inform the contractor's E&S specialist when endangered fauna species are observed.

## COMPENSATION MEASURES AND ADDITIONAL CONSERVATION ACTIONS FOR AVIFAUNA

- Promote the use of fruit trees for African Straw-coloured Fruit Bats in the compensation plans for loss of natural and critical natural habitats:
  - Including *Ficus spp*, *Magnistipula butayeei*, *Parinari curatellifolia*, *Syzygium cordatum*, *Syzygium guineense guineense*, *Syzygium guineense huillense*, *Uapaca kirkiana*, *Uapaca banguelensis*, and *Uapaca sansibarica*.
  - This is especially important in the Kanona forest reserve, Chief Chipepo forest reserve, and Kasama forest reserve, all places within the foraging range of known African Straw-coloured Fruit Bat roosts.

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### 4.1.5 ROLES AND RESPONSIBILITIES

#### PROJECT IMPLEMENTATION UNIT

The PIU E&S Manager will be supported by a biodiversity specialist. Together, they will be in charge of supervising all activities related to biodiversity monitoring and follow-up during construction and operation. This manager will work in close collaboration with the Contractor, in charge of managing activities related to biodiversity monitoring during construction.

At PIU level, the biodiversity specialist's responsibilities will include:

- Provide any support in relation to biodiversity;
- Supervise the implementation of the BMP;
- Complete any required updates of the BMP;
- Ensure that the Contractor complies with their respective commitments under the Biodiversity Action Plans;
- Training of the Contractor and the PIU on the BMP;
- Supervise all activities related to biodiversity monitoring and follow-up during construction and operation;
- Make sure that all environmental incidents/claims are properly reported (as per the contractual obligations) and addressed by the Contractor;
- Liaise with and supervise the activities of all biodiversity external experts who could be used by the Contractor;
- Ensure that all biodiversity activities are properly implemented;
- Monitor and report on the biodiversity activities;
- Assist in the preparation of various reports and publications on biodiversity;
- Look out for environmental non-conformity and assist in corrective actions.

The PIU E&S Manager and biodiversity specialist will be supported by experts with the following qualifications to implement BMP measures that require field surveys and specific expertise:

- Botanist: this expert must be familiar with the flora of northern Zambia and have field experience in Zambia. He or she should have an advanced degree and at least five years' experience in conducting field surveys for flora species of conservation concern.
- Avifauna Specialist: this expert must have an advanced degree and at least five years of experience in conducting rapid bird surveys and should be familiar with the avifauna of eastern and southern Africa, including regional and global migratory species, and with bird migration patterns in the region. Familiarity with the avifauna of northern Zambia or southern Tanzania is a plus. He or she will need to be able to assess collision and electrocution risks posed by powerlines.

- Bat Specialist. This expert must be familiar with the bat species found in northern Zambia, their habitats, flight patterns, and migrations. These experts must have advanced degrees and at least five years of experience in rapid field surveys and risk assessment.

It is recommended that these experts be sought by contacting local NGOs (such as Birdlife Zambia), the Forestry Department, and local academic institutions.

## **CONTRACTOR**

At the Contractor level, the person in charge of biodiversity will:

- Ensure implementation of all measures set regarding biodiversity;
- Monitor the activities related to biodiversity;
- Prepare relevant reporting;
- Evaluate the effectiveness of the actions;
- Conduct site inspections and document verifications;
- Participate in the improvement dynamic of the Contractor;
- Assist the PIU in any other duties required by the environmental department;
- Report to the PIU.

The Contractor in charge of managing activities related to biodiversity monitoring during construction will be supported by local biodiversity specialists.

## **ZESCO**

During operation, the implementation of BMP measures will be under ZESCO's responsibility. ZESCO's E&S Manager can be supported by biodiversity specialist and various experts to complete activities needing specific expertise.

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### **4.1.6 MONITORING**

Environmental and social monitoring, and if required, implementation of corrective actions, are carried out to ensure the required mitigation and compensation activities are being implemented and desired targets and outcomes are being achieved.

More precisely, the aim of this Biodiversity Monitoring Program is to monitor the nature, extent, quality and spatial configuration of the biodiversity features identified in relation to Project impacts and to validate the efficiency of biodiversity management measures to be applied. A specific set of monitoring actions are required for each key risk and impact identified.

Given that there has been little biodiversity data collection and studies previously carried out or planned in the study area, this monitoring plan will demonstrate leading practices and provide valuable information on biodiversity in the region.

**Table 4-5 Summary Table of Biodiversity Monitoring Measures**

Monitored Component	Supervision Method	Indicators	Standards/Targets	Location	Frequency	Responsibility	Supervision
Critical habitat for <i>Disa Aequiloba</i>	Complete additional targeted surveys Assess potential losses Develop a compensation plan to achieve net gain if needed.	Additional targeted surveys completed in all natural wet grassland and dambos Number of specimens identified Number of specimens impacted by the Project	No impact on the species If impacts are unavoidable, compensation to achieve net gain	Along the powerline, in all natural wet grassland and dambos	Before construction (surveys)	E&S Manager Biodiversity Specialist	PIU
Critical habitat for <i>Euphorbia perplexa</i> var. <i>kasamana</i>	Complete additional targeted surveys Assess potential losses Develop a compensation plan to achieve net gain if needed.	Additional targeted surveys completed in all rock outcrops in and around Kasama forest reserve Number of specimens identified Number of specimens impacted by the Project	No impact on the species If impacts are unavoidable, compensation to achieve net gain	Along the powerline, in all rock outcrops in and around the Kasama forest reserve	Before construction (surveys)	E&S Manager Biodiversity Specialist	PIU
Natural habitat loss	Assess the total area of natural habitat loss once construction is completed.	Surface area of woodland affected Surface area of riverine forests affected Surface area of natural wetlands affected	Habitat losses within the ROW and for associated infrastructure are accounted for. Compensation plans for loss of natural habitat are adapted according to results.	Along the powerline alignment, particularly in the forest reserves affected.	During clearing activities and once at the end of construction.	E&S Manager Biodiversity Specialist	PIU
Compensatory plantation and restoration of natural habitat	Evaluate the composition of plant communities within reforested and rehabilitated areas and ensure tree planting and revegetation are successful.	Total surface area of plantation and restoration Success rate of tree planting. Survival rate of species of conservation concern.	Sufficient area of reforested areas to mitigate residual impacts on natural habitats and critical natural habitats.	In areas targeted for the compensation. In rehabilitated areas (temporary roads and work areas).	Annually for the first five years, then once every two years.	E&S Manager Biodiversity Specialist: In collaboration with flora specialist and Forestry Department.	PIU (construction)/ ZESCO (operation)

Monitored Component	Supervision Method	Indicators	Standards/Targets	Location	Frequency	Responsibility	Supervision
Plant communities	Evaluate the composition of plant communities via flora surveys (species diversity and composition).	Composition of plant communities Areas of degraded habitat	Follow the plant communities' evolution after eventual degradation from openings and border effects. Identification of invasive species.	In the different types of habitats found in the ROW, focussing on areas with higher ecological integrity.	Annually for the first five years, then once every two years.	E&S Manager Biodiversity Specialist: In collaboration with flora specialist	ZESCO
Invasive Alien Flora species	Assess the presence and introduction of IAS. Evaluate disturbances of the water's physical and chemical characteristics and effects on wetland specialist species and species of conservation interest.	Number of IAS Surface area affected by IAS	Follow the presence and introduction of invasive alien species. Identify appropriate suppression and control measures if problematic presence of IAS.	Sensitive habitats within or adjacent to the ROW. Reforested areas as part of a compensation plan.	At least every 5 years.	E&S Manager Biodiversity Specialist: In collaboration with flora specialist	ZESCO
Bird diversity and abundance	Establish survey points within High, Medium-High, and Medium sensitivity zones along powerline alignment to assess diversity and density by means of point counts and vehicle-based surveys. Point counts should also be conducted in low-sensitivity zones to confirm the classification of this class in terms of diversity and abundance.	Bird diversity Bird abundance	Species diversity and abundances are maintained.	Along the powerline alignment, particularly those areas where bird activity is likely to be more prevalent, i.e., High, Medium-High, and Medium Sensitivity zones.	Quarterly surveys for the first five years of operation. Then, twice a year, during peak periods of activity by local NGOs and/or ZESCO representatives.	E&S Manager Biodiversity Specialist: In collaboration with avifaunal specialist, local NGO.	ZESCO

Monitored Component	Supervision Method	Indicators	Standards/Targets	Location	Frequency	Responsibility	Supervision
Estimates of bird activity along the powerline	Observation stations along the powerline to document flight patterns along the powerline, species, number of individuals, flight altitude, passage position relative to wires, reactions, etc.	Bird flight patterns	Species are aware of the powerline infrastructure and actively avoid powerlines in flight.	Along the powerline, particularly those areas where bird activity is likely to be more prevalent, i.e., High, Medium-High, and Medium Sensitivity zones.	Quarterly surveys for the first five years of operation. Then, twice a year, during peak periods of activity by local NGOs and/or ZESCO representatives.	E&S Manager Biodiversity Specialist: In collaboration with an avifaunal specialist, local NGO.	ZESCO
Use of pylons or powerlines as roost or nest location	Dedicated field observations to identify roosts and nest locations on the electrical infrastructure and the analysis of this utilisation.	Number of roosting/nesting birds on towers. Species using the infrastructure Breeding success.	Quality of supply is maintained. Efficacy of nesting platforms (if installed).	Along the powerline.	Quarterly surveys for the first five years. If nests are active, monthly surveys to assess breeding success.	E&S Manager Biodiversity Specialist: In collaboration with an avifaunal specialist, local NGO.	ZESCO
Use of rehabilitated areas by birds	Dedicated bird surveys to assess bird diversity and abundance.	Bird diversity Bird abundance	Use of rehabilitated areas and planted trees, by birds.	Rehabilitated areas.	Five years after the rehabilitation, every two years.	E&S Manager Biodiversity Specialist: In collaboration with an avifaunal specialist, local NGO.	ZESCO

Monitored Component	Supervision Method	Indicators	Standards/Targets	Location	Frequency	Responsibility	Supervision
Bird mortality as a result of collisions with the powerline and electrocution within substations	Bird mortality monitoring should be conducted to determine the mortality rates of priority species within High, Medium-High, and Medium sensitivity zones. Surveys should also be conducted in low-sensitivity zones to confirm this class as a low-risk area. Development of a bird mortality register and assess efficacy and durability of bird diverters. Development of a training program.	Number of mortalities recorded Species impacted Number of trainings/training attendees	No significant bird mortality on powerline or within substations. Ensure appropriate mitigation measures are in place and are effective in reducing mortality. Skills transfer to ZESCO environmental officers and local NGO representatives.	A representative sample of mitigated and unmitigated powerline spans within High, Medium-High, Medium, and Low sensitivity zones. Pensulo, Mpika, Kasama and Nakonde substation infrastructure.	A minimum of 4 times/year in the first 5 years of operation, then ongoing monitoring will be negotiated with ZESCO.	E&S Manager Biodiversity Specialist: In collaboration with an avifaunal specialist, local NGO.	ZESCO
Wildlife poaching	Validate the hunting intensity for meat markets along the ROW with wildlife officers.	Number of poaching records Species targeted	Avoid trafficking of bush meat hunted from the line's ROW and access roads. No increase in illegal harvest of mammal species	In areas within a 5 km distance from existing roads.	Ongoing. Annual report to be compiled.	E&S Manager Biodiversity Specialist: In collaboration with mammal specialist	ZESCO
Mammal communities	Indirect survey methods for large mammals, i.e., spoor and scat counting along tracks and roads in the ROW (presence/absence and abundance). Direct survey methods for surrogate or indicator taxa in the ROW.	Presence, abundance, and distribution of large mammal species utilizing habitats in the ROW. Community composition and structure of surrogate taxa in important ecological habitats in the ROW.	Mammal communities continue using the Project area No increase in illegal harvest of mammal species	Along the powerline in important ecological habitats.	During the wet and dry seasons, biennially.	E&S Manager Biodiversity Specialist: In collaboration with mammal specialist	ZESCO

Monitored Component	Supervision Method	Indicators	Standards/Targets	Location	Frequency	Responsibility	Supervision
Bat activity near the powerline	Recording bat activity using mobile and static bat detectors at selected locations along the powerline. Record bat numbers using visual observation at two major roost sites.	Abundance and diversity of bat species	Use of Project area and rehabilitated areas by bats.	Along the powerline and in rehabilitated areas.	Twice a year in different seasons.	E&S Manager Biodiversity Specialist: In collaboration with bat specialist	ZESCO
Bat mortality monitoring program	Monitoring of bat mortality (in partnership with local communities or NGOs and experts)/number of dead specimens (species involved) related to period and location. Development of a bat mortality register and a training program.	Number of mortalities recorded Species impacted	No significant bat mortality.	Along the powerline.	A minimum of 2 times/year in the first 5 years of operation, then ongoing monitoring to be determined according to initial results.	E&S Manager Biodiversity Specialist: In collaboration with bat specialist	ZESCO

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## 4.2 CULTURAL HERITAGE MANAGEMENT PLAN

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### 4.2.1 INTRODUCTION

This Cultural Heritage Management Plan (CHMP) addresses the requirement of the ZTIP and its contractors to assess and manage risks and impacts related to heritage and culture. The CHMP requires contractors to establish management measures consistent with Good International Industry Practice (GIIP) and the World Bank Group's relevant standards. Other management plans that should be reviewed in tandem with the CHMP are the Emergency Preparedness and Response Plan, the Occupational Health and Safety Management Plan and the Gender Based Violence Management Plan.

The actions and measures that will be taken to minimize risks and impacts to Project affected communities (PACs) are derived from the Project ESIA and analysis of potential risks to cultural health. Actions focus on key areas of concern raised in consultations and from professional experience of similar Projects.

A CHMP will be developed by contractor to manage and monitor potential cultural heritage issues arising during the Project cycle in line with World Bank ESS 8 and Zambian heritage legislation (National Heritage and Conservation Commission Act, No. 23 Of 1989).

The CHMP will also include the preparation of a Project-specific, 'site ready' Chance Find Procedure (CFP), which enforces the reporting of any archaeological assets to the local authority within 24 hours of discovery.

The CFP will set out the course of action to be followed in the event that any cultural heritage artifacts are discovered. The CFP will be provided to all contractors and consultants on the Project site and incorporated within the Project's 'site induction' process. It will remain in place for the lifetime of the Project.

The CHMP will also allow for:

- Demarcation of 'no go' sensitive areas, e.g., known archeological components, sacred forests, sacred trees, sacred pools, medicinal bush, and cemeteries (i.e., mitigation by avoidance). Although these sites may not be directly affected by construction activities, there is a potential for disturbance of community access routes to cultural sites and to the environmental setting of the sites themselves;
- Enhancement or protection of environmental setting may be required and should be discussed in conjunction with local community, e.g., through planting/screening; It may be necessary to demarcate areas to be avoided (e.g., by noisy, dust-inductive) construction vehicles at certain times of the day/year so as to avoid disturbance of traditional ceremonial activities in close proximity of construction routes;
- Maintaining community access to sacred sites and facilitating respect for local intangible cultural heritage, tradition and taboo will ensure that the negative socio-cultural effects are effectively managed – regular platforms for community liaison are recommended in this regard. It is suggested that the presence of culturally significant places be highlighted to contractors at an early stage, e.g., during site induction; and
- Continued liaison between the Project proponent and local cultural leaders to facilitate the identification of any cultural sites not yet shared by the community and potentially affected by the proposed Project. The CHMP must set out plans for stakeholder identification and a programme for long-term consultation in this regard.

Several archaeological and cultural resources sites have been inventoried in the extended study area. This underlines the archaeological potential of the Project area. A key area of concern with regards to Cultural Heritage (CH) is that the proposed Project will pass through the Mwela Rock Art Site, a protected National Monument with rock paintings that are legally protected under the NHCC ACT Cap. 173 and are on the World Heritage Tentative List. During the fieldwork for this Heritage Impact Assessment led by NHCC (NHCC, 2020), a number of Physical Cultural Resources (PCRs) were identified in the study area in the vicinity of the proposed wayleave for the ZTIP. These resources and their locations are summarized in the table below. The study led by NHCC did not find any heritage resource within the wayleave.

However, there are several heritage resources in the vicinity of the wayleave which are likely to be directly impacted by the project. As such, there is a high potential for chance findings throughout Northern and Muchinga provinces.

Additionally, there may be graveyards and burial sites located close to villages in the Project area. A shrine in form of a big tree located within the wayleave was identified in Mpasuka Village, in Mungwi district.

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#### **4.2.2 OBJECTIVES**

The objectives of the CHMP are to avoid known cultural heritage sites where necessary and practicable and where avoidance is not possible, manage cultural heritage sites in compliance with the requirements of World Bank ESS8 and of Zambian laws and regulations and in consultation with the National Heritage and Conservation Commission (NHCC) and local stakeholders. It covers both tangible and intangible cultural heritage.

- Tangible cultural heritage, which includes movable or immovable objects, sites, structures, groups of structures, and natural features and landscapes that have archaeological, paleontological, historical, architectural, religious, aesthetic, or other cultural significance.
- Intangible cultural heritage, which includes practices, representation, expressions, knowledge, skills – as well as the instruments, objects, artifacts and cultural spaces associated therewith – that communities and groups recognize as part of their cultural heritage.

More specifically, the CHMP objectives are to:

- Mitigate potential impacts related to the loss of tangible cultural elements.
- Collaborate with government bodies responsible for managing the national archaeological and tangible cultural heritage by collaborating with subject matter experts and using current mapping, research, and conservation methods.
- Avoid delays in Project completion by engaging early in the Project cycle with national institutions and complying with national laws as well as international best practices.

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#### **4.2.3 REQUIREMENTS**

The CHMP will be developed with consideration to:

- Relevant ZESCO environment and social management policies and commitments
- National requirements, and
- World Bank requirements

Contractors will need to review and integrate ZESCO E&S management policies, procedures and commitments, in addition to any National or International requirements relevant for their (contractor's) work scope and responsibilities.

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##### **4.2.3.1 ZESCO ENVIRONMENT AND SOCIAL MANAGEMENT**

ZESCO has developed the Zambia-Tanzania Interconnector Project Environmental and Social Commitment Plan (April 2024). Article 8.1 (ESS - 8.1) within this document specifically requires a CHMP to be prepared by the Project proponent.

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#### 4.2.3.2 NATIONAL REQUIREMENTS

##### NATIONAL HERITAGE CONSERVATION COMMISSION ACT, NO. 23 OF 1989 READ TOGETHER WITH THE NATIONAL HERITAGE CONSERVATION COMMISSION (AMENDMENT) ACT, 2021

The Act provides for the conservation of ancient, cultural and natural heritage, relics and other objects of aesthetic, historical, pre-historical, archaeological or scientific interest, by preservation, restoration, rehabilitation, reconstruction, adaptive use and good management.

The Commission also provides regulations for archaeological excavation and export of relics. If a development is unable to proceed without affecting an item of heritage, permission must be sought from the National Heritage and Conservation Commission.

The National Heritage Conservation Commission (Amendment) Act, 2021 (No 19 of 2021) amends the National Heritage Conservation Commission Act. This legislation aims to conserve ancient, cultural, and natural heritage, relics, and other objects of aesthetic, historical, prehistorical, archaeological, or scientific interest in Zambia. The original Act established the National Heritage Conservation Commission, defining its functions and powers, including the regulation of archaeological excavations and relic exports.

##### CONVENTION CONCERNING THE PROTECTION OF WORLD HERITAGE (1972)

Zambia is a signatory to the United Nations Educational, Scientific and Cultural Organization's (UNESCO's) Convention concerning the Protection of the World Cultural and Natural Heritage since 1983. The Convention aims to ensure the identification, protection, conservation, presentation, and transmission of the cultural and natural heritage to future generations. Cultural and natural heritage sites that may be identified during the implementation of the proposed Project will be protected and conserved in accordance with the provisions of the Convention.

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#### 4.2.3.3 WORLD BANK REQUIREMENTS

##### ESS 8 - CULTURAL HERITAGE

The ESS 8 recognizes that cultural heritage provides continuity in tangible and intangible forms between the past, present, and future. People identify with cultural heritage as a reflection and expression of their constantly evolving values, beliefs, knowledge, and traditions. Cultural heritage, in its many manifestations, is important as a source of valuable scientific and historical information, as an economic and social asset for development, and as an integral part of people's cultural identity and practice. The ESS8 sets out measures designed to protect cultural heritage throughout the Project life cycle.

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#### 4.2.4 MANAGEMENT MEASURES

The following figure summarizes typical procedures to ensure the identification of cultural resources, the reduction of potential impacts, and the conservation of these resources.



**Figure 4-2 Process to ensure Preservation of Cultural Heritage Resources**

The proposed mitigation measures for the identified impacts are shown in Table 4-6 below.

**Table 4-6 Cultural Heritage Management Measures**

Targets	Management Measures
Reduce disturbances caused by moving sacred sites, burial grounds, or graves.	<ul style="list-style-type: none"> <li>– Undertake community and household surveys to assess the importance of each site.</li> <li>– Integrate data on the location of sacred sites, burial sites or graves collected during field surveys, and stakeholder consultation activities into the GIS database. These data will be catalogued during the detailed ROW inventory.</li> <li>– Optimize the final line route to avoid sacred sites and burial grounds considered important by communities.</li> <li>– Provide communities and households with the financial and logistical means to plan rituals and relocate sites and graves that cannot be avoided by Project infrastructure.</li> <li>– Consult the village chiefs before carrying out the work to check one last time for the presence of sacred sites.</li> <li>– Maintain community access to sacred sites, where necessary, during the construction period. Access requirements shall be determined by the Archaeologist in consultation with local communities.</li> <li>– Respect local intangible cultural heritage, tradition and taboo during construction so as to ensure that the negative socio-cultural effects are effectively managed.</li> </ul>
Mitigate impacts on heritage features and sites.	<ul style="list-style-type: none"> <li>– Map known heritage sites in the GIS database.</li> <li>– Analyse the archaeological potential of the ROW.</li> <li>– Where possible, optimize the line route to avoid or minimize impacts on known cultural heritage features.</li> <li>– Develop a procedure for dealing with chance findings, and train all personnel involved in the Project on cultural heritage and the procedure in place.</li> <li>– Document archaeological finds and artifacts discoveries through the Chance Finds Procedure, including archaeological monitoring (surveillance mandate) during ground-disturbing activities.</li> <li>– Prohibit the collection of archaeological or other cultural artifacts found on site by contractor personnel.</li> </ul>
Avoid and mitigate impacts on the Mwela Rock Art site.	<ul style="list-style-type: none"> <li>– Conduct line route optimization to avoid rock outcrops in proximity and within the Mwela Rock Art site.</li> <li>– The site boundaries should be be flagged for special attention. All construction team personnel, particularly operators of vehicles and heavy equipment, shall be made aware of the site and advised of its importance.</li> <li>– Locate and demarcated/fenced all physical cultural resources and rock arts in proximity of access roads, work areas and wayleave.</li> <li>– Conduct all works within the Mwela Rock Art site with an archeologist from the NHCC.</li> <li>– Identify access roads and work areas with the presence of an archeologist from the NHCC. A dedicated Transport Management Plan and strict work procedures within the site should be developed and implemented.</li> <li>– Continuously monitor project activities and excavations of areas greater than 1 meter.</li> <li>– Take a photographic record of existing conditions (including buildings, if any) prior to start of construction</li> <li>– Strictly define the construction footprint while working in the Mwela Rock Art site; enforcing ROW procedures wherein access roads are narrowed as much as feasibly possible.</li> <li>– Place laydown areas adjacent to footprint of construction areas; have the area fenced or taped such that a “no-encroachment” outside the area of construction is respected</li> <li>– Strictly enforce “no-encroachment” rules outside of footprint of construction activities; carry out training of personnel in this regard.</li> <li>– Strictly implement waste management within the site. All rubble should be removed from the site.</li> <li>– Consider fencing footprint of construction areas when work is occurring within the bounds of Mwela Rock Paintings site.</li> <li>– Cover excavated materials within the Mwela Rock Art Site with erosion control blankets.</li> <li>– Rehabilitate all disturbed areas within the Mwela Rock Art site after completion of works.</li> </ul>

Targets	Management Measures
Follow measures proposed by National Heritage Conservation Commission to protect landscape at Mwela Art site	<ul style="list-style-type: none"> <li>– Locate new transmission facilities in adjacent to current structures to uphold the same spacing and avoid irregular linear patterns that can be caused by adjacent conductors being in disharmony with each other.</li> <li>– The transmission structures should be designed with a relatively narrow profile that minimizes the amount of vegetation clearing required within the proposed power transmission corridor.</li> <li>– Maintain and/or restore vegetation at road crossings, with due respect to underlying landowner's authority, to minimize or screen the view-down transmission corridors and concentrate or limit viewer attention in the immediate foreground.</li> <li>– Ensure that riparian vegetation is maintained and/or restoring at stream crossings, subject to underlying landowner permission to restore cleared areas with naturalistic landscaping.</li> <li>– Adherence to CHMP.</li> </ul>
Preserve heritage properties and sacred sites through a chance finds procedure	<ul style="list-style-type: none"> <li>– The Contractor shall minimize the risk of accidental damage to heritage sites by implementing the Chance Find Procedure (CFP) developed for this Project.</li> <li>– The Contractor Personnel shall undertake training provided by a qualified specialist in order to improve their capability to identify archaeological and paleontological finds.</li> </ul>

#### 4.2.5 CHANCE FIND PROCEDURE

A procedure for dealing with chance finds must be implemented by the Contractor throughout the duration of construction activities, particularly during all activities involving ground disturbance. The aim of the Chance Finds Procedure is to recognize and identify sites, objects, or features of heritage interest that have not yet been listed, and to protect them from any damages caused by Project activities. The procedure applies to all potential cultural heritage objects, features or sites identified during the removal of vegetation or ground surface works or any other Project-related activities. The Chance Finds Procedure (CFP) complements other previously identified mitigation measures to protect elements that were not discovered during pre-construction surveys. The CFP requires an archaeologist to be dispatched to the work site and available to intervene during all ground-disturbing activities. The archaeologist is expected to manage the two types of discoveries that can be made during work:

- Chance finds with cultural heritage value; and
- Chance finds without cultural heritage value.

All contractor staff could make an accidental discovery in the course of their duties, which must be assessed by an archaeologist to confirm its cultural heritage value. Discoveries without cultural heritage value may include modern objects or features as well as isolated artifacts. An isolated artifact, however, may indicate the presence of nearby underground or above-ground heritage sites, which is why an archaeologist must carry out an assessment. Distinguishing between the two types of chance finds requires the expertise of an archaeologist. This procedure interprets finds as potential indicators of sites rather than assigning them individual significance.

In the case of a chance find, Project activities will be suspended temporarily in the vicinity and the area will be marked appropriately as to be avoided. Site supervisors, field personnel and staff will be notified, as will the Environmental and Social Management Committee. Representatives of the National Heritage Conservation Commission will also be notified so that appropriate intervention strategies can be developed and approved. Potential intervention strategies include on-site conservation by modifying the Project design, using specialized construction techniques, or excavating and removing the artifact. Once the agreed approach and the required work have been completed, authorization to resume Project activities will be granted. The procedure in the event of a chance find is as follows:

- 1 Stop work in the immediate area.
- 2 Notify the site supervisor or foreman.
- 3 Define the exclusion area required to protect the discovery.

- 4 Install temporary site protection measures (warning tape, fencing, access restriction signs, etc.).
- 5 Inform all personnel of the possibility of a chance find and the presence of a restricted area.
- 6 Inform the EHS Manager from the PIU.
- 7 Take photographs of the discovery
- 8 Have an archaeologist carry out a preliminary assessment to determine whether the chance find is of cultural heritage interest and, if so, whether it is an isolated object or part of a larger site or feature.
- 9 Leave artifacts in place when possible. If artifacts are moved, they will be bagged and labeled by an archaeologist, then transported to the appropriate facility (archaeological or anthropological institute). Project personnel are not authorized to handle or keep artifacts for personal use.
- 10 Document finds with photos, notes, GPS coordinates, and maps as appropriate.
- 11 If the chance find is an isolated object or has no cultural heritage value, the archaeologist will authorize the removal of site protection measures and activities can resume.
- 12 If the archaeologist confirms that the chance find has cultural heritage value, the appropriate institution (institute of archaeology or anthropology) will be informed to determine the procedures to be undertaken.
- 13 Prepare and use a Chance Find Report template (for all chance finds, with or without cultural heritage value) and include location data.
- 14 Establish an action plan in collaboration with qualified archaeologists or cultural heritage managers hired by the Project promoter.
- 15 When a chance find proves to be of cultural heritage value, complete the Chance Find Report at the end of the procedures.
- 16 Throughout the procedures, keep on-site personnel informed of the status of the research and the expected timetable, as well as when work can resume.

Artifacts collected in connection with chance finds will be minimized. Those retained because they are accidentally unearthed or broken free of their soil matrix should be retained with a precise notation of their original location, and photographs should be taken in their original context. Photographs of artifacts and sites may be useful and should be taken as soon as possible.

Artifacts, associated notes, and photographs taken by Project personnel must be handed over to the Environmental and Social Management Committee. The local government owns the artifacts, and Project personnel will be responsible for transferring the material to the appropriate authorities.

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## **4.2.6 ROLES AND RESPONSIBILITIES**

### **CONTRACTOR**

The Contractor hired to carry out the activities related to the Project life cycle must comply with the following obligations:

- Communicate with the Proponent and respond to issues related to the implementation of the management plan.
- Ensure that all subcontractors employ equipment, practices and methods of construction that comply with the E&S standards enunciated above, and, in general, minimize environmental damage, control waste, avoid pollution, prevent loss or damage to natural resources and minimize effects on surrounding landowners and the public.

- Implement the mitigation measures contained in the plan as well as techniques and methods to achieve management outcomes. The Contractor shall make efforts to minimize damage to the environment, control waste, avoid pollution and all other aspects that impact the environment associated with the Project.
- Ensure the effective implementation of strategies designed to mitigate all Project impacts through communication with site staff and contractors.

Contractor is responsible for the development & implementation of the CHMP and following its provisions. As part of these requirements, Contractor shall:

- Provide cultural heritage awareness training to staff with the potential to encounter tangible or intangible cultural heritage resources during their day-to-day activities.
- Provide cultural heritage training and utilize cultural heritage monitors to observe construction activities.
- Identify and report potential chance finds to an Archaeologist.

Complete personnel required and roles and responsibilities for the implementation of the CHMP will be assigned by the Contractors will be assigned during the development of the CHMP. However, it is anticipated that the following personnel will be required to implement the CHMP when required:

### **ENVIRONMENT, HEALTH AND SAFETY MANAGER**

The EHS Manager is responsible for ensuring the implementation of the CHMP and shall:

- Ensure the Contractor has provided a licensed Archaeologist who will be responsible for monitoring soil disturbance activities during the pre-construction and construction phases as per the approved Environmental Impact Statement Report.
- Coordinate the communication between various stakeholders and the Contractor.
- Ensure the CHMP activities are aligned with Project health and safety standards and procedures and all other contractual requirements.
- Conduct regular audits/reviews of CHMP implementation and reporting.
- Participate in and/or facilitate consultations with cultural heritage stakeholders, including government agencies/regulators, community leaders, and other cultural heritage stakeholders where required.

### **ARCHEOLOGIST (AND/OR OTHER SUBJECT MATTER EXPERTS)**

An archeologist should be appointed by the Contractor and shall:

- Be responsible for prospecting and excavation operations.
- Provide full support to the competent authorities or their representatives for work supervision.
- Prepare reports of the results of the archaeological work carried out.
- Maintain a database of excavations, operations data and an inventory of the archaeological elements.
- Monitoring construction activities to avoid damage to known cultural heritage resources.
- Provide training to Contractor personnel of finds.

## COMMUNITY LIAISON OFFICER

Community Liaison Officers (CLOs) shall be appointed under the Contractor's staff as the principal interface between the community and the Contractor during construction. The CLO(s) shall be full-time employees for the period of the contract. The CLO(s) shall act as a guide and advisor to the Contractor regarding the ESMP concerning communication and local community issues. This shall be achieved by ongoing liaison with and monitoring relations with communities, identification of problem areas, and support for their resolution.

Responsibilities of the CLO shall be set by the proponent and will include the following:

- To keep communities informed about upcoming construction activities and progress with construction.
- To arrange occasional visits to construction sites for District Government and community leaders.
- To provide educational programmes on traffic safety to communities near or on access routes that will be used by construction vehicles.
- To liaise between ZESCO, the community and NGOs/service providers implementing community Projects for the construction phase.
- To communicate and manage the Complaints Register.
- Prepare monthly reports with the ESO.
- Provide guidance on and evaluate the implementation of the social aspects of the ESMP.

## RESPONSIBILITIES OF ALL SITE WORKERS (INCLUDING SUB-CONTRACTORS)

In the event that a Chance Find is observed and/or disturbed, site workers will prevent the illegal disturbance of archaeological material and will apply the Chance Find Procedure.

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### 4.2.7 MONITORING

A monitoring program will be developed within CHMP by the Contractor to ensure that proposed actions are implemented and also that any cultural heritage resources are preserved or managed according to identified actions, particularly with community leaders and NHCC. It will serve to determine the performance of the proposed actions. Table 4-7 proposes the cultural heritage monitoring plan framework with identified indicators. The monitoring plan framework will need to be validated by the Contractor prior to Project implementation. It will evolve and be adapted by the Contractor over time to address any unexpected changes or impacts.

The table below lists the main E&S monitoring measures to be applied during the construction phase. It is important to note that the monitoring obligations below are meant to correlate with the Project-related impacts and mitigation measures.

**Table 4-7 Cultural Heritage Monitoring Plan Framework**

Monitored Component	Supervision Method	Indicators	Standards/Targets	Location	Frequency	Responsibility	Supervision
Loss of cultural heritage sites	Prepare, update and communicate the Project-specific Cultural Heritage Management Plan – to include a Chance Find Procedure.	Records of correspondence – update Cultural Heritage Management Plan (CHMP)	IFC Performance Standard 8: Cultural Heritage	Project footprint and surrounding area	Quarterly, for the first year. Annually for remainder.	EHS Manager Archaeologist	PIU
Cultural Awareness Training	Train key personnel to identify cultural/archaeological artifacts	Records of training of key personnel to identify cultural/archaeological artifacts (number of cultural inductions conducted and number of personnel trained on specific cultural heritage scope, i.e., "spotters")  Record of communication with communities to verify location of sacred sites when construction is within 100 m of a known cultural heritage site. Compliments and Complaints Register	No complaints registered	Project footprint and surrounding area	Ongoing watching brief	EHS Manager Archeologist	PIU
Changes to the environmental setting of cultural sites, loss of site access	Monitor visual, sound and air quality changes, monitor changes to infrastructure plans/access routes and associated development. Facilitate community consultation in this regard.	Evidence/records of visual assessments, evidence of implemented mitigation/improvements and community consultation in this regard – update Cultural Heritage Management Plan (CHMP).	Continued access to cultural sites	Project footprint and surrounding area	Quarterly, for the first year. Annually for remainder.	EHS Manager	PIU
Chance finds Procedure	Archeologist to oversee and assess as to whether any cultural heritage sites are being negatively impacted and to implement the chance finds procedure in the case of any archaeological artifact's discovery.	Compliance with Chance Find Procedure and subsequent recommendations by specialist where artifacts are found.	IFC Performance Standard 8: Cultural Heritage	Construction area	Ongoing throughout the construction phase	EHS Manager Archeologist	PIU

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## 4.3 COMMUNITY HEALTH AND SAFETY MANAGEMENT PLAN

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### 4.3.1 INTRODUCTION

This Community Health and Safety Management Plan (CHSMP) addresses the requirement of the ZTIP and its contractors to assess and manage risks and impacts to community health and safety. The CHSMP requires contractors to establish management measures consistent with Good International Industry Practice (GIIP), such as World Bank Group's Environmental Health and Safety Guidelines (WBG, 2007b) and relevant sections of the International Finance Corporation's Environmental, Health and Safety Guidelines for Electric Power Transmission and Distribution (WBG, 2007a). Other management plans that should be reviewed in tandem with the CHSMP are the Emergency Preparedness and Response Plan, the Occupational Health and Safety Management Plan and the Gender Based Violence Management Plan.

The CHSMP sets out the actions and measures that the Contractor and subcontractors shall undertake to comply with national requirements, WB requirements and GIIP. The actions and measures that will be taken to minimize risks and impacts to Project affected communities (PACs) are derived from the Project Environmental and Social Impact Assessment (ESIA) and analysis of potential risks to community health and safety. Actions focus on key areas of concern raised in consultations and from the professional experience of similar Projects. Key areas of concern are:

- Supply reduction in ecosystem services for local communities and increased pressure on natural resources;
- Risks of increased incidences of sexually transmitted diseases (STDs) and HIV/AIDS;
- Risks of sexual abuse by workers and especially child abuse;
- Risks of abuse by Contractors hiring underage workers (child labor);
- Accidents and physical injuries involving workers or residents;
- Risks of accidents when trucks use community roads;
- Increased stress related to nuisances (noise, dust, and air pollution).

Of note, while the CHSMP addresses potential risks and impacts on communities that are near the Project and that may be affected by Project activities, the Plan's goals overlap with some of those in the Occupational Health and Safety Management Plan (OHSMP), considering part of the workforce will be from local communities. Control measures at work sites that effectively reduce the transmission of communicable diseases between the Project workforce and communities are imperative to protect family members and others from illness, and these measures are described in the OHSMP.

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### 4.3.2 OBJECTIVES

The CHSMP ensures compliance with national and client safety regulations, identifies potential hazards, assesses risks, and implements controls to prevent accidents, incidents and/or major events involving the community. Additionally, it outlines measures to protect the health and safety of communities interfacing with on-site work Project.

This plan applies to all on-site work activities during both the preconstruction and construction/operations phases, which the contractor executes. Additionally, it covers activities during both the operation and decommissioning phases, which ZESCO will manage.

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### **4.3.3 REQUIREMENTS**

The CHSMP will be developed with consideration to:

- Relevant ZESCO environment and social management policies and commitments;
- National requirements; and
- World Bank requirements.
- World Bank Group’s Environmental Health and Safety Guidelines, including :
  - General EHS Guidelines (WBG, 2007b);
  - EHS Guidelines for Electric Power Transmission and Distribution (WBG, 2007a).

Contractors will need to review the proponent's (ZESCO) E&S management policies and commitments in addition to any National or International requirements relevant for their (contractor's) work scope and responsibilities.

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#### **4.3.3.1 ZESCO ENVIRONMENT AND SOCIAL MANAGEMENT**

Within the Project proponent’s Zambia-Tanzania Interconnector Project (ZTIP) Environmental and Social Commitment Plan (April 2024), “Local Communities” are listed as a stakeholder. Hence, Contractor’s will be required to develop and implement a CHSMP.

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#### **4.3.3.2 NATIONAL REQUIREMENTS**

##### **ENVIRONMENTAL PROTECTION AND POLLUTION CONTROL (ENVIRONMENTAL IMPACT ASSESSMENT) REGULATIONS, STATUTORY INSTRUMENT NO. 28 OF 1997**

The Environmental Protection and Pollution Control (Environmental Impact Assessment) Regulations require Project developers to seek the views of affected communities. In accordance with article 10 of the Regulations, the Project must be publicised in mass media in a language that is understood by affected communities. The effects and benefits of the Project must be disclosed and communication must be done at regular intervals throughout the EIA process.

##### **OCCUPATIONAL HEALTH AND SAFETY ACT 2010**

Under the Occupational Health and Safety Act, it is the duty of the employer to ensure the health, safety, and welfare of employees while they are at the workplace.

The Act requires that an employee be placed and kept in a work environment that aligns with the employee's physical, physiological and psychological ability. The employer must provide a work environment that is safe and without risk to the health and safety of the employees within their workplace.

