SAPP

ENVIRONMENTAL AND SOCIAL MANAGEMENT PLAN FOR THE ZAMBIA-TANZANIA POWER INTERCONNECTION PROJECT

ESMP

ZAMBIA

WSP REF.: 191-09831-00

DATE: JANUARY 22, 2020
<table>
<thead>
<tr>
<th>VERSION</th>
<th>DATE</th>
<th>DESCRIPTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>00</td>
<td>October 23, 2019</td>
<td>Preliminary Version</td>
</tr>
<tr>
<td>01</td>
<td>November 27, 2019</td>
<td>Final Version</td>
</tr>
<tr>
<td>02</td>
<td>December 17, 2019</td>
<td>Final Version 2</td>
</tr>
<tr>
<td>03</td>
<td>January 8, 2020</td>
<td>Final Version 3</td>
</tr>
<tr>
<td>04</td>
<td>January 22, 2020</td>
<td>Final Version 4</td>
</tr>
</tbody>
</table>
Reference to mention:

This report was prepared by WSP for the account of SAPP, in accordance with the professional services agreement. The disclosure of any information contained in this report is the sole responsibility of the intended recipient. The material in it reflects WSP’s best judgement in light of the information available to it at the time of preparation. Any use which a third party makes of this report, or any reliance on or decisions to be made based on it, are the responsibility of such third parties. WSP accepts no responsibility for damages, if any, suffered by any third party as a result of decisions made or actions based on this report. This limitations statement is considered part of this report.

The original of the technology-based document sent herewith has been authenticated and will be retained by WSP for a minimum of ten years. Since the file transmitted is now out of WSP’s control and its integrity can no longer be ensured, no guarantee may be given with regards to any modifications made to this document.
PRODUCTION TEAM 2017

NELSAPP

NELSAPP Regional Coordinator  Elicad Elly Nyabeeya
Project Coordinator  Grania Rosette Rubombora

WSP CANADA INC. (WSP)

Project Director  Jean-Marc Evenat
Deputy Project Manager  Philippe Alary-Paquette
Project Manager  Ghyslain Pothier
Social Development Specialist  Antoine Moreau
Resettlement Specialist  Marie-Andrée Burelle
Stakeholder Engagement and Communication Specialist  Francis Barbe
Biodiversity Specialist  Hélène Chouinard
GIS Specialist  Mylène Lévesque
Administrative Assistant/Copy Editor  Julie Boisvert

MMK PROJECT SERVICES - SUBCONSULTANT

Tanzania Team Leader and Environmentalist  Munawer Khalfan
Sociologist and RAP Specialist  Josephine Meela
Water Resources  Ramadhan Muhsin
PRODUCTION TEAM 2019

SAPP

Environmental and Social Specialist  
Nomasono Mnisi

WORLD BANK GROUP – SAFEGUARDS TEAM

Lead Social Safeguards Specialist  
Adrian Howard Cutler

Senior Social Safeguards Specialist  
Angela Nyawira Khaminwa

Senior Environmental/Social Safeguards Consultant  
Thomas Walton

Environmental Safeguards  
Brandon Carter

Social Safeguards  
Njavwa Namposya Chilufya

WORLD BANK GROUP – PROJECT TEAM

Team Lead  
Mirlan Aldayarov

Team Lead  
Sam Kwesi Ewuah Oguah

Team Member  
Yi Xu

ZESCO

Chief Environmental and Social Analyst  
Brenda Lulu Musonda Chizinga

Environmental Scientist  
Peter Mautelo

Social Scientist  
Martha Moyo

Wayleave Officer  
David Mwanangombe
WSP CANADA INC. (WSP)

Project Director       Philippe Alary-Paquette

Project Manager       Kevin Murphy

Biodiversity Specialists       Maya Brennan - Jacot

Social Specialist       Eric Deneut

Occupational Health and Safety Specialist       Marie- Eve LePage

GIS Specialist       Mylene Levesque

Geomatics Specialist       Felix-Antoine Audet

Editing       Ann Rivest

SUBCONSULTANTS

Social Scientist       Dr. Mitulo SILENGO

Gender Specialist       Florence NANYANGWE

Avifauna Specialist       Megan Diamond

Mammalogist, Bat Specialist       Clare Mateke

Zoologist, Large Mammal Specialist       Ngawo NAMUKONDE

Forest Biologist/Ecologist       Lishomwa Mulongwe
## ABBREVIATIONS AND ACRONYMS

<table>
<thead>
<tr>
<th>Abbreviation</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>ACSR</td>
<td>Aluminium Conductor Steel Reinforced</td>
</tr>
<tr>
<td>ADI</td>
<td>Area of Direct Influence</td>
</tr>
<tr>
<td>AII</td>
<td>Area of Indirect Influence</td>
</tr>
<tr>
<td>ALARA</td>
<td>As Low as Reasonably Achievable</td>
</tr>
<tr>
<td>BMMP</td>
<td>Biodiversity Management and Monitoring Plan</td>
</tr>
<tr>
<td>BOD</td>
<td>Biological Oxygen Demand</td>
</tr>
<tr>
<td>C-ESMP</td>
<td>Construction worksite ESMP</td>
</tr>
<tr>
<td>CoC</td>
<td>Code of Conduct</td>
</tr>
<tr>
<td>COMESA</td>
<td>Common Market for Eastern and Southern Africa</td>
</tr>
<tr>
<td>DATF</td>
<td>District AIDS Task Force</td>
</tr>
<tr>
<td>DAOs</td>
<td>District Administrative Officers</td>
</tr>
<tr>
<td>DOPE</td>
<td>Development Organization for People’s Empowerment</td>
</tr>
<tr>
<td>EAPP</td>
<td>Eastern African Power Pool</td>
</tr>
<tr>
<td>EMP</td>
<td>Emergency Measures Plan</td>
</tr>
<tr>
<td>E&amp;S</td>
<td>Environmental &amp; Social</td>
</tr>
<tr>
<td>ESHS</td>
<td>Environmental, Social, Health and Safety</td>
</tr>
<tr>
<td>ESIA</td>
<td>Environmental and Social Impact Assessment</td>
</tr>
<tr>
<td>ESMP</td>
<td>Environmental and Social Management Plan</td>
</tr>
<tr>
<td>ESMS</td>
<td>Environmental and Social Management System</td>
</tr>
<tr>
<td>GBV</td>
<td>Gender Based Violence</td>
</tr>
<tr>
<td>GRM</td>
<td>Grievance Redress Mechanism</td>
</tr>
<tr>
<td>HIV/AIDS</td>
<td>Human Immunodeficiency Virus/Acquired Immunodeficiency Syndrome</td>
</tr>
<tr>
<td>IAS</td>
<td>Invasive Alien Species</td>
</tr>
<tr>
<td>ICBC</td>
<td>Industrial and Commercial Bank of China</td>
</tr>
<tr>
<td>ICNIRP</td>
<td>International Commission on Non-Ionizing Radiation Protection</td>
</tr>
<tr>
<td>IFC-EBRD</td>
<td>International Finance Corporation-European Bank of Reconstruction and Development</td>
</tr>
<tr>
<td>IFC EHS</td>
<td>International Finance Corporation-Environment Health &amp; Safety</td>
</tr>
<tr>
<td>IUCN</td>
<td>International Union for Conservation of Nature</td>
</tr>
<tr>
<td>KP</td>
<td>Kilometer Point</td>
</tr>
<tr>
<td>NBI</td>
<td>Nile Basin Initiative</td>
</tr>
<tr>
<td>NELSAP</td>
<td>Nile Equatorial Lakes Subsidiary Action Program</td>
</tr>
<tr>
<td>NGO</td>
<td>Non-Governmental Organization</td>
</tr>
<tr>
<td>OSC</td>
<td>Overseas Strategic Consulting</td>
</tr>
<tr>
<td>PAPs</td>
<td>Project Affected Persons</td>
</tr>
<tr>
<td>Acronym</td>
<td>Description</td>
</tr>
<tr>
<td>-------------</td>
<td>--------------------------------------------------------------------</td>
</tr>
<tr>
<td>PIU</td>
<td>Project Implementation Unit</td>
</tr>
<tr>
<td>PMU</td>
<td>Project Management Unit</td>
</tr>
<tr>
<td>RAP</td>
<td>Resettlement Action Plan</td>
</tr>
<tr>
<td>REA</td>
<td>Rural Electrification Authority</td>
</tr>
<tr>
<td>RHC</td>
<td>Rural Health Centers</td>
</tr>
<tr>
<td>ROW</td>
<td>Right-of-way</td>
</tr>
<tr>
<td>SADC</td>
<td>South African Development Community</td>
</tr>
<tr>
<td>SAPP</td>
<td>Southern African Power Pool</td>
</tr>
<tr>
<td>SAPP AREP</td>
<td>Program for Advancing Regional Energy Transformational Projects</td>
</tr>
<tr>
<td>SBDs</td>
<td>Standard Bidding Documents</td>
</tr>
<tr>
<td>SE</td>
<td>Supervising Engineer</td>
</tr>
<tr>
<td>SEP</td>
<td>Stakeholder Engagement Plan</td>
</tr>
<tr>
<td>SHEQ</td>
<td>Safety, Health, Environment and Quality</td>
</tr>
<tr>
<td>SPDs</td>
<td>Standard Procurement Documents</td>
</tr>
<tr>
<td>STD</td>
<td>Sexually Transmitted Infections</td>
</tr>
<tr>
<td>TANESCO</td>
<td>Tanzania Electric Supply Company Limited</td>
</tr>
<tr>
<td>TAZAMA</td>
<td>Tanzania-Zambia-Mafuta</td>
</tr>
<tr>
<td>TAZARA</td>
<td>Tanzania-Zambia Railway Authority</td>
</tr>
<tr>
<td>ToR</td>
<td>Terms of Reference</td>
</tr>
<tr>
<td>VSU</td>
<td>Victim Support Unit</td>
</tr>
<tr>
<td>WBG</td>
<td>World Bank Group</td>
</tr>
<tr>
<td>YMCA</td>
<td>Young Men’s Christian Association</td>
</tr>
<tr>
<td>WHO</td>
<td>World Health Organization</td>
</tr>
<tr>
<td>ZEMA</td>
<td>Zambia Environmental Management Agency</td>
</tr>
<tr>
<td>ZESCO</td>
<td>Zambia Electricity Supply Corporation Limited</td>
</tr>
<tr>
<td>ZTIP</td>
<td>Zambia-Tanzania Interconnection Project</td>
</tr>
<tr>
<td>ZTK</td>
<td>Zambia-Tanzania-Kenya</td>
</tr>
</tbody>
</table>
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 Interconnection 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 has requested SAPP to provide financial support in finalizing the required analyses and studies from its Program for Advancing Regional Energy Transformational Projects (SAPP AREP Program). The SAPP AREP Program is a World Bank assisted and financed support provided to the utilities in the SADC region to advance preparation and implementation of the regional priority projects.

The Tanzania-Zambia electrical interconnection Project has evolved considerably since its initiation in late 2013. The ZTIP Project involves construction and operation of a single-circuit 330-kV electricity transmission line mounted on steel lattice pylons linking the Nakonde substation with substations in Kasama, Mpika, and Pensulo.

The ZTIP Project is planned to be added to another ongoing transmission project promoted by the Industrial and Commercial Bank of China (ICBC), which will link the Nakonde and Kasama substations. The 330-kV line from the Tanzanian border to Nakonde and the 330/66-kV substation at Nakonde components of the ICBC Project are considered associated facilities of the present World Bank funded ZTIP Project because without them, the current ZTIP Project would not be viable.