##### **SOCIAL SAFEGUARDS STANDARDS FOR THE ENERGY SECTOR (STANDARD 4 ON COMMUNITY PROTECTION AND EMPOWERMENT)**

According to Standard 4 of the Ministry of Energy (MOE) Social Safeguard Framework, a community health programme focused on communicable diseases, sexual and reproductive health and rights, and alcohol abuse should be included as a mandatory component in the bidding documents.

The contractor must also sensitize the population on possible positive and negative impacts related to labour influx. Affected communities should also be informed about the content of the Code of Conduct focusing on the expected behaviour of Project staff towards community members.

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### 4.3.3.3 WORLD BANK REQUIREMENTS

#### ESS 4 - COMMUNITY HEALTH AND SAFETY

The ESS 4 recognizes that Project activities, equipment, and infrastructure can increase exposure to risks and impacts for the communities. Those that are already subject to impacts from climate change may also experience an acceleration or intensification of impacts due to Project activities.

The ESS 4 addresses the health, safety, and security risks and impacts on Project-affected communities and the corresponding responsibility of Borrowers to avoid or minimize these risks and impacts. Particular attention must be given to vulnerable people.

The ESS 4 aims to:

- Anticipate and avoid adverse impacts on the health and safety of Project-affected communities during the Project life cycle.
- Promote quality and safety, and considerations relating to climate change in the design and construction of infrastructure.
- Avoid or minimize community exposure to Project-related traffic and road safety risks, diseases, and hazardous materials.
- Have in place effective measures to address emergency events.
- Ensure that the safeguarding of personnel and property is carried out in a manner that avoids or minimizes risks to the Project-affected communities.

#### IFC ENVIRONMENTAL, HEALTH, AND SAFETY GUIDELINES

The WBG Environmental, Health, and Safety Guidelines include community health, safety and security aspects. The guidelines address aspects related to general guidelines and some guidelines specific to power transmission:

- Water quality and availability – preventing adverse impacts to the quality and availability of groundwater and surface water resources, and protecting drinking water sources, whether public or private, at all times.
- Structural safety of Project infrastructure – reducing potential hazards posed to the public while accessing Project facilities, and undertaking hazard analysis to identify opportunities to reduce the consequences of a failure or accident.
- Life and fire safety – design, construction and operation of all new buildings accessible to the public in accordance with building codes, fire regulations, legal/insurance requirements, and an internationally accepted life and fire safety standard. Fire prevention means of egress (design measures that facilitate safe evacuation in case of an emergency), detection and alarm systems, and an emergency response plan are important elements of the life and fire safety provisions (best practice standards will be adopted).
- Avoid or minimize exposure to the Electromagnetic fields (EMF) for the public.
- Prevent public contact with potentially dangerous equipment.
- Avoid impact on aircraft safety directly through collision or indirectly through radar interference.
- Traffic safety – preventing traffic accidents and promoting traffic safety of all Project personnel and community.
- Transport of hazardous materials – establishing procedures to ensure compliance with local laws and international requirements applicable to the transportation of hazardous materials, as well as measures presented for preventing or minimising the consequences of catastrophic releases of hazardous materials.

- Disease prevention – preventing the occurrence and spread of communicable diseases, including surveillance, active screening and treatment of workers, undertaking health awareness and education initiatives in local communities, and providing health services.
- Emergency preparedness and response – preparing Emergency Preparedness and Response plans commensurate with the risks of the facility, including provisions for communication systems, community notification, media and agency relations, medical services and government capacity and collaboration.

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#### **4.3.4 MANAGEMENT MEASURES AND ACTIONS**

This section describes the management actions required to ensure that contractors and subcontractors adopt and comply with the Project Community Health and Safety Management Plan, national requirements, and international best practice standards.

The Contractor will be required to implement management measures and safety requirements commensurate to the scope of works with regards to:

- General Community Health & Safety Awareness
- Road safety
- Presence of electrical equipment
- Exposure to communicable diseases
- Prevention of waterborne diseases
- Population influx (arrival of workers) and related issues
- Gender-based violence
- Water, natural resources, air and noise

These are discussed below.

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##### **4.3.4.1 GENERAL COMMUNITY HEALTH AND SAFETY**

The Community Health and Safety plan should be developed and implemented throughout the entire Project life cycle. This plan should cover, at a minimum, the following aspects:

- Develop and implement a communication process that describes specific measures to maintain good relations with Project affected communities, raise awareness of issues related to their health, safety and well-being, and develop clear communication protocols, as outlined in the Stakeholder Engagement Plan for the Zambia Tanzania Interconnector Project (April, 2024).
- Develop and implement community education and awareness initiatives related to the risks of wildlife interaction (e.g., snakes and other animals) during bush clearing and construction activities as appropriate.
- Ensure adequate and appropriate access control and temporary fencing of open excavations and construction sites are implemented during construction. Barriers will have high-visibility warning signs in English and the main local language with supporting graphics and pictograms. Signage will be in accordance with internationally accepted symbols and/or be well-known to local communities.
- Restrict Project land use to the line’s ROW to avoid conflict with local communities and Project developers.
- Clear first aid protocol should be identified according to the type of injury/wound. A dedicated staff should be trained to first aid and act as medical first responders at construction sites during pre-construction and construction phases.

- The contractor H&S manager (or a delegate) will provide education/training sessions in every community potentially affected by health, safety, and security hazards related to the Project. Relevant contractors will be expected to participate in some health awareness events with local communities during the construction phase.
- Community Liaison officer(s) will work with local health departments and administrators to inform them of Project schedule and activities and get their input on health issues and awareness raising.
- The Contractor’s H&S manager will be responsible for regular inspections at the site and maintain appropriate records.
- Increase security in the Project area (security personnel, lighting, and signage) during the construction phase as required.

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#### **4.3.4.2 ROAD SAFETY**

Various vehicles and machinery will be circulating on local and main access roads in the vicinity of the Project, increasing the risk of interaction with local community members. The following measures should minimally be considered in the Plan:

- Develop and implement a community road safety campaign in collaboration with local Road authorities, with the aim of helping local residents avoid traffic accidents and incidents. Printed materials, including posters, leaflets, and other visual communication, will be prepared and disseminated through designated venues in the community.
- Location of pathways and safe crossings should be decided in consultation with communities (community leadership, local administration, etc.) and communicated broadly to communities through an organized campaign.
- Develop and implement a traffic management plan that considers pedestrians and vehicles, including heavy-duty ones, to prevent the risk of a person being struck by a vehicle or a collision between vehicles. The traffic management plan will also manage and outline safe instructions regarding the entrance and exit of heavy-duty vehicles to the construction areas.
- Provide adequate signage to inform the public of access restrictions and temporary and permanent detours to bypass work areas and built infrastructure.
- Provide access to businesses and services during the works.
- Maintain free and safe access for population mobility or provide safe bypass routes where necessary.

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#### **4.3.4.3 PRESENCE OF ELECTRICAL EQUIPMENT**

The eventual electrification of the new high-tension powerline and substation represents a new risk for community members. The following measures should minimally be considered in the Plan:

- Develop and implement community safety campaigns and initiatives with the aim of helping local residents avoid accidents and incidents in relation to high-tension electrical equipment. Communication on electrical equipment will be prepared and disseminated through designated venues in the community. Printed materials will be prepared and disseminated through health clinics and other venues, including posters, leaflets, and other visual communication.
- Inform the community about the potential risks associated with high-voltage power lines and explain the importance of maintaining a safe distance from these lines.
- Raise awareness through community meetings, educational materials, and local media and involve community leaders, and local organizations in spreading safety messages.
- Install clear signs indicating the danger and advising people to stay away from the power lines.

- Install physical barriers (such as fences or hedges) around the power line areas (and other areas where required) to prevent unauthorized access.
- Install markers to minimize risk of low-flying aircrafts where relevant in collaboration with Zambia Civil Aviation Authority.
- Organize training sessions for communities on how to rescue an electrified or electrocuted person.

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#### **4.3.4.4 PRESENCE OF SECURITY PERSONNEL**

In some cases, security personnel may be required on the construction site. Proactive communication, community engagement and grievance redress are necessary to ensure that security provisions on construction sites are carried out responsibly (IFC, 2017). The following measures should be considered in the Plan:

- Make sure community members know where to address complaints about the conduct of security personnel.
- Raise awareness of security personnel regarding culturally specific gender issues to reduce women’s exposure to risks of harassment and sexual violence.
- Consider hiring female security guards, especially in areas where a lot of interaction between security personnel and community members is expected.
- Ensure that the intensity of security responses correspond to the nature and gravity of threats or offense.

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#### **4.3.4.5 EXPOSURE TO COMMUNICABLE DISEASES**

The influx of workers from other areas of the country and from other countries increases the risk of local community members being exposed to communicable diseases. The following measures should minimally be considered in the Plan:

- HIV prevalence has shown a sustained decline in recent years. The prevalence of HIV is higher among Most-At-Risk Populations (MARPS), including commercial sex workers, and people who inject drugs. Hotspots for HIV transmission should be identified; they will likely be located along major transport routes and workers’ camps/accommodations used by the Project.
- Provide awareness-raising education and outreach events on health issues such as STI/HIV prevention and communicable disease prevention for communities near the construction sites. This can be conducted by the company occupational physician, the local health staff, or local associations.
- Put in place a Code of Conduct for workers. Prevention of communicable diseases should be part of the Code of Conduct.
- Encourage workers to adopt safe sexual practices and other health-related practices (e.g., hand and food hygiene).
- Health screening for workers should be put into place. However, testing for HIV is strictly voluntary.
- Involve the District Aids Task Forces in HIV mitigation programmes to facilitate implementation at the local scale.
- In the event of an outbreak during Project implementation, standard operating procedures in line with national guidance and applicable good international industry practices should be followed.

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#### 4.3.4.6 PREVENTION OF WATERBORNE DISEASES

Land disturbance, excavation work, and movement of heavy machinery may all favor waterborne disease through the creation of depressions and ruts where water may accumulate. The following measures should minimally be considered in the Plan:

- Develop and implement larval and source control management plans for both malaria and potential arboviral diseases to include designs and plans (good housekeeping and waste management) to reduce the potential for water collections in man-made containers at the laydown yards and work areas (e.g., tyres).
- Develop and maintain strict environmental controls around earth works and related construction activities to prevent and reduce the creation of potential vector breeding habitats.
- Provide awareness and education on waterborne diseases and the best hygiene practices to adopt.
- Inform the communities about the different prevention measures that the Contractor has implemented and will implement to prevent waterborne diseases during the construction phase.
- Develop, implement, and maintain a workplace malaria and vector control program that includes:
  - Vector control (environmental and chemical as required);
  - Awareness and education;
  - Bite prevention (insect repellent, bed nets in commercial accommodation);
  - Chemoprophylaxis for non-immune workers, as necessary;
  - Effective diagnosis; and
  - Effective reporting/stewardship of program interventions and burden of disease trends.

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#### 4.3.4.7 POPULATION INFLUX AND HEALTH ISSUES

The job potential and commercial opportunities associated with the Project and the concentration of workers may induce a local population influx, which may introduce or worsen existing health issues. The following measures should minimally be considered in the Plan:

- Develop and implement a worker's code of conduct (see Section 4.10) describing the expected behaviours of all workers. This includes engagement and interaction with PACs and interaction between local workforce and incoming workforce to manage inappropriate relations between parties. Compliance with worker code of conduct will be a contractual requirement for all workers, including subcontractors. The workers code of conduct must be developed to manage transgressions within Project disciplinary procedures and structures.
- Ensure workers code of conduct will be applicable to local long-distance drivers, including subcontractors. Designated rest stops for drivers shall be identified, and exclusive use shall be enforced.
- Verify with health authorities for tracking influx and issues related to health; verify with police services for increases in illegal drug sales and use and increased incidents of alcohol-related incidents (e.g., fights).

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#### 4.3.4.8 GENDER-BASED VIOLENCE

Refer to the Gender-Based Violence Management Plan in section 4.8.

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#### 4.3.4.9 WATER AND NATURAL RESOURCES, AIR AND NOISE

The vehicle and machinery movements associated with the construction and operation of the electrical line and substations, as well as the presence of workers (especially during the construction phase), will increase the generation of nuisance (noise, dust) and the pressure on local resources. The following measures should minimally be considered in the plan:

- Develop and implement site-specific water management plans to avoid Project water use impacting the local population's water supply and manage the potential of surface—and groundwater and soil, which can potentially pollute superficial groundwater sources.
- Maintain effective communication procedures and community grievance redress mechanisms related to air quality, water quantity and quality, and noise exposure.
- Dust suppression measures shall be implemented to minimize impacts to local communities and land as well as resource users with activities near the Project. These measures might include but are not limited to:
  - Systematically cover trucks transporting rubble or other materials to limit dust generation.
  - Ensure maintenance of vehicles and equipment used to limit the production of exhaust fumes rich in CO and CO<sub>2</sub>.
  - Limit vehicle speed in dust-sensitive areas (residential zones).
- Noise suppression measures will be taken, including the use of noise berms, routine and ongoing equipment maintenance, and control of working hours). These measures might include but are not limited to:
  - Require the Contractor to select equipment regarding noise emission levels.
  - Avoid night work as much as possible.
  - Limit traffic speed to reduce noise near communities.
  - Set up schedules and procedures to minimize noisy work (working hours for noisy work from 7 a.m. to 6 p.m.).
  - Use low-noise equipment and tools and respect the national/international noise limits.
  - Ensure that high-noise equipment, such as diesel engines, compressors, etc., are enclosed.
  - Containers holding liquids such as fuels or other potentially hazardous liquids will be banded to 110% of the container's volume.

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#### 4.3.5 ROLES AND RESPONSIBILITIES

##### CONTRACTOR

The Contractor hired to carry out the activities related to the Project life cycle must comply with the following obligations:

- Communicate with the Proponent and respond to issues related to the implementation of the management plan.
- Ensure that all subcontractors employ equipment, practices and methods of construction that comply with the E&S standards enunciated above, and, in general, minimize environmental damage, control waste, avoid pollution, prevent loss or damage to natural resources and minimize effects on surrounding landowners and the public.

- Implement the mitigation measures contained in the plan as well as techniques and methods to achieve management outcomes. The Contractor shall make efforts to minimize damage to the environment, control waste, avoid pollution and all other aspects that impact the environment associated with the Project.
- Ensure the effective implementation of strategies designed to mitigate all Project impacts through communication with site staff and contractors.

The Contractor is responsible for development and implementation of the CHSMP and following its provisions. As part of these requirements, Contractor shall:

- Provide awareness and training of the plan to all stakeholders as required.
- Regularly communicate planned construction activities to mitigate any potential non-compliances to the CHSMP.

### **COMMUNITY LIASON OFFICER (CLO)**

- Community Liaison Officers (CLOs) shall be appointed under the Contractor's staff as the principal interface between the community and the Contractor during construction. The CLO(s) shall be full time employees for the period of the contract. The CLO(s) shall act as a guide and advisor to the Contractor in respect of the ESMP concerning communication and local community issues. This shall be achieved by ongoing liaison with and monitoring of relations with communities, identification of problem areas and supporting their resolution. With regards to liaising and monitoring of community relations, the CLO will organize meeting (education/training) sessions in every community as potentially affected by health, safety and security hazards related to the Project. Such meeting sessions will have the objectives of informing the communities of ongoing construction progress and activities.

Responsibilities of the CLO will include the following:

- Keep communities informed about upcoming construction activities and progress with construction.
- To arrange occasional visits to construction sites for District Government and community leaders.
- To provide traffic safety educational programmes to those communities near or on access routes that will be used by construction vehicles.
- To liaise between ZESCO the community and NGOs/service providers implementing community Projects for the construction phase
- To communicate and manage the Grievance Register
- Prepare monthly reports.
- Provide guidance on and evaluate the implementation of the social aspects of the plan.
- Develop and co-ordinate a governance framework to guide the implementation and subsequent monitoring and evaluation of the CHSMP including constituting multi-disciplinary committee(s) as necessary.
- To liaise between ZESCO, the community and NGOs/service providers implementing community Projects for the construction phase.
- To communicate and manage the Compliments and Complaints Register.
- Prepare monthly reports,
- Provide guidance on and evaluate the implementation of the social aspects of the ESMP.

## ENVIRONMENT, HEALTH AND SAFETY MANAGER

The EHS manager will:

- Implement and review the Project CHSMP.
- Implement and review the CHSMP in response to onsite and offsite accidents and emergencies, associated to, and unrelated to the Project (when required).
- Implement and review safety initiatives that are especially relevant for workers.
- Implement and review the environmental and social management plan(s), with consideration for potential human health risks.

## HEALTH AND SAFETY SPECIALIST

The HS specialist is responsible for also implementing and reviewing the environmental management plan, with consideration for potential human health risks, and to:

- Review the community participatory environment monitoring system and grievance register and respond to potential human health risks.
- Implement and review the plans related to water (and other natural resources) as well as those related to air quality, road waste management and noise.
- Manage ground disturbance and other potential vector breeding sites to reduce the risk for the development of vector related diseases.

## COMMUNITY LIAISON OFFICER

### RESPONSIBILITIES OF ALL SITE WORKERS (INCLUDING SUB-CONTRACTORS)

- Follow all instructions issued by management regarding all aspects of the CHSMP. Management communications to site workers regarding the CHSMP will be through the implementation of training workshops.

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### 4.3.6 MONITORING

A monitoring program will be developed within this Plan by the Contractor to ensure proposed actions are implemented, all activities are documented, and any glitches in the system are rapidly identified and adjusted. It will serve to determine performance of the proposed actions. Table 4-8 proposes the community health and safety monitoring plan framework with identified indicators. The monitoring plan framework will need to be validated by the Contractor prior to Project implementation. It will evolve and be adapted by the Contractor over time to address any unexpected changes or impacts.

The table below lists the main E&S monitoring measures to be applied during the construction phase. It is important to note that the monitoring obligations below are meant to correlate with the Project-related impacts and mitigation measures.

**Table 4-8 Community Health and Safety Monitoring Plan Framework**

Monitored Component	Supervision Method	Indicators	Standards/ Targets	Location	Frequency	Responsibility	Supervision
Safety and public health	Analysis of the register of injuries/accidents within communities (including their type and cause).	<ul style="list-style-type: none"> <li>– Number of complaints</li> <li>– Number of accident involving communities related to the Project</li> <li>– Number of people injured due to Project activities.</li> </ul>	– No major injuries or accidents.	Entire Project area.	Continuously during preconstruction and construction activities.	EHS Manager	PIU
	Analysis of grievances about the security personnel and their interaction with community members.	Number of grievances registered about security personnel.	– No major complaints.	Entire Project area.	Continuously during preconstruction and construction activities.	EHS Manager	PIU
	Analysis of the number of disease outbreak episodes that may be linked to the Project.	Number of outbreak episodes.	– No major outbreaks.	Entire Project area.	Continuously during preconstruction and construction activities.	EHS Manager	PIU
	Analysis of the register of underage sex cases within communities.	Number of underage sex cases.	– No case of underage sex.	Entire Project area.	Continuously during preconstruction and construction activities.	EHS Manager	PIU
	Analysis of the register of child labour cases within communities.	Number of child labour cases.	– No case of child labour.	Entire Project area.	Continuously during preconstruction and construction activities.	EHS Manager	PIU
	<ul style="list-style-type: none"> <li>– Analysis of the register of HIV/AIDS cases within communities.</li> <li>– Comparison of prevalence rates before and after construction.</li> </ul>	HIV/AIDS prevalence rate increase.	– No increase in prevalence rates.	Entire Project area.	Continuously during preconstruction and construction activities.	EHS Manager	PIU

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## **4.4 OCCUPATIONAL HEALTH AND SAFETY MANAGEMENT PLAN**

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### **4.4.1 INTRODUCTION**

This Occupational Health and Safety Management Plan (OHSMP) addresses the requirement of the ZTIP and its contractors to assess and manage risks and impacts to workers' health and safety. The OHSMP requires the contractors to establish management measures consistent with Good International Industry Practice (GIIP), such as the World Bank Group's Environmental Health and Safety Guidelines (WBG, 2007b), and relevant sections of the International Finance Corporation's Environmental, Health and Safety Guidelines for Electric Power Transmission and Distribution (WBG, 2007a). Other management plans that should be reviewed in tandem with the OHSMP are the Emergency Preparedness and Response Plan, and the Community Health and Safety Management Plan.

All Contractors shall develop and implement an Occupational Health and Safety Management Plan (OHSMP) commensurate with their scope of work that will be implemented before the commencement of construction work (including the preconstruction activities) and throughout the Project life cycle.

The purpose of the OHSMP is to prevent injuries and illness during worker activities and in the workplace (exterior and interior). The scope of the OHSMP is to include all potentially affected workers on the Project.

While the OHSMP will be a standalone document, as with other management plans, it is to be developed and implemented in consideration of other relevant environmental and social management plans.

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### **4.4.2 OBJECTIVES**

The OHSMP aims to avoid and minimize health and safety risks for all worker/personnel involved in Project activities, by providing healthy and safe working conditions. This plan will comply with Zambia's national legislation, including international best practices, World Bank's Environmental and Social Standards (ESS), ISO 45001 norms or equivalent, and funding agencies' requirements.

This plan applies to all on-site work activities during both the preconstruction and construction phases, which the contractor executes. Additionally, it covers activities from the operation phase, which ZESCO manages.

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### **4.4.3 REQUIREMENTS**

The OHSMP will be developed with consideration to:

- Relevant ZESCO environment and social management policies and commitments;
- National requirements; and
- World Bank requirements.

Contractors must review ZESCO E&S management policies and commitments in addition to any National or International requirements relevant to their (contractor's) work scope and responsibilities.

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#### **4.4.3.1 ZESCO ENVIRONMENT AND SOCIAL MANAGEMENT**

Within the Project proponent's Zambia-Tanzania Interconnector Project Environmental and Social Commitment Plan (April 2024), workers are considered as stakeholders. Hence, ZESCO is required to develop and implement an OHSMP.

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#### **4.4.3.2 NATIONAL REQUIREMENTS**

##### **OCCUPATIONAL HEALTH AND SAFETY ACT, 2010**

This is an Act to establish the Occupational Health and Safety Institute and provide for its functions; provide for the establishment of health and safety committees at workplaces and 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.

##### **EMPLOYMENT CODE ACT, NO. 3 OF 2019**

This Act was established to regulate employment; prohibit discrimination; constitute the Skills and Labour Advisory Committees and provide for their functions; provide for the engagement of persons on contracts of employment and provide for the form and enforcement of the contracts of employment; provide for employment entitlements and other benefits; provide for the protection of wages of employees; provide for the registration of employment agencies; regulate the employment of children and young persons; provide for the welfare of employees at an undertaking; provide for employment policies, procedures and codes in an undertaking.

##### **INDUSTRIAL AND LABOUR RELATIONS ACT, NO. 27 OF 1993**

This Act was established to revise the law relating to trade unions, the Zambia Congress of Trade Unions, employers' associations, the Zambia Federation of Employers, recognition agreements and collective agreements, settlement of collective disputes, strikes, lockouts, essential services, the Tripartite Labour Consultative Council, and the Industrial Relations Court. The Act specifically addresses the rights of employees with respect to trade union membership and its activities.

##### **WORKER'S COMPENSATION ACT, NO. 10 OF 1999**

The Act was implemented to make provision for the establishment and administration of a Fund for the compensation of Workers disabled by accidents or diseases contracted by such Workers in the course of their employment and for the payment of compensation to dependants of Workers who die as a result of such accidents or diseases; for the payment of contributions to such Fund by employers; for the grant of pensions and allowances to certain dependants of Workers who, being in receipt of pensions for such disablement, die from causes not connected with such accidents or diseases; for the appointment and powers of a Workers' Compensation Commissioner and the establishment and powers of a Workers' Compensation Board and an Appeal Tribunal; and matters incidental to and connected with the foregoing.

##### **SOCIAL SAFEGUARDS STANDARDS FOR THE ENERGY SECTOR (STANDARD 1 ON LABOUR AND WORKING CONDITIONS)**

According to Standard 1 of the MOE Social Safeguard Framework, developers of Projects with 25 employees or more should hire a human resource professional and a health and safety professional, suitably qualified and experienced in order to supervise and monitor compliance with labour laws and health and safety requirements.

Minimal requirements in terms of personal protective equipment (PPE) must also be complied with, including providing PPEs that are appropriate for female workers. The developer should also ensure that labour and working conditions are reflected in the ESIA and ESMP, as well as procurement, monitoring and reporting procedures.

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### 4.4.3.3 WORLD BANK REQUIREMENTS

#### ESS 2 - LABOUR AND WORKING CONDITIONS

The ESS 2 aims to:

- Promote health and safety in a workplace environment.
- Promote the fair treatment, non-discrimination, and equal opportunity for the Project's workers. It aims for inclusivity and to protect Project workers such as women, children (of working age, according to this ESS), persons living with disabilities, etc.
- Prevent all uses of forced labour and child labour. A child under the minimum age should not be employed or engaged in the Project. The labour management procedures developed and implemented by the Borrower must specify the minimum employment age. The minimum age should be 14 years unless national law specifies a higher age.
- Support the principle of freedom of association and collective bargaining for the Project's workers. It has to be applied in a manner consistent with national law.
- Provide the Project's worker with mechanisms to raise any workplace concerns.

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#### 4.4.4 MANAGEMENT MEASURES AND ACTIONS

- The Contractor is responsible for developing and implementing the OHSMP in line with the necessary working scope and related responsibilities.
- The management of Occupational Health & Safety must be in accordance with the following general performance indicators:
  - Eliminate the risks.
  - Assess the risks which cannot be avoided.
  - Reduce the risk at source.
  - Give priority to collective protective measures over individual protective measures.
  - Adapt the work to the individual, especially with regard to the design of workplaces and the choice of work equipment and production methods.
  - Implement procedures for working alone and in isolated areas (communication protocol).
  - Management and handling of hazardous products.
  - Working in confined spaces.
  - Working at heights.
  - Handling activities.
  - Driving vehicles and heavy machinery.
  - Working in the presence of hazardous energy sources.
  - Availability and use of personal protective equipment.
  - Risks associated with falling and tripping.

- Working near heavy machinery.
- Performing work on electrical equipment.
- Conducting hot works.
- Fitness to work (FTW) of the workers.

These requirements will be defined by the implementation of various measures, for which the Contractor will be responsible, throughout the different phases of the Project. Measures to ensure the best conditions for workers in terms of hygiene, health, and safety on a powerline and substation Project include:

- Informing and training workers about hazards and risks related to the expected tasks to be performed and the equipment to be handled.
- Ensure that the workers have the appropriate fitness-to-work certificates based on the task type to perform.
- Ensure that all workers have their appropriate authorisation and accreditations following the type of task to be performed.
- Describe how the worker camps, site installation, and work activities will be supplied with energy and water. This includes details about connection points to the existing system network, the use of a pumpable septic tank, power generators, and other relevant infrastructure.
- Provide appropriate personal protective equipment, including gloves, goggles, boots, helmets, and fall protection, and require their effective wearing.
- Inspect all equipment before use to ensure that it is in good working condition.
- Implement a strict lockout, tag-out procedure when servicing equipment, especially in the presence of high-voltage electrical current, and machinery.
- Adequately delineate work areas, particularly excavation and structure (pylon) lifting zones.
- Implement measures to ensure personnel safety during activities carried out with or near electrical equipment.
- Ensure adequate working hours, remuneration, and conditions for all personnel.
- Ensure flexible working hours and adjust working hours according to climate. Make medical care available to all workers/personnel throughout the project's lifetime.
- The capacities of healthcare facilities located near the Project should be assessed prior to the start of the Project. Contractors should contact healthcare facilities and the closest hospital, making sure the treatments available at those facilities are appropriate for typical workers' health issues and injuries. Establish partnerships with healthcare providers.
- Provide drinking water and sanitary facilities for all personnel in compliance with gender requirements and the number of workers.
- Implement an accident and incident reporting mechanism in compliance with World Bank procedures available to all personnel.
- Ensure that worker camps comply with hygiene rules, particularly regarding the availability of drinking water and sanitary facilities, waste management and adequate and safe energy sources (gas or electricity).
- The Contractor must ensure that no firewood or charcoal is used for cooking or heating at the worker camps. If no clean cooking technology and/or fuel is available in the community (such as gas stoves or pellet stoves), the Contractor must provide this.
- Bus tickets shall be provided for national workers to return to their families on a regular basis (ideally on pay weekends).

- Identify measures to prevent occupational illnesses associated with Project implementation.
- Make all Materials Safety Data Sheets (MSDS) available for the chemicals stored and used on-site.
- Provide a list of social and medical resources to staff and ensure that this list is known to all key personnel (human resources, supervisors, complaints management committee, etc.).
- Assist workers with physical or mental health problems, including substance abuse (e.g., hotline, physical or mental health services, etc.).
- All workers must undergo a medical check-up and obtain fitness-to-work certification before commencing their tasks. This requirement also applies to subcontractors. Additionally, all medical certificates should be made available on-site for audit purposes as required.

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#### 4.4.4.1 ACCIDENT AND INCIDENT REPORTING MECHANISM

An accident and incident reporting mechanism compliant with World Bank procedures and requirements will be implemented and disclosed to all Project personnel. It should be noted that the accident and incident reporting mechanism is complementary to the emergency preparedness and response plan (see Section 4.5). The later details the procedure for emergency events that can lead to incidents or accidents while the accident and incident reporting mechanism covers a wider range of events that may not be considered as emergencies. Reportable incidents include the following:

- Fatality: death that occur within one year of accident/incident, including resulting from occupational disease or illness.
- Lost time injury: injury or occupational disease/illness that results in workers requiring 3 or more days off or an incident that results in a member of the community needed medical treatment.
- Acts of violence or protest: intentional use of physical force against oneself or another person or against a group or community that results in or has high likelihood of resulting in injury, death, psychological harm or negative effects on the safe operation of the Project worksite.
- Disease outbreaks: occurrences of disease in excess of the normal number of cases.
- Displacement without due process: permanent or temporary displacement of individuals, families or communities from their home or land against their will and without the appropriate provisions outlined in the RAP.
- Child labour: employment of an underaged worker in connection with the Project.
- Forced labour: work or service performed involuntarily by an individual under threat of force or penalty, including any kind of involuntary or compulsory work and trafficked persons employed in connection to the Project.
- Unexpected impacts on heritage resources: impact occurring on a legally protected or internationally recognized area of cultural heritage or archaeological value that was not foreseen or predicted in the Project design or ESIA. For such incidents, the response will be based on the content of the cultural heritage management plan (see Section 4.2).
- Unexpected impacts on biodiversity resources: impact occurring on a legally protected or internationally recognized area of high biodiversity value that was not foreseen or predicted in the Project design or ESIA. This includes poaching or trafficking of critically endangered or endangered species.
- Environmental pollution incident: exceedances of emission standards to land, water, or air that have persisted for more than 24 hours and that could result in harm to the environment.

It should be noted that incidents of sensitive nature such as sexual harassment, abuse and exploitation, gender-based violence or violence/discrimination on the basis of sexual orientation, gender identity, gender expression or sex characteristics should be reported through the GBV Management Plan Procedures (see Section 4.8.6).

All other incident or accident that may have adverse effect on the environment, affected communities, the public or workers, irrespective of whether harm had occurred on that occasion should be reported through the mechanism.

An Incident Reporting Form template is provided in Appendix 4-1.

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#### **4.4.4.2 ACCIDENT AND INCIDENT RESPONSE PROCEDURE**

After any of the previous type of accident or incident is reported by workers, members of local communities or any other stakeholder, the following response procedure will be engaged:

- Secure the site: for urgent situations, the emergency response plan should be followed, and the site should be secured to ensure no further harm is caused. Relevant authorities should be notified depending on the nature of the incident/accident.
- Document the accident/incident: key information should be gathered as soon as possible, and evidence should be preserved to help with the subsequent investigation. Records to be collected include but are not limited to incident description, photographs, names and job titles of personnel involved, names of witnesses, environmental conditions at the time of the incident, descriptions of the works being undertaken at the time of the incident, etc.
- Investigation: it should be initiated as soon as possible following the incident/accident. It can be conducted by project staff or independent consultants that have qualifications appropriate to the nature, scale, severity and complexity of the incident/accident. The investigation should identify:
  - Immediate causes;
  - Underlying causes; and
  - Root causes.
- Implementation of corrective actions: based on the immediate, underlying and root causes of the incident/accident, corrective actions should be recommended to prevent recurrence. Proposed actions should be specific, measurable, actionable, realistic and timebound. Corrective actions should be consolidated in an environmental and social Safeguards Corrective Action Plan (SCAP).

The response, including the investigation findings, should be properly documented in a form such as the one provided in Appendix 4-1.

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#### **4.4.5 ROLES AND RESPONSIBILITIES**

##### **CONTRACTOR**

- Contractor is responsible for the development and implementation of the OHSMP and following its provisions during the Construction phase. As part of these requirements, the Contractor shall:
  - Provide awareness training of the plan to staff related to their day-to-day activities.
  - Regularly communicate planned construction activities to mitigate any potential non-compliances to the OHSMP.

Complete roles and responsibilities will be assigned by the Contractor during the development and implementation of the OHSMP.

The following personnel will be assigned to the management tasks of the OHSMP:

## **ENVIRONMENT, HEALTH AND SAFETY MANAGER**

- The Contractor's H&S Manager shall ensure that all actions and measures defined in the Plan are covered under the relevant Project management documents, including pre-construction and construction work schedules, plans, hazards register, procedures, method statements, and work instructions.

The EHS manager will:

- Implement and review the Project OHSMP.
- Implement and review the OHSMP in response to onsite and offsite accidents and emergencies, associated and unrelated to the Project.
- Implement and review safety initiatives.
- Implement and review the OHSMP, with consideration for potential human health risks.

## **ENVIRONMENT & SOCIAL SPECIALISTS**

- The E&S Specialists are responsible for supporting the H&S Manager in implementing and reviewing all E&S management plans, including the OHSMP, with consideration for potential human health risks, and to:
- Review the OHSMP and grievance register and respond to potential human health risks.
- Implement and review the actions related to water (and other natural resources) as well as those related to air quality, waste management and noise.
- Manage ground disturbance and other potential vector breeding sites to reduce the risk of the development of vector-related diseases.

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### **4.4.6 MONITORING**

On-going monitoring of the actions related to this plan shall be undertaken to ensure their application and efficiency. A monitoring programme(s) will be developed within this Plan by the Contractor to ensure relevance to contractor working scope and responsibilities and will serve to determine performance of the mitigation measures.

Table 4-9 proposes the occupational health and safety monitoring plan framework with identified indicators. The monitoring plan framework will need to be validated by the Contractor prior to Project implementation. It will evolve and be adapted by the Contractor over time to address any unexpected changes or impacts.

The table below lists the main E&S monitoring measures to be applied during the construction phase. It is important to note that the monitoring obligations below are meant to correlate with the Project-related impacts and mitigation measures.

**Table 4-9 Occupational Health and Safety Monitoring Plan Framework**

Monitored Component	Supervision Method	Indicators	Standards/Targets	Location	Frequency	Responsibility	Supervision
Injuries and accidents involving workers	<ul style="list-style-type: none"> <li>- Analysis of the register of workers' injuries and accidents.</li> </ul>	<ul style="list-style-type: none"> <li>- Number of workers.</li> <li>- Number of working hours.</li> <li>- Number of Total recordable cases.</li> <li>- Number of Lost Time injuries.</li> <li>- Number of days off work due to an accident.</li> <li>- Number of occupational health illnesses.</li> <li>- Number of road accidents.</li> <li>- Number of Fire incidents.</li> <li>- Total recordable cases frequency.</li> <li>- Lost time injury frequency.</li> <li>- Number of security incident.</li> <li>- Number of first aid cases.</li> <li>- Number of incidents of breaches of the code of conduct.</li> </ul>	No major injuries or accidents.	Entire Project area.	Continuously during preconstruction and construction activities.	EHS Manager	PIU
Provision and use of PPEs	<ul style="list-style-type: none"> <li>- Site visits.</li> <li>- Analysis of the register of workers' injuries and accidents</li> </ul>	<ul style="list-style-type: none"> <li>- Number and adequacy of PPEs used.</li> <li>- Number of employees using PPEs in situations that require them.</li> <li>- Availability of PPEs on work sites.</li> <li>- Number of injuries and accidents where workers were not wearing appropriate PPEs.</li> </ul>	<ul style="list-style-type: none"> <li>- All workers use appropriate PPEs.</li> <li>- PPEs are available at all work sites.</li> <li>- No major injuries or accidents caused by a lack of PPE.</li> </ul>	Entire Project area.	Continuously during preconstruction and construction activities.	EHS Manager	PIU
Provision of welfare facilities for workers	<ul style="list-style-type: none"> <li>- Analysis of work camps and facilities available for workers.</li> <li>- Site visits.</li> </ul>	<ul style="list-style-type: none"> <li>- Number of welfare facilities provided to workers.</li> <li>- Number of sanitary facilities.</li> <li>- Number of changing rooms and lockers.</li> <li>- Number of accommodation areas.</li> <li>- Number of workers using those facilities.</li> <li>- Quality of services rendered in welfare facilities.</li> </ul>	<ul style="list-style-type: none"> <li>- Welfare facilities are available to workers.</li> <li>- Workers are aware of the availability of those facilities and use them.</li> <li>- Drinking water available at all times</li> <li>- Welfare facilities well maintained.</li> </ul>	Entire Project area.	Continuously during preconstruction and construction activities.	EHS Manager	PIU

Monitored Component	Supervision Method	Indicators	Standards/Targets	Location	Frequency	Responsibility	Supervision
Child labour	<ul style="list-style-type: none"> <li>- Analysis of the register of employees.</li> <li>- Site visits to confirm employees' age.</li> </ul>	<ul style="list-style-type: none"> <li>- Number of underage workers.</li> </ul>	No underage worker.	Entire Project area.	Continuously during preconstruction and construction activities.	EHS Manager	PIU

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## 4.5 EMERGENCY PREPAREDNESS AND RESPONSE PLAN

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### 4.5.1 INTRODUCTION

The Emergency Preparedness Response Plan (EPRP) sets standard operating procedures to follow if such emergencies occur. It covers environmental risks, disasters and emergency events that could affect or pose an impending or immediate risk to human life, health, and safety, as well as properties and surrounding environment in the Project area. This includes incidents or acts that could cause harm to the workers and or nearby communities in the area of influence of the Project. This includes events such as:

- Accident at work: Injury, fatalities on site
- Road accident
- Fire
- Medical emergency (person experiencing breathing difficulties or collapse symptoms)
- Electrocutation/Electrification
- Physical aggression, vandalism
- Accidental discovery of waste or hazardous materials
- Flooding (management of excavation and drainage water associated with excavations/trenches)

The EPRP provides information and guidelines for stakeholders in the Project's response to emergency situations. While the routine functions of ZESCO or its contractors are not of an emergency nature, all employees and contractors should be prepared in their respective capacities to respond to emergencies that may threaten life, the environment, or Project integrity. This includes day-to-day obligations to assess and report any potential/actual emergency or disaster event. It requires monitoring conditions and analyzing information that could signal the onset of one or more emergencies.

This EPRP is implemented to facilitate a coordinated response to a non-routine event that exceeds the capacity of ZESCO and its contractors. Situations include, but are not limited to, emergencies that may affect workers, the public, the environment, communities, ZESCO assets, or Project integrity.

While the EPRP will be a standalone document, as with other management plans, it will be developed and implemented considering other relevant environmental and social management plans.

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### 4.5.2 OBJECTIVES

The EPRP(s) will be prepared by the Project Proponent for the Operations Phase. However, it is understood that Contractors will develop EPRPs commensurate with their scope of works.

The objectives of the EPRP are based on the requirements of relevant legislation and standards, and include the following:

- Protect Project assets, people, livestock, vegetation, wildlife and the environment from incidents and emergencies.

- Ensure that the Project responds to environmental emergencies or serious incidents in conformance with safety, maintenance, support, and administrative requirements.
- Ensure that interruptions at Project-related locations do not result in major performance loss.
- Identify the designated personnel and responsibilities for dealing with on-site and off-site environmental emergencies.
- Provide adequate information to rescue, recovery and clean-up crews, Project personnel, and government agencies in the event of an environmental emergency.
- Promote safe and effective spill clean-up and remediation.
- Conform with the ZESCO and other relevant corporate commitments.
- Comply with the emergency preparedness & response requirements of the International Finance Corporation (IFC) Performance Standards for Environmental and Social Sustainability and the associated Environment, Health and Safety (EHS) guidelines.

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### **4.5.3 REQUIREMENTS**

The EPRP will be developed with consideration to:

- Relevant ZESCO environment and social management policies and commitments;
- National requirements; and
- World Bank requirements.

Contractors must review ZESCO E&S management policies and commitments in addition to any National or International requirements relevant to their (contractor's) work scope and responsibilities.

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#### **4.5.3.1 ZESCO ENVIRONMENT AND SOCIAL MANAGEMENT**

Within the Project proponent's Zambia-Tanzania Interconnector Project Environmental and Social Commitment Plan (April 2024), article 1.6 specifically mentions the proponent's requirement of having to prepare and "ensure compliance to" the provisions of an EPRP; hence, ZESCO will need to develop and implement an EPRP.

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#### **4.5.3.2 NATIONAL REQUIREMENTS**

##### **DISASTER MANAGEMENT ACT, 2010**

- The Disaster Management Act, 2010 (Act No.13 of 2010) is the main disaster law in Zambia. It is divided into 13 key topics related to disaster risk management.
- The Zambia Health Emergency Preparedness, Response, and Resilience Project Using the Multiphase Programmatic Approach aims to strengthen health system resilience and multisectoral preparedness and response to health emergencies in Zambia.
- Occupational Health and Safety Act 2010 Under the Occupational Health and Safety Act, it is the employer's duty to ensure the health, safety, and welfare of employees while they are at the workplace.
- The Act requires that an employee be placed and kept in a work environment that aligns with the employee's physical, physiological and psychological ability. The employer must provide a work environment that is safe and without risk to the health and safety of the employees within their workplace.

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### 4.5.3.3 WORLD BANK REQUIREMENTS

#### ESS 4 - COMMUNITY HEALTH AND SAFETY

The ESS 4 recognizes that Project activities, equipment, and infrastructure can increase exposure to community risks and impacts.

The ESS 4 aims notably to:

- Have in place effective measures to address emergency events.
- Ensure that the safeguarding of personnel and property is carried out in a manner that avoids or minimizes risks to the Project-affected communities.

The ESS4 requires a Risk Hazard Assessment (RHA) to be conducted for Projects with the potential to generate emergency events. Based on the results of the RHA, an Emergency Response Plan (ERP) will be prepared in coordination with the relevant local authorities and affected communities. The ERP will include controls proportionate to the nature and scale of the hazard, identification of and secure access to emergency equipment, notification procedures for emergency responders, channels for notification of communities, training program for emergency responders including drills, coordinator for ERP implementation and measures for restoration and cleanup of the environment following any major accident.

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### 4.5.4 MANAGEMENT MEASURES AND ACTIONS

The Contractor is responsible for developing and implementing the EPRP in line with the necessary working scope and related responsibilities during the construction phase. ZESCO will also need its own EPRP for the operation phase.

The Project proponent will commit to a prevention strategy of ongoing maintenance, inventory control for hazardous and flammable materials, staff training, site security and vigilance of all aspects of work on the Project. It is the responsibility of all workers on the Project (staff and contractors) to follow the emergency preparedness and prevention requirements.

- Key components for Emergency Preparedness and Response are:
  - Incident management and communication system;
  - Emergency response plan activation;
  - Emergency resources;
  - Protection measures.

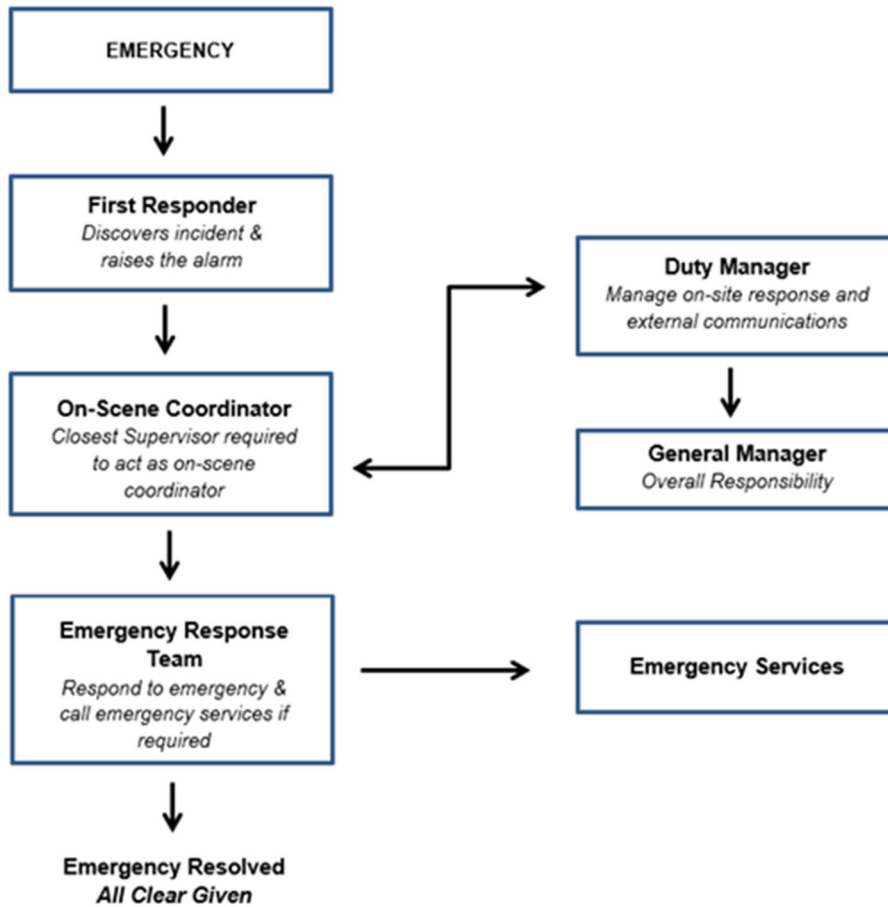
The following sections provide general emergency response procedures addressing the above components.

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#### 4.5.4.1 GENERAL ENVIRONMENTAL EMERGENCY RESPONSE PROCEDURES

Environmental emergency events can occur and develop rapidly, requiring personnel to act without obtaining guidance from supervisors. However, the individuals at the site who discover an environmental incident or emergency will only attempt to control or contain the situation if it can be done without compromising the health and safety of themselves and others, if they know the dangers associated with the materials or hazard, and if the proper Personal Protective Equipment (PPE) is available and used.

The basic response procedures with regard to an emergency event are suggested in the following flow chart (Figure 4-3).



**Figure 4-3 Response Procedure**

On discovery of an environmental incident or emergency on-site, the staff or contractor (the first responder) must raise the alarm to the On-Scene Coordinator (closest supervisor to the incident), who will undertake an initial assessment of the emergency and collect the following key information:

- The nature of the incident
- What hazards are involved
- Who is in charge
- Location of the incident
- The physical situation
- Who and what is involved (e.g., people, type of substances/materials, equipment/machinery)
- Injuries to people, if any
- Environmental/social impact

Key actions to be undertaken for the environmental emergency preparedness and prevention strategy to be implemented as early as possible are highlighted below:

- **Inventory Control** - All hazardous and flammable materials will be subject to strict inventory control and all movement or transport of hazardous materials from source to destination will be recorded in a register or chain of custody form.
- **Safety Data Sheets (SDS)** - All hazardous materials transported will have a Safety Data Sheet (SDS) accompanying the product in French and English.
- **Transport and Storage** - All hazardous material transport containers will be adapted (certified) for the hazardous materials being transported as set out in the manufacturers' SDS and storage of hazardous materials will comply with the SDS and Non-mineral Waste Management Plan.
- **Staff Reminders** - Pre-job meetings/safety meetings will be held weekly/daily to constantly remind employees about job safety and actions to improve environmental and safety performance.
- **Emergency Response Equipment** - Spill kits, fire containment and suppression materials, protective equipment, and other necessary equipment will be stored at easily accessible locations and regularly maintained and serviced.
- **A Health and Safety/Emergency Response Card** - Will be prepared and provided to all workers and contractors. This will contain an infographic setting out:
  - Key policies and procedures
  - What to do in an emergency
  - Key contacts and telephone numbers
- **Local Emergency Services and Local Administrators** - Will be apprised of the Project's environmental emergency response plans and procedures with local emergency services and local administrations.
- **Environmental Emergency Response Plans and Training** - All employees and contractors will have access to the EPRP, and appropriate training/induction provided relevant to their job description. Environmental emergency response planning/education will be included in public consultation and disclosure activities.

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#### 4.5.4.2 COMMUNITY ENVIRONMENTAL EMERGENCY PREPAREDNESS AND RESPONSE

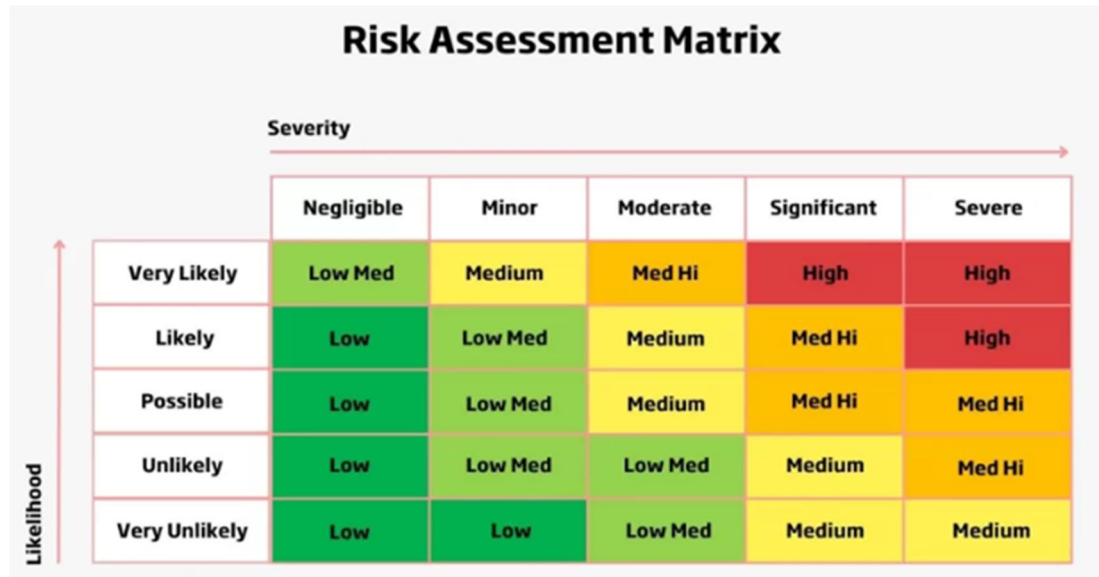
With respect to working in and in proximity to communities, the Project proponent will make information accessible to local communities and authorities on its strategy for emergency preparedness and response in the areas of:

- Transport accidents
- Security and the use of force
- Crimes and violence
- Health and well-being
- Road safety and traffic awareness
- General work activities where necessary

To minimize the impacts of emergency events on local communities, the proponent will work with communities and local administrators to identify and implement an effective emergency alert system for the Project communities. The communities will be provided with information regarding the potential hazards of Project activities and the agreed-upon Project responses and will also be sensitized to their respective responsibilities (Project vs. community responsibilities) in response to an off-site emergency.

The proponent will also explore opportunities to collaborate with communities to develop action plans for their preparedness and response during an off-site emergency.

Contractors will be expected to collaborate with the Project proponent to identify all risks related to their work responsibilities. Such risk identification will then be the subject of one or more Risk Assessment Matrix as shown below:



**Figure 4-4 Risk Assessment Matrix**

In addition to general emergency standard operating procedures, more specific or tailored procedures will be developed commensurate with Contractor responsibilities. These will then be reviewed in collaboration with the Project proponent.

The following are suggested as KPIs:

- Incident management and communication system;
- Emergency response plan activation;
- Emergency resources;
- Protection measures.

#### 4.5.4.3 INCIDENT MANAGEMENT AND COMMUNICATION SYSTEM

The Emergency Preparedness Response Plan (EPRP) must identify key stakeholders who should be notified in case of an emergency. The EPRP should also outline the available communication means, ensuring they are appropriate and adequate for each targeted stakeholder; a tiered response will need to be developed and implemented within each EPRP, whether prepared by the Contractor (Construction Phase) or the ZESCO during the Operations Phase.

The system to be developed by the Contractor will cover worker, community and media requirements as follows:

- The contractor should create an alert scheme that outlines how initial incident notifications will be managed during and outside working hours. This scheme should clearly specify who the incident witness will contact and through which communication channel.

- For workers, alarm bells, visual alarms, or other forms of communication should be used to alert them to an emergency reliably. Related measures include testing warning systems at least annually and more frequently if required by local regulations, equipment, or other considerations.
- In the event of an evacuation, appropriate evacuation signs should be in place. This also includes the Autonomous Security Lighting Block, which the contractor should maintain regularly. The contractor should designate assembly points for the workers. These assembly points may be multiple, depending on the scope of work activities. The contractor must inform all workers, including subcontractors and visitors, about the location of the assembly points from the very beginning.
- If a potential emergency arising from the construction works may put a local community at risk, the Contractor should implement communication measures to alert the community and ensure their safe evacuation.
- The Contractor and the entity in charge of the infrastructure should communicate emergency information to the media and governmental agencies.
- The contractor is responsible for creating an incident communication procedure and matrix. This document should outline the various types of incidents relevant to the Project scope. For each incident type, the contractor must identify the key stakeholders to be notified, specify the timing for notification, and determine the appropriate communication channel (e.g., phone, email, report).
- The contractor must create an emergency contact phone list and provide it to the ERP team.

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#### **4.5.4.4 EMERGENCY RESPONSE PLAN ACTIVATION**

The Contractor may be notified of an incident through various means, including a call to the on-site offices or emergency line by an employee, member of the public, a contractor, emergency services, or any other third party.

In the case of an emergency requiring activation of an emergency response as determined by the most senior manager on the site at the time, communication via a mass notification tool would be issued to all key emergency response positions and they would then be required to meet at the incident command post within a pre-set timeframe to be established by the Contractor.

Once a call comes in, it will be directed to the most senior representative present or other safety/security personnel as appropriate, who will investigate further to determine required actions.

The EPRP may be activated when:

- An emergency occurs involving any worker, visitor or community member;
- A high-severity incident occurs;
- A local emergency occurs or is imminent and requires a coordinated local response; or
- A regional emergency is declared.

The EPRP may be activated by:

- Any Contractor management or delegated representative who has direct responsibility for the asset involved;
- The first trained person at the incident site if it is determined that the incident cannot be handled by personnel on site with available equipment.

The need for an Incident Command Post may be activated:

- Based on the level of emergency and contributing factors;
- By the direction of Contractor management representative or the Emergency Response Leader;

- For any incident where emergency services (fire/police department) are dispatched;
- If the resources required to manage the incident exceed the capability of those immediately available; or
- In the event of a potentially catastrophic event occurring, where little information is known about the current situation.

The emergency response is considered to be activated when:

- A manager has assumed leadership of the command centre and declares the response is activated/open;
- Emergency response roles are being performed; and
- Emergency response activation is communicated to the Emergency Response Leader.

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#### **4.5.4.5 EMERGENCY RESOURCES**

The Contractor should ensure that the following are supplied to optimise the functionality of the Emergency Preparedness Response Plan:

- Funding for emergency response activities during both pre-construction and construction phases.
- Fire fighting capacity for small-scale fires.
- First aid responders/Paramedics for the facility as well as medical equipment suitable for the personnel, type of operation, and the degree of treatment likely to be required prior to transportation to hospital. The number of the first aid responders should be adequate to the total number of workers according to the local regulations.
- Other resources such as:
  - A list of external equipment, personnel, facilities, funding, expert knowledge, and materials that may be required to respond to emergencies; the list should include personnel with specialized expertise for spill clean-up, flood control, engineering, water treatment, environmental science, etc., or any of the functions required to adequately respond to the identified emergency.
  - Personnel who can readily call up resources as required.
  - Personnel proficiently trained in handling firefighting equipment, available on site.
  - Autonomous Security Lighting Blocks.
  - Fixed and mobile Fire extinguishers.
  - Appropriate PPE.
  - Spill containment equipment.
  - First aid kits (it is important that personnel be trained for its use).
  - Alarm system if required.

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#### **4.5.4.6 PROTECTION MEASURES**

The following protection measures should be planned and implemented by the Contractor:

- An evacuation protocol to ensure the safe evacuation of personnel and visitors in a methodical and coherent manner to facilitate the movement of people and resources toward the established assembly points.
- A safe place where all persons are to seek refuge in order to remain separated from the extant situation.

- Hazard areas to be implemented around any incident in which danger is present. This includes, but is not limited to, the area around designated emergencies, downed power lines, gas releases, damaged buildings, and locations of violence. Project personnel should be trained to limit access to the hazard area and to make these areas safe as quickly as possible by cordoning off the affected location and securing the area.
- Establish a protocol with an emergency medical service provider capable of providing medical intervention in the event of an emergency. This protocol must describe the means of intervention available from the service provider, the communication system, the duration of the intervention and the list of the various hospitals or health centers in the vicinity of the worksite that are available to receive accident victims.
- Mutualisation of means and efforts: Collaboration and resource-sharing with neighboring stakeholders in close proximity to the work activities.

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#### **4.5.4.7 POST-INCIDENT CONSIDERATIONS**

Recovery activities should be initiated as soon as the area has been declared safe. Recovery/Business Continuity planning and actions taken during response operations should be considered whenever possible.

Recovery operations should include, but not be limited to, the following:

- Restoring security and control of the site;
- Assessing structures;
- Repairing or replacing structures;
- Coordinating the restoration of utilities such as electricity and telecommunications;
- Clearing access routes;
- Restoring damaged materials and work areas;
- Maintaining the safe work zone perimeter;
- Assisting employees;
- Cleaning up debris;
- Investigating and reporting; and
- Consultation with authorities when required.

All incidents should be reported to the appropriate internal and external authorities and be thoroughly investigated to ensure the root causes are identified and corrected if possible. The Emergency Response Leader shall conduct the primary investigation. Any coordination with Emergency Services and First Responders remains the responsibility of the Project Manager.

The outcomes of all incident investigation reports should be incorporated into the risks register, especially when new hazards and risks are identified.

Particular care should be exercised in every emergency involving a fatality, serious injury, or significant private or public property damage. This is to ensure that all evidence is preserved in its original state and the custody transfer is done appropriately through the authorities. Evidence should not be distributed until permission is granted, custody transfer specifics have been clarified by relevant Insurances and Legal representatives, as well as any other law enforcement, government or regulatory agencies involved.

The Emergency Response Lead and other stakeholders should conduct an incident debrief as required to determine the causal factors and prevention measures required to avoid reoccurrence. This should include a review of the activated emergency response procedure(s) with updates as required.

Emergency response personnel should participate in external incident debrief sessions and share lessons learned, as appropriate.

All incident-related documentation should be retained for a duration to be determined by the Contractor (minimally 5 years).

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#### **4.5.5 ROLES AND RESPONSIBILITIES**

Although Contractors play a pivotal role in all Construction ESMPs, an Emergency Preparedness & Response Plan requires intrinsic involvement of the Project Proponent. As such, the proponent will be readily involved in emergency preparedness and response as required, and in consideration of the contractor's scope of work.

Stakeholders developing EPRPs must define a tiered-response approach within their EPRP(s). The intent of a tiered response is to provide a clear response approach for management by one or many of the stakeholders regarding the level (or "tier") of the emergency. Examples of criteria for activating tiered response may include:

- Life-threatening medical emergencies (i.e., cardiac arrest, unconsciousness);
- Multi-casualty incidents;
- Hazardous materials incidents (CBRNE: Chemical, Biological, Radiological, Electrical, Explosion) involving casualties and/or potential for casualties on work sites and/or in a community within the footprint of the Project.
- Large fires involving casualties and/or potential for casualties;
- Natural disasters resulting in such occurrences as building collapse.
- Vehicle collisions

Other criteria to be used in the preparation for a tiered response approach might include:

- Volume of a spill
- Area of forest degraded by a fire
- Type of ecosystem affected (sensitive environment with endangered species, etc.)

#### **CONTRACTOR**

The Contractor hired to carry out the activities related to the Project life cycle must comply with the following obligations related to this plan:

- Communicate with the Proponent and respond to issues related to the implementation of the management plan;
- Ensure that all subcontractors employ equipment, practices and methods of construction that comply with the E&S standards enunciated above, and, in general, minimize environmental damage, control waste, avoid pollution, prevent loss or damage to natural resources and minimize effects on surrounding landowners and the public.
- Implement the mitigation measures contained in the plan as well as techniques and methods to achieve management outcomes. The Contractor shall make efforts to minimize damage to the environment, control waste, avoid pollution and all other aspects that impact the environment associated with the Project; and
- Ensure the effective implementation of strategies designed to mitigate all Project impacts through communication with site staff and contractors.

- Put in place an Emergency Response Team (ERT) in charge of deploying the EPRP. The Contractor’s EPRP should be adapted to the scope of works.

In the following outline, it is ‘*suggested*’ that the composition of the Site ERT for the Project will include the following key management staff and selected employees who are dedicated and willing to submit to specialty training to assist when an emergency occurs:

- EHS Manager
- Operations Manager
- Site Services Manager
- Contracts/Procurement Manager
- Security Manager
- Community Liaison Officer (CLO)

The General Manager HSE will be responsible for selecting and training qualified and willing candidates in sufficient numbers into the Site ERT to facilitate the response programmes required by the EERP.

Personnel to be directly involved in any emergency response are the following:

### **EHS MANAGER**

- The EHS manager will be responsible for enforcing the EPRP implementation and coordinating with other management staff in responding to emergencies.
- Overall responsibility for incident communication with internal and external stakeholders.
- Review emergency preparedness and response procedures with the other Managers regularly.
- Ensure the EPRP is available and accessible to all employees and contractors.
- Ensure general training/education on emergency response procedures is provided to all employees, and key management staff and ERT undergo specialised training in line with their job functions.
- Ensure contractors and visitors are taken through an induction programme on health and safety before performing duties on site.
- Distribute the EERP to all parties with implementation responsibilities.
- Coordinate regular review and update of the EERP with the General Manager and other parties to ensure its currency with site conditions, management changes and improvements in response techniques.
- Review spill and incident reports and oversee remediation and clean-up programmes.
- Review contracts before signing to confirm EERP and OHS requirements.
- Review quarterly reports of contractor practices.
- Lead reviews or investigations into reported incidents and ensure proper response is being followed, including reporting and review.
- Maintain the emergency response equipment and supplies inventory and ensure they are in good operational order.
- Responsible for some incident communications with the public, regulatory agencies, and other stakeholders.

## HEALTH AND SAFETY SPECIALIST

This specialist will be responsible, as required, for:

- Overall responsibility for enforcing the EPRP implementation and coordinating with other management staff in responding to E&S emergencies.
- Overall responsibility for incident communication with internal and external stakeholders, especially as required when communicating with communities.
- Review emergency preparedness and response procedures with the other Managers regularly.
- Ensure the EPRP is available and accessible to all employees, contractors, and communities.
- Ensure all employees and communities receive general training/education on emergency response procedures as required.

## DUTY MANAGER

- Manage on-site response and external communications.

## SUPERVISOR (ON-SITE COORDINATION)

- Closest Supervisor to act as on-site coordinator.
- Contact and coordinate the *Emergency Response Team*.

Depending on the Contractor scope of works to be realised, additional personnel with varying roles might be assigned to the EPRP in relation to development, implementation, communication and management of emergencies.

### 4.5.6 MONITORING

The EPRP will need to be developed by the Contractor, covering the construction phase, and by ZESCO for the operation phase. A monitoring program will be developed within both plans to ensure proposed actions are implemented, all activities are documented, and any gaps in the response plan are rapidly identified and adjusted. This exercise will serve to determine the performance of the proposed actions. Table 4-10 proposes the EPR monitoring plan framework with identified indicators. The monitoring plan framework will need to be validated prior to Project implementation. It will evolve and be adapted over time to address any gaps.

The table below lists the main E&S monitoring measures to be applied. It is important to note that the monitoring obligations below are meant to correlate with the Project-related impacts and mitigation measures.

**Table 4-10 Emergency Preparedness and Response Monitoring Plan Framework**

Monitored Component	Supervision Method	Indicators	Standards/ Targets	Location	Frequency	Responsibility	Super- vision
Emergency preparedness and response plan	Analysis of the register of workers' injuries and accidents.	<ul style="list-style-type: none"><li>– Number of the extinguishers (Fixed and mobile) on site</li><li>– Number of Drills</li><li>– Number of first aid training sessions</li><li>– Number of alarm tests carried out</li><li>– Number of injured transferred to hospital</li></ul>	No major injuries or accidents.	Entire Project area.	Continuously during preconstruction and construction activities.	EHS Manager	PIU

All Managers will contribute to the monitoring of incidents/emergencies that may occur at facilities under their supervision and will document and report the same to the General Manager. The HS Manager will coordinate regular EPRP monitoring and monthly reporting across the site and submit a report to the General Manager. Reporting will include:

- 1 A summary of incidents during the reporting period;
- 2 Planned activities during the next reporting period;
- 3 Corrective actions;
- 4 Any other issues of concern.

This information will be summarized in the Annual ESMP Monitoring Report.

Contractors will develop and implement monitoring, audits, and compliance verifications and programmes commensurate with their responsibilities.

EPRP will incorporate procedures for monitoring the response to emergencies that their contracted scope may require; these should include:

- Ways to alert employees;
- Reporting emergencies;
- Evacuation when necessary;
- Designated assembly locations;
- Contact for key personnel and their telephone numbers;
- First aid and medical assistance;
- Clean-up and business resumption;
- Business continuity;
- Employee training;
- Methods for testing the various responses (drills); and
- Communication with media, communities, employees and their families (as necessary).

Contractors must consult with the proponent's Emergency Response Team for all emergency response management preparedness.

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## **4.6 RESIDUAL MATERIAL AND HAZARDOUS PRODUCTS MANAGEMENT PLAN**

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### **4.6.1 INTRODUCTION**

This Residual Material and Hazardous Products Management Plan (RMHPMP) identifies Project-specific mitigation measures to be implemented by ZESCO and the Contractor to address waste and hazardous materials management procedures. The RMHPMP provides guidance to address the environmental obligations associated with the storage, handling, and management of residual and hazardous materials.

The RMHPMP is intended to guide all waste management for the Project. Contractors and staff will comply with this RMHPMP. In some cases, contractors on the Project will be required to develop specific or tailored waste management plans for their work or contracts that comply with this RMHPMP.

The potential impacts to be managed through the RMHPMP include:

- Pollution of soils, surface water and groundwater from indiscriminate handling/disposal waste, landfill leachate or accidental spill of hazardous/non-hazardous wastes or materials.
- Loss of amenity of neighbouring areas due to litter, dust, odours, from waste handling and disposal facilities.

Compliance with the mitigation measures will reduce potential impacts from hazardous materials used and hazardous waste generated during the transmission line's construction and operation.

Mitigation of potential risks related to worker health and safety While the RMHPMP will be a standalone document, as with other management plans, it will be developed and implemented in consideration of other relevant environmental and social management plans.

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## **4.6.2 OBJECTIVES**

The objective of the RMHPMP is to reduce the risks associated with the use, storage, transportation, and disposal of waste and hazardous materials. The RMHPMP should be developed with consideration to the following:

- 1** Minimize the liabilities and environmental impacts of waste disposal by practicing:
  - I. waste avoidance and reduction at source,
  - II. promoting re-use and recycling, performing upstream non-mineral waste segregation, and
  - III. ensuring safe and secure temporary storage and handling before permanent re-use, recycling or disposal.
- 2** Remediate or manage long-term contaminated sites where investigation has demonstrated an impact or risk to the environment, and/or community health and livelihoods.
- 3** Protect the environment, and/or community health and livelihoods by preventing unauthorised releases of wastes (including hazardous materials) to surface water, groundwater, the atmosphere, and/or soil.

The objectives of the RMHPMP are then to:

- Maximize waste reduction, reuse, and recycle opportunities;
- Effective collection, segregation, storage, and disposal of non-hazardous and hazardous waste materials;
- Promote occupational and community health and safety.

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## **4.6.3 REQUIREMENTS**

The RMHPMP will be developed with consideration to:

- Relevant ZESCO environment and social management policies and commitments
- National requirements, and
- World Bank requirements

Contractors will need to review ZESCO's E&S management policies and commitments in addition to any National or International requirements relevant to their (contractor's) work scope and responsibilities.

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#### 4.6.3.1 ZESCO ENVIRONMENT AND SOCIAL MANAGEMENT

ZESCO has developed management procedures for:

- Chemicals (Management of Chemicals, Doc No: CO.14900.GNPR.00040; dated 26/06/2023,
- PCBs (poly-chlorinated hydrocarbons. Management of PCBs, Doc No: 14900.GNPR.00050; dated 26/06/2023),
- Hydrocarbons (Management of Hydrocarbons, Doc No: CO.14900.GNPR.00010; dated 26/06/2023), and
- General Waste Management Procedure (Doc No: CO.14900.GNPR.00008; dated 26/06/2023)

The RMHPMP will need to consider these procedures in addition to any National or International requirements relevant to their (contractor's) responsibilities.

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#### 4.6.3.2 NATIONAL REQUIREMENTS

##### ENVIRONMENTAL MANAGEMENT (LICENSING) REGULATIONS SI. NO. 112 OF 2013

This regulation provides for:

- 1 the protection and monitoring of air quality,
- 2 sets the procedures for managing waste, and
- 3 addresses toxic waste hazardous to the environment.

The Zambia Environmental Protection Agency issues licenses for releasing pollutants, and applications must comply with the Water Resources Management Act, follow specified criteria for wastewater, and may require groundwater monitoring wells.

The Environmental Management (Licensing) Regulations (S.I. No 112 of 2013) establishes limits for effluents and wastewater discharged into the aquatic environment in its Third Schedule. Standards are set for physical, bacteriological, chemical, metals, organics, and radioactive parameters. The standards for physical parameters are presented in Table 4-11 below. Those parameters will be respected at all times when work near water is conducted.

**Table 4-11 Physical Parameter Limits for Effluents and Waste Water Discharged into the Aquatic Environment**

Physical parameter	Unit	Limit
Temperature	°C	40
Colour	Hazen units	40
Odour	-	Must not cause any deterioration in odour as compared with natural state.
Turbidity	Nephelometer turbidity units	15
Total suspended solids	mg/L	100
Settleable matter sedimentation in 2 hours	mg/L	0.5
Total dissolved solids	mg/L	3,000
Conductivity	mS/cm	4,300

Source: Third Schedule, Environmental Management (Licensing) Regulations (S.I. No. 112 of 2013)

In terms of hazardous waste, the Seventh Schedule of the Environmental Management (Licensing) Regulations (S.I. No 112 of 2013) identifies the types of hazardous characteristics: explosive (H1), flammable liquids (H3), flammable solids (H4.1), substances liable to spontaneous combustion (H4.2), substances which emit flammable gases when in contact with water (H4.3), oxidizing substances (H5.1), organic peroxides (H5.2), poisonous substances (H6.1), infectious substances (H6.2), corrosives (H8), toxic substances (H11), and exo-toxic substances (H12). The Regulations also identify minimal requirements for handling, storing, and transporting hazardous waste.

## **BASEL CONVENTIONS**

- The Basel Convention (1992) (on the Control of Transboundary Movements of Hazardous Wastes and Their Disposal) to which Zambia has acceded (1995), controls the movement, storage, transport, treatment, reuse, recycling, recovery and final disposal of hazardous waste as well as requiring producers of hazardous waste to dispose of their waste in an environmentally responsible manner close to where it is generated.

## **STOCKHOLM CONVENTION**

- The Stockholm Convention (2004) on Persistent Organic Pollutants is a global treaty to protect human health and the environment from chemicals that remain intact in the environment for long periods, become widely distributed geographically, accumulate in the fatty tissue of humans and wildlife, and have harmful impacts on human health or on the environment. Zambia acceded to this convention in 2006.

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### **4.6.3.3 WORLD BANK REQUIREMENTS**

## **ESS 3 - RESOURCE EFFICIENCY AND POLLUTION PREVENTION AND MANAGEMENT**

The ESS 3 on resource efficiency and pollution prevention and management aims to:

- Promote the sustainable use of resources such as water, raw materials and energy.
- Avoid or minimize adverse impacts from the Project activities, Project-related emissions of short- and long-lived climate pollutants, and generation of hazardous and non-hazardous waste.
- Minimize and manage the risks and impacts related to pesticide use.

The Borrower is required to consider the conditions of the Project area and apply resource efficiency and pollution prevention measures according to the mitigation hierarchy. The measures applied must be proportionate to the risks and impacts of the Project and consistent with the Good International Industry Practice (GIIP) and World Bank Group Environmental, Health, and Safety Guidelines (EHSGs).

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### **4.6.4 WASTE STREAMS CLASSIFICATION AND IDENTIFICATION**

The Contractor will classify all waste generated by the Project according to Zambian waste management regulations, the Solid Waste Regulation and Management Act, 2018, and the Environmental Management (Licensing) Regulations, S.I. No 112 of 2013.

As a general rule, the following summarises the waste streams anticipated to be generated by the Project:

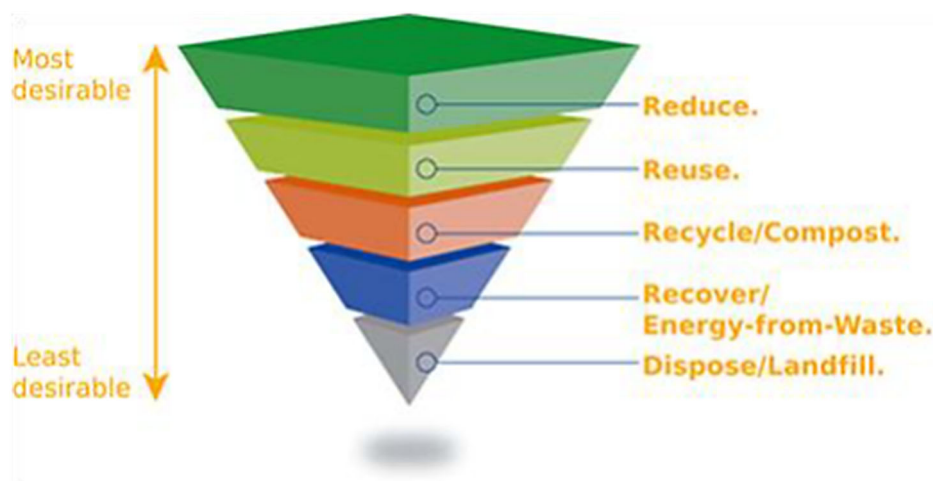
- 1 Recyclable/Reusable:** Materials (glass and plastic bottles/containers that are not contaminated, scrap iron and steel, clean wood, aluminum, etc.).
- 2 Liquid:** Wastes, including wastewater, treatment plant effluent, and oily water.
- 3 Organics:** Waste that can be composted.

- 4 **Hazardous:** Waste that must be disposed of so as to not impact the receiving environment or human health (e.g., batteries, greases/waste oil, diesel, oil filters, coolant, pesticides, contaminated soils, light ballasts, fluorescent light tubes, computer wastes, explosives, sewage sludge, etc.).
- 5 **Medical:** Waste, mainly used needles and biological waste, generated at the onsite clinic.
- 6 **Combustible:** Wastes that are considered combustible but can be incinerated when handled correctly.
- 7 **Inerts:** Solid non-combustible waste (i.e., any waste that cannot be incinerated, composted, or recycled and will be disposed of in the landfill. Note that this waste stream does not include any hazardous wastes.
- 8 **Chemicals:** chemicals will be managed as stipulated in ZESCO’s Management of chemicals management plan (Doc. No. CO. 149000.GNPR.0040).

It is recommended the Contractor develop its RMHPMP to anticipate waste volumes for each waste stream.

#### 4.6.5 MANAGEMENT MEASURES AND ACTIONS

ZESCO and the contractor will develop the RMHPMP such that waste and hazardous products management can be accomplished through hierarchical application of the practices of source reduction, re-use, recycling/recovery, treatment, and responsible disposal as illustrated below:



**Figure 4-5 Hierarchical Approach for Residual Material and Hazardous Products Management**

Management strategies for the following waste streams are suggested in the following tables:

- Non-Hazardous Waste Management (Table 4-12)
- Wastewater Management (Table 4-13)
- Hazardous Products Management (Table 4-14)
- Hazardous Waste Management (Table 4-15)
- Management of Chemicals (Table 4-16)

The various Contractors will need to develop their RMHPMP according to their work scope and anticipate waste types and waste volumes accordingly.

**Table 4-12 Non-Hazardous Waste Management**

Target	Management Measures	Performance Indicator(s) or Verification
Non-hazardous waste management	All non-hazardous camp waste shall be collected, separated for recycling, temporarily stored, transported and disposed of in accordance with Project Waste Management Plan.	As per requirement. Records of waste collected and recycling. Manifests of waste collection and disposal at selected municipal waste disposal sites.
Waste generation and recycling	<ul style="list-style-type: none"> <li>– Develop waste inventories. These inventories will be updated throughout the Project, commissioning and operations phases.</li> <li>– Stipulate the storage and disposal requirements for each waste stream.</li> <li>– Develop waste management strategies for each waste stream based on the waste management hierarchy.</li> <li>– Prepare waste management procedures for the specific scope of work and expected waste types and volumes.</li> <li>– Ensure worksites are kept free of litter and that any litter is cleaned up immediately.</li> <li>– Demonstrate efforts to reduce waste volumes, where possible, and to segregate and recycle waste where not possible.</li> </ul>	Record of waste reduction and recycling initiatives. Recycling bins on site.
Waste handling and storage	<ul style="list-style-type: none"> <li>– Comply with applicable regulatory requirements and standards regarding the design and operation of all waste storage areas (The Solid Waste Regulation and Management Act, 2018, and Environmental Management (Licensing) Regulations, 2013).</li> <li>– Segregate all waste streams at source, where practicable</li> <li>– Store all waste in appropriately designed and clearly labelled waste bins or waste containers.</li> <li>– Cover or close waste receptacles that may present an issue for the attraction of pests and other fauna.</li> <li>– Regard any unidentified wastes as hazardous waste and handle and store such waste accordingly.</li> <li>– Separate combustible wastes from ignition sources to minimize fire hazards.</li> <li>– Inspect and empty temporary waste bins/facilities regularly.</li> <li>– Securely store and contain all wastes during transport to landfill facilities. Waste transport vehicles shall be in secure skips or containers that are covered during transport.</li> </ul>	Evidence of waste storage containers. Separate bins/containers for different kinds of waste are evidence of segregation. Clear labels on bins. Evidence of waste inspection records. Evidence of inspection of waste transport vehicles.