WSP is charged with conducting the ZTIP Project’s Environmental and Social Impact Assessment (ESIA), Environmental and Social Management Plan (ESMP), and Resettlement Action Plan (RAP) and has worked in collaboration with the Consultant in charge of the feasibility study (FS Consultant). 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 eight main chapters, including the introduction, project description, impacts and mitigation, institutional framework, training, monitoring plan, implementation schedule, cost summary, and finally references.
PROJECT DESCRIPTION

The Project involves construction and operation of:

- Nakonde – Kasama – Mpika – Pensulo: one 330-kV circuit of alternating current, mounted on one row of single-circuit pylons over 596 km, with a 50 m ROW.

Other recommended Project characteristics include:

- additional equipment into the planned 400/330/66-kV substation in the Nakonde area (construction of the substation is included in the Kasama-Nakonde 330-kV transmission Project built with the ICBC, but considered as an associated facility in the present ESIA);
- additional equipment into the existing 330/66-kV substation in Kasama (substation already existing, with sufficient space to accommodate additional equipment);
- additional equipment into the planned 330/66-132-kV substation in Mpika (substation already existing, with sufficient space to accommodate additional equipment);
- extension of existing 330/66-kV substation in Pensulo;
- access and maintenance roads along wayleave, where necessary.

The configurations above have been confirmed by the Project Steering Committee and are presented in detail in the Project’s Final Feasibility Study.

Two components of the ICBC Project listed above are considered associated facilities of the ZTIP Project because the Project would not be viable without them, these include:

- the 330-kV line from the Tanzanian border to Nakonde;
- the 330/66-kV substation at Nakonde.

Tower heights will range from 31.1 m to 37 m.

The width of the wayleave is 50 m over the entire length of the Project area and ZESCO plans to acquire the right-of-way (ROW) over the entire length. However, portions of the Project that parallel existing transmission lines will require less new ROW (i.e., 35 m width of new ROW between Pensulo and Kasama, and 10 m width of new ROW between Kasama and Nakonde) because the ROW will be shared between projects. The Project capital costs are estimated at USD 161,436,000 and, at this stage, the construction phase can be expected to take two to three years from its start date.

ENVIRONMENTAL AND SOCIAL MANAGEMENT PLAN

The Project’s ESMP will ensure measures proposed to mitigate or optimize the Project’s potential impacts are effectively implemented during the construction, operation, and decommissioning phases of the Project. The ESMP proposes the implementation of monitoring and follow-up programs during the pre-construction, construction, operation, and decommissioning phases. 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, 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.
# TABLE OF CONTENTS

<table>
<thead>
<tr>
<th>Section</th>
<th>Title</th>
<th>Pages</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>INTRODUCTION</td>
<td>1-1</td>
</tr>
<tr>
<td>1.1</td>
<td>REGIONAL BACKGROUND</td>
<td>1-1</td>
</tr>
<tr>
<td>1.2</td>
<td>PROJECT BACKGROUND</td>
<td>1-1</td>
</tr>
<tr>
<td>1.3</td>
<td>PROJECT DEVELOPMENT PROCESS</td>
<td>1-2</td>
</tr>
<tr>
<td>1.4</td>
<td>REPORT OBJECTIVES AND CONTENTS</td>
<td>1-2</td>
</tr>
<tr>
<td>1.5</td>
<td>REPORT STRUCTURE</td>
<td>1-3</td>
</tr>
<tr>
<td>2</td>
<td>PROJECT DESCRIPTION</td>
<td>2-1</td>
</tr>
<tr>
<td>2.1</td>
<td>OVERVIEW</td>
<td>2-1</td>
</tr>
<tr>
<td>2.2</td>
<td>PROJECT DESCRIPTION AND CONFIGURATION</td>
<td>2-5</td>
</tr>
<tr>
<td>2.2.1</td>
<td>HISTORICAL OVERVIEW</td>
<td>2-5</td>
</tr>
<tr>
<td>2.2.2</td>
<td>GENERAL PROJECT DESCRIPTION FOR ZAMBIA</td>
<td>2-5</td>
</tr>
<tr>
<td>2.2.3</td>
<td>RESULTS FROM THE ANALYSIS OF ALTERNATIVES</td>
<td>2-6</td>
</tr>
<tr>
<td>2.2.4</td>
<td>PROPOSED LINE ROUTE</td>
<td>2-7</td>
</tr>
<tr>
<td>2.3</td>
<td>PROJECT COMPONENTS</td>
<td>2-11</td>
</tr>
<tr>
<td>2.3.1</td>
<td>TRANSMISSION LINE</td>
<td>2-11</td>
</tr>
<tr>
<td>2.3.2</td>
<td>SUBSTATIONS</td>
<td>2-14</td>
</tr>
<tr>
<td>2.3.3</td>
<td>TEMPORARY FACILITIES</td>
<td>2-15</td>
</tr>
<tr>
<td>2.3.4</td>
<td>ASSOCIATED FACILITIES</td>
<td>2-15</td>
</tr>
<tr>
<td>2.4</td>
<td>PROJECT COSTS AND SCHEDULE</td>
<td>2-16</td>
</tr>
<tr>
<td>2.5</td>
<td>PROJECT BOUNDARIES</td>
<td>2-16</td>
</tr>
<tr>
<td>2.5.1</td>
<td>AREA OF DIRECT INFLUENCE</td>
<td>2-17</td>
</tr>
<tr>
<td>2.5.2</td>
<td>AREA OF INDIRECT INFLUENCE</td>
<td>2-17</td>
</tr>
<tr>
<td>2.6</td>
<td>PROJECT REQUIREMENTS</td>
<td>2-17</td>
</tr>
<tr>
<td>2.6.1</td>
<td>AGGREGATES, GRAVEL, AND SAND</td>
<td>2-17</td>
</tr>
<tr>
<td>2.6.2</td>
<td>WATER</td>
<td>2-17</td>
</tr>
<tr>
<td>2.6.3</td>
<td>PERSONNEL</td>
<td>2-17</td>
</tr>
<tr>
<td>2.6.4</td>
<td>CAMP SITES</td>
<td>2-18</td>
</tr>
<tr>
<td>2.6.5</td>
<td>LOCAL SUPPLIES AND SERVICES (FOOD, MEDICAL ATTENTION, AND FUEL)</td>
<td>2-18</td>
</tr>
<tr>
<td>2.6.6</td>
<td>ELECTRICITY</td>
<td>2-18</td>
</tr>
<tr>
<td>2.7</td>
<td>PROJECT ACTIVITIES</td>
<td>2-18</td>
</tr>
<tr>
<td>2.7.1</td>
<td>PRE-CONSTRUCTION PHASE</td>
<td>2-18</td>
</tr>
<tr>
<td>2.7.2</td>
<td>CONSTRUCTION PHASE</td>
<td>2-19</td>
</tr>
<tr>
<td>2.7.3</td>
<td>OPERATION PHASE</td>
<td>2-19</td>
</tr>
<tr>
<td>2.7.4</td>
<td>DECOMMISSIONING PHASE</td>
<td>2-20</td>
</tr>
</tbody>
</table>
3 KEY ENVIRONMENTAL AND SOCIAL IMPACTS AND MITIGATION MEASURES ...........................................3-1

3.1 ENVIRONMENTAL AND SOCIAL MITIGATION MEASURES ........................................3-1
3.1.1 PRE-CONSTRUCTION AND CONSTRUCTION ..................3-2
3.1.2 OPERATION ..........................................................3-17
3.1.3 DECOMMISSIONING ...........................................3-25

4 INSTITUTIONAL FRAMEWORK AND ACTION PLANS ...........................................4-1

4.1 OVERALL ESMP MANAGEMENT DURING PREPARATION AND CONSTRUCTION PHASES ........................................4-1

4.2 INSTITUTIONS IN CHARGE OF THE ESMP ...........................................4-2
4.2.1 GOVERNMENT OF ZAMBIA AND PROJECT SPONSORS ........4-2
4.2.2 PROJECT OWNER: ZESCO BOARD AND MANAGEMENT ..............4-2
4.2.3 PROJECT IMPLEMENTATION UNIT (PIU) ..................................4-2
4.2.4 GRM FOCAL POINTS AND GBV SERVICE PROVIDERS ..........4-4
4.2.5 SUPERVISING ENGINEER ............................................4-5
4.2.6 CONTRACTORS .......................................................4-6

4.3 OPERATION PHASE .........................................................4-7

4.4 FRAMEWORK OF THE STAKEHOLDER ENGAGEMENT PLAN ........................................4-7
4.4.1 INTRODUCTION .........................................................4-7
4.4.2 SEP FOR ZESCO PROJECT IMPLEMENTATION UNIT (PIU) .................................................................4-8
4.4.3 SEP FOR THE CONSTRUCTION CONTRACTORS AND THE SUPERVISING ENGINEER ........................................4-13

4.5 FRAMEWORK OF THE GRIEVANCE REDRESS MECHANISM ........................................4-16
4.5.1 INTRODUCTION .........................................................4-16
4.5.2 ACTORS AND ACTIVITIES ............................................4-16
4.5.3 MONITORING AND REPORTING ........................................4-22
4.5.4 CAPACITY BUILDING ...................................................4-23

4.6 FRAMEWORK OF THE GBV ACTION PLAN ...........................................4-23
4.6.1 INTRODUCTION .........................................................4-23
4.6.2 ACTORS AND ACTIVITIES ............................................4-24
4.6.3 MONITORING AND REPORTING ........................................4-34
4.6.4 CAPACITY BUILDING ...................................................4-35
4.6.5 POTENTIAL SERVICE PROVIDERS ......................................4-35
5 INSTITUTIONAL CAPACITY-BUILDING AND TRAINING NEEDS ......................5-1

5.1 REINFORCEMENT OF WORKERS AND FIELD WORKERS’ SPECIFIC CAPACITIES ..........5-2
5.2 COMMUNITIES’ AWARENESS AND TRAINING .........................................................5-3
5.3 ORGANIZATIONAL CAPACITY ASSESSMENT .........................................................5-3

6 MONITORING PLAN ..............................6-1

6.1 ENVIRONMENTAL AND SOCIAL SURVEILLANCE ..............................................6-1
6.2 ENVIRONMENTAL AND SOCIAL MONITORING ...............................................6-7

7 IMPLEMENTATION SCHEDULE ..........7-1

8 COST SUMMARY ................................ 8-1

9 REFERENCES ........................................ 9-1

TABLES

| TABLE 2-1 | REGIONAL INTERCONNECTION PROJECTS ...........................................2-1 |
| TABLE 2-2 | TOWER CHARACTERISTICS .......... 2-11 |
| TABLE 2-3 | CURRENT ROW MANAGEMENT PRACTICES IN ZAMBIA .........................2-13 |
| TABLE 2-4 | TOWER CHARACTERISTICS .......... 2-15 |
| TABLE 3-1 | MANAGEMENT MEASURES TO BE IMPLEMENTED DURING THE PRE-CONSTRUCTION AND CONSTRUCTION PHASES ........3-3 |
| TABLE 3-2 | MANAGEMENT MEASURES TO BE IMPLEMENTED DURING THE OPERATION PHASE .................. 3-19 |
| TABLE 3-3 | MANAGEMENT MEASURES TO BE IMPLEMENTED DURING THE DECOMMISSIONING PHASE ........ 3-27 |
| TABLE 4-1 | GRM ACTORS DURING PROJECT PREPARATION .................................. 4-20 |
| TABLE 4-2 | GRM ACTORS DURING CONSTRUCTION ............................................. 4-21 |
| TABLE 4-3 | GBV ACTION PLAN ACTORS DURING PROJECT PREPARATION ................. 4-25 |
| TABLE 4-4 | GBV ACTORS DURING PROJECT CONSTRUCTION ................................... 4-28 |
TABLE 5-1  CAPACITY-BUILDING AND TRAINING PROGRAM ........................................5-1
TABLE 6-1  SPECIFIC ENVIRONMENTAL AND SOCIAL COMPLIANCE MEASURES..6-3
TABLE 6-2  ENVIRONMENTAL AND SOCIAL MONITORING COMPONENTS...........6-8