Target	Management Measures	Performance Indicator(s) or Verification
Waste transport and disposal	<ul style="list-style-type: none"> <li>- Comply with the Zambian waste management regulations regarding waste disposal (The Solid Waste Regulation and Management Act, 2018).</li> <li>- Stipulate the storage and disposal requirements for each waste stream.</li> <li>- For items that are marketable, re-use or recycle waste materials. These materials shall be separated from the waste stream at their point of generation and stored separately for collection by an accredited recycling contractor.</li> <li>- In accordance to the legislation, where transport of waste off-site is required, use a transporter that is licensed.</li> <li>- Collect waste sufficiently frequent to ensure that there is no overloading of the temporary storage at the site.</li> <li>- Have in place the means to respond appropriately to spillages of waste anywhere along the route within a time limit acceptable to the Proponent.</li> <li>- Provide certificates of safe disposal to the Site Engineer for all wastes disposed at the waste site.</li> <li>- Where possible, dispose the waste in a discreet location at the waste site that permits deposition and closure independently of other waste so that due diligence can be verified and documented.</li> </ul>	Record of waste manifest signed by ESO Certificates of safe disposal
Burying of waste on site	Prohibit the discard or burying of waste materials on site.	No incidents of waste being buried on sites.
Specific requirements for recycling of inorganic wastes	Separate inorganic waste into appropriately labelled waste bins for recycling. Provide bins for plastics, glass, waste packaging, aluminum cans and scrap ferrous metal. Uncontaminated wood shall be made available to communities for their use (or used in a wood chipper and used for composting).	As per specification
Specific requirements - cement storage, use and disposal	Cement/aggregate shall be stored and mixed on compacted ground in designated areas. This ground shall be lifted and disposed of in a waste site as cover fill at the end of the construction phase.	As per requirement

**Table 4-13 Wastewater Management**

Target	Management Measures	Performance Indicator(s) or Verification
Effluent Disposal (oily wastewater) (irrigation)	<ul style="list-style-type: none"> <li>– Dispose of effluent in accordance with Zambian regulations on effluent water disposal requirements or World Bank Group Effluent standards, whichever is more stringent.</li> <li>– Prepare a method statement describing effluent management at Camps that shall include, but not be limited to:                             <ul style="list-style-type: none"> <li>– How effluent will be stored prior to treatment.</li> <li>– How the effluent will be treated to meet the standards required under Zambian legislation: Water Pollution Control (The Environmental Management (Licensing) Regulations, S.I. No 112 of 2013.”</li> <li>– Measures to ensure that there will be no release of polluted runoff from the site.</li> <li>– Measures to prevent erosion at any discharge point.</li> <li>– The duration of the use of the site.</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>– Method statement available and followed by staff</li> <li>– No non-conformances</li> </ul>
Potentially oil-contaminated wastewater	<ul style="list-style-type: none"> <li>– In work areas for servicing of vehicles and equipment and other tasks where oils and fuel are handled, route spillages via appropriately sized mechanical oil separators. Undertake planned maintenance activities under roofed areas to minimize contaminated stormwater.</li> </ul>	<ul style="list-style-type: none"> <li>– POC-contaminated areas contained, and drainage routed through mechanical oil traps</li> </ul>
Potentially contaminated stormwater	<ul style="list-style-type: none"> <li>– Keep potentially oil-contaminated (POC) stormwater separate from other drainage. If necessary, test and treat POC storm water to remove contaminants before being released into the environment.</li> </ul>	<ul style="list-style-type: none"> <li>– Incident reports and corrective action report where contaminated water is generated</li> </ul>
Compliance with Zambian oil and grease specifications for effluent	<ul style="list-style-type: none"> <li>– Ensure that water draining from POC areas complies with the Zambian specification for oil and grease in effluent discharged to the environment.</li> </ul>	<ul style="list-style-type: none"> <li>– Compliance with oil and grease standards for POC-wastewater released into the environment</li> </ul>
Vehicle wash bays	<ul style="list-style-type: none"> <li>– Regard heavy vehicle wash bay(s) as POC areas.</li> </ul>	<ul style="list-style-type: none"> <li>– Compliance with oil and grease standards for wastewater released into the environment</li> </ul>

Target	Management Measures	Performance Indicator(s) or Verification
Domestic wastewater (irrigation)	<ul style="list-style-type: none"> <li>– Discard grey water (kitchens) into French drains.</li> <li>– Drain sewage effluent from worker’s Camp activities to a brick or concrete-lined sump and treat it in a package sewage plant, the effluent from which shall comply with the requirements of the Zambian regulations for domestic wastewater or World Bank Group Effluent standards – whichever is more stringent.</li> <li>– Size the sewage plant in order to cater for the maximum forecast loads over the Project construction and operation periods. Undertake regular compliance monitoring of effluent quality.</li> <li>– In the event that the Contractor proposes a septic tank and soak away system, design this in accordance with a recognised standard such as ZA SANS 10400-P:2010. The septic tank shall accommodate at least three times the expected daily flow rate (approximately 90 litres per day worker) and the soak away shall meet the requirements of the standard or other recognised standards.</li> <li>– Ensure that no septic tank and soak away system is situated closer than 150 m from a community borehole.</li> <li>– For Camps and work sites, ensure that there is a sufficient complement of composting toilets available.</li> </ul>	<ul style="list-style-type: none"> <li>– Compliance with domestic wastewater specifications.</li> </ul>
Potentially oil-contaminated wastewater	<ul style="list-style-type: none"> <li>– Small quantities of POC wastewater may result from the washdown of spillages in the POC work areas at the Construction Camp. These include bunded areas for hydrocarbon storage, the bunded generator platform and areas designated for vehicle servicing and repair.</li> </ul>	<ul style="list-style-type: none"> <li>– POC-contaminated areas contained, and drainage routed through mechanical oil traps</li> </ul>

**Table 4-14 Hazardous Products Management**

Target	Management Measures	Performance Indicator(s) or Verification
General	All applicable laws, regulations, permit and approval conditions and requirements relevant to the storage and use of hazardous materials shall be complied with. All hazardous materials shall be managed safely and responsibly.	Reference to waste management in the weekly reports of the ESO
Specific requirements - disposal of unused chemical waste	Chemicals that are no longer used or are past their shelf-life date shall be stored in the hazardous waste storage area at the Camps for interim storage until disposal (toxic chemicals are normally sent to incineration).	Records of disposal
Specific requirements - pesticide use for vector control	<ul style="list-style-type: none"> <li>– Should pesticides be used to control the mosquito vector in and around worker’s camps and work sites, they shall be selected to minimize negative effects on non-target organisms.</li> <li>– The disposal of waste pesticide and pesticide containers shall be as per the ZTIP Waste Management Plan.</li> <li>– A Pest and Pesticide Management Plan must be compiled by the contractor for approval by the Environmental Manager prior to use of any chemicals.</li> </ul>	<ul style="list-style-type: none"> <li>– Records of pesticide use and eco-toxicity management</li> <li>– Records of selection procedure</li> </ul>
Location of planned maintenance facilities	<ul style="list-style-type: none"> <li>– Planned vehicle and equipment maintenance shall only be undertaken at the Construction Camp. All drainage from vehicle and machinery servicing areas shall be collected and passed through a mechanical oil separator. Waste oils and other hydrocarbon wastes shall be collected, drummed and recycled according to the requirements in the Waste Management Plan.</li> <li>– No hydrocarbon-contaminated water may be voided into the environment.</li> <li>– The Contractor shall strictly prohibit washing vehicles or other machinery or changing lubricants in rivers, streams, ponds, or other waterways.</li> </ul>	Compliance with oil and grease standards for wastewater released into the environment.
Method statement	<p>The Contractor shall prepare a Method Statement for approval by the EHS Manager, which includes an inventory of all hazardous materials that will be used on site and measures to prevent:</p> <ul style="list-style-type: none"> <li>– Soil contamination,</li> <li>– Pollution of water,</li> <li>– Accidental fires, and</li> <li>– Risk/injury to people or animals.</li> </ul>	– Method Statement as per requirement
MSDS availability	<p>The MSDSs of any hazardous chemicals/substances (including that within equipment) described in the Method Statement shall be provided to the Environmental Manager and shall be kept in the following locations:</p> <ul style="list-style-type: none"> <li>– the chemical storage area,</li> <li>– the office of the Contractor’s site manager</li> </ul>	– Inventory of hazardous materials and MSDS’s Documentation available at specified locations.
Prohibition of PCBs	Transformers and other equipment used on site shall use oils that are PCB-free.	Documented statement by Contractor regarding PCB-free equipment

Target	Management Measures	Performance Indicator(s) or Verification
Prohibition of CFCs	Refrigerants used on site shall be CFC-free.	Documented statement by Contractor regarding the use of CFC-free Refrigerants.
Location of fixed-fuel storage	Fixed fuel storage tanks shall not be located anywhere other than at the Construction Camp, approved plant yards, lay down areas or campsites.	Location of fixed fuel storage as per requirement
Enclosure and signage at fuel storage areas	<ul style="list-style-type: none"> <li>– All fixed fuel storage shall be enclosed with a security fence that has a lockable gate.</li> <li>– Signs indicating 'no smoking' 'no naked flames' and 'danger' shall be provided in appropriate languages and are to conform to a recognised standard such as the South African Bureau of Standards Code 1186 or equivalent Zambian standards.</li> <li>– The capacity of the tank and the product within the tank shall be displayed using the Emergency System detailed in SABS 0232 or a similar international code.</li> </ul>	As per enclosure and signage requirements.
Surfacing of storage areas	Fixed fuel storage shall be on a flat, impermeable surface surrounded by a bund wall capable of retaining at least 110% of the tank's volume to ensure that accidental spillage does not pollute local soil or water resources.	As per the storage requirement
Refuelling at fixed storage areas	Fuel transfer at fixed fuel storage areas shall be performed on a concrete surface draining to a mechanical oil separator. No hydrocarbon-contaminated water shall be released into the environment.	<ul style="list-style-type: none"> <li>– As per requirement.</li> <li>– Incident and corrective action records.</li> </ul>
Refuelling in the field	<p>All reasonable precautions shall be taken to prevent fuel and lubricant spills in the field during the course of construction. Measures include the following:</p> <ul style="list-style-type: none"> <li>– No overfilling of diesel bowsers</li> <li>– Regular inspections to verify that no leaking or defective refuelling equipment is brought onto site.</li> </ul> <p>Capture of any fuel spills, oils or lubricants discharged during emergency vehicle servicing on site using drip trays, containers or other appropriate containment measures.</p>	<ul style="list-style-type: none"> <li>– As per requirement</li> <li>– Incident and corrective action records</li> </ul>
Location of storage in relation to sensitive environments	<p>Chemicals, fuels, lubricating oils and any other hazardous materials shall not be stored within:</p> <ul style="list-style-type: none"> <li>– 200 m of the full seasonal extent of any river, wetland, pan or depression</li> <li>– 20 m of any stormwater drainage system</li> <li>– 100 m of any community groundwater borehole</li> </ul>	As per requirement
Health risk awareness and protective clothing	<p>The Contractor shall make his employees and subcontractors aware of the health risks associated with any hazardous substances used and appropriate safety behaviour when working with or near such substances. The Construction Contractor shall provide workers with appropriate protective clothing/equipment in case of spillages or accidents.</p> <p>The necessary awareness training (including safe handling) of such hazardous substances will also be provided to employees</p>	<ul style="list-style-type: none"> <li>– Records of training conducted</li> <li>– Provision of PPE</li> </ul>
Below ground storage	No fuel or any other chemicals shall be stored below ground (either partially or completely).	As per storage requirement

Target	Management Measures	Performance Indicator(s) or Verification
Diesel generators	Diesel power generators at the Construction Camp shall be located on a bunded impermeable surface to contain fuel spills. Diesel generators in the field shall be located on a PVC liner or drip tray to contain spills.	Spill protection around generators
Availability of spill clean-up materials	In all cases, the necessary tools and materials, including absorbent material, shovels and bags shall be readily available at the Construction Camp and work sites to clean up spills. An inventory of this equipment and its location on site shall be prepared and included in the contractor's Method Statement.	Availability of spill/drip clean-up materials at specified locations
Emergency spill kits	Key vehicles that work at the work sites for the majority of the time must be equipped with temporary sheeting/drip trays and absorbent materials in case of emergency maintenance in the field.	Sheeting/drip trays in all key vehicles
Spill management and reporting	All spills of fuels, oils or other hazardous substances shall be cleaned up and measures are taken to remediate the spill. The incident shall be reported to the ESO and an incident report completed. The ESO shall ensure that the spill is cleaned up and the incident closed out with the Contractor.	Incident and corrective action records.

**Table 4-15 Hazardous Waste Management**

Target	Management Measures	Performance Indicator(s) or Verification
Compliance with legislation	Comply with the Zambian Regulations for the management of Hazardous Wastes (Hazardous Waste Regulations (SI No.125 of 2001) and Environmental Management (Licensing) Regulations SI. No. 112 of 2013). The specifications below cover key requirements, but a full listing should be obtained from the regulations themselves.	<ul style="list-style-type: none"> <li>– Comply with the Zambian Regulations for the management of Hazardous Wastes (Hazardous Waste Regulations (SI No.125 of 2001) Environmental Management (Licensing) Regulations SI. No. 112 of 2013.</li> </ul>
Waste generation and recycling	<ul style="list-style-type: none"> <li>– Develop waste inventories. These inventories must be updated throughout the Project.</li> <li>– Stipulate the storage and disposal requirements for each waste stream.</li> <li>– Develop waste management strategies for each waste stream based on the waste management hierarchy.</li> <li>– Prepare waste management procedures for their specific scope of work and expected waste types and volumes.</li> <li>– Manage controlled waste as required by the Zambian waste regulations and Cowater International's HSE policy.</li> <li>– Demonstrate efforts to reduce waste volumes.</li> <li>– Recycle used oils and greases, where possible, or dispose of them appropriately according to the regulation.</li> </ul>	<ul style="list-style-type: none"> <li>– Record of waste reduction and recycling initiatives.</li> <li>– Recycling bins on site</li> </ul>

Target	Management Measures	Performance Indicator(s) or Verification
Waste storage and handling	<ul style="list-style-type: none"> <li>- Comply with applicable regulatory requirements and standards regarding the design and operation of all waste storage areas.</li> <li>- Segregate all waste streams at source, where practicable.</li> <li>- Line hazardous waste containers or construct of materials that are compatible with the wastes to be stored. Keep containers in good condition, free from corrosion, leaks or ruptures and sealed to prevent spillage.</li> <li>- Label hazardous waste accordingly.</li> <li>- Keep Material Safety Data Sheets (MSDS) for stored hazardous waste, where available, at the following locations:               <ul style="list-style-type: none"> <li>- the office of the Contractor's</li> <li>- the ESO's office</li> </ul> </li> <li>- Regard any unidentified wastes as hazardous waste and handle and store such waste.</li> <li>- Locate spill kits at hazardous liquid waste storage areas.</li> <li>- Handle waste chemicals in accordance with the appropriate MSDS.</li> <li>- Keep temporarily stored hazardous waste at the work sites on pallets underlain by a plastic liner.</li> <li>- Fully secure the storage area with lockable gates to prevent unauthorized access.</li> <li>- Inspect and empty hazardous waste storage facilities regularly.</li> </ul>	<ul style="list-style-type: none"> <li>- Evidence of waste storage containers.</li> <li>- Evidence of waste segregation, separate bins/containers for different kinds of waste.</li> <li>- Clear labels on bins</li> <li>- Evidence of inspection waste storage facilities/containers</li> <li>- Presence of spill kits</li> <li>- Record of MSDS for hazardous waste materials</li> <li>- Manifest of waste removal from site</li> </ul>
	<ul style="list-style-type: none"> <li>- Remove the contaminated soils to an area allocated by the ESO/HSE Manager (over a surfaced hard-standing area). Contractors shall be responsible of the management of their own contaminated soil until the following standards are met:               <ul style="list-style-type: none"> <li>- There is no hydrocarbon odour.</li> <li>- The soil particles do not coagulate as a result of hydrocarbon contamination.</li> <li>- There is no visual evidence of hydrocarbons in the soil.</li> <li>- Where there is uncertainty, the soil shall be sent for analysis.</li> <li>- Where other hazardous chemicals contaminate soils they shall be removed and disposed of as per hazardous waste disposal requirements, indicated in the MSDSs.</li> </ul> </li> </ul>	Records of treatment/disposal

**Table 4-16 Management of Chemicals**

Target	Management Measures	Performance Indicator(s) or Verification
Decanting of Chemical Substances	Chemical substances shall not be decanted into bottles or containers associated with beverages and food products (e.g., soft drinks and water bottles) even if the original labelling has been removed	— Compliance with the Procedure for Chemicals Management
Handling Chemicals	Handling/Management will be according to MSDS. Ensure the personnel assigned to handle chemicals are equipped with adequate PPE.	
Employee Awareness	Carry out drills and training sessions to ensure that employees are sensitized to the safe handling, storage, use, and disposal of the chemicals.	
Storage of chemical substances	<ul style="list-style-type: none"> <li>— Storage will be according to MSDS.</li> <li>— Store all hazardous chemical substances in impermeable and covered areas.</li> <li>— Place chemical containers on wooden pallets or dip trays to prevent possible corrosion, spills or damage to the chemical containers that may be exposed to moisture on the floor.</li> <li>— Access to the storage area shall be controlled.</li> <li>— Incompatible substances (acids, bases, flammables, oxidizers, reactive chemicals, etc.) shall be stored in separate areas.</li> <li>— Hazardous chemical substances shall not be stored together with non-hazardous chemical substances.</li> <li>— Avoid reuse of containers for different products without checking material/chemical substance compatibility.</li> <li>— Inspect containers containing chemicals regularly to check for leakages so that appropriate remedial measures are taken if any leakages are observed.</li> </ul>	

Target	Management Measures	Performance Indicator(s) or Verification
Transport of Chemical Substances	<ul style="list-style-type: none"> <li>– Any chemical substance being transported must be properly closed and sealed before being transported;</li> <li>– The transport vehicle must be appropriately equipped for the specific type of chemical substance to be transported, e.g., where required,</li> <li>– standard labels affixed, licenses to transport, spill containment measures, availability of fire extinguishers, etc.;</li> <li>– Chemical substances must be secured in such a way so as to prevent any spillage or leakage;</li> <li>– The driver and assistants responsible for the transport of chemical substances should be inducted on the clean-up of any spillage, should it occur; and</li> <li>– Respective MSDS should be available.</li> </ul>	Compliance with ZESCO's Procedure for Chemicals Management
Chemical Waste Disposal	<p>PPE shall be used when handling chemical waste as per the respective MSDS.</p> <ul style="list-style-type: none"> <li>– Empty containers for chemical substances and PPE contaminated with chemical substances must enter the hazardous waste stream and shall be managed appropriately as stated in ZESCO's Waste Management Procedure (CO.14900.GNPR.00008) according to MSDS</li> </ul>	<p>Correct use of PPE</p> <p>Compliance with Waste Management Procedure</p>

In addition, a Chemical Substance Site Register will be kept on site as an inventory control. The register will be a “live” document to be updated as required; chemical record keeping will be as stipulated in ZESCO’s Management of Chemicals Plan (Doc No.: CO.14900.GNPR.00040; Version 4).

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## 4.6.6 ROLES AND RESPONSIBILITIES

### CONTRACTOR

- Contractors are expected to develop and implement RMHPMP(s) commensurate with scope of works during the Construction Phase. Nonetheless, the responsibility of managing residual material and hazardous products resides with every staff member, contractor, or worker on the Project, who must be well-informed and/or trained on the requirements or content of this RMHPMP.
- Complete personnel required, and roles and responsibilities for implementation of the RMHPMP will be assigned by the Contractors during the development of the RMHPMP. However, the effective implementation of the RMHPMP requires a comprehensive understanding of roles and responsibilities for residual material and hazardous products management by all personnel working on the Project.

The Contractor hired to carry out the activities related to the Project life cycle must comply with the following obligations:

- Communicate with the Proponent and respond to issues related to the implementation of the management plan.
- Ensure that all subcontractors employ equipment, practices and methods of construction that comply with the E&S standards enunciated above, and, in general, minimize environmental damage, control waste, avoid pollution, prevent loss or damage to natural resources and minimize effects on surrounding landowners and the public.
- Implement the mitigation measures contained in the plan as well as techniques and methods to achieve management outcomes. The Contractor shall make efforts to minimize damage to the environment, control waste, avoid pollution and all other aspects that impact the environment associated with the Project.
- Ensure the effective implementation of strategies designed to mitigate all Project impacts through communication with site staff and contractors.

It is suggested that the following personnel be directly involved in implementing waste management procedures. Obviously, assigned personnel will depend upon the Contractor's scope of activities.

The following contractor staff will be the responsible personnel:

### ENVIRONMENT, HEALTH AND SAFETY MANAGER

The EHS manager will:

- Implement and review the Project RMHPMP.
- Implement and review the RMHPMP in response to onsite and offsite accidents and emergencies associated and unrelated to the Project.
- Implement and review initiatives and ensure the environmental waste audit and inspection programmes are carried out.
- Implement and review the RMHPMP, with consideration for potential human health risks.

## ENVIRONMENTAL AND SOCIAL SPECIALIST

The E&S specialists will be responsible for supporting the EHS Manager in implementing and reviewing all E&S management plans, including the RMHPMP, with consideration for potential human health risks, and to:

- Review the RMHPMP and worker/community grievance register related to waste management and respond to potential human health risks.
- Implement and review actions related to waste management.
- Manage ground disturbance and other potential issues related to waste management sites to reduce the risk of accidents to workers and or communities.

It is to be noted that a “Waste superintendent”, where applicable, might be necessary; this, of course, will be dependant upon the Contractor's scope of works. The waste superintendent will be responsible for the operation and management of the waste management facilities (ex.: incinerator, containment berms, landfill facilities, and open burn facilities) and protocols.

All stakeholders involved in the Project cycle will participate in required trainings and ensure competency for the implementation of the RMHPMP.

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### 4.6.7 MONITORING

A monitoring program will be developed within this Plan to ensure its proper implementation. The following are examples of monitoring various components, which the contractors will need to develop in accordance with their scopes.

For the following components listed in Table 4-17, audits will be carried out to reconcile chain-of-custody or waybills and receipts showing the final outcome of the various waste types and volumes, i.e., whether the waste type was treated according to best industry practice and the Waste Hierarchy illustrated above.

**Table 4-17 Monitoring Plan for Residual Material and Hazardous Products Management**

Monitored Component	Supervision Method	Indicators	Standards/Targets	Location	Frequency	Responsibility	Supervision
Waste (solid and wastewater)	Observing	<ul style="list-style-type: none"> <li>- Compliance report by ESO</li> <li>- Records of waste collected and recycling</li> <li>- Manifests of waste collection and disposal at selected municipal waste disposal site</li> </ul>	Absence of waste in inappropriate areas	At the construction site At the camps	Weekly	ESO	PIU
Hazardous Materials Management	Observation	<ul style="list-style-type: none"> <li>- Approved method statement for handling hazardous materials on site</li> <li>- Compliance with requirements of approved method statement</li> <li>- Inventory of hazardous materials and MSDS's Documentation available at specified locations</li> <li>- Documentation confirming PCB and CFC free equipment</li> <li>- Protection of fuel storage and camp generators as per requirement</li> <li>- Availability of spill/drip clean-up materials at specified locations</li> <li>- Incident and corrective action records</li> <li>- Provision of appropriate PPE to employees</li> <li>- Records of induction training and toolbox talks</li> <li>- Records of bioremediation</li> </ul>	<ul style="list-style-type: none"> <li>- Absence of hazardous products in inappropriate areas</li> <li>- Absence of spills</li> </ul>	Camp sites, work sites	Ongoing watching brief	<ul style="list-style-type: none"> <li>- ESO</li> <li>- EHS Manager</li> <li>- Workshop Managers</li> <li>- Camp Manager</li> </ul>	PIU
Hazardous Material Storage	Daily inspections of the status of leak-proof tanks and separators.	Compliance report by ESO	Absence of leaks and contamination	On-site Facilities, tanks, separators	Daily	ESO	PIU

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## **4.7 POLLUTION PREVENTION MANAGEMENT PLAN**

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### **4.7.1 INTRODUCTION**

The Pollution Prevention Management Plan (PPMP) will identify Project-specific mitigation measures to be implemented by ZESCO and the Contractor to address potential impacts related to pollution issues. The PPMP will guide all pollution prevention measures for the Project. Contractors and staff will conform with the developed PPMPs.

Project construction activities can generate various pollution streams that require mitigation throughout the Project cycle to prevent impacts on human health and other environmental receptors. The potential pollutants that could arise from Project activities require management to avoid negative impacts on human health and environmental receptors such as groundwater, soils, surface water, and the general ecosystem. This Pollution Prevention Management Plan (PPMP) outlines the general approach and necessary actions and measures for the overall management of pollution prevention and mitigation. It covers mainly protection of air quality and ambient noise as an important component of the pollution prevention measures are covered by the residual material and hazardous products management plan presented in section 4.6.

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### **4.7.2 OBJECTIVES**

The aim of this PPMP is to ensure that potential pollution resulting from Project activities is mitigated. Potential impacts include impacts on biodiversity, communities, workers and surrounding land use.

The guidance on pollution prevention provided in this plan is aligned with the following objectives:

- Integrate into the detailed design any equipment or components that could ensure the reduction of pollutant emission during the Project life cycle;
- change equipment or processes to eliminate or reduce pollutants emission or reduce energy use;
- eliminate or replace toxic substances or materials;
- identify any opportunities for Project activities to reuse or recycle pollutants emissions;
- improve purchasing and inventory techniques.

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### **4.7.3 REQUIREMENTS**

The PPMP will be developed with consideration to:

- Relevant ZESCO environment and social management policies and commitments
- National requirements, and
- World Bank requirements

Contractors will need to review ZESCO's E&S management policies and commitments in addition to any National or International requirements relevant to their (contractor's) work scope and responsibilities.

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#### **4.7.3.1 ZESCO ENVIRONMENT AND SOCIAL MANAGEMENT**

As stated in previous sections, the Project proponent (ZESCO) has developed management procedures for:

- Chemicals (Management of Chemicals (Doc No: CO.14900.GNPR.00040; dated 26/06/2023)
- PCBs (poly-chlorinated hydrocarbons. Management of PCBs, Doc No: 14900.GNPR.00050; dated 26/06/2023)
- Hydrocarbons (Management of Hydrocarbons, Doc No: CO.14900.GNPR.00010; dated 26/06/2023), and
- a General Waste Management Procedure (Doc No: CO.14900.GNPR.00008; dated 26/06/2023)

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#### **4.7.3.2 NATIONAL REQUIREMENTS**

##### **ENVIRONMENTAL PROTECTION AND POLLUTION CONTROL (ENVIRONMENTAL IMPACT ASSESSMENT) REGULATIONS (CAP. 204), 1997,**

These Regulations provide for procedures and requirements for compulsory Project briefs and environmental impact assessment and assessment statements. The Second Schedule sets out those Projects for which an EIA may be required. The developer of a Project shall consult with local communities prior to submission of an EIA statement. The statement includes an impact management plan containing a description of measures proposed for preventing, minimizing, or compensating for any adverse impact and enhancing beneficial effects and measures to monitor pollution.

##### **ENVIRONMENTAL MANAGEMENT ACT NO 12 OF 2011**

It provides for the sustainable management of natural resources, protection of the environment, and prevention and control of pollution.

##### **THE ENVIRONMENTAL MANAGEMENT (LICENSING) REGULATIONS, S.I. NO 112 OF 2013**

Provides for the regulation of a wide variety of matters regarding environmental protection, including air quality control, waste management, hazardous waste, and other substances harmful to the environment, such as pesticides and ozone-depleting substances.

Air quality threshold values are provided in Table 4-18 for the following parameters: SO<sub>2</sub>, NO<sub>x</sub>, CO, PM<sub>10</sub> (particulates with aerodynamic parameter <10 µm), PM<sub>2.5</sub> (particulates with aerodynamic parameter <2.5 µm), total suspended particulates (TSP), lead (Pb), dust fall, and ozone as per the Second Schedule of the Environmental Management (Licensing) Regulations (S.I. No. 112 of 2013). The World Health Organization (WHO) 2021 Global Air Quality Guidelines are also presented. When national and international standards differ, the most stringent will be applied.

**Table 4-18 Guideline Limits for Ambient Air Pollutants**

Parameter	Reference Time	Environmental Management (Licensing) Regulations (S.I. No 112 of 2013)	WHO 2021 Global Air Quality Guidelines	
Sulfur dioxide (SO <sub>2</sub> ) (µg/m <sup>3</sup> )	10 minutes	500	500	
	1 hour	350	-	
	24 hours	-	40	
SO <sub>2</sub> in combination with total suspended particles (TSP) (µg/m <sup>3</sup> )	SO <sub>2</sub>	24 hours	125	-
		6 months	50	-
	TSP	24 hours	120	-
		6 months	50	-
	PM <sub>10</sub>	24 hours	70	-
PM <sub>10</sub> (µg/m <sup>3</sup> )	24 hours	70	45	
PM <sub>2.5</sub> (µg/m <sup>3</sup> )	12 months	15	5	
Oxides of nitrogen (NO <sub>x</sub> ) (µg/m <sup>3</sup> )	1 hour	400	200	
	24 hours	150	40	
Carbon monoxide (CO) (µg/m <sup>3</sup> )	15 minutes	100	100	
	30 minutes	60	-	
	1 hour	30	35	
	8 hours	10	10	
Ambient lead (Pb) (µg/m <sup>3</sup> )	3 months	1.5	-	
	12 months	1.0	-	
Dust fall (mg/m <sup>2</sup> /day)	30 days	Residential: 250	-	
		Non-residential: 500	-	
Ozone (O <sub>3</sub> ) (µg/m <sup>3</sup> )	8 hours	120	100	

### 4.7.3.3 WORLD BANK REQUIREMENTS

#### ESS3 RESOURCE EFFICIENCY AND POLLUTION PREVENTION AND MANAGEMENT

The ESS 3 on resource efficiency and pollution prevention and management aims to:

- Promote the sustainable use of resources such as water, raw materials and energy.
- Avoid or minimize adverse impacts from the Project activities, Project-related emissions of short- and long-lived climate pollutants, and generation of hazardous and non-hazardous waste.
- Minimize and manage the risks and impacts related to pesticide use.

It is required from the Borrower to consider the conditions of the Project area, and to apply resource efficiency and pollution prevention measures according to the mitigation hierarchy. The applied measures must be proportionate to the risks and impacts of the Project, and consistent with the Good International Industry Practice (GIIP) and World Bank Group Environmental, Health and Safety Guidelines (EHSs).

#### AIR QUALITY

Air emissions guidelines are outlined in the World Health Organization (WHO) Air Quality Guidelines (WHO 2021).

## NOISE

According to the Environmental Management Act (2011), ZEMA is responsible for establishing noise levels and noise emission standards for construction sites, plants, machinery, and industrial activities, among others. However, those standards have not yet been developed. In this context, the IFC's Environmental, Health, and Safety (EHS) Guidelines (2007) regarding noise levels will be considered. It limits noise levels near residential, institutional, and educational receptors to 55 dBA during daytime (7:00 a.m. to 10:00 p.m.) and 45 dBA during nighttime (10:00 p.m. to 7:00 a.m.). Near industrial or commercial receptors, the noise limit is set at 70 dBA throughout the day.

### 4.7.4 MANAGEMENT MEASURES AND ACTIONS

The following are provided pollution prevention measures to be implemented.

**Table 4-19 Pollution Prevention Management**

Target	Managements Measures
Reduce dust and emissions generation	<ul style="list-style-type: none"> <li>– Dust caused by construction activities shall be controlled to ensure no detrimental effect on landowners, occupants, employees or the public. The contractor shall comply with the Zambian Environmental Protection and Pollution Control Act and IFC/World Bank air quality guidelines for suspended particulates and ambient pollutants. These are as follows:               <ul style="list-style-type: none"> <li>– Suspended Particulates (Zambia daily standard): 120 µg/m<sup>3</sup></li> <li>– Dust fall: 7.5 tonnes/km<sup>2</sup></li> <li>– PM<sub>10</sub>: 70 µg/m<sup>3</sup></li> <li>– PM<sub>10</sub> (IFC annual standard): 20 ug/m<sup>3</sup></li> </ul> </li> <li>– Where considered necessary by the EHS Manager the Contractor shall demonstrate compliance with the above standard by monitoring of dust using passive air quality monitoring devices.</li> <li>– Construction vehicles shall comply with speed limits and minimize haul distances.</li> <li>– Material loads shall be suitably covered and secured during transportation to prevent the scattering of soil, sand, materials or dust.</li> <li>– The Contractor shall be responsible for any clean-up resulting from the failure by employees or suppliers to properly secure transported materials.</li> <li>– Ensure trucks transporting fine granular (sand) material are equipped with a tarpaulin to cover the material during travel between material site source and work site.</li> <li>– Drop granular material as close to the ground as possible to reduce the generation of airborne particles.</li> <li>– Take necessary precautions and control measures during dry and high wind speed conditions.</li> <li>– Avoid double handling of material where possible.</li> <li>– Covering fine material stockpiles with tarpaulins/permanent covers when not in use.</li> <li>– Maintaining the stockpile moisture level to avoid further particle entrainment, if necessary.</li> </ul>
Prevent deterioration of air quality due to gaseous emissions	<ul style="list-style-type: none"> <li>– Carry out an initial emissions measurement to establish the baseline situation for comparison with future monitoring.</li> <li>– Carry out maintenance and periodic overhaul of all machinery and vehicles assigned to the work to maintain normal operating conditions, ensure the minimization of gaseous emissions, minimize risks of soil and water contamination, and comply with noise emission standards.</li> <li>– Installation, operation and maintenance of control equipment and emissions monitoring.</li> <li>– Periodic monitoring of emissions in line with contractor scope.</li> </ul>
Dust suppression	<p>Dust suppression measures to meet the standard shall include dust suppression along roads using water carts and, where necessary, 'environmentally friendly' surface binding products to achieve dust reduction. The Contractor shall ensure that sufficient watering capacity is available on site to dampen dust at all work areas and along access roads used by construction traffic, particularly in areas where there are nearby communities.</p>

Target	Managements Measures
Avoid soil pollution due to waste deposition	<ul style="list-style-type: none"> <li>– Implement the Residual Material and Hazardous Products Management Plan</li> <li>– An education and awareness program should be implemented in order to instruct all workers to properly dispose of domestic waste and raise awareness of the need to preserve the environment.</li> <li>– Collect all rubble and other construction waste;</li> <li>– Identify areas properly prepared for the storage and handling of hazardous waste (pave with concrete, ensure a slope towards a retention box or septic tank and adequately protect it from the action of stormwater).</li> </ul>
Avoid changes in water quality due to infiltration of contaminants	<ul style="list-style-type: none"> <li>– Implement the Residual Material and Hazardous Products Management Plan</li> <li>– Waste and Hazardous substances with a potential to leach must be stored on an impermeable surface in a secure, sealed facility with restricted access.</li> <li>– Materials capable of containing and cleaning up fuel or oil spills (spill kits) should be available in these areas.</li> <li>– Spills must be cleaned up immediately and contaminated soils disposed of in accordance with legislation at a licensed hazardous waste disposal facility;</li> <li>– Material Safety Data Sheets (MSDS) for all hazardous substances must be available in storage areas.</li> <li>– Procedures detailed in the MSDSs must be followed in the event of an emergency.</li> <li>– Construct a designated, signposted, concrete wash down bay that is fully contained for all excess concrete and concrete wash down (e.g., plastic lined);</li> <li>– Store hazardous materials at least 60 m away from any watercourse or wetland) in a manner that includes secondary containment and prevents interaction with other materials, the environment, and accidental tampering.</li> </ul>
Avoid unnecessary noise increase from proper equipment and vehicles management	<ul style="list-style-type: none"> <li>– Ensure communication channels are established between EHS management and potential sensitive receptors (surrounding communities) as well as road users, including, but not limited to, the following information: <ul style="list-style-type: none"> <li>– Proposed working times;</li> <li>– How long the activity is anticipated to take place;</li> <li>– What is being done, or why the activity is taking place; and</li> <li>– Contact details of a responsible person where any complaints can be lodged should there be an issue of concern.</li> </ul> </li> <li>– Ensure unnecessary traffic volumes are reduced by developing plans to optimise vehicle usage and movement.</li> <li>– Encouraging the receipt of materials during non-peak traffic hours to avoid traffic build-up and associated noise.</li> <li>– Maintain equipment and machinery, including brakes, mufflers, catalysers, and silencers, in good running condition, clean (power washed), and free of leaks, excess oil, and grease.</li> <li>– Switch off vehicles, machines, plant equipment, generators when not in use to avoid idling of vehicles.</li> <li>– Inform drivers to limit speed in sensitive areas and to limit noise from the rear panel of dumpster truck.</li> <li>– Drivers should be sensitized on noise reduction measures through an Eco-driving attitude program.</li> <li>– Equip the compressors and generators used on site with an acoustic enclosure, a noise barrier or placing them in a soundproof box. This is particularly important in areas with sensitive receptors.</li> <li>– If blasting is required, ensure noise and vibration mapping has been realized, limit load of explosives accordingly and advise local population in advance to prevent nuisances.</li> <li>– Installation of temporary noise barriers where necessary to meet targets; however, ensuring that these do not block access to community amenities, nor impede the ability of the road users to drive in a manner that would ensure the safety of themselves and others, i.e., that the barriers do not block signage, ability to view other users and for an adequate distance ahead as well as pedestrians and hazards.</li> <li>– Short-term and simple ambient noise sampling pre-construction, during intense construction activities and in response to complaints are recommended; however, if ambient noise-related grievances are received regularly, the ambient noise monitoring program should be developed and implemented to verify construction-related emission levels, identify the main sources, and develop potential actions for improvement.</li> </ul>

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## 4.7.5 ROLES AND RESPONSIBILITIES

### CONTRACTOR

- Contractors are expected to develop and implement PPMP commensurate with scope of works during the Construction Phase. Nonetheless, the responsibility of residual material and hazardous products management resides with every staff, contractor, or worker on the Project who must be well-informed and/or trained on the requirements or content of this RMHPMP.
- Complete personnel are required, and the contractors will assign roles and responsibilities for implementing the RMHPMP during the development of the PPMP. However, the effective implementation of the RMHPMP requires a comprehensive understanding of the roles and responsibilities for residual material and hazardous products management by all personnel working on the Project.

The Contractor hired to carry out the activities related to the Project life cycle must comply with the following obligations:

- Communicate with the Proponent and respond to issues related to the implementation of the management plan;
- Ensure that all subcontractors employ equipment, practices and methods of construction that comply with the E&S standards enunciated above, and, in general, minimize environmental damage, control waste, avoid pollution, prevent loss or damage to natural resources and minimize effects on surrounding landowners and the public.
- Implement the mitigation measures contained in the plan as well as techniques and methods to achieve management outcomes. The Contractor shall make efforts to minimize damage to the environment, control waste, avoid pollution and all other aspects that impact the environment associated with the Project; and
- Ensure the effective implementation of strategies designed to mitigate all Project impacts through communication with site staff and contractors.

It is suggested that the following personnel be directly involved with implementing waste management procedures. Obviously, assigned personnel will depend upon the Contractor's scope of activities.

The following contractor staff will be the responsible personnel:

### ENVIRONMENT, HEALTH AND SAFETY MANAGER

Specific responsibilities of the EHS Manager shall be as follows:

- Ensure compliance with the measures provided for in the PPMP and report to the Proponent and to ZEMA whenever necessary on the level of implementation of the PPMP;
- Ensure that subcontractors are informed and held accountable for the application of the recommendations presented in the PPMP; where necessary, the HSEQ Manager will ensure subcontractors develop their PPMP specific to their work scopes
- Ensure that the environmental parameters are monitored as per the PPMP requirements;
- Ensure that all environmental incidents are reported and investigated and that measures are in place to prevent reoccurrence;
- Provide monthly reports that include an assessment of PPMP compliance, which must be supplied to ZESCO and external stakeholders such as ZEMA or Lenders as required;
- Produce an Environmental Management Report at the end of each phase of the Project, providing an assessment of the degree of compliance with the recommendations presented in the PPMP;

- Review environmental performance, ensuring that action plans are in place to address non-compliance and that issues are investigated and reported to the appropriate levels within the organization;
- Ensuring that the environmental audit and inspection programme is carried out; and
- Ensuring that independent environmental monitoring activities are regularly conducted, the reports analyzed, and measures are implemented to address trends.

## **ALL PARTIES**

All parties shall comply with all the requirements of the ZTIP ESIA and PPMP and shall, in accordance with accepted industry standards and the World Bank policies and guidelines, employ such up to date techniques, practices and methods that will ensure compliance with the requirements and in general, minimize environmental damage, control waste, avoid pollution, prevent loss or damage to natural resources and minimize effects on surrounding landowners, occupants and the general public.

## **ENVIRONMENTAL SITE OFFICER**

The Environmental Site Officer (ESO) shall be appointed under the Contractor's staff and employed full-time for the duration of the contract phase. The ESO shall perform all tasks necessary to monitor the contractor's performance with respect to the environmental specifications in the PPMP and ensure the protection of the environment.

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### **4.7.6 MONITORING**

A monitoring programme(s) will be developed to ensure relevance to the contractor's working scope and responsibilities and to determine the mitigation measures' performance. The following are examples of monitoring components that the contractors will need to develop in line with their scopes.

**Table 4-20 Monitoring for all Project Phases**

Monitored Component	Supervision Method	Indicators	Standards/Targets	Location	Frequency	Responsibility	Supervision
Dust and air pollution	<p>Daily observation at key locations where dust is being generated near sensitive receptors</p> <p>Passive sampling, when specified by the ESO/CLO in cases where dust impact is in question either due to visible evidence of public complaint</p>	<p>Observation</p> <ul style="list-style-type: none"> <li>- ESO to monitor and log dust incidents where dust control is ineffective or only partially effective in sensitive areas.</li> <li>- Log to include time of day, period over which incident occurs, and apparent severity (low, medium, high).</li> </ul> <p>Community Concerns</p> <ul style="list-style-type: none"> <li>- Number of community complaints recorded in the Compliments and Complaints register or made directly to the CLO.</li> </ul> <p>250 mg/m<sup>2</sup>/day Quantitative Monitoring</p> <ul style="list-style-type: none"> <li>- PM<sub>10</sub> (daily): 70 ug/m<sup>3</sup></li> <li>- TSP (daily): 120 ug/m<sup>3</sup></li> <li>- PM<sub>10</sub> (IFC annual standard): 20 ug/m<sup>3</sup></li> </ul> <p>Fallout Dust: 250 mg/m<sup>2</sup>/day in residential areas and 500 mg/m<sup>2</sup>/day in non-residential areas (measured over 30 days)</p>	<p>Compliance with national and international regulations</p> <p>No grievance</p>	<p>To be based on the location of sensitive receptors in relation to construction activities.</p> <p>ESO to prioritise locations in which monitoring is required.</p>	Daily	<p>ESO</p> <p>CLO</p>	PIU

Monitored Component	Supervision Method	Indicators	Standards/Targets	Location	Frequency	Responsibility	Supervision
Dust and air pollution	Check the spraying measures at the material transportation roads for dust suppression. Visual inspection is performed to check the airborne dust, material handling, and transportation routes near the resident areas.	Compliance report by ESO	No grievance Roads adequately sprayed with water	Along transportation routes	Before the transportation of materials. During windy days	ESO	PIU
Use of water carts to suppress road and work site dust	Visual inspection is performed to check the airborne dust, material handling, and transportation routes near the resident areas.	<ul style="list-style-type: none"> <li>- Availability of sufficient water spray capacity to prevent dust</li> <li>- Absence of community complaints in Compliments and Complaints Register</li> <li>- Records of monitoring in ESO monthly reports.</li> </ul>	No grievance Monitoring reports in compliance with regulations	Along transportation routes	As required	ESO	PIU
Change in air quality due to gaseous emissions associated with Project vehicles	Weekly air quality monitoring (SOx, COx, NOx & VOC) for 24 hours. Monthly inspection of vehicle maintenance status;	<ul style="list-style-type: none"> <li>- Records of observations in ESO monthly reports</li> <li>- Updated maintenance log books.</li> <li>- (Need for use of formal monitoring equipment to be determined by ESO, based on circumstances on site.</li> <li>- Emissions monitoring log.</li> </ul>	Monitoring reports in compliance with regulations	Along transportation routes	As required.	ESO EHS Manager	PIU

Monitored Component	Supervision Method	Indicators	Standards/Targets	Location	Frequency	Responsibility	Supervision
Soil pollution due to waste deposition	<p>Daily inspection of facilities</p> <p>Semi-annual collection of soils where fuel or oil spills have occurred for contamination analysis</p> <p>Weekly inspection of waste manifests</p> <p>Monthly inspection of maintenance books</p>	<ul style="list-style-type: none"> <li>- Registration of training and awareness actions;</li> <li>- Updated waste manifests;</li> <li>- lack of waste in inappropriate areas;</li> <li>- Updated Maintenance log book.</li> </ul>	<p>Waste stored in appropriate containers</p> <p>No pollution</p>	Camps, storage areas, Project footprint	As required	ESO ESH Manager	PIU
Changes in water quality due to infiltration of contaminants	Water quality monitoring at determined points of the Project footprint and Area of Direct Impact (ADI)	<ul style="list-style-type: none"> <li>- Presence of spill cleaning kits;</li> <li>- Availability of updated and complete MSDS.</li> </ul>	No spills observed	Project footprint and Area of Direct Impact (ADI)	Monthly	ESO EHS Manager	PIU

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## 4.8 GBV MANAGEMENT PLAN

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### 4.8.1 INTRODUCTION

The main objective of this GBV management plan is to implement measures to prevent and respond to Project-related GBV and negative social impacts on the community, as well as promote gender equality and social inclusion. Further, it incorporates HIV/AIDS prevention measures referred to in the Community Health and Safety Management Plan.

As stated in section 3.1 above, the GBV Action Plan will be applied to the Project as well as to the ICBC Project so as to reduce cumulative impacts arising from successive implementation of those two Projects.

This GBV Action Plan framework follows these principles:

- Be survivor-centered: confidentiality is key; the survivor needs to receive the required psychological, paralegal, and medical support;
- Emphasize prevention: awareness is key and shall aim at workers and community members;
- Build on existing local knowledge: it is important to involve existing NGOs and other institutions from each district (VSU and One Stop Centres [OSC]) as presented in the ESIA. Be evidence-based;
- Be adaptable: the GBV framework action plan needs to be adapted to reflect site realities, adaptation (if necessary) shall be done by ZESCO once each actor is well identified and construction is planned. Each mitigation measure actor is described in the section “Actors and Activities”;
- Enable continuous monitoring and learning: the GBV action plan includes a monitoring plan.

This framework needs to be understood by the Contractors and Supervising Engineer who will take active part in the GBV management. This framework must be provided to the GBV Service Provider who will be in charge of addressing complaints related to GBV.

The framework provides room for adaptation based on site realities, constraints, and stakeholder discussions. It provides sufficient detail so that measures can be covenanted in the various contract agreements and to ensure the Contractor and Supervising Engineer comply with WB requirements and understand the issues at stake.

Significant synergy exists between the GRM and the GBV action plans; implementing the GBV cannot be done without the GRM. Accordingly, the GRM will also be applicable to the ICBC Project, as mentioned in sections 3.1 and 4.5.1.

The framework of this action plan shall be covenanted in various binding documents of the construction Contractors, Supervising Engineer, and the GBV Service Provider:

- The Terms of Reference (ToR);
- Financial and technical proposals;
- Contract agreements.

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### 4.8.2 OBJECTIVES

This plan provides a framework for the various initiatives that will be introduced to describe the key stakeholder engagement actions in mitigating GBV and other negative community impacts and creating social value and equal opportunities during the pre-construction and construction phases.

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### 4.8.3 REQUIREMENTS

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#### 4.8.3.1 NATIONAL REQUIREMENTS

##### **SOCIAL SAFEGUARD FRAMEWORK FOR THE ENERGY SECTOR, MINISTRY OF ENERGY, 2023**

**Standards 2 – Non-Discrimination and Equal Opportunities**, helps to operationalise government’s commitments and legal requirements to empower targeted citizens, including women, youth and persons with disabilities, through employment quotas and other measures to increase the participation of these groups.

**Standard 3 – Sexual Exploitation, Abuse and Harassment (SEAH)** is focused on prevention and response to GBV, focusing specifically on sexual exploitation, abuse, and harassment (SEAH), since this is a common manifestation of GBV in infrastructure Projects. It provides detailed guidance on what to include in the SEAH Action Plan and the Code of Conduct, including inappropriate relationships and SEAH against children.

**Standard 4 – Community Protection and Empowerment** provides guidance on how to prevent and mitigate negative social and gender impacts associated with labour influx such as HIV/AIDS, school dropouts, child labour and unwanted pregnancies and unsafe abortions.

##### **GENDER NATIONAL POLICY OF 2023**

The Gender National Policy’s rationale is that gender equity and equality are important for enhancing inclusive development. It anchors itself in the legal framework, most notably the Gender Equity and Equality Act, No. 22, as described below. The main objective of the Gender National Policy is to eliminate gender inequalities, including:

- 1 To eliminate all forms of Gender Based Violence (GBV);
- 2 To increase equitable access, participation and control in the economic sector;
- 3 To reduce poverty among vulnerable groups, especially women and girls;
- 4 To increase women’s participation in employment;
- 5 To increase participation of women in governance and decision-making;
- 6 To increase participation of women in science and technology, transport and infrastructure development;
- 7 To reduce gender disparities in access to education;
- 8 To facilitate access to cost-effective quality and gender-responsive health care services for all;
- 9 To increase access to clean and safe water, sanitation and hygiene services for women and girls;
- 10 To improve gender responsiveness in disability, HIV/AIDS and climate change; and
- 11 To strengthen advocacy, coordination, monitoring and evaluation of gender programmes.

##### **CHILDREN’S CODE ACT, NO. 12 OF 2022**

The Children’s Code Act criminalises child marriages and is inclusive of all children regardless of their status.

##### **CONSTITUTION (AMENDMENT) ACT, NO. 2 OF 2016**

Act No.2 provides for the equal worth of women and men and their rights to freely participate in, determine and build a sustainable political, legal, economic and social order.

## **GENDER EQUITY AND EQUALITY ACT, NO. 22 OF 2015**

The Gender Equity and Equality Act promotes gender equality, prohibits gender-based discrimination, and ensures equal opportunities for all individuals regardless of their gender. It obliges public and private bodies to develop gender action plans and implement measures to increase women's representation.

## **EMPLOYMENT CODE ACT NO. 3 OF 2019**

The Employment Code Act provides comprehensive protection against discrimination and promotes equal rights for all individuals in the workplace. It promotes affirmative action in employment and ensures equal pay and parental leave entitlement.

## **THE CITIZEN ECONOMIC EMPOWERMENT ACT NO. 3 OF 2006**

This Act establishes the Citizens Economic Empowerment Commission and aims to promote economic empowerment of targeted citizens, which includes women, youth and persons with disabilities. It obliges public and private bodies to ensure equitable representation of suitably qualified people from targeted citizens in all occupational categories and levels in the workforce.

## **ANTI GENDER-BASED VIOLENCE ACT, NO. 1 OF 2011**

The Anti Gender-Based Violence Act provides for:

- The protection of victims of gender-based violence;
- The constitution of the anti gender-based violence committee;
- The establishment of the anti gender-based violence fund; and
- Matters connected with, or incidental to, the foregoing.

This Act also provides the legal background for filing GBV complaints, supporting victims, and prosecuting perpetrators. It provides the legal basis for the police's legal actions (Police Victim Support Unit).

## **NATIONAL HIV/AIDS/STI/TB COUNCIL ACT OF 2002**

The act provides for the establishment of the HV/AIDS/STI/TB council whose main function is, according to Part ii Section 4 (1) of the Act, to coordinate and provide support to the development, monitoring and evaluation of the multi-sectoral response for the prevention and combating of the spread of HIV/AIDS, in order to reduce the personal, social and economic impacts of HIV/AIDS, STI, and TB. Other Acts include:

- National health insure act, no. 2 of 2018;
- Anti-human trafficking act, no. 11 of 2008;
- Citizen economic empowerment act, no. 3 of 2006;
- Persons with disabilities act, no. 6 of 2012;
- National youth development council act, no. 13 of 1994.

## **ANTI-HUMAN TRAFFICKING ACT NO. 11 OF 2008**

The Act aims to prevent and address human trafficking, including provisions to combat sexual exploitation and forced labour.

## **INTERNATIONAL HUMAN RIGHTS CONVENTIONS**

Zambia has ratified eight of the nine main global human rights instruments, including which all have gender implications:

- International Convention on the Elimination of All Forms of Racial Discrimination (ICERD);
- International Covenant on Civil and Political Rights (“ICCPR”) and the Optional Protocol to the International Covenant on Civil and Political Rights;
- International Covenant on Economic, Social and Cultural Rights (“ICESCR”);
- Convention on the Elimination of All Forms of Discrimination against Women (CEDAW);
- Convention against Torture and Other Cruel, Inhuman or Degrading Treatment or Punishment (CAT);
- Convention on the Rights of the Child (CRC);
- International Convention for the Protection of all Persons from Enforced Disappearance (CPED);
- Convention on the Rights of Persons with Disabilities (CRPD).

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### **4.8.3.2 INTERNATIONAL REQUIREMENTS**

#### **ESS 2 - LABOUR AND WORKING CONDITIONS**

The ESS 2 aims to notably:

- Promote health and safety in a workplace environment.
- Promote the fair treatment, non-discrimination, and equal opportunity for the Project’s workers. It aims for inclusivity and to protect Project workers such as women, children (of working age, according to this ESS), persons living with disabilities, etc.
- Prevent all uses of forced labor and child labour. A child under the minimum age should not be employed or engaged in the Project. The labor management procedures developed and implemented by the Borrower must specify the minimum employment age. The minimum age should be 14 years unless national law specifies a higher age.
- Provide the Project’s workers with mechanisms to raise any workplace concerns.

#### **ESS 4 - COMMUNITY HEALTH AND SAFETY**

The ESS 4 recognizes that Project activities, equipment, and infrastructure can increase exposure to risks and impacts for the communities. Those that are already subject to impacts from climate change may also experience an acceleration or intensification of impacts due to Project activities.

The ESS 4 addresses the health, safety, and security risks and impacts on Project-affected communities and the corresponding responsibility of Borrowers to avoid or minimize these risks and impacts. Particular attention must be given to vulnerable people.

The ESS 4 aims to:

- Anticipate and avoid adverse impacts on the health and safety of Project-affected communities during the Project life cycle.
- Promote quality and safety, and considerations relating to climate change in the design and construction of infrastructure.

- Avoid or minimize community exposure to Project-related traffic and road safety risks, diseases, and hazardous materials.
- Have in place effective measures to address emergency events.
- Ensure that personnel and property are safeguarded in a manner that avoids or minimizes risks to the Project-affected communities.

## **ESS 5 LAND ACQUISITION, RESTRICTIONS ON LAND USE AND INVOLUNTARY RESETTLEMENT**

- To avoid involuntary resettlement or, when unavoidable, minimize involuntary resettlement by exploring Project design alternatives.
- To avoid forced eviction.
- To mitigate unavoidable adverse social and economic impacts from land acquisition or restrictions on land use by: (a) providing timely compensation for loss of assets at replacement cost and (b) assisting displaced persons in their efforts to improve, or at least restore, their livelihoods and living standards, in real terms, to pre-displacement levels or to levels prevailing prior to the beginning of Project implementation, whichever is higher.
- To improve living conditions of poor or vulnerable persons who are physically displaced through the provision of adequate housing, access to services and facilities, and security of tenure.
- To conceive and execute resettlement activities as sustainable development programs, providing sufficient investment resources to enable displaced persons to benefit directly from the Project, as the nature of the Project may warrant.
- To ensure that resettlement activities are planned and implemented with appropriate disclosure of information, meaningful consultation, and the informed participation of those affected.

## **WORLD BANK - GOOD PRACTICE NOTE ADDRESSING SEXUAL EXPLOITATION AND ABUSE AND SEXUAL HARASSMENT (SEA/SH) IN INVESTMENT PROJECT FINANCING INVOLVING MAJOR CIVIL WORKS**

- Recommends that SEA/SH under the GBV umbrella is analyzed as a risk to the development Project and that specific mitigation measures are implemented.
- Provides guidelines on how to implement mitigation measures and ensure monitoring.

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### **4.8.4 MANAGEMENT MEASURES AND ACTIONS**

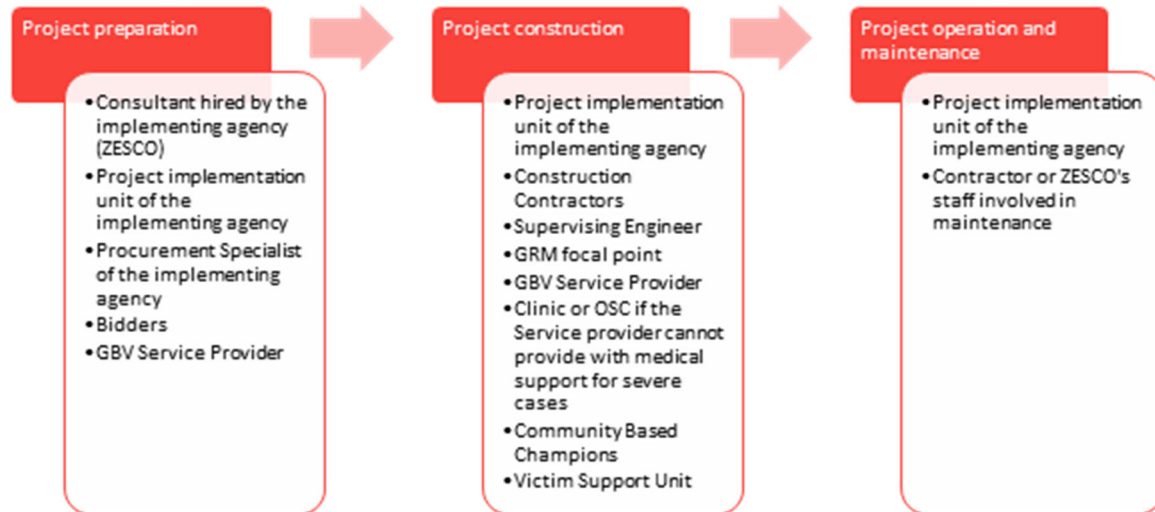
GBV preventive and corrective measures and activities involve several actors, each acting in the different phases of the Project.

The Project Actors will be required to implement measures with regards to:

- Bidding documents and Evaluation of bids;
- Resettlement;
- Worker's and Supervising Engineer Camp design;
- Labour influx;
- Code of Conduct;
- Social Awareness Programme;
- Child Labour;

- HIV/AIDS;
- Non-discrimination and Equal Opportunities.

These are discussed below.



**Figure 4-6 GBV Preventive and Corrective Measures and Activities Actors for Each Phase of the Project**

The ESIA has recommended several measures; each is further detailed in this action plan framework:

- Translating GBV measures into contractual requirements;
- Evaluating Contractors' proposals and selecting Contractors;
- In kind compensation to ensure women are not left behind;
- Proper workers and Supervising Engineer camp design;
- Management of workers' influx;
- Robust community engagement (Stakeholder Engagement Plan for the Zambia Tanzania Interconnector Project);
- Code of conduct for all workers (formal, informal, and those from Subcontractors, such as security personnel, etc.);
- Social Awareness program for all workers and community members;
- Equal employment opportunities for women, youth and persons with disabilities.

#### 4.8.4.1 TRANSLATING GBV MEASURES INTO CONTRACTUAL REQUIREMENTS

The bidding document and contracts for construction Contractors shall include social and gender measures developed in the action plan, including the Code of Conduct, the Grievance Redress Mechanism, the measures to limit worker influx, and other GBV prevention measures. The bidding documents should clearly state how adequate GBV prevention and response measures will be paid for in the contract. The responsibility for implementing many of the prevention measures must cascade down to the Contractor and Supervisor Engineer (and often Subcontractors), who have the greatest day-to-day presence on the ground and sustained interaction with affected people.

The bidding document and contract shall include clear directions on how the Contractor's Environmental and Social Management Plan (C-ESMP) shall adapt these action plan measures to become operational based on site and Project realities (the final Project design, the proposed construction method statements, the nature of the Project site, etc.).

The Procurement Specialist shall include "special selection criteria" in the bidding document, such as:

- Self-assessment of past client relationships and experience regarding gender aspects of Project construction and prevention of GBV;
- Self-assessment of relationships with surrounding communities and stakeholders presenting past claims or grievances by NGOs, by traditional authorities, vulnerable groups, and other community members;
- Past Projects involving an ESIA, ESMP, and RAP, and monitoring and auditing activities;
- The development of a Worker and Labor Management Plan in line with World Bank requirements, as well as ensuring compliance with respect to the Workers Compensation Fund Control Board (WCFCB), the National Health Insurance Management Authority (NHIMA), and the National Pension Scheme Authority (NAPSA).
- Ensure that a Letter of Clearance from the Ministry of Labor and Social Security (MLSS) is included in the evaluation and qualification criteria of the procurement documents and consider additional verification methods of HSESG performance.

The bidding document and contract for construction Contractors shall reflect the new requirements of the World Bank as highlighted in the documents "Summary of Environmental, Social, Health and Safety (ESHS) Enhancements Standard Procurement Documents (SPDs) & Standard Bidding Documents (SBDs)", World Bank Good Practice Notes on Sexual Exploitation, Abuse and Sexual harassment, Gender, and Disability and Non-discrimination and the Social Safeguard Framework of the Ministry of Energy. These documents highlight that:

- Bidders are required to make a declaration listing any civil work contracts that have been suspended or terminated for ESHS reasons.
- Bidders must submit a Code of Conduct that will apply to their employees and Subcontractors as well as their Environmental, Social, Health and Safety Policy, detailing staff in charge of E&S management. Corrective measures need to be in place in the case of GBV and GBV Service Providers need to be involved.
- Bidders must have a collective agreement in place, this could either be a Joint Industrial Council (JIC) Collective Agreement through an Employer Association or an individual agreement with the union.
- Bidders must be aware that a Contractor's Environmental and Social Management Plan (C-ESMP) will be required within a short timeframe before commencing physical work and that the C-ESMP will be reviewed and approved by the Client/Supervision Consultant (in consultation with the Design Engineers), and the World Bank before construction of the transmission line is permitted.
- Bidders will be required to provide an ESHS Performance Security in the form of a demand bank guarantee.
- A provisional sum should be included for ESHS outcomes, which would see Contractors paid for reasonable costs of implementing the ESMP (and GBV activities); bidders will then have a consistent level of funding in their bids, neutralizing the implications of underpricing or overpricing. This could be done by including line items in the bill of quantities for well-defined ESMP activities (including GBV activities).
- Bidders are required to demonstrate that they have suitably qualified ESHS specialists among their key personnel; key personnel must be named in the proposal and the contract. Lastly, the quality of the proposed ESHS specialists should be assessed during the evaluation of proposals. Bidders need to be aware that removal of personnel (and legal prosecution) may be requested if they engage in GBV or if their behavior breaches the Code of Conduct.
- Contracts must contain specific ESHS reporting requirements and mention that work will be supervised for compliance regarding E&S measures.

- Contracts must contain financial leverage. The use of contractual remedies, including suspension of disbursements and delays in payment, is recommended until there is clear evidence of an improvement in the Contractor’s performance.
- Develop an Equal Job Opportunity and Local Content Plan with a clear process to recruit women, youth, and people with disabilities in employment positions and procure goods and services for camps from local businesses. Prime contractor to have specific targets and measures related to:
 

Employment and recruitment of women, identifying targeted citizens for skilled positions through engagement with NGOs, universities and training institutions, and industry associations as part of stakeholder engagement. Adopt the following minimum employment quotas: at least 85% of the workforce will be from the local communities, 30% of the total workforce will be women, 30% of the total workforce will be youth and 5% of the total workforce will be persons with disabilities.
- Posters advertising job opportunities and encouraging women, youth and persons with disabilities to apply will be displayed at the worker camps, the work sites and in the affected communities in English and local languages.
- Organize women and people with disabilities into groups as necessary and provide training for specific line of service providing such as catering and food production, camp cleaning and maintenance, repairs to PPE and construction apparel, as examples.

Bidding documents and contracts for the Supervising Engineer (SE), including the Technical Specification, shall also include some specific measures from the ESMP and outline the SE’s E&S responsibilities. Activities and the costs of the resulting mitigation measures should be made explicit in both bidding documents and the final contract to ensure that they are, in fact, implemented:

- Requirements to foresee dedicated staff with appropriate qualifications and experience to manage and monitor specific social and environmental impacts;
- Requirements to produce regular E&S reports to assess compliance with GBV and other E&S measures;
- Ensure that the PPE requirements in the Occupational Health, Safety and Security Management Plan to be developed include an obligation to provide PPE suitable for female workers (diverse range of body shapes and sizes);
- Requirements to develop a SE Code of Conduct and to take active part in the Grievance Redress Mechanism;
- Requirements to respect ratified conventions from the International Labour Organization (such as child labor, forced labor, and all other conventions that Zambia ratified; these are presented in the ESMP);
- Requirements to respect ratified convention from the International Labour Organization, especially those related to child labor:
  - C029 - Forced Labour Convention, 1930 (No. 29);
  - C111 - Discrimination (Employment and Occupation) Convention, 1958 (No. 111);
  - C138 - Minimum Age Convention, 1973 (No. 138). Minimum age specified: 15 years;
  - C182 - Worst Forms of Child Labour Convention, 1999 (No. 182).

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#### **4.8.4.2 EVALUATING CONTRACTORS’ PROPOSAL AND SELECTING CONTRACTORS**

When evaluating bidders’ proposals, it is important to evaluate the Contractor’s GBV response and confirm, prior to finalizing the contract, the Contractor’s ability to meet the Project’s GBV requirements.

It is strongly recommended that Contractor’s self-assessment of previous relationships with surrounding communities and stakeholders be verified.

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#### 4.8.4.3 RESETTLEMENT RELATED GENDER IMPACTS

In kind compensation such as land, is usually highly recommended by lenders as World Bank. However, as detailed in the RAP, ZESCO only intends to give cash compensations. As explained in the RAP, given the context of the Project and the moderate significance of resettlement, where people will only be displaced a short distance, and given the fact that PAPs will accept cash compensation, it is considered an acceptable means to compensate PAPs. However, some women fear cash compensation would be detrimental to them because of the risk of men running away with it. To reduce risks:

- Women shall participate in the negotiation process and sign offs, as well as be aware of the amount given as compensation.
- The wife should be present during counselling, disclosure of the compensation packages, and when making compensation payments.
- ZESCO's Consent for Compensation/Disclosure form, included in the RAP, should be adapted for more than one signature in case of households in unions, including polygamous marriages. According to the Social Safeguard Standard 4 of the Ministry of Energy, documentation of ownership or occupancy and compensation payments should be issued in the names of both spouses or single heads of households as relevant.
- In cases of risk of property grabbing or impacts on female-headed households, ZESCO shall engage the GBV Service Provider to provide legal support and awareness training to village headmen to ensure displaced women have equal access to land. It is highly recommended that all compensation payments be made before beginning construction.

Lastly, to reduce the risk to female-headed households during resettlement, an awareness program will be implemented during Project preparation, aiming at Traditional Authorities (TAs) to ensure women have equal access to land.

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#### 4.8.4.4 PROPER WORKERS AND SUPERVISING ENGINEER CAMP DESIGN

The PIU shall engage with communities to select the most suitable place for the workers' camps.

Certain measures can be covenanted in future Contractor contracts, such as:

- The workers' camps shall be fenced and clearly delineated to control entrance;
- Locker rooms and latrines shall be well-lit and gender segregated and should lock from the inside;
- Posters on Anti-GBV and the GRM will be displayed at the worker camps, the work sites and in the affected communities in English and local languages, signalling to workers and the community that the Project site is an area where GBV is prohibited;
- Bus tickets shall be provided for national workers to go back to their families regularly (ideally on pay weekends);
- Unskilled labor shall be sourced from the affected communities and a local hiring plan shall be developed in the C-ESMP;
- Posters on the principles of Equal Opportunities and Non-discrimination, including the employment quotas for women, youth and persons with disabilities, will be displayed at the worker camps, the work sites and in the affected communities in recruitment centres or public areas in English and local languages, to encourage these groups to apply.

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#### 4.8.4.5 MANAGEMENT OF WORKERS' INFLUX

Workers' influx shall be managed at two levels:

- Each construction Contractor shall include, in their C-ESMP, local content measures to favour community members for unskilled jobs and this will be communicated widely to discourage movement towards the Project.
- The PIU shall carry out meetings with village headmen to sensitize them on the risk of workers' influx and on the need to report any cases of development of shantytowns.

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#### 4.8.4.6 CODE OF CONDUCT FOR ALL WORKERS (FORMAL, INFORMAL, AND THOSE FROM SUBCONTRACTORS)

The Contractors and Supervising Engineer will design, implement, maintain and monitor a Code of Conduct (CoC) (see Section 4.10) based on the following principles regarding GBV:

- The CoC must detail how the Contractors and the Supervising Engineer intend to prevent GBV, but also other forms of misconduct such as speeding on roads, drinking on site, bribery, and poaching. It must list all the prohibited activities and associate a penalty measure to each breach. The CoC shall also list actions that are criminal offences by national legislation.
- The CoC must be translated into local language and induction trainings must be given to all workers who need to sign it. The CoC shall be annexed to all workers' contracts, and the Contractor will keep the signed copy, which should be available upon inspection. Informal workers and Subcontractors are subject to the same CoC obligations as regular workers and their compliance is the Contractor's responsibility.
- A copy of the CoC shall be displayed in a location easily accessible to the community. It shall be provided in languages comprehensible to the local community and all Contractor's personnel (including Subcontractors).
- Generally, the CoC should include the following:
  - Clear definition of GBV, including SEAH, based on Zambian law and measures to address any gaps against World Bank ESS.
  - Prevention and Response Action Plan so that workers understand behavior expectations and policies.
  - Sanctions and disciplinary measures.
  - GBV Reporting tools and accountability and response protocols.
  - Support and resources to address GBV aspects.

A draft CoC is provided in Appendix F of MOE's Social Safeguard Framework.

The CoC shall include the following sections:

- 1 An introduction on commitments to comply with applicable laws, rules, and regulations, including ILO conventions, World Bank ESSs, GBV definitions and the commitment to protect the local community (including vulnerable and disadvantaged groups) and the Contractor's personnel;
- 2 A paragraph on the use of illegal substances;
- 3 A paragraph on how to interact with the local communities, members of the local communities, and any affected person(s) (for example, to convey an attitude of respect to their culture and traditions);
- 4 A paragraph describing how the Contractor commits to identifying GBV amongst his workers and Subcontractor workers;

- 5 A paragraph defining Project-related GBV risks and how the Contractor intends to prevent GBV amongst his workers and Subcontractor workers;
- 6 A paragraph presenting the procedure to address breaches to the CoC. Disciplinary sanctions should be part of a process that is entirely internal to the employer and placed under the full control and responsibility of its managers and is conducted in accordance with the applicable Zambian labor legislation and the individual worker's employment contract. Sanctions for less severe cases shall be staged as follows:
  - a. Informal warning;
  - b. Formal warning;
  - c. Additional training on the CoC;
  - d. Loss of up to one week's salary;
  - e. Suspension of employment for a determined period;
  - f. Termination of employment and referral to the police or other authorities, as warranted (in case of severe GBV the sanction must go directly to f).
- 7 A paragraph stating the commitment to protect children (i.e., including prohibitions against sexual abuse, or unacceptable behavior towards children);
- 8 A commitment to report violations of the CoC to the local law enforcement;
- 9 A commitment to collaborate with GBV Service Providers and to be audited by an external person such as the Supervising Engineer or third-party;
- 10 A commitment on non-retaliation against workers who report violations of the CoC and a GBV allegation procedure to help workers report cases of GBV;
- 11 A commitment on induction training and awareness programs, including the frequency of these trainings;
- 12 Lastly, a paragraph on how the Contractor intends to monitor GBV and the dedicated Specialist to manage ESHS issues.

All employees of contractors (including sub-contractors), supervising Engineers and other consultants with a footprint on the ground in the Project area shall sign the CoC after job orientation and induction trainings. The CoC should be written in plain language. Employees sign the CoC to indicate that they have:

- Received a copy of the CoC;
- Had the code explained to them and they have followed an induction training on GBV;
- Acknowledged that adherence to this CoC is a condition of employment;
- Understood that violations of the CoC can result in dismissal or referral to legal authorities for prosecution.

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#### **4.8.4.7 SOCIAL AWARENESS PROGRAM FOR ALL WORKERS AND COMMUNITY MEMBERS**

A Social Awareness Program is the basic requirement for all workers and community members as stipulated by the Social Safeguards Framework of the Ministry of Energy. An HIV awareness plan was also the most commonly proposed measure by community members during the 2017 rounds of public consultations.

The Social Awareness Program should cover various work-related measures (health and safety) but also the Code of Conduct, HIV/STDs, SEAH, Sexual and Reproductive Health and Rights (SRHR), and alcohol abuse, GBV and the GRM. The programme may also include training in financial literacy and joint decision-making in households and encourage workers to form saving groups among themselves or in the community. This would help reduce higher disposable income thus contributing to reducing alcohol abuse, risky sexual behaviours and GBV occurrences.

The Social Awareness Programme will comprise of induction trainings for all workers (including supervisors and managers), bi-weekly toolbox talks, quarterly refreshment trainings and community awareness meetings. The Social Awareness Programme will also be extended to the pre-construction phase by including pre-bid awareness meetings and on-boarding training for the Supervising Engineers and Contractor on the social and gender requirements, including GBV and HIV prevention and response measures.

During the induction trainings, representatives from the One Stop Centre (VSU officer, medical officer, legal officer and psycho-social counsellor) shall ideally be present to share information about the services provided by the OSCs and explain the national laws that make sexual harassment and gender-based violence a punishable offence. Discussions with the Police Victim Support Unit (VSU) in Lusaka have highlighted the fact that many Contractors refuse to involve the VSU in induction trainings. It is, therefore, important to highlight in the Contractors' contract the mandatory presence of VSU and other OSC representatives during induction training. Workers will also be sensitised on the content of the Code of Conduct as part of the induction training. Upon completion of this training, workers will be asked to sign a document confirming that they have followed the training course, and they understand the implications of the Code of Conduct. This social awareness programme and its budget shall be developed as part of the Contractor C-ESMP (see ESMP) and shall include hiring NGOs and medical staff. Identification of local clinics that offer tests for STDs and medication is also required and workers need to know where they can get tested.

Table 4-2 below provides more information about the Social Awareness Programme.

**Table 4-21 Table Social Awareness Programme Description, GBV Management Plan**

Training	Target Audience	When/ Frequency	Responsible
<b>PRE-BIDDING PHASE AND CONTRACTOR/SUPERVISING ENGINEER ON-BOARDING PHASE</b>			
Pre-bid awareness meeting on the social and gender requirements (2h) <i>Presentations from MOLSS, CEEC, ZWES, and ZPPA may be considered</i>	Bidders	Pre-bid	ZESCO
On-boarding training on the implementation, monitoring, and reporting of the social and gender requirements (4h)	Supervising Engineer	Contract award	ZESCO/GBV Service Provider
On-boarding training on the implementation, monitoring, and reporting of social and gender requirements (4h)	Senior Management of selected Contractor	Contract award	ZESCO/GBV Service Provider
<b>CONSTRUCTION PHASE: WORKPLACE</b>			
Induction Training on the social and gender requirements, including CoC (4h)	All Contractor staff	Inception	Contractor (S&G Manager)/GBV Service Provider
Toolbox talk on social and gender issues such as SEAH, Child Labour and HIV/AIDS (5-10 min)	Workers of the Contractor	Twice per week	Contractor (S&G Manager)
Refresher Training on the social and gender requirements for Managers (2h)	Managers of the Contractor	Bi-annually	ZESCO/Supervising Engineer
Refresher Training on social and gender issues for Workers (1h)	Workers	Quarterly	Contractor (S&G Manager)
<b>CONSTRUCTION PHASE: COMMUNITY</b>			
Training for GRMC members on the procedure of receiving, recording, and tracking complaints (2h)	Members of the GRMC	Prior to Contractor mobilization	ZESCO/Supervising Engineer/GBV Service Provider
Community Awareness Meetings on the social and gender requirements in the Project, the CoC and GRM (2h)	Community members	Quarterly	Contractor (S&G Manager)/GBV Service Provider

Lastly, the Contractors and Supervising Engineer must identify local clinics that offer tests for STDs and medication; workers need to know where they can get tested.

One of the main risks of GBV relates to child marriage (see impact chapter). Therefore, community sensitization shall be aimed at all community members, including young girls. This could be done at the school level with the involvement of teachers and the Ministry of Education.

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#### **4.8.4.8 MEASURES AGAINST CHILD LABOR**

The construction Contractors and Supervising Engineer shall enforce the ratified conventions from the International Labour Organization, especially those related to child labor:

- C029 - Forced Labour Convention, 1930 (No. 29);
- C111 - Discrimination (Employment and Occupation) Convention, 1958 (No. 111);
- C138 - Minimum Age Convention, 1973 (No. 138);
- C182 - Worst Forms of Child Labour Convention, 1999 (No. 182).

According to article 3 of the Minimum Age Convention, 1973 (No. 138), the minimum age for admission to any type of employment or work which, by its nature or the circumstances in which it is carried out, is likely to jeopardise the health, safety, or morals of young persons shall not be less than 18.

According to article 7, National laws or regulations may permit the employment or work of persons 13 to 15 years of age on light work which is not likely to be harmful to their health or development and not such as to prejudice their attendance at school, their participation in vocational orientation or training programmes approved by the competent authority, or their capacity to benefit from the instruction received. Construction sites are likely to be harmful to a child of 13 to 15 years of age, therefore the minimum age to work on site shall be 18.

The contractor will be required to keep copies of all employees' national identity documents to ensure that there are no underage workers.

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#### **4.8.4.9 HIV/AIDS PREVENTION MEASURES**

Integrating HIV, gender and human rights aspects into capital Projects is a key strategy in the Zambia National HIV/AIDS Strategic Framework, 2017-2022. Given the interconnection between HIV, GBV and gender, it is recommended that a holistic approach is adopted in the GBV Action Plan. Specific HIV measures to be implemented include the following:

- Provision of condoms at the toilets at all work sites and camp sites
- Behavioural Change Communication Campaign on HIV/AIDS, GBV/SEAH, gender equality (30% employment target for women), disability inclusion and other social aspects targeting communities and workplace using different methods (awareness meetings, radio, road shows, drama, social media, IEC, etc.) to be conducted quarterly at all work sites and Project-affected communities.
- Voluntary Counselling and Testing (VCT) offered quarterly at all work sites and Project-affected communities, testing for HIV/AIDS and other sexually transmitted diseases (STDs), blood pressure, and tuberculosis (TB).
- Establish contact with the Provincial AIDS Coordination Advisor (PACA) and the Districts AIDS Coordination Advisor (DACA). The PACA and DACA, in cooperation with the Districts AIDS Task Force (DAFT) and Community AIDS Task Force (CAFT), should be involved in all aspects of GBV and HIV management.

#### 4.8.4.10 NON-DISCRIMINATION AND EQUAL OPPORTUNITIES MEASURES

During the recruitment of workers, the Contractor must comply with the employment quotas for targeted citizens indicated in Ministry of Energy’s Social Safeguard Framework, stating that 30% of the workers should be women, 30% youth and 5% persons with disabilities.