FIGURES
FIGURE 2-1  EXISTING AND PROJECTED INTERCONNECTION POWERLINES IN THE EASTERN AFRICA POWER POOL 2-2
FIGURE 2-2  PLANNED INTERCONNECTION PROJECTS WITH EASTERN/NILE BASIN COUNTRIES AND SOUTHERN AFRICA POWER POOL ..................2-3
FIGURE 2-3  ZESCO ELECTRICITY GRID ..........2-4
FIGURE 2-4  COMBINED USE OF SELF-SUPPORTING AND GUYED SINGLE-CIRCUIT TOWERS .................. 2-12
FIGURE 2-5  EXAMPLE OF A DOUBLE-CIRCUIT TRANSMISSION LINE .........................2-16
FIGURE 4-1  INSTITUTIONAL FRAMEWORK FOR ESMP IMPLEMENTATION, PRE-CONSTRUCTION/CONSTRUCTION PHASE........................................4-1
FIGURE 4-2  COMPONENTS OF THE SEP........ 4-10
FIGURE 4-3  SEP FOR EACH STAGE AND PROJECT ACTORS ..................4-11
FIGURE 4-4  GRM ACTIVITIES DURING PROJECT PREPARATION AND PROJECT CONSTRUCTION............................... 4-16
FIGURE 4-5  OVERALL PRESENTATION OF THE GRM............................................. 4-18
FIGURE 4-6  GBV PREVENTIVE AND CORRECTIVE MEASURES AND ACTIVITIES ACTORS FOR EACH PHASE OF THE PROJECT ..............4-24
FIGURE 4-7  GBV ACTION PLAN OVERALL PROCEDURE..............................4-32
FIGURE 7-1  ESMP AND RAP IMPLEMENTATION SCHEDULE – LINE AND SUBSTATIONS........................................7-3
FIGURE 8-1  PRELIMINARY ESMP BUDGET ESTIMATE BASED ON MAIN COSTS8-1

MAP
MAP 2-1  PROPOSED LINE ROUTE..............2-9
APPENDICES

1-1 Scoping Report and Terms of Reference Submission to ZEMA
2-1 Project Component Coordinates
2-2 Final Feasibility Drawings and Outline of Towers to be Built
2-3 Substation Configuration Drawings
2-4 Details of the Construction Schedule
3-1 WBG EHS Guidelines - Electric Transmission and Distribution
3-2 Zesco SHEQ Policy
3-3 WBG EHS Guidelines - Waste Management
3-4 WBG EBRD Guidelines - Worker Accommodations
4-1 General Environmental Management Conditions for Construction Contracts
1 INTRODUCTION

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 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. 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.

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 Interconnection 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 (SOP1 and SOP2):

- **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 2024;

- **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 Tanzania-Zambia interconnection 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 has requested SAPP to provide financial support in finalizing the required analyses and studies from its Program for Advancing Regional Energy Transformational Projects (SAPP AREP Program).
The SAPP AREP Program is a World Bank assisted and financed support provided to the utilities in the SADC region to advance preparation and implementation of the regional priority projects. There will be an implementing framework signed between ZESCO and SAPP specifying their roles and responsibilities, where SAPP will act as procurement and financing agent representing the interests of ZESCO as a client.

### 1.3 PROJECT DEVELOPMENT PROCESS

The Tanzania-Zambia electrical interconnection Project 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 ZEMA. This scoping report included the proposed terms of reference for conduction of the present ESIA & Resettlement Action Plan (RAP), covering the retained Project design, and was submitted to ZEMA on June 1, 2017. The Scoping Report and corresponding ToRs were then approved by ZEMA through a letter to ZESCO dated June 27, 2017 (see Appendix 1-1). A draft ESIA and 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.

The current ESIA/ESMP provide an update of the 2017 drafts and are revised 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.).

### 1.4 REPORT OBJECTIVES AND CONTENTS

Under the laws of Zambia, and as per World Bank policies, the Project requires the completion of an ESIA accompanied by a RAP.

The main objectives of the ESIA are to:

- identify key Project environmental and social impacts;
— develop an Environmental and Social Management Plan (ESMP) that will outline measures to avoid, reduce or compensate adverse impacts, enhance positive Project impacts, and provide mechanisms for their implementation.

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;
— identify responsibilities and timing for implementation of E&S management measures as well as costs for their implementation.

A RAP is also provided as a standalone document.

The analyses presented in the ESIA were developed based on the selected Project design which is described in greater detail within the Project Description (see Chapter 3 of the ESIA). Data collected from secondary sources, field surveys and consultation with stakeholders at the regional and local levels (see Chapter 7 of the ESIA) were used in the ESIA.

### 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 presented within eight chapters, the contents of each is described 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;
— **Chapter 3 – Key Environmental and Social Impacts and Mitigation Measures:** summarizes impacts and provides an impact mitigation plan for the Project;
— **Chapter 4 – Institutional Framework:** provides a description of the institutional arrangements proposed for ensuring proper implementation of the ESMP;
— **Chapter 5 – Institutional Capacity Building and Training Needs:** provides a high-level overview of the program aimed at strengthening institutional environmental and social capacity;
— **Chapter 6 – Monitoring Plan:** presents the plan developed to ensure proper follow-up and quantification of environmental and social effects of the Project;
— **Chapter 7 – 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 8 – 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

As indicated in the Introduction of the ESMP, SAPP along with the EAPP, are working with the governments of the Eastern and Southern African countries, and with regional bodies, to foster cooperation and collaboration in the development of the vast hydropower resources in the region, and in promoting regional power interconnection and trade.

Currently, powerlines cover only a few regions of different countries and several networks are not connected. Table 2-1 indicates the regional interconnection projects that were initiated in the EAPP in recent years. These projects are at various planning and implementation stages.

Table 2-1 Regional Interconnection Projects

<table>
<thead>
<tr>
<th>Project Name</th>
<th>Country</th>
<th>Voltage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bujugali-Tororo-Lessos</td>
<td>Uganda and Kenya</td>
<td>220 kV</td>
</tr>
<tr>
<td>Uganda-Rwanda</td>
<td>Uganda and Rwanda</td>
<td>220 kV</td>
</tr>
<tr>
<td>Nkenda-Beni-Butembo-Bunia</td>
<td>Uganda and DR-Congo</td>
<td>220 kV</td>
</tr>
<tr>
<td>Singida-Arusha-Nairobi</td>
<td>Tanzania and Kenya</td>
<td>400 kV</td>
</tr>
<tr>
<td>Rusumo-Bujumbura</td>
<td>DR-Congo and Burundi</td>
<td>220 kV</td>
</tr>
<tr>
<td>Rusumo-Kigali</td>
<td>DR-Congo and Rwanda</td>
<td>220 kV</td>
</tr>
<tr>
<td>Rusumo-Nyakanazi</td>
<td>DR-Congo and Tanzania</td>
<td>220 kV</td>
</tr>
<tr>
<td>Kibuye-Gisenyi-Goma-Kigali</td>
<td>Burundi, DR-Congo, and Rwanda</td>
<td>220 kV</td>
</tr>
<tr>
<td>Rusizi III-Bujumbura</td>
<td>DR-Congo and Burundi</td>
<td>220 kV</td>
</tr>
<tr>
<td>Iringa-Mbeya</td>
<td>Tanzania</td>
<td>400 kV</td>
</tr>
</tbody>
</table>


Figure 2-1 shows the different interconnection projects between countries of the southern part of the EAPP.

**Figure 2-1** Existing and Projected Interconnection Powerlines in the Eastern Africa Power Pool
Moreover, the Project between Iringa and Mbeya will provide the 400-kV network extension towards Zambia and then link the Eastern/Nile Basin Countries to the Southern Africa Power Pool, as illustrated in Figure 2-2.


Figure 2-2 Planned Interconnection Projects with Eastern/Nile Basin Countries and Southern Africa Power Pool

At the regional level, interconnections help strengthen networks. Figure 2-3 shows Zambia’s networks, which will be connected by the Tanzania – Zambia 400-kV Project.
Reference: ZESCO.

**Figure 2-3**  ZESCO Electricity Grid
2.2 PROJECT DESCRIPTION AND CONFIGURATION

2.2.1 HISTORICAL OVERVIEW

The Tanzania-Zambia Electrical Interconnection Project 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 Environmental and Social Impact Assessment (ESIA) and Resettlement Action Plan (RAP). The global Project was initially limited to a 400-kV interconnection between the substations of Mbeya (in Tanzania) and Nakonde in Zambia, and a 330-kV 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. Finally, a last modification was made following experiences and feedback from implementation of a similar but separate project (the Pensulo-Kasama 330-kV transmission line, described in section 2.2.2 below), in the same area.

The revised Project now considers the following global alignment, a 400-kV line from Mbeya substation to a new substation in Tunduma in Tanzania, near the border with Zambia, where voltage will be stepped down to 330-kV. The 330-kV line would then continue south, crossing the border with Zambia and reaching the existing Nakonde substation, in Zambia. From this substation, the line would extend towards the southwest to the existing Kasama substation and then further south to the existing Mpika substation, and then to the existing Pensulo substation. This new alignment adds up to 732.5 km of transmission line including 122.2 km at 400/330-kV in Tanzania and 610.3 km at 330-kV in Zambia.

2.2.2 GENERAL PROJECT DESCRIPTION FOR ZAMBIA

2.2.2.1 CONTEXT AND EXCLUSIONS

The ZTIP Project under study in the present report is planned to add to another ongoing transmission project promoted by the Industrial and Commercial Bank of China (ICBC), which will link the Nakonde and Kasama substations.

The ZTIP Project under study will be integrated with the ICBC project and will therefore interact with some of its components. For clarity, the following components are covered by the ICBC project and will therefore be financed and built within the scope of said ICBC Project:

- 230 km of 330-kV single-circuit transmission line from Kasama to Nakonde;
- 330/66-kV substation at Nakonde;
- 14.3 km of 330-kV double-circuit transmission line from Nakonde to the interconnection point at the Tanzanian border;
- 180 km of 330-kV single-circuit transmission line from Kasama to Mporokoso District;
- 170 km of 132-kV single circuit transmission line from Kasama to Mungwi District.
However, two components of the ICBC Project listed above are considered associated facilities of the present World Bank funded ZTIP Project because the Project would not be viable without them. The present ESIA for the ZTIP Project therefore needs to take them into account as associated facilities (see section 2.3.3). They are:

- the 330-kV line from the Tanzanian border to Nakonde;
- the 330/66-kV substation at Nakonde.

The current ZTIP Project will be constructed in parallel with the ICBC Project from Kasama to Nakonde and is therefore included in the assessment of cumulative impacts, in Section 6.3 of this ESIA.

### 2.2.2.2 INCLUSIONS

The ZTIP Project involves construction and operation of a single-circuit 330-kV electricity transmission line 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 – Mpika – Pensulo: one 330-kV circuit of alternating current, mounted on one row of single-circuit pylons over 596 km, for a 50 m ROW.

Other recommended ZTIP Project characteristics include:

- additional equipment into the planned 400/330/66-kV substation in the Nakonde area (construction of the substation is included in the Kasama-Nakonde 330-kV transmission Project built with the ICBC, but considered as an associated facility in the present ESIA);
- additional equipment into the existing 330/66-kV substation in Kasama (substation already existing, with sufficient space to cater to additional equipment);
- additional equipment into the planned 330/66-132-kV substation in Mpika (substation already existing, with sufficient space to cater to additional equipment);
- extension of existing 330/66-kV substation in Pensulo;
- access and maintenance roads along wayleave, where necessary.

The configurations above have been confirmed by the Project Steering Committee and are presented in detail in the Project’s Final Feasibility Study.

Unless specified otherwise, all project description information in this chapter is based on the Project’s Final Feasibility Study report. Project component coordinates are presented in Appendix 2-1.

### 2.2.3 RESULTS FROM THE ANALYSIS OF ALTERNATIVES

The analysis of alternatives has been conducted and is presented in chapter 4 of the present report. The outcome from that multicriteria evaluation was a 2 km-wide corridor from the Nakonde substation to the Pensulo substation.

A local optimization of this line route was also carried out, in collaboration with AECOM (the feasibility Consultant), in charge of the Feasibility Study, the Detailed Design and Tender Documents. This final optimization allowed to avoid the most sensitive elements, such as schools, churches, etc., and minimize the need to construct new access tracks.

Further in the Project preparation process, difficulties in implementing the Pensulo-Kasama 330-kV transmission line (in the same area) made ZESCO question the planned alignment and seek another alternative alignment that avoided hurdles that had previously been met.
A revision of the analysis of alternatives was therefore performed with additional corridor alternatives following an alignment identified by ZESCO as avoiding hurdles mentioned above. The revised analysis of alternatives led to identification of a revised 2 km-wide corridor linking Nakonde and Pensulo substations.

A validation of the central axis location was then performed to ensure it does not impact heavily on sensitive elements such as schools, churches, villages, etc.

ZESCO then approved this final line route, on which the final 50-meter wayleave was established.

### 2.2.4 PROPOSED LINE ROUTE

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

- The preferred corridors selected in the analysis of alternatives (corridors 2, 4B, and 8);
- 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 in Zambia starts at the proposed location of the Nakonde substation (to be built as part of the ICBC project, see Map 2-1). It then follows a section of the D1 Road towards the northwest before turning west and following the southern side of the D3 Road until reaching the community of Chandaweyaya. The proposed alignment then leaves the side of the D3 Road and descends in a straight line towards the southwest until reaching the eastern periphery of Kasama. The alignment bypasses Kasama’s built area from the south before entering 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 330-kV 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 330-kV Project construction. It goes in a southwestern direction for about 3 km, where it makes an angle to come back in a south-south-western direction. It crosses the Pensulo-Kasama 330-kV 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 kilometers before crossing to its eastern side and then crossing the TAZARA railway to get to its eastern side. It follows the TAZARA and road M1 until PK 77, where it veers to the south-south-east to follow road RD56, avoiding Chandesi to the east and south. From there, it joins again with the Pensulo-Kasama 330-kV 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, to connect to the Pensulo substation from the north-east.
The map shows the proposed 330 kV Transmission Line Project in Zambia, including substation and associated facilities.

**Project Components**
- Proposed 330 kV Transmission Line Project
- Substation

**Associated Facilities**
- ICBC 330-kV Line to Tanzania Border
- ICBC 330/66-kV Nakonde Substation

**Map 2-1 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)

**Preparation:** K. Murphy
**Drawing:** M. Lévesque
**Validation:** P. Alary-Paquette

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.
2.3 PROJECT COMPONENTS

As per mentioned above, the Project under study in the present report is planned to add to another ongoing transmission project financed by the ICBC, and which will link Nakonde and Kasama as well as making the link with the Tanzanian network. It should be noted that components of that other ongoing project are not studied in the present study, except for the Nakonde substation and a 14.3 km double-circuit segment connecting it to the Tanzanian border, which are considered associated facilities.

2.3.1 TRANSMISSION LINE

2.3.1.1 VOLTAGE LEVEL

The Project will be operated at 330-kV which is the standard high-voltage tension level in Zambia.

2.3.1.2 NUMBER OF CIRCUITS

The Project involves a one circuit 330-kV line. Its operation in pair with the existing Pensulo - Kasama 330-kV Project and upcoming ICBC project will form a double-circuit interconnection with the Tanzanian network, mounted on two distinct one-circuit lines.

A single pylon configuration will be used all along the Project, being a one single circuit line mounted on one row of pylons. The wayleave width will be 50 meters.

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. Tower characteristics that are planned in double-circuit and single-circuit scenarios are presented in the Table 2-2 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 single-circuit towers are illustrated at figure 2-4. Final feasibility drawings are included in Appendix 2-2.

Table 2-2 Tower Characteristics¹

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Tower heights (m from top of foundations to top of pylons)</td>
<td>Standard: 31</td>
<td>Standard: 31.1</td>
</tr>
<tr>
<td></td>
<td>Minimum: 26.5</td>
<td>Minimum: 28</td>
</tr>
<tr>
<td></td>
<td>Maximum: 37</td>
<td>Maximum: 34.1</td>
</tr>
<tr>
<td>Average line span (m)</td>
<td>400</td>
<td>400</td>
</tr>
<tr>
<td>Locations</td>
<td>Nakonde substation - Pensulo</td>
<td>Nakonde substation - Pensulo</td>
</tr>
</tbody>
</table>

2.3.1.4 PHASE CONDUCTORS

Conductors will be the Bison type (ACSR). 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.

2.3.1.5 FOUNDATIONS

Two types of foundations are recommended by the Feasibility Study: slab foundations with reinforced concrete body, and rock-anchored concrete blocks.

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. ZESCO wayleave requirements were confirmed at the Preliminary ESIA & RAP Progress Report workshops held in Dares Salaam on June 15 and 16, 2015. The ROW width is therefore set at 50 m on the entire Project length.

However, the 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:

- 50 m when the new wayleave is not paired with another existing wayleave;
- 35 m along segments paired with the Pensulo – Kasama project;
- 10 m between Kasama and Nakonde, where the Project is paired with the ICBC Project which has a wider wayleave than is required.

**RIGHT-OF-WAY MANAGEMENT**

The current ROW management practices in Zambia, according to ZESCO officials, are described in the following table.

<table>
<thead>
<tr>
<th>Table 2-3</th>
<th>Current ROW Management Practices in Zambia</th>
</tr>
</thead>
<tbody>
<tr>
<td>Item</td>
<td>Row Management Practices</td>
</tr>
<tr>
<td>ROW acquisition practices</td>
<td>The policy currently in place at ZESCO is to acquire the entire wayleave.</td>
</tr>
<tr>
<td>Uses allowed in the ROW</td>
<td>Growing of low laying crops; below 2 meters in height (e.g., maize, cassava, wheat, etc.).</td>
</tr>
<tr>
<td>Uses not permitted in the ROW</td>
<td>Growing crops exceeding 2 meters in height. As per ZESCO policy, crop(s) destroyed during construction or maintenance will be compensated for.</td>
</tr>
<tr>
<td>Policy regarding service road minimization</td>
<td>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.</td>
</tr>
</tbody>
</table>

Also, in order to maximize chances of achieving the abovementioned 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.

### 2.3.2 SUBSTATIONS

No construction of substations is included in the Project. All substations where the Project will connect are either already built or planned for construction in the short term under the Kasama-Nakonde 330-kV transmission line Project financed by ICBC. The present interconnector will add new equipment in those substations. Substation configuration drawings are available in Appendix 2-3.

#### 2.3.2.1 KASAMA SUBSTATION

The existing 330/66-kV Kasama substation is already built under the Pensulo-Kasama 330-kV Project, and located close to the town of Kasama at an altitude of 1,335 m. Its existing configuration is double busbar, single-circuit breaker with bypass disconnector. Circuit breakers are insulated with SF6 gas. The substation has sufficient space to cater to the interconnector Project equipment. Modifications to be made under the Project include:

- two 330-kV line bays and two-line shunt reactors;
- reactive power compensation equipment and auxiliary systems;
- new control systems in the existing control building.

#### 2.3.2.2 MPIKA SUBSTATION

The existing 330/66-132-kV Mpika substation is already built under the Pensulo-Kasama 330-kV Project, close to the town of Mpika at an altitude of 1,375 m. The configuration of the 330-kV switchgear is double busbar, single-circuit breaker with bypass disconnector. Circuit breakers are insulated with SF6 gas. The substation has sufficient space to cater to the interconnector Project equipment. Modifications to be made under the Project include:

- two 330-kV line bays and associated equipment;
- reactive power compensation equipment, static Var compensator, and auxiliary systems;
- new control systems in the existing control building.

#### 2.3.2.3 PENSULO SUBSTATION

This 330/66-kV existing substation is located close to the town of Pensulo at an altitude of 1,570 m. The configuration of existing 330-kV switchgear is double busbar, single-circuit breaker with bypass disconnector. Circuit breakers are insulated with SF6 gas. The Project will expand the existing substation in order to add additional equipment. The substation will be extended by approximately 15 m in width for a total extension of approximately 10,500 m². Modifications to be made include:

- one spare bay, one 330-kV line bay, one 330-kV line shunt reactor bay;
- reactive power compensation equipment and auxiliary systems;
- new control systems in the existing control building.
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. The location and extent of these components are not yet known and will be the Contractor’s responsibility.

Construction activities are forecasted to include the following activities, as per detailed in Table 6-1: site preparation, transportation and circulation, construction (including tower erection, stringing works, etc.), and waste and hazardous materials management. Those broad categories will be defined in more detail by the Contractor at the beginning of his assignment, during the pre-construction phase, when he will establish the construction plan.

2.3.4 ASSOCIATED FACILITIES

2.3.4.1 NAKONDE SUBSTATION

This 330/66-kV substation is to be built under the ICBC Project by the villages of Barton and Longwani at an altitude of 1,500 m. It is considered as an associated facility to the present Project because although its construction is not included within its scope, it is essential to its functioning. The configuration of the 330-kV and 66-kV switchgears are double busbar, single-circuit breaker with bypass disconnector. Equipment to be added by the present Project includes:

- 330-kV switchgear;
- reactive power compensation equipment, autotransformer, and auxiliary systems;
- new control building.

2.3.4.2 14.3 KM AT 330-KV BETWEEN NAKONDE SUBSTATION AND TANZANIA BORDER

The Project will interconnect with the Tanzanian network through a 14.3-km segment of double-circuit 330-kV transmission line, linking the Nakonde substation to the interconnection point at the Tanzanian border. A double-circuit configuration was adopted for this segment in order to allow joining the two 330-kV circuits from the Zambian side (ICBC project and the present Project), with the Tunduma substation in Tanzania. Table 2-4 provides tower characteristics on this segment of the line, while an example is provided in Figure 2-5 below. Appendix 2-2 provides an outline of the towers to be built.