Specific measure to achieve the employment quotas will be implemented by the Contractor with support from the PIU and GBV Service Provider:

- Identify targeted citizen for technical positions by engaging with NGOs, universities and training institutions, and industry associations, including the Zambia Women in Engineering Section.
- Identify targeted citizens in the community for unskilled and skilled positions, through engagement with traditional leaders and other community leaders, the District AIDS Coordination Advisor (DACA) at the local councils, and the Provincial Gender Officers under Gender Division.
- Ensure that posters with information about the employment quotas are put up on the notice board of all project sites and in the community.
- Ensure that all job adverts specifically encourage women, youth and persons with disabilities to apply.
- Conduct weekly toolbox talks to raise awareness among workers about the employment quotas and benefits of gender equality, youth participation and disability inclusion.
- Adopt the principles of universal design and reasonable adjustments principles, taking necessary measures to make the workplace accessible and supportive of disabled employees.

#### 4.8.5 ROLES AND RESPONSIBILITIES

##### 4.8.5.1 PROJECT PREPARATION

Table 4-22 presents the responsibilities of each actor during Project preparation.

**Table 4-22 GBV Action Plan Actors during Project Preparation**

Project Actors	Responsibility Regarding this Action Plan
Consultant hired by the implementing agency	The Consultant responsible for the development of this ESMP has identified potential GBV Service Providers and has met with the community to discuss ways to address Project related GBV. <i>These potential Service Providers are presented in the last section of this action plan.</i>
Project implementation unit of the implementing agency	The PIU shall supervise this action plan and take part in the following prevention measures: <ul style="list-style-type: none"> <li>– Proper workers and Supervising Engineer camp design;</li> <li>– Management of workers’ influx.</li> </ul> The PIU (or ZESCO) is responsible for compensation payment and shall, according to its internal procedure on resettlement, ensure women are involved in compensation negotiations and sign-offs.
Procurement Specialist of the implementing agency	The Procurement Specialist shall: <ul style="list-style-type: none"> <li>– translate GBV measures into contractual requirements;</li> <li>– evaluate Contractors’ proposals and include environmental and social criteria in the selection process;</li> <li>– include measures regarding workers and Supervising Engineer camp design.</li> </ul>
Bidders	Bidders shall provide their proposal considering the requirements of this action plan. This includes detailing how the Code of Conduct (CoC) will be implemented and how it will be introduced into conditions of employment and engagement, what training will be provided, how it will be monitored, and how the Contractor proposes to deal with any breaches.
GBV services provider(s)	A GBV Service Provider shall be involved during compensation and resettlement whenever a widow or female-headed household has difficulties in finding land or is a victim of property grabbing.

## 4.8.5.2 PROJECT CONSTRUCTION

Table 4-23 presents the responsibility of each actor.

**Table 4-23 GBV Actors during Project Construction**

Project Actors	Responsibility Regarding this Action Plan
Project implementation unit of the implementing agency	<p>The PIU shall supervise this action plan.            The PIU shall identify a GBV Service Provider(s) before construction based on the recommendations in this Action Plan.            The PIU shall participate in the GBV complaint team (see below for an explanation).            A social specialist and SEAH expert were added to the contractor's positions.            The PIU shall monitor the implementation of the action plan, by incorporating social and gender key performance indicators in the monthly reporting template for the Contractor.</p>
Construction Contractors	<p>The actual responsibility for implementing many of the GBV prevention measures must cascade down to the Contractor, who has the greatest day-to-day presence on the ground and sustained interaction with affected people. Contractors are also responsible for including GBV prevention measures in Subcontractors' contracts.</p> <ul style="list-style-type: none"> <li>– Contractors must design, implement, and maintain a Code of Conduct (CoC) for all workers (formal, informal, and those from Subcontractors).</li> <li>– Contractors must implement a social awareness program.</li> <li>– The Contractors must report all cases of GBV to the PIU and participate in the GBV Resolution Mechanism and take part in the GBV complaint team (see below for an explanation).</li> <li>– The Contractors must take corrective action in cases of GBV from their staff.</li> <li>– Contractors' managers must be trained on the GBV Action Plan.</li> <li>– The Contractor must engage a Social and Gender Specialist as part of their team who will take the lead in implementing the Action Plan together with the GBV and GRM Service Provider.</li> <li>– The Contractor must provide progress reports on the implementation of the action plan as part of the monthly reporting to the PIU.</li> </ul>
Supervising Engineer	<p>The Supervising Engineer will supervise the implementation of the GBV Action Plan by the Contractor and Service Provider.            The Supervising Engineer must design, implement, and maintain a Code of Conduct (CoC) for all staff.            The Supervising Engineer must implement an awareness program for all its staff.            The Supervising Engineer must engage a Social Specialist as part of its team.            The Supervising Engineer must implement a Contractor control system which includes auditing all Subcontractors to report all cases of GBV to the PIU and participate in GBV Resolution Mechanisms.            The Supervising Engineer must take corrective action in cases of GBV from his staff and take part of the GBV complaint team (see below for explanation).            The Supervising Engineer must be trained on the GBV action plan.</p>
GRM focal point	<p>The GRM focal point must liaise with the GBV Service Provider in cases of grievances related to GBV. Once in place, they must be trained on collecting GBV allegations.</p>
GBV Service Provider(s)	<p>The main preventive and corrective measures developed in the ESIA relate to the involvement of GBV Service Provider(s).            In close cooperation with the Contractor's Social Specialist and SEAH Expert, the GBV Service Provider shall be responsible for:</p> <ul style="list-style-type: none"> <li>– training the main Project actors in GBV, HIV and other social aspects, these are the Contractors and the Supervising Engineer;</li> <li>– carrying out awareness with the community, including in schools; for this purpose, the Service Provider shall liaise with local teachers to determine the best approach to sensitization at the school level;</li> <li>– developing a GBV Allegation Procedure to receive and handle GBV complaints either directly or indirectly through the GRM committee;</li> <li>– assessing the nature of complaints;</li> <li>– providing the victim with support which should include advice and referral on health services and psychological and legal support;</li> <li>– communicating with the PIU and the World Bank on the case;</li> <li>– proposing for the appropriate remedy to be applied to the perpetrator through a GBV Resolution Mechanism;</li> <li>– liaising with the relevant district-level agencies that could provide support during awareness and sensitization such as OSCs, VSUs and Ministry of Community Development and Social Services.</li> </ul>

Project Actors	Responsibility Regarding this Action Plan
One Stop Centres (OSCs)	In districts where fully operational OSCs are present in the health clinics, survivors of GBV will be provided with all services (medical, police, legal and psychosocial support) in the same facility. The Victim Support Unit representative of the OSC will play an important role in creating awareness and managing complaints (see details below).
Health clinic	The clinic shall provide necessary medical support for cases that require medical assistance and emergency treatment.
Community Based Champions	Community Based Champions are well respected community members that can be selected to become informants for the GRM focal point and the GBV Service Provider. They must be trained on the GBV action plan.
Victim Support Unit from the Police	The VSU shall be integrated into this action plan. They shall be involved at two levels: <ul style="list-style-type: none"> <li>– Induction training with all workers: it is recommended that the GBV Service Provider engages the VSU to conduct part of the induction training and that police officers be wearing their uniform to ensure workers understand the law regarding GBV;</li> <li>– Take part in the GBV complaint team and ensure legal prosecution in case of unlawful acts (see below for explanation).</li> </ul>
Provincial AIDS Coordination Advisors (PACA) and District AIDS Coordination Advisors (DACA)	The PACA's work under of National Aid Council and are responsible for overseeing and monitoring the HIV/AIDS activities in the provinces. The DACAs are situated in the local councils and are responsible for mainstreaming of HIV/AIDS, gender and human rights at district level. They should work closely with the Contractor and GBV Service Provider.

## BOX 7. SEAH ACTION PLAN

The Action Plan needs to include specific **arrangements** for the Project by which GBV/SEAH risks will be addressed. This includes considerations such as:

- Awareness raising strategy, which describes (i) how workers and local communities will be sensitized to SEAH risks and (ii) the worker's responsibilities under the CoC;
- How the Project will provide information to employees and the community on how to report cases of SEAH in violation of the CoC to the GRM;
- The GRM process for notifying the Contractor of allegations;
- GBV service providers to which GBV survivors, including SEAH survivors, will be referred, as well as the services that will be available. See the [GBV Dashboard](#);
- Plans to coordinate with others working on GBV and SEAH in the community and district, such as NGOs, churches, and health clinics.

The SEAH Action Plan should include an **Accountability and Response Framework** detailing how SEAH allegations will be handled. The framework should include, as a minimum,:

- How allegations will be handled, in what timeframe, and the range of possible disciplinary actions for violation of the CoC by workers, taking account of due process;
- Protocols on responding to survivors, applying the survivor-centred approach, including a referral pathway to refer survivors to appropriate support services;
- Procedures that clearly lay out confidentiality requirements for dealing with cases;
- Specific provisions to address allegations involving children who are survivors of SEAH;
- Procedures for review of complaints or incident reports.

Protocols for protection of whistleblowers and prohibition on retaliation against survivors.

#### 4.8.6 GBV MANAGEMENT PLAN PROCEDURE

The following Figure 4-6 identifies the overall GBV plan procedure. It illustrates the dissemination of information on the GBV Action Plan (stage A and B), detection of GBV (stages 1, 3 and 4), involving GBV Service Provider (stages 5 and 6), providing support to the survivor (stage 2) and GBV Resolution Mechanism (stages 7 to 12).

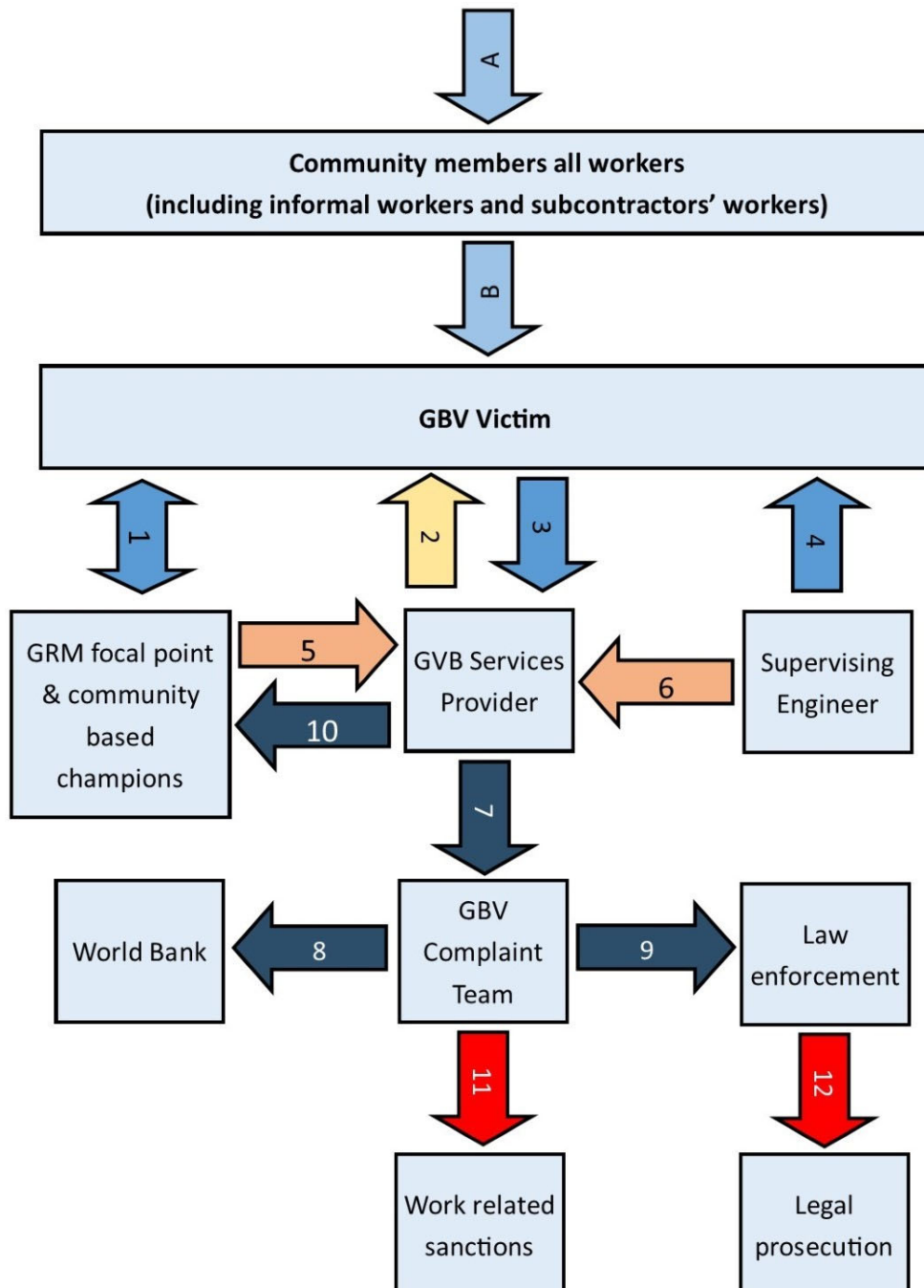


Figure 4-7 GBV Action Plan Overall Procedure

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#### **4.8.6.1 DISSEMINATING INFORMATION ON THE GBV ACTION PLAN**

This stage is represented by Letters A and B.

It is important that the GBV action plan be disseminated and publicly announced so that people are aware that there are remedies for GBV and a procedure in place (A). Normally, this awareness campaign is to be done by a GBV Service Provider.

During these awareness campaigns, the term GBV shall be defined, and clear examples of GBV shall be presented so that people understand the scope of the action plan and what defines a GBV survivor (B). The overall procedure shall also be presented during these campaigns.

Best practices recommend not limiting the scope of the action plan to survivors of workers but also including all GBV, whether it is directly related to the action of workers (non-community members) or not. GBV survivors within households of the study area also need to be included in the action plan. The scope shall also go beyond the specific location where civil works are taking place into the wider Project adjoining communities since workers are highly mobile.

The GRM, including the GRM for GBV, shall also be promoted to local communities, workers, and all stakeholders. The Project actors involved in the Stakeholder Engagement Plan must provide information to employees and the community on how to report cases of GBV.

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#### **4.8.6.2 DETECTING GBV**

This stage is represented by Numbers 1, 3, and 4.

It is important that all social and gender related incidents such as GBV, discrimination, labour exploitation should be reported and investigated. In order to detect GBV, three mechanisms shall be in place:

- 1** GBV Allegation Procedures (3) that needs to be publicly presented during consultations with communities as well as during induction training with workers. This procedure falls under the responsibility of the GBV Service Provider. This procedure helps victims reach for support from the GBV Service Provider.
- 2** The regular GRM where victims can convey their grievances or complaints (1) or through the community-based Champions that can identify any cases (two-way arrows mean that the victim can either be identified or can come himself to seek support).
- 3** Contractor Control System from the Supervising Engineer as part of its audit on ESHS (4) where victims can be identified.

#### **GBV GRIEVANCE MECHANISM**

Once GBV is detected, it must be addressed through the existing grievance management plan, either through the community GRM committee (refer to ZESCO's Stakeholder Engagement Plan) or the worker grievance mechanism, whichever applies. The following actions shall be undertaken:

- Assess whether the Project Grievance Redress Mechanism adequately handles GBV/SEAH complaints, given the risk of stigmatisation and reprisals against survivors. Consideration should be given to a separate GBV/SEAH GRM system, potentially operated by a GBV service provider - with feedback to the Project GRM.
- Develop and implement internal grievance and support that is accessible to all employees, pays special attention to the different realities of female and male survivors of GBV, and includes the possibility of denouncing any form of harassment or intimidation. Ensure proper actions are taken according to the Zambian legislation in harassment cases.

- Develop and implement an external gender-sensitive grievance redress mechanism that is accessible to all segments of the general population and communities, pays special attention to the different realities of female and male victims of GBV, and includes the possibility of denouncing any form of harassment or intimidation. Ensure proper actions are taken according to the Zambian legislation in harassment cases.
- Implement and follow up on gender-sensitive grievance redress mechanisms, paying special attention to the different realities of female and male victims of GBV or sexual harassment.
- Once a GBV or sexual harassment case has been reported to and recorded, the case will be handed over to a formal referral pathway.
- Whenever GBV complaints are brought up, the GRM focal point must keep allegations confidential to safeguard the survivor’s identity and refer the survivor to a local GBV Service Provider through the Referral Pathway mentioned in section 4.8.5.5.
- While all GBV-related complaints will be recorded in a special GBV GRM register, the complainant should be allowed to handle the case through a formal or informal complaint procedure (the former requiring a formal investigation).
- Global best practice recognizes that responding appropriately to a survivor’s complaint is essential by respecting the survivor’s choices. This means that the survivor’s rights, needs and wishes are prioritized in every decision related to the incident. The survivor of GBV who has the courage to come forward must always be treated with dignity and respect. Every effort should be made to protect the survivor's safety and well-being, and any action should always be taken with the survivor’s consent. These steps serve to minimize the potential for re-traumatization and further violence against the survivor.

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#### **4.8.6.3 INVOLVING GBV SERVICE PROVIDERS FOR RESPONSE SERVICES**

This stage is represented by Numbers 5 and 6.

The GBV service provider shall be mobilized on site to meet the survivor.

A GBV Service Provider is an organization offering specific services for GBV survivors, such as health services, psychosocial support, shelter, legal aid, safety/security services, etc. Good examples of such Service Providers are the One-Stop Centers (OSC), which refers to organizations that provide GBV survivors with all key services (health, psychosocial, police, and legal) under one roof to avoid survivors moving from one place to another. There are currently 69 OSCs operating in Zambia under the Ministry of Health, and an additional 31 OSCs will be created by transitioning GBV Help Desks into OSCs. With the exception of Chitambu in Central Province, all affected districts have OSCs. Chitambo district has a GBV Help Desk, which is in the process of transitioning to an OSC. While the OSCs are primarily focused on providing response services, other Service Providers are more focused on prevention through awareness raising, training, and community engagement. Consultations with communities and stakeholders (2019) have allowed to study several options for the GBV Service Provider and discuss openly with stakeholders about their feasibility. In addition, meetings in Lusaka with several NGOs and the Ministry of Gender have allowed to pre-identify GBV Service Providers and to make appointments to meet with them in their respective districts.

It should be noted that the selected GBV Service Providers selected by ZESCO must be able to provide both prevention and response services (or facilitate access to quality response services via the OSCs) through a holistic and integrated approach to GBV, HIV and other social and gender impacts<sup>1</sup>. The role and specific tasks of the GBV Service Provider is outlined in Chapter 5.

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#### **4.8.6.4 OFFERING THE SURVIVOR SUPPORT**

This stage is represented by Number 2.

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<sup>1</sup> The GBV Referral Pathway can be accessed online: [https://www.gender.gov.zm/?page\\_id=1616](https://www.gender.gov.zm/?page_id=1616)

GBV Service providers shall offer psychological support to the survivor and advice and referral on health services, and psychological and legal support. The Service Provider shall liaise with a local health center for severe cases such as sexual abuse and rape.

The GBV Service Provider's role is solely to provide support to the survivor. The VSU is in charge of legal procedures against the perpetrator. The Victim Support Unit (VSU) shall accompany the GBV Service Provider on site so the victim can file a complaint without having to spend money going to town.

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#### **4.8.6.5 GBV RESOLUTION MECHANISM**

This stage is represented by Numbers 7, 8, 9, 10, 11, and 12.

The GBV Service Provider and/or ZESCO Social Safeguard Expert shall handle all local cases of GBV in affected communities (whether directly linked to the Project or not, as recommended by best practices) in accordance with the law, the employment contract, and the Code of Conduct. The GBV Service Provider and/or ZESCO Social Safeguard Expert shall be responsible for implementing a GBV Resolution Mechanism. This resolution mechanism is as follows:

- Receiving and handling GBV complaints either directly or indirectly through the GRM focal point.
- Providing the survivor with support, which should include advice and referrals on health services, psychological, and legal support.
- A GBV complaints team (7) is designated and includes a member of the Contractor, a member of the Project implementation unit, a member of the Supervising Engineer, and the VSU for suspected unlawful acts.
- With the survivor's consent, the case is reviewed and the GBV complaints team collectively agrees upon the appropriate remedy to be applied to the perpetrator (action and work-related sanction) (11). Reasonable adjustments should be made to the alleged perpetrator's or survivor's work schedule and work environment, preferably by moving the perpetrator rather than the victim. The employer should provide adequate leave to survivors seeking services. If a criminal case is suspected, the case should be referred and investigated by the police.
- If necessary, the VSU takes the lead on the case (9) for legal prosecution (12) to be enacted if there is a legal obligation to report the crime.
- The GBV Service Provider closes the case upon resolution and advises the GRM focal point, who notes the resolution (10).
- All members shall keep GBV allegation reports confidential.
- The World Bank shall be notified for severe cases and when the cases are closed (8).
- The GBV Service Provider shall identify and fight against the risk of retaliation in case of reporting cases.
- This resolution mechanism must be consistent with national law and labor legislation.

Since traditional ways of dealing with GBV are usually not in favor of women (see ESIA analysis on the topic) and since the confidentiality of women needs to be guaranteed, it is not recommended to involve traditional authorities in the GBV complaints team unless they are known GBV prevention champions.

Specific funds should also be set apart for a GBV Service Provider.

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#### **4.8.6.6 REPORTING OF GBV CASES**

The Gender Division does not have presence at district level, and they depend on NGOs for work on GBV issues, while the VSU from the police has units in every district. The VSU is a special unit of the police to prevent and legally address GBV cases. A meeting with the National Coordinator of the VSU has allowed to understand the way this unit operates. A person of the VSU is a member of each one-stop center in the country to take the lead on legal prosecution against perpetrators. This ESIA recommends that the VSU be involved with each GBV Service Provider presented in the ESMP. Unfortunately, constraints for victims to report aggression to the VSU exist; stakeholders have highlighted that victims from rural areas are usually not inclined to report aggression to the VSU because of the cost of transportation to go to town. Therefore, this GBV management plan recommends that the VSU accompany GBV Service Providers on the field whenever required. As presented in the ESMP, funds shall be allocated to allow these Service Providers to function; the main issue (as highlighted in meetings with stakeholders) is to provide reliable transportation and fuel.

There are GBV fast-track courts in Zambia to accelerate court cases; however, none of these are in the study area.

There are also District Gender Focal Points in each district; some of them were met during stakeholder meetings. These are employees at the local council and they are responsible for managing the “Gender-Based Violence Task Force” at the district level. The GBV task forces are expected to coordinate activities related to GBV and meet with GBV Service Providers regularly. However, some District Gender Focal Points and GBV Task Forces are not as active as expected, possibly due to limited resources, lack of training, or competing priorities within the districts. The District AIDS Coordination Advisor is also situated in the local council and is responsible for functions related to HIV/AIDS management, human rights, and gender mainstreaming at the community level. The District Gender Focal Points and DACAs shall be met at the inception of construction work to present the GBV Action Plan.

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#### **4.8.7 MONITORING**

Through the Contractor Control System, which includes auditing all Subcontractors, the Supervising Engineer shall identify cases of GBV and monitor the performance indicators. He shall report all cases of GBV and participate in GBV Resolution Mechanisms.

The Supervising Engineer should monitor and report on the effectiveness of the GBV action plan implementation to prevent and mitigate GBV risks associated with the Project.

The GBV Service Provider shall also be in charge of regularly writing confidential reports destined for the PIU and the World Bank. These reports shall describe the cases in which a GBV Resolution Mechanism was implemented.

It is recommended that an independent third-party is commissioned to provide GBV Management Plan monitoring reports and it is critical that the third-party has appropriately qualified social and environmental Specialists for this task. This third-party has a high-level monitoring oversight function to confirm that all Project actors, including the GBV service provider and the designated focal points or committee address and resolve GBV complaints and are implementing the GBV Action Plan. The third-party also verifies that the provisions to prevent and respond to GBV are in place and functioning, and so can provide early warning of problems that may surface.

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#### **4.8.7.1 KEY PERFORMANCE INDICATORS**

A performance monitoring procedure including a series of Key Performance Indicators (KPIs) shall be developed by the Contractor to ensure meaningful and effective assessment and management of GBV aspects in line with IFC PS2 and IFC PS 4 and national requirements.

Monitoring shall be carried out with the appropriate checklists and follow up measures. PIU and Contractor shall follow implementation of corrective measures.

A list of monitoring measures and KPIs has been described in Table 7-1.

#### 4.8.7.2 INTERNAL REPORTING

The Contractor and Supervising Engineer shall be responsible for providing monthly reports of gender and GBV-related issues during the pre-construction and construction stages. It is expected that, as a minimum, the following information will be disclosed to key stakeholders (Table 4-24).

**Table 4-24 Gender and Social Reporting Metrics**

Topic	Metrics
Management System	<ul style="list-style-type: none"> <li>Environmental and Social Management System - key related GBVH risks and incidents associated with the Project</li> <li>The percentage of workers that have signed a CoC.</li> </ul>
Labour and Working Condition	<ul style="list-style-type: none"> <li>Number and percentage of Foreigners, Zambians, community members (locals), women, youth and persons with disabilities in the workforce</li> <li>Number and percentage of women, youth and persons with disabilities in unskilled, skilled, technical, and management positions</li> <li>Gender pay gap</li> </ul>
Training and Awareness	<ul style="list-style-type: none"> <li>Percent of employees completing the Induction Training</li> <li>Number of Toolbox Talks conducted on social and gender issues, including GBV and HIV</li> <li>Number of refreshment trainings conducted for workers and managers</li> <li>Number of community awareness meetings</li> </ul>
Community Health, Safety and Security	<ul style="list-style-type: none"> <li>Percent of gender safety incidents</li> </ul>
GBV Management	<ul style="list-style-type: none"> <li>Number of measures to improve gender equality and reduce risks associated with GBV</li> <li>Percent of incidents of GBV and percent of referred survivors</li> </ul>
HIV/AIDS Management	<ul style="list-style-type: none"> <li>Number of Voluntary Counselling and Testing (VCTs) conducted in the workplace and the community</li> <li>Number of employees and community members using the VCT service (disaggregated by sex, age and disability)</li> </ul>
Social and Gender Incidents	<ul style="list-style-type: none"> <li>Number of reported GBV incidents (workforce and community)</li> <li>Number of social and gender incidents (other than GBV) such as discrimination, child labour and trafficking</li> <li>Percent of GBV and other social and gender incidents handled and resolved within the stipulated timeframe</li> </ul>

The reporting forms and KPIs will be reviewed at least semi-annually during the performance measurement.

#### 4.8.7.3 EXTERNAL REPORTING

The Supervising Engineer, in collaboration with ZESCO, shall be responsible for providing annual reports to key external stakeholders on the project's social and gender inclusion performance and providing updates on any key GBV issues and related grievances.

#### 4.8.7.4 RECORD KEEPING

Records are essential to keep track of the implementation of all GBV actions the Contractor has committed to (registers, procedures, minutes of meetings, mapping, trainings completed, etc.). Once completed, records are permanent documents that are no longer modified, as they demonstrate the results of an activity that has been performed. Detailed records pertaining to the various components of GBV-related activities of importance to the Contractor will be maintained for the duration of the Project (as a minimum). Records will ensure proper data collection takes place on stakeholders engaged and the outcome of the engagements will be an important component of monitoring and evaluation activities.

Hard copies will be digitised as much as possible. Those that cannot be digitised, for any reason, will be stored in secure boxes.

**Electronic back-ups** - Backup copies will be made as per the existing IT protocols.

**Archives** – Backup systems and documents will be kept in a safe and secure space. Electronic files are kept for the entire lifetime of the Project.

The following records need to be kept:

**Table 4-25 GBV and Gender Inclusion Record Keeping Requirements**

Records	
Description	Contents
Sex-disaggregated data	Contact details of service providers Breakdown of employees by position and gender % Of women in the management team
Engagement results on GBVH aspects	Minutes of meetings
Information disclosure	Record of all materials disclosed to stakeholders, including presentation materials
Training records	Training scheduled with regard to GBV and gender inclusion
Complaints/grievance records	Key confidential GBV complaints and grievances received as per Grievance Management Plan

## 4.9 WORKER GRIEVANCE REDRESS MECHANISM

During the implementation of the Project activities, it is possible that disputes/disagreements between the Project developer and workers may arise. The worker grievance redress mechanism (WGRM) shall be prepared to comply with the WB’s ESS 2 and the MOE’s Social Safeguard Framework as soon as the construction contract is awarded but before the works start. This document provides the official framework to be developed by the Contractor for the proposed actions associated with the submittal, recording, analysis, and treatment of employee grievances associated with workplace concerns. ZESCO should also develop its own Worker Grievance Redress Mechanism applicable for both the construction and operation phases.

The objective of the proposed worker grievance redress mechanism is to respond to Project workers' complaints quickly and transparently and ensure that they have avenues for presenting and addressing their grievances related to any aspect of the work on the ZTIP.

### 4.9.1 SUBMITTING A GRIEVANCE

The employer will need to offer various ways for an employee to submit a grievance, including the possibility of doing it anonymously, that is:

- Verbally to their direct manager or another Contractor’s management team representative. This person will be responsible for following and ensuring treatment of the grievance.
- In writing using, or not, an official grievance form and deposited in clearly identified and communicated locations or transmitted by mail to a specific mail address (including among the human resources team) or their manager. Workers should be able to report grievance in different ways – in person, in writing, online, complaint boxes – and should also be offered some anonymous means.

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#### **4.9.2 RECORDING OF THE GRIEVANCE**

The Contractor must propose a recording process (logbook or digitalised system) allowing for all grievances to be recorded within a maximum deadline of 24 hours. This process shall be used to monitor and track the grievances raised.

Following the recording of the grievance, an acknowledgment message (if not anonymous) must be communicated to the grievant within 48 hours.

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#### **4.9.3 GRIEVANCE EVALUATION AND RESOLUTION**

The employer will establish a prioritisation definition of the grievance (low, medium, or critical) based on the following aspects (or their equivalent):

- One-off or isolated and minor complaint;
- On-going complaints associated with odour, environmental noise, work conditions;
- Critical issues associated with breach of law and related Contractor policies such as gender-based violence, safety and security issues, and environmental aspects.

Evaluation of grievances shall follow a specified timeline, which shall be applied to evaluate and investigate each raised grievance. The timeline for addressing grievances shall be agreed upon internally and communicated to the workers. This timeline should be reasoned to avoid improper delays but to ensure sufficient time for an adequate analysis and clear response.

When developing a response to a grievance, the employer's representative should consult with relevant parties (this could include management team members, staff, witnesses) to obtain guidance and further information in order to develop a well-informed proposal for resolution. The grievant may also be approached by the Contractor's representative to provide more details during the investigation or to discuss potential next steps. Furthermore, the source of a grievance should be assessed where possible (e.g., equipment claimed as dangerous or inefficient).

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#### **4.9.4 GRIEVANCE RESPONSE AND AGREEMENT ON NEXT STEPS**

The employer's representative will communicate the outcome of the investigation to the grievant and request feedback on the resolution. This initial response will include a summary of what actions are planned to resolve the grievance and when they are likely to be implemented or an explanatory note clarifying why action is not required. The response will be in writing, although a verbal response should also be provided where appropriate.

The grievant will be asked to give feedback on the proposed course of action within a limited number of working days to be set by the employer. If the grievant is in agreement with the next steps, they will co-sign a specific agreement form to be included in the internal grievance report with the Contractor. This agreement form will acknowledge the agreement on the proposed actions for resolution.

The agreement should be recorded, and the actions delegated to appropriate personnel by the Contractor's representative. Although the resolution of the grievance cannot be time-bound, the appropriate steps and actions to resolve the grievance should be completed in a thorough and prompt manner.

In case of any major disputes and failure to reach an agreement with the grievant, the matter shall be reported to higher-level management, which will attempt to resolve the issue within a pre-established timeframe. The Contractor should also consider the possibility of including a neutral third party acting as moderator if resolution is not possible between the higher-level management and the grievant.

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### 4.9.5 RESOLUTION AND FOLLOW-UP

When corrective actions are agreed upon between the Contractor's representative and the grievant, relevant personnel assigned to the case will ensure they are implemented.

The Contractor is responsible for informing the grievant on the progress of implemented corrective actions. If the grievant is satisfied with the steps that have been taken, they must sign off to signify the closing of the case.

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### 4.9.6 RESPONSIBILITIES

Actors to be involved in the management of grievances should depend on the types of grievances submitted. Internal focal point should be prioritized for low or medium complaint. The focal point could be a single person or a committee. The composition of a committee should factor in the demographics of the workforce, so there is adequate representation. Internal representant could be the direct manager or a human resource manager (IFC, 2021).

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## 4.10 CODE OF CONDUCT

The Contractor will be responsible for establishing a Code of Conduct that applies to all its employees as well as to the various subcontractors who will be present and/or active on the work site. This Code of Conduct is intended to guide employees in their day-to-day activities so that they comply with the Contractor's Environmental and Social Policies, as well as its commitment to high standards of responsibility, ethics, inclusion, and safety.

The Code of Conduct must be supported by the Contractor's senior managers, who will demonstrate this by putting in place the organizational means to ensure its governance, and an audit process to monitor its application with respect for employees and subcontractors, the environment, and the communities affected by the project. In furtherance of the above, the Contractor must display the Code of Conduct, duly signed by the Management of the organization. The Code of Conduct will include, among others, commitment to environmental and social management, gender equality, GBV/SEA, working conditions/fare wage, cultural heritage, community health / development etc.

The purpose of the Code of Conduct is to make all employees and Contractor management accountable to the various themes below, which must be drawn up to reflect the Contractor's commitments and adapted to the context of the particularities of the current project. The major aspects to be covered by the Contractor's Code of Conduct should include in particular:

- Human rights:

This applies to the treatment of employees, recruitment, and hiring decisions, remuneration, professional development, the fight against modern slavery (forced and child labour), and the free opportunity to join an association or trade union. This section must also state the obligations of respect that employees must have towards each other, and the consequences associated with actions contrary to these principles.

- Gender equality and Gender-Based Violence and Harassment (GBVH):

Promoting gender diversity and inclusion. Women's fundamental rights, including their right to life, health, education, employment, and participation in public life will be respected. All applicable laws and regulations regarding gender equality and the protection of women's rights will be respected. No form of discrimination, harassment or unfair treatment based on gender will be accepted. All Gender-Based Violence, Sexual Exploitation and Abuse, Sexual Harassment will be condemned. A more detailed description of the content and principles of the CoC in regards to GBV is presented in Section 4.8.4.6.

- Respect for local cultural realities:

Sensitize workers coming from outside the region to local cultural realities as well as to the types of behaviour expected of them when interacting with local populations.

— Alcohol, drugs, and other substances:

Declaring the prohibition of the consumption of these substances at work and the empowerment of employees in relation to the risks associated with such consumption for their health, that of their colleagues (risk of accidents) and that of the surrounding communities.

— Employee safety:

Presenting the Contractor's commitment to ensuring a safe working environment and the employees' obligation to comply with the standards and procedures put in place to minimize the risk of incidents or accidents. All workers must follow safety procedures, wear appropriate protective equipment, and report hazardous situations immediately.

— Conflicts of interest:

Describing what is meant by a potential conflict of interest for both managers and employees (kinship with a supplier, close relationship with customer representatives, etc.).

— Fair business practices:

Defining the fair competition practices established by the Contractor both in relation to its competitors and with its subcontractors.

— Information protection:

Explaining the importance of confidentiality associated with information transmitted by the customer to the Contractor and its employees. Similarly, employees must be made aware of the need to protect internal information circulating on the project.

— Responsible and transparent communication:

Presenting the rules and means of communication established by the Contractor both internally and externally and defining the people responsible and authorized to speak on behalf of the company. Promoting prior information and transparent communication with local communities.

— Freedom of expression:

Encouraging employees to communicate/express their concerns and ensuring that they will not suffer consequences for doing so.

— Disruption Reduction:

Committing to minimizing disruption to local communities, planning work to minimize the impact on residents' daily lives as much as possible. Encouraging workers to understand local issues and respect the culture, customs, and traditions of the communities in which they work.

# 5 INSTITUTIONAL FRAMEWORK

This chapter describes responsibilities for the implementation and monitoring of elements in the Environmental and Social Management Plan (ESMP) which are shared between various stakeholders, including relevant ministries, competent authorities, ZESCO, and its contractors.

## 5.1 ESMP MANAGEMENT DURING PRE-CONSTRUCTION AND CONSTRUCTION PHASES

Figure 5-1 illustrates the proposed framework for the ESMP implementation structure during the pre-construction/construction phases.

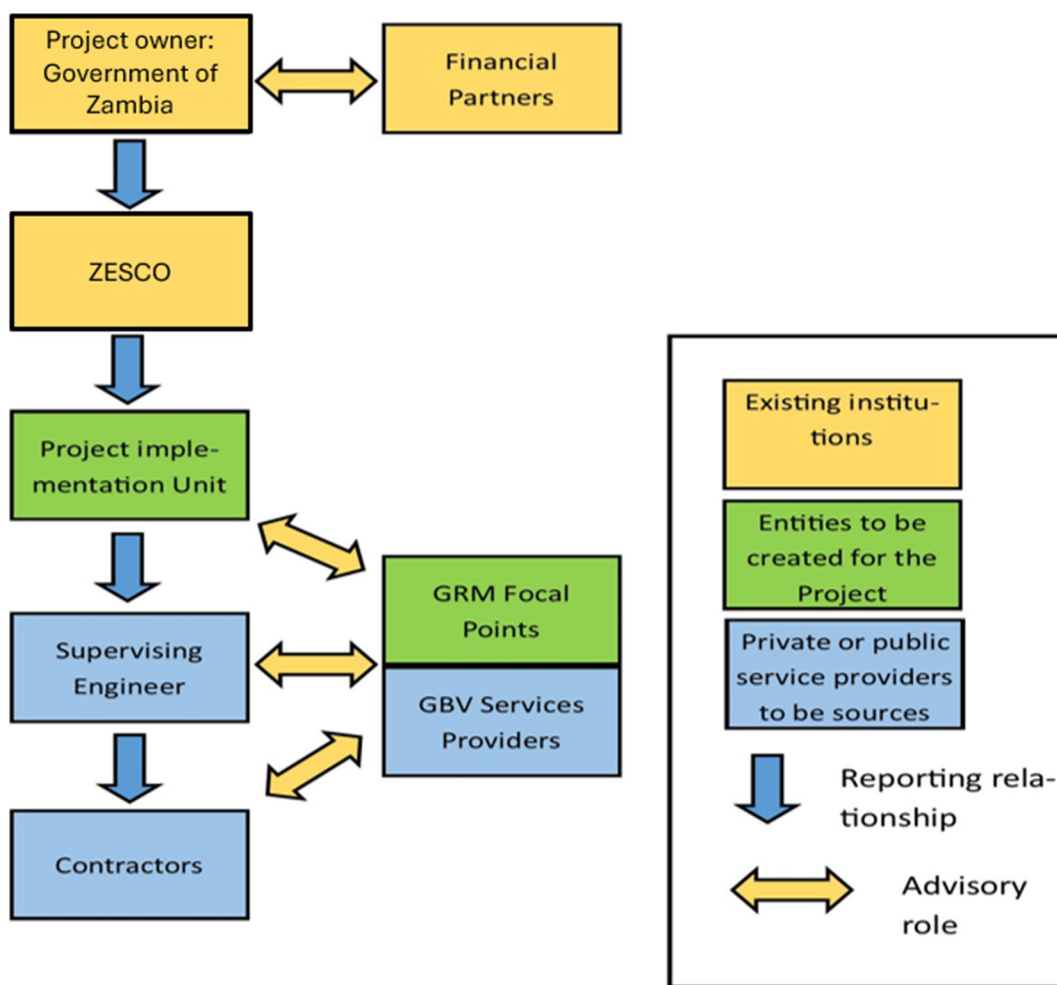


Figure 5-1 Institutional Framework for ESMP Implementation during Pre-construction/Construction Phase

## 5.2 INSTITUTIONS RESPONSIBLE FOR THE ESMP

The following sections detail the responsibilities for the different Project actors.