<table>
<thead>
<tr>
<th>Characteristics</th>
<th>Double-circuit, 330-kV</th>
</tr>
</thead>
</table>
| Tower heights (meters from top of foundations to top of pylons) | Standard: 50.3  
                                          Minimum: 44.3  
                                          Maximum: 60.8 |
| Average line span (m)                   | 400                   |
| Locations                               | Border – Nakonde substation |

Table 2-4 Tower Characteristics

2.4 PROJECT COSTS AND SCHEDULE

The Project capital costs are estimated at USD 161,436,000.

As for implementation schedule, activities starting from the start-up meeting of the construction contract to commissioning, are planned to require 26 months for the transmission lines and 20 months for the substations. 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 for the transmission lines and month 5 for substations, and therefore it will last 19 months. Details of the construction schedule as planned in the Final Feasibility Study 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, we must consider delays for the resettlement, which will be spread over a more or less long period of time (estimate provided in standalone RAP). It is therefore not possible to predict with accuracy the beginning of construction activities.

2.5 PROJECT BOUNDARIES

The Project’s area of influence is the area likely to be affected by the Project, including all its ancillary aspects (e.g., access roads, borrow and disposal areas, construction camps, and unplanned developments induced by the Project, such as spontaneous settlement, or shifting agriculture along access roads)4. Some of the impacts have local (village, ward, and district), regional, or international implications. As such, two Project boundaries are used to discuss Project impacts, referred to as the area of direct influence (i.e., associated with the direct temporary and permanent Project Footprints) and the area of indirect influence. These terms are further defined below.

2.5.1 AREA OF DIRECT INFLUENCE

The Area of Direct Influence (ADI) includes the direct Project footprint:

- The area to be taken by the ROW;
- The area to be taken temporarily during construction for laydown areas, worker camps, storage areas, etc.;
- Access roads and borrow pits.

The ADI includes the districts of Nakonde, Mungwi, Kasama, Mpika, Chitambo and Serenje, where the Project will be implemented. The ESIA will therefore focus on the study area delimited in Map 2-1 above.

2.5.2 AREA OF INDIRECT INFLUENCE

The Area of Indirect Influence (AII) may comprise all of Zambia, as socioeconomic effects (e.g., stability of the electrical network, employment, and procurement) are expected to be experienced throughout the country, considering that it is susceptible to having a stabilizing effect on the national electrical network.

2.6 PROJECT REQUIREMENTS

The Project will require various locally available construction materials for construction of the transmission line. Such locally available materials required for construction work include aggregates, gravel or crushed stone, sand and water. This needs to be found in the areas around the Project site.

Detailed Project requirements are not available at this stage of the Project design and will be detailed by the Contractor.

2.6.1 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 Contractor but are estimated at 35,000 tonnes of aggregate, 15,000 tonnes of sand, and 20,000 tonnes of gravel. They will be obtained locally as much as possible, and if not, 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 land owners for production to meet the Project requirements.

2.6.2 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 criss-cross the Project area. Water needed will be confirmed ahead of construction, but it is currently estimated that approximately 400,000 liters of water could be required. The Contractor will need to obtain required water use permits.

2.6.3 PERSONNEL

Although the number of people to be employed is not yet established, it is expected that at the peak of the construction phase, as many as 600 people will be employed. Of the 600 people 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.

### 2.6.4 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.

### 2.6.5 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 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 STIs). It is expected that approximately 2 million litres of diesel fuel will be required, which will be sourced in bulk.

### 2.6.6 ELECTRICITY

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

### 2.7 PROJECT ACTIVITIES

#### 2.7.1 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 which will involve establishment of equipment storage yards and worker camps, as well as vegetation clearing. 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. The actual areas that will be impacted will be covered in the ESIA.

### 2.7.2 CONSTRUCTION PHASE

The construction phase will mainly involve the following 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.

— 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.

— 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.

### 2.7.3 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.
2.7.4 DECOMMISSIONING PHASE

The following activities are 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.
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 3-1 (pre-construction and construction), 3-2 (operation and maintenance), and 3-3 (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 biodiversity management measures for flora and fauna are included in this ESMP, however, more detailed management measures will be outlined within a Biodiversity Management and Monitoring Plan (BMMP) which was under development at the time of writing the ESMP. The BMMP will provide additional information regarding biodiversity baseline conditions, key risks and impacts on biodiversity, and provides further details of management measures and monitoring programs proposed in response. It is anticipated that the BMMP will be completed February 2020.

Mitigation measures for cultural and heritage sites will be developed as part of the NHCC Mwela Rock Art Site assessment mentioned in Section 6.2.4.7 of the ESIA. The TORs for this assessment and results of the assessment will be reviewed and approved by the World Bank prior to completing the study. The NHCC study of the Mwela Rock Art Site will be completed prior to construction, will examine the cumulative impacts, and will recommend adequate mitigation measures to be applied to both projects, including realignment of the lines if necessary.

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, are also appropriate for reducing cumulative impacts associated with the ICBC Project (see Section 6.3 of the ESIA). ZESCO confirms the GRM and the GBV Action Plan, will be applied to all PAPs from both projects. Moreover, the following additional mitigation measures are suggested to further reduce cumulative impacts:

- Use the same temporary construction areas (lay down areas and worker camps) and access roads for the ZTIP and ICBC Projects to reduce land clearing required.

- Augment management measures on the ICBC Project to meet international standards and align with those outlined herein for the ZTIP Project.

- Expand the scope of mitigation measures designed in response to the current Project, and outlined within this ESIA and ESMP, to include all PAPs of the ICBC and ZTIP Projects. The SEP should apply to all PAPs from both projects.

- Implement mitigation measures, provided within the ICBC Project’s Heritage Impact Assessment regarding the Mwela Rock Art National Monument, for the Bank funded ZTIP Project.

Recommended environmental and social monitoring is provided in Section 6 of the ESMP.
3.1.1 PRE-CONSTRUCTION AND CONSTRUCTION

Environmental and social measures proposed to mitigate negative impacts or enhance positive impacts during the preconstruction and construction phases are presented in Table 3-1.
### Table 3-1 Management Measures to be Implemented during the Pre-Construction and Construction Phases