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### **5.2.1 GOVERNMENT OF ZAMBIA AND PROJECT SPONSORS**

The Government of Zambia oversees the Project's high-level strategic planning, financing, and implementation via the Ministry of Energy and Water Development and the Ministry of Finance.

Financial partners (lenders), for their part, also contribute to the Project's strategic planning prior to financing of its construction. Their environmental and social safeguards provide standards regarding Project design and implementation requirements to mitigate and manage potential project-related environmental and social impacts.

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### **5.2.2 PROJECT OWNER: ZESCO BOARD AND MANAGEMENT**

As the Project owner, ZESCO will have ultimate responsibility for Project and implementation of the ESMP requirements. Under the structure illustrated above, the roles attributed to ZESCO Board and Management are as follows:

- Interface with financial partners regarding compliance with their environmental and social safeguards;
- Carry out a gap analysis to identify gaps regarding lenders' required Environmental and Social (E&S) requirements and those proposed by various contractors;
- Ensure required E&S safeguards are included in contractor bidding and contractual documents;
- Ensure implementation of E&S safeguards by all Project stakeholders;
- Act as focal point for all matters regarding E&S safeguards development, implementation, and management.
- Act as repository for all E&S data management requirements.

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### **5.2.3 PROJECT IMPLEMENTATION UNIT (PIU)**

It is proposed that a Project Implementation Unit (PIU) office be created to allow for the Project preparation and implementation processes to be carried out effectively and successfully. This unit is to be created within ZESCO but be fully dedicated only to the ZTIP Project implementation.

The PIU should consist of technical capabilities to coordinate the technical aspects of the Project implementation. Among the technical staff to be hired, these will include:

- A Health and Safety Manager that will oversee the implementation of Contractor's Health and Safety Plans and EPRP;
- An Environmental and Social (E&S) Manager that will oversee the ESMP implementation, including most of the specific management plans, as well as the implementation of the RAP (Resettlement Action Plan);
- A Social and Gender (S&G) Manager that will oversee the ESMP implementation, focusing specifically on the GBV Management Plan and the Stakeholder Engagement Plan, as well as supervising the GBV and GRM Service Providers; and
- An Engineering Supervisor to ensure construction performance.

It is recommended that the terms of references for the above-mentioned roles be reviewed and approved by the Client / Supervision Consultant (in consultation with the Design Engineers), and the World Bank.

The PIU should be set up sufficiently in advance to ensure contractor-related E&S Terms of Reference and minimum requirements are fully developed prior to Project initiation. The PIU should be in place to monitor construction activities and associated impacts.

It is anticipated the PIU will need to be fully operational for the entire length of construction, after which a reduced team will monitor long-term Project performance on environment, communities, and households. It is also proposed that the PIU have offices located within the Project areas to facilitate transport and communications with local populations and local authorities. The PIU will assess the situation and propose proper localization to that effect.

Technical staff will be composed of technical Experts to ensure compliance with construction standards included in the Project plans and specifications, bidding documents, and contracts.

This unit will also be composed of Construction Engineers and Subject Matter Experts to ensure Contractor Terms of References (TORs) are implemented. The PIU Construction engineers will ensure contractors' scope of work is reviewed and approved; likewise E&S Subject Matter Experts (such as botanists, sociologists, gender experts, etc.) will ensure E&S safeguards are implemented during the construction phase.

Both engineering and E&S staff could be sourced from ZESCO's professional staff or be contracted. The PIU's E&S subject matter experts will act under the authority of ZESCO's designated representative.

The PIUs dedicated Health and Safety Manager will be identified at the onset of Project preparation. The Health and Safety (H&S) Manager will be responsible for overseeing and approval of Contractor's Occupational Health and Safety Management Plan Community Health and Safety Management Plan and Emergency Preparedness and Response Plan that will outline the roles and responsibilities of those who will be involved in the Project, or who will have access to the job site. These plans will outline requirements to implement the plan, including necessary resources, training, equipment, and costs. The PIU, through the Health and Safety Manager, will be responsible for auditing Contractor H&S activities throughout all stages of the Project to ensure these are completed according to the proposed plans and in line with ZESCO's SHEQ Policy (Appendix 3-1).

The PIU's E&S and S&G Managers will be responsible for approval of the Contractor's ESMP, Contractor's specific management plans, verification of the Contractor's implementation of its E&S control plans and measures, including audits of the E&S management to ensure correct implementation according to the contractor's ESMP during the pre-construction and construction phases. Further, the PIU will engage two independent Service Providers for GBV and GRM management through public proposal and selection process. The PIU will also be responsible for the implementation of the RAP. As such, its main responsibilities will include:

— Pre-construction phase:

- Coordinate E&S aspects of Project procurement, inter alia inclusion of E&S safeguards (ESMP & RAP, as well as the World Bank's Environmental & Social Standards (ESS) and MoE's national Social Safeguard Framework) in Contractor(s) and Owner's Engineer tender documents and contracts. The World Bank's General Environmental Management Conditions for Construction Contracts can be found in Appendix 5-1.
- Coordinate population resettlement and compensation, as well as implementation of other RAP measures.
- Implement Stakeholder Engagement Plan.
- Prepare Detailed Terms of Reference for the GBV and GRM Service Providers.
- Supervise Community Grievance Redress Mechanism (GRM).

— Construction phase:

- Supervise implementation of contractor's ESMP.
- Implement RAP and specific management plans under its responsibility.
- Implement Stakeholder Engagement Plan (SEP).
- Supervise Community Grievance Redress Mechanism (GRM).

To achieve the objectives outlined above, it is recommended that PIU environmental staff conducts field inspections on a monthly basis to monitor implementation of relevant E&S measures by the Contractor and monitoring by the Owner's Engineer.

In the case of an incident that could cause serious damage to the environment or equipment, PIU environmental staff will be authorized to stop work or to give instructions to the Head Contractor to ensure impacts are reduced or eliminated.

Daily implementation and supervision of both the RAP and ESMP will be conducted with help from the Supervising Engineer (see below 5.2.5).

For the RAP, the responsibilities of the PIU will include:

- Implementing the resettlement plan according to the RAP documentation and national legislation;
- Settling the RAP compensation budget through counterpart funding and paying the stipulated compensations;
- Implementing proposed development and social integration programs;
- Informing the communities on the resettlement implementation process, Project description, and schedule of activities in advance;
- Providing information on activities and consultations with the PAPs;
- Interacting with government authorities to ensure the transfer of services;
- Implementing and managing a grievance redress mechanism;
- Signing of compensation agreement and managing compensation payments;
- Monitoring and evaluating implementation of the resettlement process;
- Identifying the witness NGO to be hired and facilitating their involvement in the consultation activities, compensation, and resettlement related activities;
- Producing monitoring reports (see below) related to the RAP implementation for government authorities, and the relevant contractors where required;
- Arranging for the conduct of an independent, third-party audit of RAP implementation after implementation has been completed.

The envisaged compensation amounts and resettlement modalities for each PAP will require approval and endorsement by the PAPs, the competent governmental authorities, and by the PIU.

Community and household fears regarding the non-payment of claims are important and widespread. To manage such fears, it is strongly recommended that approval for start of Project construction of the transmission line be conditional to the submission of a satisfactory progress report from the PIU. This report must clearly establish, with supporting evidence, that compensation was paid, and that resettlement projects were successfully carried out prior to initiation of the Project construction phase. The confirmation of the witness NGO for this report is essential; i.e., it will be necessary for the selected NGO to witness the compensation process to completion and provide an "acceptance" or "confirmation" report.

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## **5.2.4 GRM FOCAL POINTS AND GBV SERVICE PROVIDERS**

To enhance transparency and trust from Project area stakeholders, it is suggested that two independent actors that are recognized and credible in the Project area be retained through a public proposal and selection process by ZESCO to manage the GRM system and implement the GBV Management Action Plan.

This outside look will ensure proper environmental and social management and mitigation measures are implemented, and that grievances are adequately addressed. This mode of supervision was experienced in other projects and gave positive results in terms of reduction of grievances.

These actors will be integrated within the GRM committee and project rights holders will be informed of their role and functions.

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#### 5.2.4.1 ROLE OF THE GBV SERVICE PROVIDER

The GBV Service Provider shall be an NGO or organization responsible for delivering a comprehensive and holistic program that goes beyond GBV, addressing a range of social issues including HIV/AIDS and other social risks within the workforce and project-affected communities, while also promoting non-discrimination and equal opportunities for targeted citizens. A list of potential organizations that work nationally on GBV and/or HIV/AIDS is presented in Appendix 5-2. The provider must have a team comprising a Social and Gender Specialist, Psychosocial Counsellor, and Medical Nurse, with the capacity to conduct mobile outreach across all project sites to ensure wide coverage and accessibility. Ideally, the selected provider should have experience working on infrastructure projects in the affected districts.

In collaboration with the Contractor's Social and Gender Specialist, the GRM Focal Point, and other stakeholders identified in the GBV Management Plan, the GBV Service Provider will focus on:

- Preventing GBV and SEAH: Promoting the reporting of cases, ensuring effective case management, and supporting survivors and guiding the GRM committee on GBV issues.
- Reducing HIV Transmission Risks: Mitigating the risk of HIV transmission among Contractor's personnel and the local community, promoting early diagnosis, and assisting affected individuals in managing positive diagnoses.
- Ensuring Fair Working Conditions and Equal Opportunities: Supporting the Contractor in preventing exploitative working conditions for all workers and promoting equal employment opportunities and economic empowerment for targeted citizens.

The GBV Service Provider will be responsible for the following tasks:

- GBV prevention and response:

The GBV Service Provider shall in close cooperation with the GRM Focal Point, One-Stop Centre (OSC) Provincial and District Coordinators and the OSC staff (medical nurse, police officer from the Victim Support Unit, psychosocial counsellor, and paralegal):

- Support the Contractor and GRM Focal Point in identifying cases of GBV and assessing GBV related risks.
- Implement a survivor-centered approach, ensuring effective case management from the initial report to the conclusion of support services. This includes assessing the survivor's needs, developing a care plan, coordinating with various service providers, and ensuring that the survivor is supported throughout the process.
- Support GBV survivors in accessing quality response services, covering medical, police, psychosocial support and legal aid, by linking them to One-Stop Centres which provides all service under one roof, including post-exposure prophylaxis (PEP), emergency contraception and vaccination to Hepatitis B for women who have experienced sexual violence (and possible exposure to HIV).
- Manage all GBV-related grievances reported to the GRM committee, including SEAH, ranging from comments of sexual nature to rape and abuse. These grievances should be recorded in a separate log-book for the purpose of confidentiality. The GBV Service Provider shall make use of the existing national referral pathway on GBV by linking the complainants to OSCs where they can access medical, psychological and legal support and report the case to a VSU police officer. GBV-related grievances concerning inappropriate behaviours such as sexual comments will be referred to the Contractor's Social Specialist for internal investigation. In such cases, the GBV Service Provider will advise on appropriate sanctions/resolutions if applicable (i.e. depending on the outcome of the investigation).

— HIV/AIDS prevention and response:

The GBV Service Provider shall in close cooperation with the Contractor's Social Specialist, the Provincial AIDS Coordination Advisor (PACA), the District AIDS Coordination Advisor (DACA) and local health clinics:

- Provide free Voluntary Counselling and Testing (VCT) and referral services on a quarterly basis.
- Facilitate free access to antiretrovirals (ARVs) to affected staff throughout the construction period.
- Make available male and female condoms for all staff, and the local community as appropriate (workplace and designated community sites).
- Provide on-site immediate care and basic medical interventions, including administering Post-Exposure Prophylaxis (PEP), emergency contraception (EC) within the required 72 hours window to victims of sexual violence or workers engaged in risky sexual behaviours in situations where access to such cannot be accessed in OSCs or local health clinics due to long distances or lack of resources.

— Promotion of worker's rights, non-discrimination and equal opportunities:

The GBV Service Provider shall in close cooperation with the PIU, Labour Office, the local council through the DACA, and the Provincial Gender Officers of the Gender Division:

- Collaborate with the labour office and unions to raise awareness among workers about their rights and responsibilities, minimum working conditions, and the available channels for support and redress.
- Support the Contractor in identifying targeted citizens (women, youth and persons with disabilities) for skilled and unskilled positions, through engaging with NGOs, universities and training institutions, and industry associations, community leaders, DACAs and other stakeholders.
- In cooperation with the Contractor, identify services and goods that could be reserved for businesses owned/managed by targeted citizens, including providing trainings on specific skills if required.
- Support the Contractor in adopting the principles of universal design and reasonable adjustments, taking necessary measures to make the workplace accessible and supportive of disabled employees.

— Social Awareness and Community Engagement:

The GBV Service Provider shall:

- Support the Contractor in conducting induction trainings for new workers, covering HIV, GBV, worker's rights and equal opportunities, with a special focus on the Code of Conduct.
- Produce and distribute behaviour change materials, including posters with messages regarding HIV, GBV, Workers Rights and Equal Opportunities, displayed at all sites and project affected communities.
- Conduct monthly Social Awareness campaigns on GBV, HIV and Equal Opportunities, integrating Information, Education and Consultation Communication and Social and Behaviour Change Communication approaches, addressed to all the Site staff and labour (including all the Contractor's employees, all Sub-Contractors and Consultants' employees, and all truck drivers and crew making deliveries to Site for construction activities) and to the immediate local communities. The campaigns shall include awareness sessions, use of local theatre groups and/or road shows. The campaign must be gender responsive, culturally sensitive and conducted in an applicable language (English, Nyanja or Bemba)
- In cooperation with the PIU, conduct quarterly community engagement meetings, with community leaders, schools, Parents and Teacher Associations, Women's Groups and other relevant groups.
- Identify and train peer educators/champions in the community and contractors workforce in accordance with national guidelines provided by National Aids Council. The focus must move beyond HIV and include GBV and other social aspects.

- Monitor the take up and effectiveness of HIV/AIDS, GBV and equal opportunity measures through agreed Key Performance Indicators.

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#### **5.2.4.2 ROLE OF THE GRM SERVICE PROVIDER**

The GRM Service Provider shall be an NGO or organization tasked with managing and enhancing the Grievance Redress Mechanism (GRM) across all project phases. This role involves ensuring that the GRM is comprehensive, accessible, and responsive to the needs of project-affected communities, with a particular emphasis on vulnerable groups such as women, children, and the elderly. The GRM Service Provider will work closely with the GRM Committee to ensure a coordinated approach to grievance management.

Specific Tasks of the GRM Service Provider include the following:

— Grievance Collection and Coordination:

- The GRM focal point, provided by the GRM Service Provider, will sit on the GRM Committee and work alongside other members to coordinate the grievance process.
- The GRM Service Provider is responsible for ensuring that grievances are recorded accurately and promptly in a central logbook shared with the GRM Committee. This logbook will track all grievances to ensure transparency and accountability.
- While the GRM will receive all types of grievances, GBV-related grievances will be referred to the GRM Service Provider for specialized assessment and management.
- The GRM Service Provider will handle whistleblower complaints from the Contractor's workers, especially in cases of serious grievances or regulatory breaches where workers may fear retaliation if reporting through the Contractor's Worker's GRM

— Grievance Documentation and Tracking:

- The GRM Service Provider is responsible for maintaining a detailed record of all grievances in the central logbook, ensuring that each complaint is logged with relevant details, including the nature of the grievance, the date of submission, and the status of the resolution.
- The GRM focal point will provide regular updates to the GRM Committee and other relevant stakeholders on the status of grievances, ensuring that all parties are informed of the progress and any delays in resolution.

— Outreach and Support to Vulnerable Groups:

- The GRM Service Provider will ensure that the grievance mechanism is accessible to all, particularly women, children, and other vulnerable groups. This includes conducting outreach activities to raise awareness about the GRM and providing assistance to those who may have difficulty accessing the mechanism.

#### **CONSIDERATION FOR AN ONLINE GRIEVANCE SYSTEM**

It is recommended that the PIU consider using an online grievance collection system provided and managed by the GRM Service Provider. The system must have offline functionality, allowing grievances to be recorded in areas with poor internet access and synchronized with the central database once connectivity is restored. The system should be accessible on mobile phones and include features for secure data storage, user anonymity, and easy access for all stakeholders. Additionally, it must remain operational after project closure to ensure ongoing record-keeping and accessibility for any future reference or audits.

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## 5.2.5 SUPERVISING ENGINEER

The Supervising Engineer's role is to represent ZESCO in monitoring Project implementation. As such, the Supervising Engineer will monitor implementation of the Project's technical, environmental, and social aspects. Generally, the role would include verification and approval of technical execution studies and drawings, as well as supervision and monitoring of the Project construction works and all environmental, social, security, health and safety topics.

The Supervising Engineer will appoint qualified Environmental and Social specialists with expertise in gender who will be responsible for the following main tasks:

- Prior to initiation of construction:
  - Verification and approval of Lead Contractor's candidates as EHS Manager and supporting H&S and E&S specialists and the Social Specialist and SEAH Expert.
  - Review and approval of the detailed Contractors' ESMP during the Project construction phase (C-ESMP) to ensure environmental, social and gender risks are assessed and mitigation measures are put in place before activities commence.
  - Review and approval of the Contractors' various specific management plans.
  - Review and approval of training provided to the Contractors' and Subcontractors' staff.
  - As necessary, contribute to the development of the various specific management plans to be incorporated in the C-ESMP in line with Contractor's scope of works.
- During construction:
  - Ensure Contractor's update C-ESMP to reflect changes to construction management plans, methodologies, or schedules. Monitor implementation of the C-ESMP and specific management plans by the Contractors and Subcontractors, using audit tools.
  - Review and approve E&S reports delivered by the contractors.
  - Manage Project's potential environmental and social impacts with the Contractor's involvement when required.
  - Ensure communication protocols are implemented by the Contractor against the C-ESMP, and supervise grievances against contractor's performance according to complaints issued by the public through the GRM.
  - Produce biweekly E&S monitoring reports for the PIU, including:
    - Review and approve Contractors' E&S performance management reports.
    - Manage complaints according to the requirements of the ZTIP Stakeholder Engagement Plan and associated GRM.
    - Review and approve Contractor reports regarding incidents and accidents with associated root causes analysis report.
    - Integrate results from audits to ensure Contractor's implementation of approved ESMPs.
    - Manage unanticipated E&S impacts (not identified in the ESMP) with applied management measures.
  - Manage Contractor performance.
  - Review and approve root cause analysis reports and approve adopted management measure.

The Supervising Engineer's assignment will end at the end of the Project's construction phases.

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## 5.2.6 CONTRACTORS

Several contractors will be selected, two for the line (working in different areas) and one for the Nakonde substation. In addition, land preparation (e.g., clearing of trees, leveling, etc.) may require an additional Contractor.

The tender documents will require each contractor to appoint an Environment, Health and Safety (EHS) Manager. Also, contractors will be required to appoint a Health and Safety (H&S) Specialist and Environmental and Social (E&S) Specialist and a Social and Gender (S&G) Specialist who will report to the EHS Manager. After approval of their qualifications, the Contractor's E&S Specialists will be responsible for daily implementation and management of all relevant E&S measures provided in the ESMP and will be responsible for adapting these in their C-ESMP.

The E&S and S&G Specialists will work closely in implementing the following tasks:

- Prior to initiation of construction:
  - Prepare the Contractor's C-ESMP commensurate with the Contractor's scope of work to be submitted and approved by the Supervising Engineer and PIU before commencing construction works.
  - Prepare all detailed specific management plans and policies required by the ESMP including the Code of Conduct and confirm inclusion of SEP requirements in the C-ESMP.
  - Train the Contractor and Subcontractor staff on C-ESMP to ensure integration of control measures in the planning of works, including induction training on the Code of Conduct.
  - In close cooperation with the PIU, organise community engagement meetings in project affected communities to share information about the project, the ESMP and associated policies, including the employment quotas for targeted citizens.
- During construction:
  - Monitor environmental and social indicators in accordance with the environmental and social performance monitoring program. Those measurements are to be done before, during, and after completion of works at a given site to assess the efficiency of mitigation measures and proposed plans.
  - Implement, monitor and report on E&S control measures (as reflected within the C-ESMP) of construction works conducted by the Contractor and Subcontractors as required by the C-ESMP and associated specific management plans.
  - Work closely the GBV and GRM Service Provider in implementing the GBV Management Plan and GRM system.
  - Produce weekly (or as stipulated within the C-ESMP) E&S reports to the Supervising Engineer detailing Contractor performance (C-ESMP implementation).
  - Conduct bi-weekly toolbox talks on environmental, social and gender topics.
  - Report and investigate root causes of work-related accidents, incidents, and events that may affect the quality of the environment and/or the human environment or the health and safety.
  - Support PIU and / or the Supervisory Engineer in addressing grievances and complaints as required by PIU and / or the Supervisory Engineer.
  - Implement a Stakeholder Engagement Plan that will align with ZESCO SEP.
  - Develop and implement a Workers' GRM.

It should be noted that Contractors are to be held accountable for all H&S infractions, E&S infractions, and ESMP infringements caused by their Subcontractors. In terms of division of responsibilities, the E&S Specialist will primarily focus on environmental issues and social impacts related to dust, noise and other disturbances to the community, including land and resettlement issues, whereas the S&G Specialist will be responsible for GBV and HIV management, worker's rights and equal opportunities and other social impacts such as child labour, school dropouts, working in close cooperation with the GBV Service Provider. Community engagement and trainings will be a joint responsibility.

As stated, the Contractors are also expected to appoint dedicated H&S Specialist who would be responsible for the application of health and safety obligations and reporting on H&S performance. In addition to WHO or World Bank standards, all applicable national health & safety regulations, as well as ZESCO SHEQ Policy (see Appendix 3-1) and standards, will be implemented. The Contractors must hold all necessary licenses and permits before the work begins. Contractors will be required to provide ZESCO and PIU with all the required legal documents, including signed agreements with owners, authorisations for borrow pits, authorisations for temporary storage sites, etc., i.e.: for all contractor scope of works.

The Contractors' contracts will end at the end of the Project's pre-construction and/or construction phases depending on the scope of works. The Supervising Engineer will be responsible for signing a work completion form.

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## 5.3 OPERATION PHASE

The PIU will be dismantled once the construction phase is finalized. The PIU responsibilities will then be passed on to ZESCO. As Project Owner and Operator, ZESCO will consequently be the only proponent directly responsible for the ESMP implementation at the Project's Operation Phase.

ZESCO will therefore be responsible for developing and implementing all required mitigation and monitoring measures provided in the ESMP for the Operational Phase.

# 6 ENVIRONMENTAL AND SOCIAL MONITORING PROGRAM

Performance monitoring and, if required, implementation of corrective actions are carried out to ensure that the required ESMP activities are being implemented and that the desired targets and outcomes are being achieved.

Performance monitoring involves three components:

- Monitoring of the implementation of identified management measures and plans;
- Monitoring of selected environmental and social indicators associated with expected impact sources and changes on environmental and social components associated with project implementation;
- Audits assessing the strengths and weaknesses of the ESMP.

The environmental and social performance monitoring consolidates all planned monitoring activities to ensure proper implementation. Monitoring, inspections and verification will be carried out regularly to control compliance with the measures, procedures and plans set up. The discrepancies will be corrected, incorporated into existing practices and documented. The nature and causes of issues will be analysed.

Environmental and social performance monitoring provides an outline to ensure the project’s environmental and social compliance during pre-construction-construction and operational phases, tracks environmental and social performance, and provides an analysis framework to implement corrective actions as needed. It should be implemented and kept up to date by the project management unit's environmental and social management committee. A retroactive mechanism for each reported unconformity will help ensure the improvement of the ESMP overtime and its adaptation to field realities. The retroactive mechanism is presented in Figure 6-1.

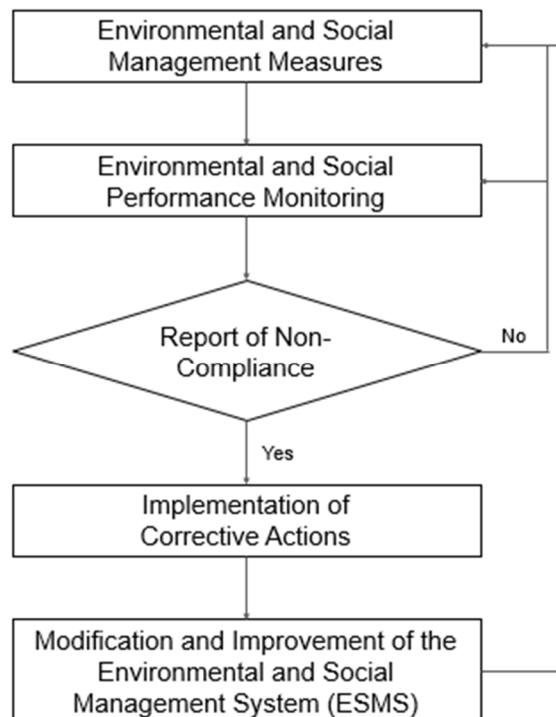


Figure 6-1 Retroactive Mechanism for ESMP Implementation

Each component of the environmental and social performance monitoring is described in the following sections, the surveillance being implemented during the construction phase and the monitoring during the operation phase.

Monitoring of the specific management plans developed in Chapter 4, is detailed in their respective plan. In addition, monitoring of resettlement (economical and/ or physical), is detailed in the stand-alone Resettlement Action Plan report.

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## 6.1 ENVIRONMENTAL AND SOCIAL SURVEILLANCE

The purpose of the environmental and social surveillance program is to ensure the commitments in the ESMP are fully implemented during the construction phase. This program includes the validation and integration of management measures (e.g., avoidance, mitigation, compensation, or improvement) and other environmental considerations from the plans and specifications, and then their implementation during construction. It also includes the global application of the proposed management solutions and the considerations raised by the Contractor that will oversee the construction phase. The Contractor will hire an Environmental Manager who will be responsible for the application of the environmental and social measures. Failure to comply with this requirement could result in penalties.

Before starting the construction work, the PIU will internally appoint an individual responsible for the supervision of the environmental monitoring. This individual will regularly be present on site, will be easily reachable during construction, and will be mandated to ensure practical application of management measures. This person will also work in close collaboration with the Contractor team's Environmental Manager. The role and authority of this PIU Specialist will be defined in the environmental specifications to be provided to the Contractor, but they must have sufficient power to compel the Contractor to change his working procedures and techniques, if needed. The PIU shall develop a tracking system for non-compliances. This system shall include several levels of non-compliances (minor, moderate, major and critical) and specify penalties associated with critical non-compliances and persistent issues. The system should be established before the beginning of construction activities and should address all stages of non-compliance management, including the documentation and evaluation of non-compliances, the identification and implementation of corrective measures, if required, the penalties associated with non-compliances and the follow-up on those issues. Among potential penalties, it could be possible for a contractor not to be paid if it contravenes to its environmental and social commitments.

Furthermore, to ensure the implementation of all management measures, those responsible for environmental monitoring will identify non-compliances, propose corrective measures, and guide the decision-making on site with relation to environmental issues.

In summary, the activities related to the environmental and social surveillance program include:

- Overseeing the application of management measures contained in the ESMP and in plans and specifications;
- Implementation of the C-ESMP management plans and specific management plans by the Contractors;
- Conducting on-site work inspections and reporting all non-conformities, or new issues or impacts not previously identified to the Contractor;
- Supervising higher impact activities or activities occurring in sensitive zones (i.e., deforestation, work in aquatic environments such as floodplains or banks or near cultural or collective sites, etc.) to reduce impacts;
- Recording all complaints and concerns raised by affected communities;
- Evaluating the efficiency and the quality of management procedures and identifying, in consultation with the PIU environmental and social management committee, alternative measures needed to be put in place in order to resolve any unforeseen problems that may occur during the work;
- Ensuring the work is performed in accordance with national environmental requirements and international best practices adopted by the funders;
- Ensuring a strong health and safety culture is in place for all contractors.

Corrective actions will be added to the monitoring program to ensure there is a follow-up on their application and efficiency. The environmental and social surveillance program will include on-site inspections along with sampling, specific observations, or investigations in neighbouring communities.

Table 6-1 lists the main measures to be implemented. Monitoring frameworks for various components covered by the specific management plans are detailed in Chapter 4.

The cost of these environmental and social surveillance measures cannot be specified at this point. Costs will be covered by the PIU's operating budget. The surveillance of the job site and associated costs are included in the terms of the Contractor's agreement. Biannual environmental surveillance reports will be provided to the ZESCO board during the work period.

**Table 6-1 Specific Environmental and Social Compliance Measures**

Monitored Component	Supervision Method	Indicators	Standards / Targets	Location	Frequency	Responsibility	Supervision
Soil integrity	Visual inspection of construction sites and access roads. Evaluate the time needed to apply the emergency measures plan (EMP) and implement corrective actions, if needed. Ensure contaminated soils are properly managed.	<ul style="list-style-type: none"> <li>– Signs of erosion, area involved, level of erosion, soil type involved, period.</li> <li>– Signs of compaction, area involved.</li> <li>– Signs of contamination.</li> <li>– Time needed to apply emergency measures and corrective actions, if required.</li> </ul>	Avoid or control the installation of erosive processes. Reduce soil compaction. Avoid soil profile structure destruction. Avoid soil contamination.	Along the ROW, access roads, and work areas.	Continuously during preconstruction and construction activities.	PIU EHS Manager. Supervising Engineer.	PIU E&S Manager.
Hydrology	Visual observations of water flow.	<ul style="list-style-type: none"> <li>– Sign of obstruction to natural water flows.</li> <li>– Proper dimensioning of culverts regarding natural water flows.</li> </ul>	Ensure there is no obstruction to water flow and that culverts are appropriately sized, well installed, and properly functioning.	At rivers, streams, and wetlands crossed by the ROW.	Continuously during works on water and near aquatic environments.	PIU EHS Manager. Supervising Engineer.	PIU E&S Manager.
Water quality	Analysis of pH, TSS, turbidity, phosphorus, BOD, coliform bacteria, and temperature), Visual detection of pollution signs (presence of oil, waste, etc.). Evaluate the time needed to apply the emergency measures plan (EMP) and to implement corrective actions, if needed.	<ul style="list-style-type: none"> <li>– Intensity of suspended particles in water.</li> <li>– Signs and intensity of water contamination.</li> <li>– Time needed to apply emergency measures and corrective actions, if required.</li> </ul>	Avoid significant degradation of baseline conditions.	Selected sites along rivers, streams, and wetlands crossed by the ROW.	Once a month during construction work on water and near aquatic environments.	Contractor EHS Manager. Supervising Engineer.	PIU E&S Manager.
Air quality	Visual inspection of construction sites and access roads for dust; verification that equipment and machinery are maintained and properly functioning.	<ul style="list-style-type: none"> <li>– Absence of waste-burning activities.</li> <li>– Frequency of dust abatement spraying on exposed surfaces and piles of granular materials.</li> <li>– Intensity of particle material in the air.</li> <li>– Exhaust emission from vehicles, equipment, and machinery.</li> </ul>	Avoid significant degradation of baseline conditions.	Along ROW, access roads, and work areas.	Continuously during preconstruction and construction activities.	Contractor EHS Manager. Supervising Engineer.	PIU H&S Manager.

Monitored Component	Supervision Method	Indicators	Standards / Targets	Location	Frequency	Responsibility	Supervision
Noise Levels	<ul style="list-style-type: none"> <li>Inspection of construction sites.</li> <li>Présence and use of noise screens at specified locations.</li> </ul>	<ul style="list-style-type: none"> <li>Noise levels in decibels (dB).</li> <li>Presence and use of noise screens at specified locations.</li> </ul>	Respect of national standards.	In communities and cluster of houses located close to construction sites.	During noisy activities.	Contractor EHS Manager. Supervising Engineer.	PIU H&S Manager.
Plant communities	<ul style="list-style-type: none"> <li>Evaluation of the composition of plant communities via flora surveys (diversity and composition).</li> </ul>	<ul style="list-style-type: none"> <li>Plant communities' evolution after eventual degradation from openings and border effects.</li> <li>Presence of invasive alien species (IAS).</li> </ul>	<ul style="list-style-type: none"> <li>Avoid significant degradation outside the ROW.</li> <li>Avoid introduction of IAS.</li> </ul>	In the different habitat types found in the ROW, focussing on areas with higher ecological integrity.	Annually during construction.	PIU specialists Contractor EHS Manager. Supervising Engineer.	PIU H&S Manager.
Natural habitat loss (secondary and mature woodland, riverine forest)	<ul style="list-style-type: none"> <li>Field observations with the support of satellite imagery in forested habitats.</li> <li>Important to take pictures and describe the habitats prior to impact and after.</li> </ul>	<ul style="list-style-type: none"> <li>Lost area of natural habitat.</li> <li>Natural habitat integrity outside the ROW.</li> </ul>	Reduced areas of lost forested and woodland habitats.	Along ROW, where forested habitats are found.	Continuously during preconstruction and construction activities.	PIU specialists. Contractor EHS Manager. Supervising Engineer.	PIU E&S Manager.
Invasive alien flora	<ul style="list-style-type: none"> <li>Assessment of the presence and introduction of IAS.</li> </ul>	<ul style="list-style-type: none"> <li>Presence of IAS.</li> <li>Habitat modification that may have led to their introduction.</li> <li>Effect on native species and species of conservation interest.</li> </ul>	<ul style="list-style-type: none"> <li>Avoid introduction of IAS.</li> <li>Identify appropriate suppression and control measures if problematic IAS are recorded.</li> </ul>	In sensitive habitats within or adjacent to the ROW and in reforested areas as part of the compensation plan.	Once, at the end of construction.	PIU specialists. Contractor EHS Manager. Supervising Engineer.	PIU E&S Manager.
Vegetation integrity	ROW vegetation cutting with the supervision of a botanist or a technician from the Department of Forestry to identify and relocate, as well as protect vegetation that does not represent a risk for the power line. Visual inspection of construction sites and access roads.	<ul style="list-style-type: none"> <li>Vegetation integrity outside the ROW.</li> <li>Integrity of protective equipment (fences) limiting access to sensitive areas.</li> </ul>	Avoid significant degradation outside the ROW. Protection of flora species with conservation status.	ROW and substation site.	During vegetation removal in the ROW.	PIU specialists. Contractor EHS Manager. Supervising Engineer.	PIU E&S Manager.

Monitored Component	Supervision Method	Indicators	Standards / Targets	Location	Frequency	Responsibility	Supervision
Vegetation success of the rehabilitated areas	Field observations in rehabilitated areas and flora surveys (.	– Number of viable planted individuals.	Success of the habitat rehabilitation (vegetation density and flora species diversity).	In rehabilitated areas.	After construction activities.	PIU specialists. Supervising Engineer.	PIU E&S Manager.
Bird conservation	Pre-construction inspection (avifaunal walk-through) of the final power line route alignment and road access routes to identify Red List species that may be breeding within the ROW and its immediate surroundings (1 km radius) to ensure the impacts to breeding species (if any) are adequately managed.	– Number of birds and nests, species observed, conservation status, activity in nests.	Avoid nest destruction, especially destruction of active nests or those of threatened species.	ROW and substation sites.	During vegetation removal in the ROW.	PIU specialists.	PIU E&S Manager.
Fauna protection	Visual inspection of construction sites and access roads. Large mammal surveys using indirect methods, i.e., spoor or dung counts.	– Presence of species, species observed, age, number of individuals, conservation status, in particular critical habitat species.	Avoid habitat loss and disturbances for local fauna.	ROW and substation sites.	During vegetation removal in the ROW.	PIU specialists.	PIU E&S Manager.
Bat conservation	Undertake a pre-construction inspection in the final power line route alignment and road access routes to identify any major bat roosts within or close to the areas to be cleared	– Presence of species, species observed, age, number of individuals, conservation status.	Avoid disturbance or destruction of bat roosts, particularly of Near Threatened species potentially inside the Project area.	ROW and substation sites.	During vegetation removal in the ROW.	PIU specialists.	PIU E&S Manager.
Nuisance to neighbouring communities	Complaint and concern management processes and surveys among communities.	– Type of nuisance, measures implemented to solve the problem. – Number of solved problems.	Reduce impacts on the quality of life of people in or around populated areas during works.	Along ROW and substation sites, especially in populated areas.	Continuously during preconstruction and construction activities.	PIU specialists. Contractor EHS Manager. Supervising Engineer.	PIU H&S Manager.

Monitored Component	Supervision Method	Indicators	Standards / Targets	Location	Frequency	Responsibility	Supervision
Local and regional economies	Assessment of local communities' involvement in works or in the procurement of goods and services to the Contractor.	<ul style="list-style-type: none"> <li>– Number of local workers employed.</li> <li>– Number of working days for local workers.</li> <li>– Proportion of local workers and days of works for local workers.</li> <li>– Proportion of local suppliers used for project-related procurement.</li> </ul>	Enhance positive impacts and improve the local economy.	Neighbouring communities along ROW.	During construction.	PIU specialists. Contractor EHS Manager. Supervising Engineer.	PIU E&S Manager.
	Field observations of price levels within communities.	<ul style="list-style-type: none"> <li>– Inflation rates of base products.</li> </ul>	Inflation rates remain similar or lower to the national rate for a given year.	Community markets within 3 km of worker camps or substations site.	Every 3 months during preconstruction and construction activities.	PIU specialists. Contractor EHS Manager. Supervising Engineer.	PIU E&S Manager.
Land use	Visual inspection of construction sites and access roads, as well as properties used for crops, livestock, and other activities.	<ul style="list-style-type: none"> <li>– Affected areas outside the ROW.</li> <li>– Rehabilitation of affected areas.</li> </ul>	Avoid encroachment into areas used by neighbouring communities not identified in the plans and specifications.	ROW and substation sites.	Continuously during preconstruction and construction activities.	PIU specialists. Contractor EHS Manager. Supervising Engineer.	PIU E&S Manager
Communities and social cohesion	<ul style="list-style-type: none"> <li>– Analysis of grievance reports about resettlement conflict.</li> </ul>	<ul style="list-style-type: none"> <li>– A proportion of resettlement-related conflicts are solved through the GRM.</li> </ul>	100% resolution rate.	Communities along the ROW and near substations.	Continuously during preconstruction and construction activities.	PIU specialists. Contractor EHS Manager. Supervising Engineer.	PIU E&S Manager.
	<ul style="list-style-type: none"> <li>– Analysis of complaints and concerns related to workers' behaviour.</li> </ul>	<ul style="list-style-type: none"> <li>– Number of complaints related to workers' behaviour.</li> </ul>	No complaint.	Communities along the ROW and near substations.	Continuously during preconstruction and construction activities.	PIU specialists. Contractor EHS Manager. Supervising Engineer.	
Gender	<ul style="list-style-type: none"> <li>– Analysis of the register of the entire contractor workforce.</li> </ul>	<ul style="list-style-type: none"> <li>– Proportion of local women employed.</li> <li>– Proportion of women among contractor employees.</li> </ul>	Minimum of 15%.	Entire Project area.	Continuously during preconstruction and construction activities.	PIU specialists. Contractor EHS Manager. Supervising Engineer.	PIU E&S Manager.
Cultural heritage	<ul style="list-style-type: none"> <li>– Analysis of complaints and concerns related to cultural heritage.</li> </ul>	<ul style="list-style-type: none"> <li>– Number of complaints regarding destroyed/damaged assets.</li> </ul>	No complaint.	Along the ROW, access roads and work areas.	Continuously during preconstruction and construction activities.	PIU specialists. Contractor EHS Manager. Supervising Engineer.	PIU E&S Manager.