<table>
<thead>
<tr>
<th>Environmental and/or Social Components</th>
<th>Potential Impacts Addressed</th>
<th>Sources of Impact</th>
<th>Management Measure</th>
<th>Implementation Timing / Responsibilities</th>
<th>Performance Indicators</th>
<th>Costs</th>
</tr>
</thead>
</table>
| All                                    | Cross-cutting               | Cross-cutting     | Develop and implement a construction worksite 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 & social monitoring. The worksite ESMP is to cover all elements under the Contractor’s control (i.e. construction works), consider 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 prior to, and implementation during, construction phase  
  - Development: Contractor  
  - Approval: Client / Supervision Consultant (in consultation with the Design Engineers), and the World Bank | 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. | Included in construction contract. |
| All                                    | Cross-cutting               | Cross-cutting     | Develop and implement ZESCO’s Safety, Health Environment & 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 prior to, and implementation during, construction phase  
  - ZESCO | No construction works undertaken before ESMS is in operation. | $150,000 |
| All                                    | Cross-cutting               | Cross-cutting     | Obtain all required permits and authorizations before initiating construction works. Implement all their conditions. | Obtain required permits prior to construction phase and implement conditions before and during construction, as appropriate  
  - Contractor | No construction works undertaken before all required permits and authorizations are secured. | Included in the construction contract. |
| Terrestrial mammals.                  |                                            | Site preparation. Construction activities. Waste and hazardous materials management. | Safeguard and clear all construction materials from work sites once construction is completed, particularly those used to reinforce structures i.e., steel wires, to avoid their use as wire snares. | Development prior to, and implementation during, construction phase  
  - Implementation: Contractor  
  - Monitoring: Owner’s Engineer | Hazardous materials management plan approved by Owner’s Engineer prior to initiation of Construction phase Work site inspection at the end of construction works/Absence of residual material in work areas | Included in the construction contract phase. |
  - Development: Contractor  
  - Approval: Owner’s Engineer and PIU | Hazardous materials management plan approved by Owner’s Engineer prior to initiation of Construction phase. | Included in the construction contract phase. |
<table>
<thead>
<tr>
<th>Environmental and/or Social Components</th>
<th>Potential Impacts Addressed</th>
<th>Sources of Impact</th>
<th>Management Measure</th>
<th>Implementation Timing / Responsibilities</th>
<th>Performance Indicators</th>
<th>Costs</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cultural and archaeological heritage</td>
<td>Potential disturbance or destruction of archaeological sites and/or objects. Disturbance or potential disturbance of burial sites and/or sacred sites.</td>
<td>Site preparation. Construction activities.</td>
<td>Develop and implement an Emergency Measures Plan.</td>
<td>Development prior to, and implementation during, construction phase  - Cultural and archaeological heritage.</td>
<td>Potential disturbance or destruction of archaeological sites and/or objects.</td>
<td>Included in the construction contract.</td>
</tr>
<tr>
<td>Aquatic habitats and associated fauna</td>
<td>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) as a result of construction activities.</td>
<td>Site preparation. Construction activities.</td>
<td>Undertake a pre-construction inspection (avifaunal walk-through) of the final powerline 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 (see details in BMMP).</td>
<td>Two weeks prior to clearing in any given area within the ROW and for the duration of the construction process  - Implementation: Contractor, Avifaunal Specialist  - Monitoring: Owner’s Engineer</td>
<td>Bird nest surveys undertaken systematically prior to clearing.</td>
<td>Included in the construction contract.</td>
</tr>
<tr>
<td>Avifauna</td>
<td>Bird collisions with the powerlines.</td>
<td>Construction activities.</td>
<td>Conduct an avifaunal walk through prior to the commencement of construction activities, once the final tower positions have been pegged identify spans of the transmission line that require the installation of bird flight diverters (see details in BMMP).</td>
<td>Two weeks prior to clearing in any given area within the ROW and for the duration of the construction process  - Implementation: Contractor, Avifaunal Specialist  - Monitoring: Owner’s Engineer</td>
<td>All line sections described in the BMMP and recommended following walkthrough survey are equipped with bird diverters.</td>
<td>Included in the construction contract.</td>
</tr>
<tr>
<td>Built environment</td>
<td>Relocation of houses and other buildings located within the ROW.</td>
<td>Land acquisition. Resettlement</td>
<td>Update and implement the Resettlement Action Plan</td>
<td>Prior to construction phase  - Implementation: PIU</td>
<td>Relocations and compensations to be completed prior to beginning of construction.</td>
<td>See stand-alone RAP.</td>
</tr>
<tr>
<td>Bats</td>
<td>Habitat alteration and degradation resulting in reduction of activity of bats, that provide important ecosystem services.</td>
<td>Site preparation. Construction activities. Transport and traffic. Presence of workers.</td>
<td>Record bat activity before clearing and construction at specific sites (see details in BMMP).</td>
<td>Prior to and throughout construction phase  - Implementation: Contractor  - Monitoring: Owner’s Engineer</td>
<td>Bat activity before and during construction identified and used as comparison to operation phase.</td>
<td>Included in the construction contract.</td>
</tr>
<tr>
<td>Bats</td>
<td>Habitat alteration and degradation resulting in reduction in activity of bats, that provide important ecosystem services.</td>
<td>Site preparation. Construction activities. Transport and traffic. Presence of workers.</td>
<td>Record bat activity before clearing and construction at specific sites (see details in BMMP).</td>
<td>Prior to and throughout construction phase  - Implementation: Contractor  - Monitoring: Owner’s Engineer</td>
<td>Bat activity before and during construction identified and used as comparison to operation phase.</td>
<td>Included in the construction contract.</td>
</tr>
<tr>
<td>Employment and economic development</td>
<td>Inflation risk. Purchase of materials, goods, and services promoting local products and services, when available.</td>
<td>Site preparation. Construction activities. Transport and traffic.</td>
<td>Adapt procurement and labour policies promoting local products and services, when available.</td>
<td>Prior to the construction phase</td>
<td>Employment and economic development</td>
<td>Inflation risk.</td>
</tr>
<tr>
<td>Communities and social cohesion</td>
<td>Tension with surrounding communities and social acceptability.</td>
<td>Site preparation. Construction activities. Transportation and traffic.</td>
<td>Adapt, implement, and maintain the Stakeholder Engagement Plan (see SFP).</td>
<td>Prior to and throughout construction phase  - Implementation: Contractor  - Monitoring: Owner’s Engineer</td>
<td>Number of meetings held.</td>
<td>Included in the construction contract.</td>
</tr>
<tr>
<td>Environmental and/or Social Components</td>
<td>Potential Impacts Addressed</td>
<td>Sources of Impact</td>
<td>Management Measure</td>
<td>Implementation Timing / Responsibilities</td>
<td>Performance Indicators</td>
<td>Costs</td>
</tr>
<tr>
<td>----------------------------------------</td>
<td>-----------------------------</td>
<td>------------------</td>
<td>--------------------</td>
<td>----------------------------------------</td>
<td>------------------------</td>
<td>-------</td>
</tr>
<tr>
<td>Safety and public health</td>
<td>Increased stress-related disturbances (noise, dust, and air pollution).</td>
<td>Site preparation. Construction activities. Transportation and traffic.</td>
<td>Implement and follow-up on Grievance Redress Mechanism (see GRM action plan).</td>
<td>See GRM for details on responsibilities.</td>
<td>See GRM for details on monitoring.</td>
<td>Included in the construction contract. Provision for the GRM focal points $75,000 (allowance to the GRM focal points, fuel, and vehicle rental).</td>
</tr>
<tr>
<td>Safety and public health</td>
<td>Occupational health and safety hazards and risks.</td>
<td>Site preparation. Construction activities Transportation and traffic. Waste and hazardous materials management. Purchase of materials, goods, and services. Presence of workers.</td>
<td>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 &amp; 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.</td>
<td>Prior to beginning of construction phase Implementation: PIU &amp; Contractor</td>
<td>Risk assessment completed.</td>
<td>Included in the construction contract.</td>
</tr>
<tr>
<td>Terrestrial flora</td>
<td>Terrestrial fauna</td>
<td>Permanent loss of natural habitat area and of its associated flora. Potential impacts on vulnerable species, Ansellia Africana, and other species of conservation concern such as Prunocarpus angoleensis.</td>
<td>Site preparation. Clearly mark the extent of the ROW with stakes at intervals of 50 m or less. Identify and mark the vegetation to be preserved along sections of the ROW.</td>
<td>Throughout construction phase Implementation: PIU Monitoring: Owner’s Engineer</td>
<td>Limits of ROW marked prior to beginning of works in a given area.</td>
<td>Included in the construction contract.</td>
</tr>
<tr>
<td>Terrestrial flora</td>
<td>Terrestrial fauna</td>
<td>Terrestrial habitat fragmentation and degradation in some areas along the ROW. Potential impacts on vulnerable species, Ansellia Africana, and other species of conservation concern such as Prunocarpus angoleensis.</td>
<td>Site preparation. Undertake ROW vegetation cutting with the supervision of a botanist or a technician from the Forestry Department to identify and relocate, if possible, species of conservation concern, especially Ansellia Africana, 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 (see details in BMMP).</td>
<td>Throughout construction phase Implementation: PIU</td>
<td>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.</td>
<td>$45,000</td>
</tr>
<tr>
<td>Safety and public health</td>
<td>Workers’ health and safety</td>
<td>Risk of accidents and physical injuries involving local workers and residents. Adherence to labor standards and well-being of construction workers.</td>
<td>Construction activities. Require all Contractors and Subcontractors to comply with relevant WB health and safety requirements and ZESCO’s corporate policy.</td>
<td>Prior to beginning of construction phase Implementation: PIU &amp; Contractor</td>
<td>WB H&amp;S requirements and ZESCO corporate policy integrated in Contractor and Subcontractor contracts.</td>
<td>Included in the construction contract.</td>
</tr>
<tr>
<td>Safety and public health</td>
<td>Workers’ health and safety</td>
<td>Risk of accidents and physical injuries involving local workers and residents.</td>
<td>Construction activities. Presence of workers.</td>
<td>Develop and implement an H&amp;S management plan to protect every worker involved in construction activities, even temporary workers.</td>
<td>Prior to beginning of construction phase Implementation: Contractor Monitoring: Owner’s Engineer</td>
<td>H&amp;S management plan approved by Owner’s Engineer prior to initiation of Construction phase.</td>
</tr>
<tr>
<td>Safety and public health</td>
<td>Workers’ health and safety</td>
<td>Occupational health and safety hazards and risks.</td>
<td>Site preparation. Construction activities. Transportation and traffic. Waste and hazardous materials management. Purchase of materials, goods and services. Presence of workers.</td>
<td>Training specific to construction site to be provided 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. 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 Implementation: PIU &amp; Contractor</td>
<td>Records of completed training</td>
<td>Included in the construction contract.</td>
</tr>
<tr>
<td>Environmental and/or Social Components</td>
<td>Potential Impacts Addressed</td>
<td>Sources of Impact</td>
<td>Management Measure</td>
<td>Implementation Timing / Responsibilities</td>
<td>Performance Indicators</td>
<td>Costs</td>
</tr>
<tr>
<td>--------------------------------------------------------</td>
<td>-------------------------------------------------------------------------------------------</td>
<td>---------------------------------</td>
<td>------------------------------------------------------------------------------------</td>
<td>---------------------------------------------------------------------------------</td>
<td>------------------------------------------------------------------------------------------</td>
<td>-----------------------------------------------------------------------</td>
</tr>
</tbody>
</table>
| Safety and public health                               | 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. | Prior to beginning of construction phase  
Implementation: Contractor 
Monitoring: Supervising Engineer | Community H&S plan approved by Supervising Consultant prior to initiation of Construction phase. | Included in the construction contract.                                          |
| Soils                                                  | Soil erosion in erosion-prone areas.                                                      | Site preparation.              | Prepare and implement erosion and sediment control plans, particularly in areas identified as having high erosion potential. | Prior to construction phase  
Development: Contractor 
Approval: Owner’s Engineer and PIU | Erosion and sediment control plan approved by Owner’s Engineer prior to initiation of Construction phase | Included in the construction contract.                                          |
| Hydrography and water resources                        | Soil erosion in erosion-prone areas.                                                      | Construction activities.        | Restrict transportation to the identified access by clearly marking out the limit of the ROW and access roads. | Throughout construction phase  
Implementation: Contractor 
Monitoring: Owner’s Engineer | Limits of ROW and access roads marked prior to beginning of works in a given area. | Included in the construction contract.                                          |
| Land use employment and economic development           | Soil erosion in erosion-prone areas.                                                      | Construction activities.        | 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 330 kV Pensiolo - Nakonde electricity transmission line. | Throughout construction phase  
Implementation: Contractor 
Monitoring: Owner’s Engineer | Equipment and vehicle movements outside the line route and access roads’ ROW restricted to a minimum. | Included in the construction contract.                                          |
| Soils                                                  | Soil erosion in erosion-prone areas.                                                      | Construction activities.        | 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 330 kV Pensiolo - Nakonde electricity transmission line. | Throughout construction phase  
Implementation: Contractor 
Monitoring: Owner’s Engineer | Limits of ROW and access roads marked prior to beginning of works in a given area. | Included in the construction contract.                                          |
| Terrestrial flora Avifauna Terrestrial fauna           | Soil erosion in erosion-prone areas.                                                      | Construction activities.        | 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 330 kV Pensiolo - Nakonde electricity transmission line. | Throughout construction phase  
Implementation: Contractor 
Monitoring: Owner’s Engineer | Limits of ROW and access roads marked prior to beginning of works in a given area. | Included in the construction contract.                                          |
| Terrestrial flora Avifauna Soils                       | Terrestrial habitat fragmentation and degradation in some areas along the ROW. Terrestrial habitat fragmentation and degradation in some areas along the ROW. | Site preparation.              | Minimize the construction of new access roads. Promote the use of existing access roads for machinery and vehicle movements, increasing their width as necessary. | Throughout construction phase  
Implementation: Contractor 
Monitoring: Owner’s Engineer | Limits of ROW and access roads marked prior to beginning of works in a given area. | Included in the construction 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. Modifications of surface water quality with a risk of contamination. Modifications of groundwater quality with a risk of contamination. | Site preparation.              | 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. | Throughout construction phase  
Implementation: Contractor 
Monitoring: Owner’s Engineer | Daily inspection by the Contractor of all equipment and machinery used during construction. | Included in the construction contract.                                          |
| 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. | Construction activities.        | Prohibit idling of vehicles on-site. Generators and machinery will be shut down when not in use. | Throughout construction phase  
Implementation: Contractor 
Monitoring: Owner’s Engineer | Daily inspection by the Contractor of construction areas for excessive nuisance dust, noise, and air pollutants. Contractor / Owner’s Engineer to maintain records of complaints on noise and air quality, and follow-up with corrective measures. | Included in the construction contract.                                          |
<table>
<thead>
<tr>
<th>Environmental and/or Social Components</th>
<th>Potential Impacts Addressed</th>
<th>Sources of Impact</th>
<th>Management Measure</th>
<th>Implementation Timing / Responsibilities</th>
<th>Performance Indicators</th>
<th>Costs</th>
</tr>
</thead>
<tbody>
<tr>
<td>Air quality Safety and public health</td>
<td>Temporary air quality deterioration. Increased stress related to nuisances.</td>
<td>Site preparation. Construction activities. Transportation and traffic. Worksite restoration.</td>
<td>Stockpiles of fine materials will be covered during period of high winds.</td>
<td>Throughout construction phase Implementation: Contractor Monitoring: Owner’s Engineer</td>
<td>Daily inspection by the Contractor of construction areas for excessive nuisance dust, noise, and air pollutants. Contractor / Owner’s Engineer to maintain records of complaints on noise and air quality, and follow-up with corrective measures.</td>
<td>Included in the construction contract.</td>
</tr>
<tr>
<td>Air quality Safety and public health</td>
<td>Temporary air quality deterioration. Increased stress related to nuisances.</td>
<td>Construction activities. Transportation and traffic.</td>
<td>Cover excavated materials with erosion control blankets and loads of brittle material during transport.</td>
<td>Throughout construction phase Implementation: Contractor Monitoring: Owner’s Engineer</td>
<td>Daily inspection by the Contractor of construction areas for excessive nuisance dust, noise, and air pollutants. Contractor / Owner’s Engineer to maintain records of complaints on noise and air quality, and follow-up with corrective measures.</td>
<td>Included in the construction contract.</td>
</tr>
<tr>
<td>Air quality Safety and public health</td>
<td>Temporary air quality deterioration. Increased stress related to nuisances.</td>
<td>Construction activities.</td>
<td>Use water for dust suppression on stockpiles, exposed soils and roads if dust generation is visible.</td>
<td>Throughout construction phase Implementation: Contractor Monitoring: Owner’s Engineer</td>
<td>Daily inspection by the Contractor of construction areas for excessive nuisance dust, noise, and air pollutants. Contractor / Owner’s Engineer to maintain records of complaints on noise and air quality, and follow-up with corrective measures.</td>
<td>Included in the construction contract.</td>
</tr>
<tr>
<td>Air quality Safety and public health</td>
<td>Temporary air quality deterioration. Increased stress related to nuisances.</td>
<td>Construction activities.</td>
<td>Restrict speed on loose surface roads to 20 km/h during dry or dusty conditions and install signposts where relevant.</td>
<td>Throughout construction phase Implementation: Contractor Monitoring: Owner’s Engineer</td>
<td>Daily inspection by the Contractor of construction areas for excessive nuisance dust, noise, and air pollutants. Contractor / Owner’s Engineer to maintain records of complaints on noise and air quality, and follow-up with corrective measures.</td>
<td>Included in the construction contract.</td>
</tr>
<tr>
<td>Noise and vibrations Safety and public health</td>
<td>Increase in noise and vibration levels. Increased stress related to nuisances.</td>
<td>Site preparation. Construction activities. Transportation and traffic.</td>
<td>Restrict noise and vibration generating activities near residential or institutional sensitive receptors between 7 am and 7 pm. Maintain noise levels at or below national thresholds.</td>
<td>Throughout construction phase Implementation: Contractor Monitoring: Owner’s Engineer</td>
<td>Daily inspection by the Contractor of construction areas for excessive nuisance dust, noise, and air pollutants. Contractor / Owner’s Engineer to maintain records of complaints on noise and air quality, and follow-up with corrective measures.</td>
<td>Included in the construction contract.</td>
</tr>
<tr>
<td>Soils Hydrography and water resources</td>
<td>Soil erosion in erosion-prone areas. Surface water contamination.</td>
<td>Construction activities. Transportation and traffic.</td>
<td>Operate machinery on land in a way that minimizes disturbance to the banks of watercourses.</td>
<td>Throughout construction phase Implementation: Contractor Monitoring: Owner’s Engineer</td>
<td>No machinery operations inside top-of-bank of watercourses.</td>
<td>Included in the construction contract.</td>
</tr>
<tr>
<td>Terrestrial flora Terrestrial fauna Arvifiiiana</td>
<td>Permanent loss of natural habitat area and of its associated flora. Terrestrial habitat fragmentation and degradation in some areas along the ROW. Potential impacts on vulnerable species, Ansellia Africana, and other species of conservation concern, such as Protea angolensis. Potential impacts on fruit bats, specifically the Near-Threatened African Straw-coloured Fruit Bat. Modification of species composition in flora and fauna communities present in the project area. Supply reduction of ecosystem services.</td>
<td>Site preparation. Construction activities.</td>
<td>Establish a Compensation Plan for the loss of natural habitats (see details in BMMP). Promote the use of native species and include the plantation and reseeding of Protea angolensis, Ansellia Africana, 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 Ficus spp. Magnifépanda butyros, Parinari caratiilloba, Syzygium cordatum, Syzygium guineense guineense, Syzygium guineense huillense, Uapaca kirkiana, Uapaca banguelensis, and Uapaca santhiara.</td>
<td>Throughout construction phase Implementation: Development and implementation: PIU</td>
<td>Compensation plan developed prior to beginning of construction phase. Compensation completed as per the plan, before the end of the construction phase.</td>
<td>$150,000</td>
</tr>
</tbody>
</table>