Monitored Component	Supervision Method	Indicators	Standards / Targets	Location	Frequency	Responsibility	Supervision
Landscape	<ul style="list-style-type: none"> <li>– Pictures before and after construction at strategic locations.</li> </ul>	<ul style="list-style-type: none"> <li>– Changes in visual characteristic.</li> </ul>	Reduction of landscape modifications.	Along the ROW and near substations.	Before and after construction activities.	PIU specialists. Contractor EHS Manager. Supervising Engineer.	PIU E&S Manager.
Communities health and safety	<ul style="list-style-type: none"> <li>– Analysis of the register of injuries/accidents within communities (including their type and cause).</li> </ul>	<ul style="list-style-type: none"> <li>– Cause and type of injuries/accidents within communities.</li> <li>– Number of complaints associated with health and safety.</li> <li>– Number of accidents involving communities, related to the project.</li> <li>– Number of people injured due to project activities.</li> </ul>	No major injuries or accidents.	Entire Project area.	Continuously during preconstruction and construction activities.	PIU specialists. Contractor EHS Manager. Supervising Engineer.	PIU H&S Manager.
	<ul style="list-style-type: none"> <li>– Analysis of the register of underage sex cases within communities.</li> </ul>	<ul style="list-style-type: none"> <li>– Number of underage sex cases.</li> </ul>	No case of underage sex.	Entire Project area.	Continuously during preconstruction and construction activities.	PIU specialists. Contractor EHS Manager. Supervising Engineer.	PIU H&S Manager.
	<ul style="list-style-type: none"> <li>– Analysis of the register of child labour cases within communities.</li> </ul>	<ul style="list-style-type: none"> <li>– Number of child labour cases.</li> </ul>	No case of child labour.	Entire Project area.	Continuously during preconstruction and construction activities.	PIU specialists. Contractor EHS Manager. Supervising Engineer.	PIU H&S Manager.
	<ul style="list-style-type: none"> <li>– Analysis of the register of HIV/AIDS cases within communities.</li> <li>– Comparison of prevalence rates before and after construction.</li> </ul>	<ul style="list-style-type: none"> <li>– HIV/AIDS prevalence rate increase.</li> </ul>	No increase in prevalence rates.	Entire Project area.	Continuously during preconstruction and construction activities.	PIU specialists. Contractor EHS Manager. Supervising Engineer.	PIU H&S Manager.

Monitored Component	Supervision Method	Indicators	Standards / Targets	Location	Frequency	Responsibility	Supervision
Worker's health and safety	<ul style="list-style-type: none"> <li>- Analysis of the register of workers' injuries and accidents.</li> </ul>	<ul style="list-style-type: none"> <li>- Number of workers.</li> <li>- Number of working hours.</li> <li>- Number of Total recordable cases.</li> <li>- Number of Lost Time injury.</li> <li>- Number of days off work due to an accident.</li> <li>- Number of occupational health illnesses.</li> <li>- Number of road accidents.</li> <li>- Number of fire incidents.</li> <li>- Total recordable cases frequency.</li> <li>- Lost time injury frequency.</li> <li>- Number of security incidents.</li> <li>- Number of first aid cases.</li> <li>- Number of incidents of breaches of the code of conduct.</li> </ul>	No major injuries or accidents.	Entire Project area.	Continuously during preconstruction and construction activities.	PIU specialists. Contractor EHS Manager. Supervising Engineer.	PIU H&S Manager.

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## 6.2 ENVIRONMENTAL AND SOCIAL MONITORING

Environmental and social monitoring is an essential component of the ESMP, it allows environmental performance during the Project's operation phase to be evaluated. Essentially, this exercise should provide ongoing information on actual changes occurring in the natural and socioeconomic environments as a result of the Project's implementation. It also allows for the validation of the effectiveness of planned management strategies.

Throughout the Project lifecycle, monitoring of the environmental and social performance will allow for continuous assessment and improvement of the efficiency of proposed management measures, contributing to improve sustainable development of the Project. Monitoring efforts are applied at different levels (e.g., local, along ROW and in near communities or at the national level) and therefore require the cooperation of several participants.

The elements included in the Project's monitoring program are available in Table 6-2. Main biodiversity monitoring measures for flora and fauna are included in this ESMP, but these will be further detailed in a Biodiversity Management and Monitoring Plan.

It should be noted that the description of the wayleave's initial conditions will have to be undertaken at the end of the construction work. The baseline data collected, including pre- and post-construction data, will be compared with the data collected during monitoring.

**Table 6-2 Environmental and Social Monitoring Components**

Component	Method	Indicators	Standards/Targets	Location	Frequency	Responsibility														
Noise level	Noise measurement (dBA).	Noise level in dBA.	<p>WBG Noise Level Guidelines during facility operations (WBG, 2007a), summarized as follows:</p> <table border="1"> <thead> <tr> <th colspan="3">Noise Level Guidelines</th> </tr> <tr> <th rowspan="2">Receptor</th> <th colspan="2">One Hour L<sub>Aeq</sub> (dBA)</th> </tr> <tr> <th>Daytime 07:00 - 22:00</th> <th>Nighttime 22:00 - 07:00</th> </tr> </thead> <tbody> <tr> <td>Residential; institutional; educational</td> <td>55</td> <td>45</td> </tr> <tr> <td>Industrial, commercial</td> <td>70</td> <td>70</td> </tr> </tbody> </table>	Noise Level Guidelines			Receptor	One Hour L <sub>Aeq</sub> (dBA)		Daytime 07:00 - 22:00	Nighttime 22:00 - 07:00	Residential; institutional; educational	55	45	Industrial, commercial	70	70	<p>Sampling in communities and dwellings closest to the substations.</p> <p>Representative sampling along the transmission line lines.</p>	Annually for the first 5 years of operation phase.	ZESCO.
Noise Level Guidelines																				
Receptor	One Hour L <sub>Aeq</sub> (dBA)																			
	Daytime 07:00 - 22:00	Nighttime 22:00 - 07:00																		
Residential; institutional; educational	55	45																		
Industrial, commercial	70	70																		
Electromagnetic fields	Sampling with proper devices (μT).	Electromagnetic field μT.	<p>The World Bank (2007b) suggests that average and peak exposure levels should remain below the ICNIRP recommendation for General Public Exposure (ICNIRP, 1998).</p> <table border="1"> <thead> <tr> <th colspan="3">ICNIRP Exposure Limits for General Public Exposure to Electric and Magnetic Fields</th> </tr> <tr> <th>Frequency</th> <th>Electric Field (V/m)</th> <th>Magnetic Field (μT)</th> </tr> </thead> <tbody> <tr> <td>50 Hz</td> <td>5000</td> <td>100</td> </tr> <tr> <td>60 Hz</td> <td>4150</td> <td>83</td> </tr> </tbody> </table>	ICNIRP Exposure Limits for General Public Exposure to Electric and Magnetic Fields			Frequency	Electric Field (V/m)	Magnetic Field (μT)	50 Hz	5000	100	60 Hz	4150	83	<p>Along the ROW with representative sample of zones with human activities, such as crop areas, urban and rural zones, etc.</p>	Annually for the first 5 years of operation phase.	ZESCO		
ICNIRP Exposure Limits for General Public Exposure to Electric and Magnetic Fields																				
Frequency	Electric Field (V/m)	Magnetic Field (μT)																		
50 Hz	5000	100																		
60 Hz	4150	83																		

Component	Method	Indicators	Standards/Targets	Location	Frequency	Responsibility
Soil integrity	Visual inspection of construction sites and access roads.	<ul style="list-style-type: none"> <li>– Signs of erosion, area involved, level of erosion, soil type involved, period.</li> <li>– Signs of compaction, area involved.</li> <li>– Signs of contamination.</li> <li>– Time needed to apply emergency measures and corrective actions, if required.</li> </ul>	<ul style="list-style-type: none"> <li>– Avoid the installation of erosive processes or control them.</li> <li>– Reduce soil compaction.</li> <li>– Avoid soil profile structure destruction.</li> </ul>	Work areas in used and around pylons.	Annually during the whole operation phase.	ZESCO.
Surface water quality	<ul style="list-style-type: none"> <li>– Analysis of pH, TSS, turbidity, phosphorus, BOD, coliform bacteria, and temperature.</li> <li>– Visual detection of pollution or contamination signs (i.e., presence of oil, waste, etc.).</li> <li>– Evaluate the time needed to apply the emergency measures plan (EMP) and to implement corrective actions, if needed.</li> </ul>	<ul style="list-style-type: none"> <li>– Intensity of suspended particles in water.</li> <li>– Signs and intensity of water contamination.</li> <li>– Time needed to apply emergency measures and corrective actions, if required.</li> </ul>	Avoid significant degradation in relation with baseline conditions.	<p>Selected sites along rivers and streams crossed by the ROW.</p> <p>Downstream of electric substations.</p>	Twice per year for the first 5 years, in rainy season and in dry season. Then once every 2 years.	ZESCO.
Surface water	<ul style="list-style-type: none"> <li>– Inspection at pylons location and substations.</li> </ul>	<ul style="list-style-type: none"> <li>– Accumulation of water at the base of pylons.</li> <li>– Presence of runoff water patterns causing erosion at pylons or substations.</li> </ul>	<ul style="list-style-type: none"> <li>– Avoid water retention at the base of pylons.</li> <li>– Avoid erosion caused by surface water runoff.</li> </ul>	At pylons location and substations.	Annually for the first 5 years, then once every 2 years.	ZESCO.
Invasive Alien Flora species	Assess the presence and introduction of IAS. Evaluate disturbances of the water's physical and chemical characteristics and effects on wetland specialist species and species of conservation interest.	<p>Number of IAS</p> <ul style="list-style-type: none"> <li>– Surface area affected by IAS</li> </ul>	<p>Follow the presence and introduction of invasive alien species.</p> <ul style="list-style-type: none"> <li>– Identify appropriate suppression and control measures if problematic presence of IAS.</li> </ul>	Sensitive habitats within or adjacent to the ROW. Reforested areas as part of a compensation plan.	Annually for the first 5 years, then once every 2 years.	ZESCO.

Component	Method	Indicators	Standards/Targets	Location	Frequency	Responsibility
Compensatory plantation and restoration of natural habitat	<ul style="list-style-type: none"> <li>Evaluate the composition of plant communities within reforested and rehabilitated areas and ensure tree planting and revegetation are successful.</li> </ul>	<p>Total surface area of plantation and restoration</p> <p>Success rate of tree planting.</p> <p>Survival rate of species of conservation concern.</p> <ul style="list-style-type: none"> <li></li> </ul>	<ul style="list-style-type: none"> <li>Sufficient area of reforested areas to mitigate residual impacts on natural habitats and critical natural habitats.</li> </ul>	<p>In areas targeted for the compensation.</p> <p>In rehabilitated areas (temporary roads and work areas).</p>	<p>Annually for the first five years, then once every two years.</p>	ZESCO.
Plant communities	Evaluate the composition of plant communities via flora surveys (species diversity and composition).	<p>Composition of plant communities</p> <ul style="list-style-type: none"> <li>Areas of degraded habitat</li> </ul>	<p>Follow the plant communities' evolution after eventual degradation from openings and border effects.</p> <ul style="list-style-type: none"> <li>Identification of invasive species.</li> </ul>	In the different types of habitats found in the ROW, focussing on areas with higher ecological integrity.	Annually for the first five years, then once every two years.	ZESCO.
Integrity of aquatic habitats	Evaluate the integrity of aquatic habitats (level of degradation).	<ul style="list-style-type: none"> <li>Ecological parameters of aquatic habitat according to their types.</li> <li>Signs of degradation, including turbidity siltation and apparent signs of pollution.</li> </ul>	Maintenance of the quality of aquatic habitats.	Zones where streams and wetlands are crossed.	Annually for the first 5 years, then once every 2 years.	ZESCO.
Bat activity near the powerline	<p>Recording bat activity using mobile and static bat detectors at selected locations along the powerline.</p> <ul style="list-style-type: none"> <li>Record bat numbers using visual observation at two major roost sites.</li> </ul>	Abundance and diversity of bat species	Use of Project area and rehabilitated areas by bats.	Along the powerline and in rehabilitated areas.	Twice a year in different seasons.	ZESCO.
Bat mortality monitoring program	<p>Monitoring of bat mortality (in partnership with local communities or NGOs and experts)/ number of dead specimens (species involved) related to period and location.</p> <ul style="list-style-type: none"> <li>Development of a bat mortality register and a training programme.</li> </ul>	<p>Number of mortalities recorded</p> <p>Species impacted</p>	No significant bat mortality.	Along the powerline.	A minimum of 2 times/year in the first 5 years of operation, then ongoing monitoring to be determined according to initial results.	ZESCO.

Component	Method	Indicators	Standards/Targets	Location	Frequency	Responsibility
Bird diversity and abundance	Establish survey points within High, Medium-High, and Medium sensitivity zones along powerline alignment to assess diversity and density by means of point counts and vehicle-based surveys. Point counts should also be conducted in low-sensitivity zones to confirm the classification of this class in terms of diversity and abundance.	Bird diversity Bird abundance	Species diversity and abundances are maintained.	Along the powerline alignment, particularly those areas where bird activity is likely to be more prevalent, i.e., High, Medium-High, and Medium Sensitivity zones.	Quarterly surveys for the first five years of operation. Then, twice a year, during peak periods of activity by local NGOs and/or ZESCO representatives.	ZESCO
Estimates of bird activity along the powerline	Observation stations along the powerline to document flight patterns along the powerline, species, number of individuals, flight altitude, passage position relative to wires, reactions, etc.	Bird flight patterns	Species are aware of the powerline infrastructure and actively avoid powerlines in flight.	Along the powerline, particularly those areas where bird activity is likely to be more prevalent, i.e., High, Medium-High, and Medium Sensitivity zones.	Quarterly surveys for the first five years of operation. Then, twice a year, during peak periods of activity by local NGOs and/or ZESCO representatives.	ZESCO.
Use of pylons or powerlines as roost or nest location	— Dedicated field observations to identify roosts and nest locations on the electrical infrastructure and the analysis of this utilisation.	Number of roosting/nesting birds on towers. Species using the infrastructure Breeding success. —	Quality of supply is maintained. — Efficacy of nesting platforms (if installed).	Along the powerline.	Quarterly surveys for the first five years. If nests are active, monthly surveys to assess breeding success.	ZESCO.
Use of rehabilitated areas by birds	Dedicated bird surveys to assess bird diversity and abundance.	Bird diversity Bird abundance	Use of rehabilitated areas and planted trees, by birds.	Rehabilitated areas.	Five years after the rehabilitation, every two years.	ZESCO.

Component	Method	Indicators	Standards/Targets	Location	Frequency	Responsibility
Bird mortality as a result of collisions with the powerline and electrocution within substations	Bird mortality monitoring should be conducted to determine the mortality rates of priority species within High, Medium-High, and Medium sensitivity zones. Surveys should also be conducted in low-sensitivity zones to confirm this class as a low-risk area.  Development of a bird mortality register and assess efficacy and durability of bird diverters.  Development of a training program.	Number of mortalities recorded Species impacted — Number of trainings/training attendees	No significant bird mortality on powerline or within substations.  Ensure appropriate mitigation measures are in place and are effective in reducing mortality.  — Skills transfer to ZESCO environmental officers and local NGO representatives.	A representative sample of mitigated and unmitigated powerline spans within High, Medium-High, Medium, and Low sensitivity zones.  Pensulo, Mpika, Kasama and Nakonde substation infrastructure.	A minimum of 4 times/year in first 5 years of operation, then ongoing monitoring to be negotiated with ZESCO.	ZESCO.
Wildlife poaching	Validate the intensity of hunting for meat markets along the ROW with wildlife officers.	Number of poaching records — Species targeted	Avoid trafficking of bush meat hunted from the line's ROW and access roads.  — No increase in illegal harvest of mammal species	In areas within a 5 km distance from existing roads.	Ongoing.  Annual report to be compiled.	ZESCO
Mammal communities	Indirect survey methods for large mammals, i.e., spoor and scat counting along tracks and roads in the ROW (presence/absence and abundance).  Direct survey methods for surrogate or indicator taxa in the ROW.	Presence, abundance, and distribution of large mammal species utilizing habitats in the ROW.  — Community composition and structure of surrogate taxa in important ecological habitats in the ROW.	Mammal communities continue using the project area  No increase in illegal harvest of mammal species	Along the powerline in important ecological habitats.	During the wet and dry seasons, biennially.	ZESCO.
Built environment	Survey of relocated households.  RAP audit.	— Level of satisfaction and well-being of resettled households.	— Satisfaction with the process and relocation sites.	Along the ROW and at substation sites where relocation occurred.	After the first year and as required, depending on the results.	ZESCO.
Nuisance to neighbouring communities	Analysis of complaints and concerns related to sexual abuses and GBV.	— Type of nuisance, mitigation measures implemented to solve the problem.  — Number of nuisances remaining after mitigation.	— Limited or no nuisance.  — No nuisance of high gravity.	In communities along the ROW and at substation sites.	Continuously during the operational phase.	ZESCO.

Component	Method	Indicators	Standards/Targets	Location	Frequency	Responsibility
Encroachment within the ROW	Inspection of the ROW in collaboration with local leaders.	Number of restricted components found within the ROW.	No restricted components inside the ROW.	Along the ROW.	Annually.	ZESCO.
Landscape	Pictures before and after construction at strategic locations.	Visual aspects	Integrity of landscape and no additional modifications.	Along the ROW and near substations (same locations as during construction).	Every 5 years.	ZESCO.
Safety and public health	<ul style="list-style-type: none"> <li>– Analysis of the register of HIV/AIDS cases within communities.</li> <li>– Comparison of prevalence rates before and after construction.</li> </ul>	Increase in HIV/AIDS prevalence rate.	No increase in prevalence rates.	In communities along the ROW and at substation sites.	Annually.	ZESCO.
	Analysis of the register of injuries/accidents within communities (including their type and cause).	<ul style="list-style-type: none"> <li>– Cause and type of injuries/accidents within communities.</li> <li>– Number of complaints.</li> <li>– Number of accidents involving communities, related to the Project.</li> <li>– Number of people injured due to Project activities.</li> </ul>	No major injuries or accidents.	In communities along the ROW and at substation sites.	Annually.	ZESCO.
Social and Economic advantages for local communities	<p>Monitoring the rate of rural electrification and number of associated development projects.</p> <p>Monitoring of local content objectives (local employment, service contracts locally sourced) with explicit attention to opportunities made available to women.</p>	<ul style="list-style-type: none"> <li>– Length in km of distribution lines connecting with the Project (after Project implementation).</li> <li>– Number of projects powered (after Project implementation).</li> <li>– Number of local workers used for operation and maintenance activities.</li> <li>– Number of local women used for operation and maintenance activities.</li> </ul>	Maximizing economic benefits for communities.	Communities within 10 km of the ROW and substation sites.	Annually.	ZESCO.

Component	Method	Indicators	Standards/Targets	Location	Frequency	Responsibility
Worker's health and safety	Complete register of the cause and type of workers' injuries/accidents.	<ul style="list-style-type: none"> <li>– Number of workers.</li> <li>– Number of working hours.</li> <li>– Number of total recordable cases.</li> <li>– Number of Lost Time injury.</li> <li>– Number of days off work due to an accident.</li> <li>– Number of occupational health illnesses.</li> <li>– Number of road accidents.</li> <li>– Number of fire incidents.</li> <li>– Total recordable cases frequency.</li> <li>– Lost time injury frequency.</li> <li>– Number of security incidents.</li> <li>– Number of first aid cases.</li> <li>– Number of incidents of breaches of the code of conduct.</li> </ul>	No injuries or accidents.	Employees working in the line.	Annually.	ZESCO.
Community health	Register on HIV/AIDS prevalence in local population.	<ul style="list-style-type: none"> <li>– Increase in HIV/AIDS prevalence rate.</li> </ul>	No propagation attributable to the Project.	Communities in the ROW and near substation sites.	Annually.	ZESCO.
Community health	Complete register of the cause and type of injuries and accidents within communities associated with the power line and substations.	<ul style="list-style-type: none"> <li>– Cause and type of injuries/accidents within communities.</li> <li>– Number of complaints</li> <li>– Number of accidents involving communities, related to the Project.</li> <li>– Number of people injured due to Project activities.</li> </ul>	No injuries or accidents associated with the power line and substation.	Communities in the ROW and near substation sites.	Annually.	ZESCO in collaboration with local communities.



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## **6.3 ENVIRONMENTAL AND SOCIAL AUDITS**

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### **6.3.1 INTERNAL AUDITS**

These audits aim to assess activities against procedures, measures and plans integrated in the ESMP established to ensure compliance with environmental and social commitments and objectives. The PIU will undertake yearly environmental and social inspections. Each management system component will then be audited at least once a year. The components demonstrating a sign of weakness will be audited more frequently. The internal audit can be conducted in one or multiple periods as per the audit program to be determined. Protocols are established based on internal documentation supporting the assessed component. Internal audits will also include Health and Safety issues.

Non-compliance claims will be recorded in a database with preventive or corrective measures indicated along with the responsible party, timelines, and resources needed to implement the identified measures. The number of claims should decrease each year until the ultimate goal of zero is reached. Non-compliances will be corrected; corrective actions will be documented and incorporated into existing practices. The nature and causes of non-compliance will be analysed. This internal audit will notably aim to prepare all supporting information for the statutory audit by ZEMA.

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### **6.3.2 LEGAL COMPLIANCE AUDITS**

The purpose of these audits is to assess compliance with national legislations and regulations, as well as international agreements the project implementation needs to comply with. Unless conducted or reviewed by lawyers, conclusions of these audits do not have any legal value. The exercise intends to diligently ensure that project activities meet the core legal requirements and that the legal framework and associated management measures are updated if needed.

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### **6.3.3 EXTERNAL AUDITS**

The external audit aims to assess the activities against the procedures, measures, and plans integrated into the ESMP established to ensure compliance with environmental and social commitments and objectives. A successful external audit will provide an accredited auditor's perspective that ESMP and project-related activities conform to specified requirements, reach environmental and social objectives, and that the entire environmental and social management approach is effectively carried out. An external auditor brings a fresh pair of eyes to the task, identifying issues internal auditors may have overlooked because of familiarity. Best practices and current developments can be introduced if external consultants are made aware. Results of the external audits will be recorded in a database. When improvements need to be implemented, preventive or corrective measures will be followed, and the responsible party, timelines, and resources needed to implement the measures are identified. ESMP content will be updated after external audits. External audit will also cover Health and Safety issues.

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### **6.3.4 ENVIRONMENTAL AUDIT RESULTS**

Environmental auditing is a key process in the implementation of the ESMP. The findings of each audit are registered in a database, where corrective and/or preventive actions are prescribed, responsibilities assigned, deadlines established and necessary resources mobilized.

In compliance with the procedure, audit reports shall categorize the findings as being either “major”, “minor” or “observational”. The number of findings should decrease every year until the ultimate goal of zero major findings is achieved.

The reviewing process evaluates the performance of the Environmental and Social Management System with regard to its suitability, adequacy and effectiveness. Reviews will assess the need for changes and the opportunity for management system improvements, including objectives, activities, management measures, and implementation resources.

The review will be based on the following:

- The annual report with environmental and social surveillance and monitoring results.
- The results of internal, external and legal compliance audits.
- A presentation summarizing the ESMP's state of performance, main results and findings.
- Foreseen changes in circumstances or legal requirements.
- Recommendations for future objectives and orientations, intended improvements, suggested preventive and/or corrective actions and proposals for improvements.

The review will lead to decisions stated by the project management unit regarding projects and activities to implement, management procedures to adapt, and future orientations to promote in terms of environmental and social management.

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### **6.3.5 DOCUMENT CONTROL AND RECORD MANAGEMENT**

To ensure that the ESMP documents are kept up to date with regard to ongoing activities, that current versions of the documents are made available and that the outdated versions are withdrawn from circulation, management measures, management plans, environmental and social performance monitoring frames, drawings, photographs, forms and any other document required to support administrative activities, will be controlled. Document control and records management will be subjected to internal and external audits.

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#### **6.3.5.1 DOCUMENT CONTROL**

Document control comprises:

- Review and approval: Any new document or modification to an existing document is prepared by the person responsible for the activity and forwarded to the PIU for comments and approval. A signature from the general manager is required before the new document or modification is approved and integrated into the system.
- Distribution control: The electronic version is the official version. Documents will be available to users under a "read-only" mode to prevent accidental changes to the document. Only authorized persons will have access to the modified documents. Only updated versions of the document will be available for use. Preceding versions will be archived on the system but will only be available to authorized personnel.
- Hardcopy documents will be used where access to the electronic information system is not possible or not convenient. In this case, ring binders, plastic lamination of loose sheets, or other protection measures will be implemented to ensure that the legibility and identification of the documents remain throughout their use. Circulating documents will be stamped with color ink to let the user know he is using a controlled hardcopy.

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#### **6.3.5.2 RECORD KEEPING**

Records are essential to keep track of the implementation of all environmental and social commitments. Once completed, records are permanent documents that are no longer modified, as they demonstrate the results of an activity that has been performed.

The individuals responsible for the implementation will be responsible for record completion and transmittal to their supervisors. Archives will be kept as long as the line is operated. The ESMP approach promotes electronic record keeping. Hardcopies will be digitized as much as possible; those that cannot be digitized for any reason will be stored in boxes. Electronic backups and backup copies will be made frequently in case of computer information system failures. Electronic files are kept for the entire lifetime of the project.

# 7 INSTITUTIONAL CAPACITY-BUILDING AND TRAINING NEEDS

Effective environmental and social management is based on a collaborative approach involving shared responsibilities among stakeholders. The Project Implementation Unit (PIU), specifically the environmental and social management managers and specialists, is a key player in the execution of the ESMP. Since several Project-related impacts occur during the pre-construction and construction phases, the Contractor, via its Environmental Manager, is responsible for ensuring Project commitments are met. The Contractor shall ensure that training is provided to all employees about ZESCO's commitment to conduct the proposed activities in a manner that is respectful to local people, and which minimises impact on their lands, resources and the natural environment and social environment. Concerned authorities, such as the Ministry of Environment, play a key role in judging the acceptability and effectiveness of environmental and social management plans.

Environment and social management training and capacity-building programmes shall be conducted to ensure effective implementation of the management and control measures during pre-construction and construction phases.

The ESMP relies on stakeholders' enhanced understanding of their responsibilities and individual implications regarding environmental and social management. In this context, the successful implementation of the ESMP is encouraged through an institutional support and capacity-building programme. Capacity building allows stakeholders and organizations to obtain and improve knowledge, equipment skills required, by building internal capabilities to perform their jobs adequately. An effective capacity building program should encompass the following points:

- Completion of an organizational capacity assessment prior to construction;
- Development and implementation of a stakeholder awareness program directed at relevant stakeholders regarding the execution of the ESMP, monitoring environmental and social performance, and understanding individual responsibilities;
- Provide the institutions responsible for monitoring the ESMP with the tools, techniques, and support necessary (e.g., technical training, mapping tools, stakeholder management, mobile laboratories, guidance regarding sampling techniques, etc.);
- Through the PIU, NGOs, and rural associations, promote greater community involvement in Project development, environmental and social performance, continuous improvement and reducing anticipated risks for communities and infrastructures;
- Through the PIU's technical, environmental, and social committee, promote greater participation of concerned governmental departments in multi-sectorial planning meetings.

Those capacity strengthening initiatives should allow for long-term continuous improvement of environmental and social practices as well as improved compliance with legal requirements and international best practices. Table 7-1 presents the main aspects of the capacity building and training program. Some specific aspects are discussed below.

**Table 7-1 Capacity-Building and Training Program**

Recipients	Training Mode	Topics	Organization Providing the Training	Approximate Cost
PIU, environmental experts of the electricity society, and staff from concerned ministries	– Workshops and seminars	<ul style="list-style-type: none"> <li>– Global view of environmental aspects for energy projects</li> <li>– Environmental rules and by-laws related to energy projects</li> <li>– ESMP implementation, including specific management plans</li> <li>– Specific workshops on documentation management (quality procedures)</li> <li>– Mitigation of SEA/SH risks</li> <li>– Root cause analysis to understand incidents/accidents and development of SCAPs</li> <li>– Project-related labour management procedures and codes of conduct</li> <li>– Grievance management and resolution process</li> </ul>	<ul style="list-style-type: none"> <li>– Ministerial delegation</li> <li>– National external Consultants</li> <li>– International Experts</li> </ul>	US\$100,000
	– Case studies at other existing project sites	<ul style="list-style-type: none"> <li>– Environmental and social management, including the World Bank’s ESF and requirements of relevant ESSs</li> <li>– Health and safety practices</li> </ul>	<ul style="list-style-type: none"> <li>– Specialists from utilities</li> <li>– National external consultants</li> <li>– International experts</li> </ul>	US\$20,000
Ministries, local authorities, and NGO	– Technical training on ESMP monitoring and updating	<ul style="list-style-type: none"> <li>– Specific workshops on environmental monitoring and reporting</li> <li>– Computer monitoring tools</li> <li>– Mapping and meetings with stakeholders</li> <li>– Mobile laboratories and training on sampling techniques</li> </ul>	<ul style="list-style-type: none"> <li>– National external consultants</li> <li>– International experts</li> </ul>	US\$100,000 (US\$50,000 material)
Site operation and line maintenance staff	<ul style="list-style-type: none"> <li>– Workshops</li> <li>– Case studies at existing project sites</li> </ul>	<ul style="list-style-type: none"> <li>– ESMP implementation, including specific management plans</li> <li>– Environmental best practices</li> <li>– Integration of environmental and social management measures in plans and specifications</li> <li>– Internal policies and procedures relating to sustainability and preservation of natural and/or critical habitats</li> <li>– Environmental work supervision</li> <li>– Environmental and social monitoring</li> </ul>	<ul style="list-style-type: none"> <li>– Ministerial delegation</li> <li>– National external Consultants</li> <li>– International Experts</li> </ul>	US\$25,000
	– Training at the Project site	<ul style="list-style-type: none"> <li>– Environmental and social management</li> <li>– Health and safety practices</li> </ul>	<ul style="list-style-type: none"> <li>– Ministerial delegation</li> <li>– National external Consultants</li> <li>– International Experts</li> </ul>	US\$20,000
Contractor staff	<ul style="list-style-type: none"> <li>– Induction</li> <li>– Technical training</li> <li>– Case studies at existing project sites</li> <li>– Training at the Project site</li> </ul>	<ul style="list-style-type: none"> <li>– Induction of occupational health and safety, and emergency response</li> <li>– Introduction to the working environment, policies and practices, and organizational structure.</li> <li>– Environmental global perspective</li> <li>– Environmental rules and by-laws</li> <li>– ESMP implementation, including specific management plans</li> <li>– Environmental supervision</li> <li>– Road safety</li> <li>– SEA/SH awareness, prevention, and response</li> <li>– Worker grievance mechanism</li> <li>– Construction site induction training</li> <li>– Code of conduct for workers, OHS risk assessment, and labour and working conditions, including compliance with national labour laws and combatting child labour and forced labour</li> <li>– Management of respectful, environmental, and health and safety (for workers and communities) construction</li> <li>– Awareness on cultural requirements in the ESMP</li> </ul>	<ul style="list-style-type: none"> <li>– National external Consultants</li> <li>– International Experts</li> </ul>	US\$35,000

Recipients	Training Mode	Topics	Organization Providing the Training	Approximate Cost
Communities	<ul style="list-style-type: none"> <li>- Presentations in communities</li> </ul>	<ul style="list-style-type: none"> <li>- Communities Health and Safety</li> <li>- Traffic awareness</li> <li>- Appraisal of risks and opportunities related to the construction and operation of the power line</li> <li>- Respect of the ROW, electrocution threat, permitted and forbidden activities in the ROW, monitoring of bird mortalities and nesting (if applicable), opportunities from electrification and efficient electricity management</li> <li>- Mitigation of SEA/SH risks.</li> <li>- Awareness campaign against seasonal bushfire practices</li> </ul>	<ul style="list-style-type: none"> <li>- Contractors and NGOs</li> <li>- Local external Consultants</li> </ul>	US\$20,000

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## **7.1 REINFORCEMENT OF WORKERS AND FIELD WORKERS' SPECIFIC CAPACITIES**

Workers should be aware and adequately trained regarding how best practices can be integrated into their work. Ongoing toolbox talks (to include reinforcement of safe work procedures, code of conduct, etc.), and other educational posters shall be structured to meet specific needs, depending on the activity being undertaken. The Contractor shall maintain an updated list of all training sessions for review at the monthly meetings. Along the same lines, employees directly assigned to Project implementation should receive training regarding environmental and social issues related to similar projects and various aspects of environmental and social management, such as environmental protection, relations with local communities, as well as health and safety. The training could and should be adapted to the experience and role of the employees (engineers and technical specialists, professional construction workers, non-specialized workers, etc.). Furthermore, employees identified as part of specific intervention groups (firefighting, first aid, emergency response, etc.) should benefit from more extensive training adapted to the requirements of these groups.

The PIU representatives are responsible for managing the training and capacity-building requirements will need to develop and implement a training register to ensure that all employees have completed the required training. The register should minimally record the nature of the training, the date it was held, who participated, and individual results if a test was given. For those trainings that need to be repeated as refresher courses during the work period, a date should be proposed for renewal.

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## **7.2 COMMUNITIES' AWARENESS AND TRAINING**

Experience gained from other transmission line projects reveals that some inhabitants still construct various structures within the wayleave and that accidents with locals during the construction and the operation phases still occur. Accidents could be reduced by offering training and informative material adapted to local communities. Communities could also play an active role as Control Agents for supervision and environmental and social monitoring, since they live near the line. Training, which targets local communities, will therefore reduce line-related risks and allow for community level involvement in monitoring, including for example, monitoring of bird mortality, nesting, and carcass management.

All training offered to communities should be documented in a specific training register, recording minimally the nature of training offered, the date it was given, and the number of participants. An attendance sheet with a detailed list of all the participants should also be added to the register.

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## **7.3 ORGANIZATIONAL CAPACITY ASSESSMENT**

Successful implementation of the ESMP will be in large part dependent on the organizational capacity of the actors in charge of its implementation. To enhance this capacity, a capacity assessment will be performed at the beginning of the construction phase, once the institutional framework is in place and the individual resources have been identified. The capacity assessment will be performed by an external specialized Consultant and be focused on the environmental and social management aspects. The ultimate objective of the organizational capacity assessment will be to fine-tune the contents of the training program to address capacity shortcomings. The assessment will also evaluate the availability of resources to confirm if they have sufficient capacity to handle the workload.

A specific budget for this task is reserved in the ESMP budget.

## 8 IMPLEMENTATION SCHEDULE

The following provides an overview of the key steps necessary to ensure the efficiency of the Environmental and Social Management Plans (ESMP), avoid redundant efforts, and to ensure that information is shared amongst all key Project parties.

The pre-construction phase will see to the creation of the Project Implementation Unit (PIU), according to the guidelines established within Chapter 4 of the ESMP. Institutional continuity is key to this process, and changes to the composition of the teams should be kept to a minimum to maximize their efficiency. Therefore, approximately six months are attributed to the identification, selection, and preparation (including training) of the PIU team.

Once the final ROW is selected, the preconstruction phase will lead to land acquisitions associated with resettlement and compensations of affected households. All compensations will need to be paid at the satisfaction of the PAPs prior to starting construction work. An awareness program for PAPs will also need to be undertaken.

The construction phase is characterized by the clearing of the ROW. In parallel with these activities is the implementation of the ESMP and its monitoring by the PIU. It is crucial that responsibilities for the implementation, supervision, and monitoring of the ESMP be clearly defined within PIU responsibilities.

In the first year of the operation phase, some ESMP measures such as mitigation efforts associated with impacts arisen during the construction phase will be realized, as well as the monitoring of the state of revegetated areas and the well-being of resettled households. Generally, during the operation phase, considerable effort will be devoted to the monitoring of the Project's performance according to environmental and social indicators.

A Project ESMP implementation schedule is proposed in Table 8-1; this is divided into a preconstruction phase, construction phase, and operation phase.

The detailed Project schedule includes specificities associated with the Project implementation for different lots, including Lots 1-2 (Pensulo-Kasama), Lot 3 (Kasama-Nakonde) and Lot 4 (Pensulo and Nakonde DVSDs). The construction schedules are very similar for the 4 lots, covering a 24-month period. However, Lot 3 and Lot 4 include a "*Development of tender documents, update of design, and tender management*" stage at the start of activities for which the duration is expected to be 3 months. Consequently, Lot 3 and Lot 4 will be completed 3 months after Lots 1-2 because of the added 3-month "*tender management*" period.







## 9 COST SUMMARY

Most of the costs associated with the implementation of mitigation measures and improvements cannot be specified at this stage of the study. Many of these measures will be the responsibility of the Contractor(s) who will construct the Project, so those costs will be integrated with other construction costs. It should be mentioned that it is imperative for the ESMP to be appended to the construction tender documents to be published to ensure that those costs become the responsibility of the Project Contractor(s).

Since the implementation of certain measures will be under ZESCO's and PIU's responsibility, part of the operational budget to be applied to the application of measures is not yet known. Table 9-1 provides a summary of the main costs for the implementation of plans, programs, and certain management measures.

It should be noted that the costs below should be added to the cost of the RAP (stand-alone report).

**Table 9-1 Preliminary ESMP Budget Estimate Based on Main Costs**

	Cost (USD)	
	Lump sum	Yearly
<b>Pre-construction and Construction Phase</b>		
Organizational Capacity Assessment	50,000	
PIU operating budget (4 staff for environmental & social management, 4 years)		260,000
Capacity building and training program	270,000	
Development of Environmental and Social Management System based on ZESCO SHEQ Policy, including the specific management plans for Construction (by the Contractor and the PIU) and Operation phase (by ZESCO)	250,000	
Implementation of the specific management plans under PIU responsibility		
Biodiversity Management Plan	790,000	
Stakeholder Engagement Activities during preconstruction/construction phase	85,000	
Resettlement Action Plan (RAP) including compensation measures and assistance to affected households and landowners	TBD	
Code of Conduct	30,000	
Workers' Grievance Management Plan	20,000	
Community Grievance Redress Mechanism		17,500
Gender Based Violence Management Plan	90,000	
Environmental and social surveillance		100,000
<b>Sub-Total</b>	<b>1,660,000</b>	<b>360,000</b>
<b>Operation Phase</b>		
Capacity building and training program		
Implement the detailed specific management plans associated with the operation phase:		
Stakeholder Engagement Plan		20,000
Pollution Prevention Management Plan	65,000	
Biodiversity Management Plan	included in monitoring cost	included in monitoring cost
Residual Materials and Hazardous Products Management Plan	75000	
Code of Conduct	25,000	
Gender-based Violence and Harassment Risk Assessment and Management Plan	30,000	
Workers' Grievance Management Plan	25,000	
Community Grievance Redress Mechanism	60,000	
Occupational Hygiene. Health. and Safety Plan	75,000	
Community Health and Safety Plan	40,000	
Emergency Prevention and Response Plan, including Spill containment kits and spill response training of on-site staff	60,000	
Compensate for damage to property or assets during maintenance, including damage to crops.		5,000
Ensure regular maintenance of permanent access roads and related ditches and culverts to prevent the water crossings from becoming insurmountable obstacles for the aquatic fauna. Maintenance will also prevent soil erosion leading to sediment input into aquatic habitats.		10,000
Grade ground surface at each tower site to provide drainage away from tower base		5,000
Coordinate with local authorities to allow local population to benefit from woody material cleared from the ROW.		5,000

	Cost (USD)	
	Lump sum	Yearly
Implement a sensitization program in order to educate and increase local communities' awareness on safe behaviors close to a powerline	30,000	
PAP compensation for any damage to their assets during maintenance activities		5,000
Stakeholder engagement activities during operation phase		10,000
Monitoring of environmental and social performance. including the development of adapted mitigation measures (notably for birds)	73,000	182,000
Environmental audit		10,000
Supervision of environmental and social monitoring from designated authorities	72,000	
<b>Sub-Total</b>	<b>630,000</b>	<b>252,000</b>
<b>TOTAL</b>	<b>2,290,000</b>	<b>612,000</b>



# 10 REFERENCES

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