**Environmental and/or Social Management Plan for the Zambia-Tanzania Power Interconnection Project**

**Responsibilities**

- **Compensation completed as per the plan**
- **Beginning of construction phase**
- **Monitoring: Owner's Engineer**
- **Contractor / Owner's Engineer to maintain records of complaints on noise and air quality, and follow-up with corrective measures.**
- **Daily inspection by the Contractor of construction areas for excessive nuisance dust, noise, and air pollutants.**
- **Construction activities.**
- **Site preparation.**
- **Institutional sensitive receptors.**
- **Transportation and traffic.**
- **Construction activities.**
- **Site preparation.**
- **Construction activities.**
- **Site preparation.**
- **Construction activities.**
- **Site preparation.**
- **Construction activities.**
<table>
<thead>
<tr>
<th>Environmental and/or Social Components</th>
<th>Potential Impacts Addressed</th>
<th>Sources of Impact</th>
<th>Management Measure</th>
<th>Implementation Timing / Responsibilities</th>
<th>Performance Indicators</th>
<th>Costs</th>
</tr>
</thead>
<tbody>
<tr>
<td>Terrestrial flora</td>
<td>Permanent loss of natural habitat area and of its associated flora.</td>
<td>Site preparation. Construction activities.</td>
<td>Compensation plan shall include restoration of natural miombo woodland in the Kanona Forest Reserve by reforestation with typical miombo species in an equivalent area of the degraded areas of the Kanona FR (see details in BMMP).</td>
<td>Throughout construction phase Development and implementation: PIU</td>
<td>Compensation plan developed prior to beginning of construction phase. Compensation completed as per the plan, before the end of the construction phase.</td>
<td>$80,000</td>
</tr>
<tr>
<td>Terrestrial fauna</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Avifauna</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Soils</td>
<td>Soil compaction in work areas.</td>
<td>Construction activities.</td>
<td>Avoid vehicle or machinery traffic in areas where soils are highly saturated, such as dambos.</td>
<td>Throughout construction phase Implementation: Contractor Monitoring: Owner’s Engineer</td>
<td>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.</td>
<td>Included in the construction contract.</td>
</tr>
<tr>
<td>Hydrography and water resources</td>
<td>Changes in soil’s chemical properties and risk of soil contamination.</td>
<td>Waste and hazardous materials management.</td>
<td>Construct a designated, signposted, concrete wash down bay that is fully contained for all excess concrete and concrete wash down (e.g., plastic lined).</td>
<td>Throughout construction phase Implementation: Contractor Monitoring: Owner’s Engineer</td>
<td>Washdown bay(s) built prior to beginning of construction works in a given area. No concrete washdown elsewhere.</td>
<td>Included in the construction contract.</td>
</tr>
<tr>
<td>Soils</td>
<td>Changes in soil’s chemical properties and risk of soil contamination.</td>
<td>Waste and hazardous materials management.</td>
<td>Regularly maintain the concrete washout bay, by treating any water prior to releasing into natural systems.</td>
<td>Throughout construction phase Implementation: Contractor Monitoring: Owner’s Engineer</td>
<td>Washout bay(s) regularly maintained. Water treated before releasing into the environment.</td>
<td>Included in the construction contract.</td>
</tr>
<tr>
<td>Hydrography and water resources</td>
<td>Changes in soil’s chemical properties and risk of soil contamination.</td>
<td>Waste and hazardous materials management.</td>
<td>All ignitable, reactive, flammable, corrosive, and toxic materials will be stored 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.</td>
<td>Throughout construction phase Implementation: Contractor Monitoring: Owner’s Engineer</td>
<td>No ignitable, reactive, flammable, corrosive, or toxic materials stored elsewhere than in labelled containers.</td>
<td>Included in the construction contract.</td>
</tr>
<tr>
<td>Soils</td>
<td>Changes in soil’s chemical properties and risk of soil contamination.</td>
<td>Waste and hazardous materials management.</td>
<td>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.</td>
<td>Throughout construction phase Implementation: Contractor Monitoring: Owner’s Engineer</td>
<td>Secure storage of all hazardous materials.</td>
<td>Included in the construction contract.</td>
</tr>
<tr>
<td>Hydrography and water resources</td>
<td>Changes in soil’s chemical properties and risk of soil contamination.</td>
<td>Waste and hazardous materials management.</td>
<td>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.</td>
<td>Throughout construction phase Implementation: Contractor Monitoring: Owner’s Engineer</td>
<td>Secure storage of all hazardous materials. Inspections to ensure proper storage handling techniques are being followed.</td>
<td>Included in the construction contract.</td>
</tr>
<tr>
<td>Soils</td>
<td>Changes in soil’s chemical properties and risk of soil contamination.</td>
<td>Waste and hazardous materials management.</td>
<td>Oil water separators and grease traps should be installed and maintained as appropriate at refueling facilities, workshops, parking areas, fuel storage and containment areas.</td>
<td>Throughout construction phase Implementation: Contractor Monitoring: Owner’s Engineer</td>
<td>Presence of oil water separators and grease traps. Inspections to ensure proper storage handling techniques are being followed.</td>
<td>Included in the construction contract.</td>
</tr>
<tr>
<td>Environmental and/or Social Components</td>
<td>Potential Impacts Addressed</td>
<td>Sources of Impact</td>
<td>Management Measure</td>
<td>Implementation Timing / Responsibilities</td>
<td>Performance Indicators</td>
<td>Costs</td>
</tr>
<tr>
<td>---------------------------------------</td>
<td>------------------------------------------------------------------------------------------</td>
<td>---------------------------------------------------------------------------------</td>
<td>---------------------------------------------------------------------------------</td>
<td>------------------------------------------</td>
<td>------------------------</td>
<td>------------------------</td>
</tr>
<tr>
<td>Soils Hydography and water resources</td>
<td>Changes in soil’s chemical properties and risk of soil contamination.</td>
<td>Waste and hazardous materials management.</td>
<td>Provide portable spill containment and cleanup equipment on site and training in the equipment deployment.</td>
<td>Throughout construction phase</td>
<td>Spell containment and cleanup equipment onsite.</td>
<td>Included in the construction contract.</td>
</tr>
<tr>
<td></td>
<td>Modifications of surface water quality with a risk of contamination.</td>
<td></td>
<td></td>
<td>Implementation: Contractor</td>
<td>Monitoring: Owner’s Engineer</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Modifications of groundwater quality with a risk of contamination.</td>
<td></td>
<td></td>
<td>Monitoring: Owner’s Engineer</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Soils Hydography and water resources</td>
<td>Changes in soil’s chemical properties and risk of soil contamination.</td>
<td>Waste and hazardous materials management.</td>
<td>Train workers on the correct transfer and handling of fuels and chemicals and in response to spills.</td>
<td>Throughout construction phase</td>
<td>Evidence of adequate training.</td>
<td>Included in the construction contract.</td>
</tr>
<tr>
<td></td>
<td>Modifications of surface water quality with a risk of contamination.</td>
<td></td>
<td></td>
<td>Implementation: Contractor</td>
<td>Monitoring: Owner’s Engineer</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Modifications of groundwater quality with a risk of contamination.</td>
<td></td>
<td></td>
<td>Monitoring: Owner’s Engineer</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Soils Hydography and water resources</td>
<td>Changes in soil’s chemical properties and risk of soil contamination.</td>
<td>Waste and hazardous materials management.</td>
<td>Control and reduce at the source the production of waste and hazardous waste.</td>
<td>Throughout construction phase</td>
<td>Production of waste and hazardous waste reduced to a minimum.</td>
<td>Included in the construction contract.</td>
</tr>
<tr>
<td></td>
<td>Modifications of surface water quality with a risk of contamination.</td>
<td></td>
<td></td>
<td>Implementation: Contractor</td>
<td>Monitoring: Owner’s Engineer</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Modifications of groundwater quality with a risk of contamination.</td>
<td></td>
<td></td>
<td>Monitoring: Owner’s Engineer</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Soils</td>
<td>Soil compaction in work areas.</td>
<td>Transportation and traffic.</td>
<td>De-compact soils following construction with appropriate equipment.</td>
<td>Throughout construction phase</td>
<td>Following construction, assessment of soil compaction in and around the ROW by the Owner’s Engineer, and decommission if necessary.</td>
<td>Included in the construction contract.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Implementation: Contractor</td>
<td>Monitoring: Owner’s Engineer</td>
<td></td>
</tr>
<tr>
<td>Soils</td>
<td>Changes in soil’s chemical properties and risk of soil contamination.</td>
<td>Construction activities.</td>
<td>Temporarily store excavated soils in order to use them as backfill when needed.</td>
<td>Throughout construction phase</td>
<td>Excavated soils properly stored.</td>
<td>Included in the construction contract.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Implementation: Contractor</td>
<td>Monitoring: Owner’s Engineer</td>
<td></td>
</tr>
<tr>
<td>Soils</td>
<td>Soil erosion in erosion-prone areas.</td>
<td>Construction activities.</td>
<td>Rev egetate areas of bare and disturbed soils as soon as possible with native species.</td>
<td>Throughout construction phase</td>
<td>Bare and disturbed areas revegetated as required.</td>
<td>Included in the construction contract.</td>
</tr>
<tr>
<td>Terrestrial flora</td>
<td>Loss of organic layer in areas where excavation and backfilling activities are held.</td>
<td></td>
<td></td>
<td>Implementation: Contractor</td>
<td>Monitoring: Owner’s Engineer</td>
<td></td>
</tr>
<tr>
<td>Landscape</td>
<td>Impairment of flora communities.</td>
<td></td>
<td></td>
<td>Monitoring: Owner’s Engineer</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Temporary degradation of the landscape at worksite.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hydrography and water resources</td>
<td>Changes in hydrology.</td>
<td>Construction activities.</td>
<td>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.</td>
<td>Throughout construction phase</td>
<td>Hydrological connectivity maintained in all work sites impacting watercourses.</td>
<td>Included in the construction contract.</td>
</tr>
<tr>
<td>Aquatic habitats and associated fauna</td>
<td>Impairment of hydrological dynamics leading to disturbances and alterations.</td>
<td></td>
<td></td>
<td>Implementation: Contractor</td>
<td>Monitoring: Owner’s Engineer</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Monitoring: Owner’s Engineer</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hydrography and water resources</td>
<td>Changes in hydrology.</td>
<td>Construction activities.</td>
<td>Avoid material piling, equipment and vehicle movement in rivers, floodplains, and wetland areas, such as dambo and communual grazing sites. If unavoidable, reduce access to a minimum.</td>
<td>Throughout construction phase</td>
<td>No material piling in watercourses and wetland areas.</td>
<td>Included in the construction contract.</td>
</tr>
<tr>
<td>Aquatic habitats and associated fauna</td>
<td>Modifications of surface water quality with a risk of contamination.</td>
<td></td>
<td></td>
<td>Implementation: Contractor</td>
<td>Monitoring: Owner’s Engineer</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Local degradation of aquatic and semi-aquatic habitats and associated fauna and flora disturbances.</td>
<td></td>
<td></td>
<td>Monitoring: Owner’s Engineer</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hydrography and water resources</td>
<td>Changes in hydrology.</td>
<td>Construction activities.</td>
<td>Set and implement strict procedures for in-water works.</td>
<td>Throughout construction phase</td>
<td>In-water work rules approved by Owner’s Engineer prior to initiation of Construction phase.</td>
<td>Included in the construction contract.</td>
</tr>
<tr>
<td>Aquatic habitats and associated fauna</td>
<td>Modifications of surface water quality with a risk of contamination.</td>
<td></td>
<td></td>
<td>Implementation: Contractor</td>
<td>Monitoring: Owner’s Engineer</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Local degradation of aquatic and semi-aquatic habitats and associated fauna and flora disturbances.</td>
<td></td>
<td></td>
<td>Monitoring: Owner’s Engineer</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hydrography and water resources</td>
<td>Changes in hydrology.</td>
<td>Construction activities.</td>
<td>Conduct activities during the dry season to minimize disturbance of sensitive shoreline and wetland areas.</td>
<td>Throughout construction phase</td>
<td>Activities in wet season minimized.</td>
<td>Included in the construction contract.</td>
</tr>
<tr>
<td>Aquatic habitats and associated fauna</td>
<td>Modifications of surface water quality with a risk of contamination.</td>
<td></td>
<td></td>
<td>Implementation: Contractor</td>
<td>Monitoring: Owner’s Engineer</td>
<td></td>
</tr>
<tr>
<td>Environmental and/or Social Components</td>
<td>Potential Impacts Addressed</td>
<td>Sources of Impact</td>
<td>Management Measure</td>
<td>Implementation Timing / Responsibilities</td>
<td>Performance Indicators</td>
<td>Costs</td>
</tr>
<tr>
<td>---------------------------------------</td>
<td>-----------------------------</td>
<td>------------------</td>
<td>--------------------</td>
<td>-----------------------------------------</td>
<td>------------------------</td>
<td>-------</td>
</tr>
</tbody>
</table>
| Hydrography and water resources       | Modifications of surface water quality with a risk of contamination. | Construction 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. | Throughout construction phase  
  Implementation: Contractor  
  Monitoring: Owner’s Engineer | Required silt barriers installed. | Included in the construction contract. |
| Hydrography and water resources       | Modifications of groundwater quality with a risk of contamination. | Construction activities. | Promptly pump any groundwater that could have been contaminated during excavation works. | Throughout construction phase  
  Implementation: Contractor  
  Monitoring: Owner’s Engineer | Groundwater seepage pumped out during excavations. | Included in the construction contract. |
| Hydrography and water resources       | | Site preparation. | In the Mungwi Forest Reserve, undertake a selective cutting of the vegetation and ensure maximum vegetation cover is preserved during construction work. Restore degraded vegetation within the Forest Reserve to ensure the area still plays its ecological functions (see details in BMMP). | Throughout construction phase  
  Implementation: Contractor  
  Monitoring: Owner’s Engineer | Vegetation clearing performed as required. Low scrubby and herbaceous vegetation maintained. Restoration of degraded vegetation. Performance indicator: status of ground cover in construction areas, surface water quality. | Included in the construction contract. |
| Terrestrial fauna                     | Potential impacts on species of conservation concern, Pterocarpus angolensis. | Site preparation. | If possible, collect seeds from Pterocarpus angolensis (see details in BMMP). | Throughout construction phase  
  Implementation: Contractor  
  Monitoring: Owner’s Engineer | Creations immediately replanted in suitable similar habitat. | Included in the construction contract. |
| Terrestrial 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. Construction activities. | Undertake selective cutting of the vegetation in dambos and riparian habitat to keep low scrubby 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 (see details in BMMP). | Throughout construction phase  
  Implementation: Contractor  
  Monitoring: Owner’s Engineer | Maintain vegetation in a 10 m shoreline and on steep slopes when compatible with ROW operation. | Included in the construction contract. |
| Terrestrial flora                     | Potential introduction of invasive alien species. Modification of species composition in fauna communities present in the Project area. | Construction activities. Transportation and traffic. | Inspect and clean construction equipment properly after working in areas known to be infested with invasive alien flora species (see details in BMMP). | Throughout construction phase  
  Implementation: Contractor  
  Monitoring: Owner’s Engineer | Construction equipment cleaned as required. | Included in the construction contract. |
| Terrestrial flora                     | Potential introduction of invasive alien species. Modification of species composition in fauna communities present in the Project area. | Site preparation. Construction activities. | Burn residues of invasive alien flora species (IAS) to reduce the risk of propagation to other areas (see details in BMMP). | Throughout construction phase  
  Implementation: Contractor  
  Monitoring: Owner’s Engineer | IAS specimens managed as required. | Included in the construction contract. |
| Land use                              | Loss of land, crops, tree and pastoral zones in the ROW. 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 (see details in BMMP). | Throughout construction phase  
  Implementation: Contractor  
  Monitoring: Owner’s Engineer | Chopped woody resources managed as required. | Included in the construction contract. |
| Air quality                           | Temporary air quality deterioration. Permanent loss of natural habitat area and of its associated flora. Temporary degradation of the landscape at worksite. | Site preparation. Construction 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 (see details in BMMP). | Throughout construction phase  
  Implementation: Contractor  
  Monitoring: Owner’s Engineer | Exposed soils rehabilitated as soon as possible following construction activities. | Included in the construction contract. |
| Terrestrial 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 near threatened species populations. Temporary degradation of the landscape at worksite. | Site preparation. Construction activities. | Promote the selection of areas with bare soil, and less of a need for tree cutting, for temporary work and storage areas (see details in BMMP). | Throughout construction phase  
  Implementation: Contractor  
  Monitoring: Owner’s Engineer | Temporary work and storage areas installed in already disturbed areas whenever possible. | Included in the construction contract. |
<table>
<thead>
<tr>
<th>Environmental and/or Social Components</th>
<th>Potential Impacts Addressed</th>
<th>Sources of Impact</th>
<th>Management Measure</th>
<th>Implementation Timing / Responsibilities</th>
<th>Performance Indicators</th>
<th>Costs</th>
</tr>
</thead>
<tbody>
<tr>
<td>Terrestrial flora</td>
<td>Terrestrial habitat fragmentation and degradation in some areas along the ROW</td>
<td>Transportation and traffic. Construction activities</td>
<td>Stick to designated access and avoid the storage of material inside natural habitats (see details in BMMP).</td>
<td>Throughout construction phase Implementation: Contractor Monitoring: Owner’s Engineer</td>
<td>Reduction of created access roads.</td>
<td>Included in the construction contract.</td>
</tr>
<tr>
<td>Terrestrial fauna</td>
<td>Terrestrial habitat fragmentation and degradation in some areas along the ROW. Modification of species composition in fauna communities present in the project area. Local reduction of fauna density for species of higher use value in given areas. Changes in protected and IUCN-designated near threatened species populations.</td>
<td>Presence of workers.</td>
<td>Implement a biodiversity protection awareness program with workers (see details in BMMP). 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 poaching (see Code of Conduct).</td>
<td>Throughout construction phase Implementation: Contractor Monitoring: Owner’s Engineer</td>
<td>Biodiversity Protection Awareness Program developed and approved by Owner’s Engineer prior to beginning of construction activities. Workers engaged in poaching activities sanctioned. No bush meat consumed in workers’ camp.</td>
<td>Included in the construction contract.</td>
</tr>
<tr>
<td>Terrestrial fauna</td>
<td>Habitat fragmentation and degradation for IUCN-designated near threatened species potentially present inside the Project area.</td>
<td>Construction activities.</td>
<td>Inform the Contractor's E&amp;S Specialist when endangered fauna species are observed, in or close, to Project sites. Raise awareness of workers as part of the biodiversity protection awareness program (see details in BMMP).</td>
<td>Throughout construction phase Implementation: Contractor Monitoring: Owner’s Engineer</td>
<td>Contractor's E&amp;S Specialists aware of endangered fauna sightings.</td>
<td>Included in the construction contract.</td>
</tr>
<tr>
<td>Bats</td>
<td>Disturbance or destruction of bat roosts, particularly of Near Threatened species potentially inside the Project area.</td>
<td>Site preparation. Construction activities.</td>
<td>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 cleaned (see details in BMMP).</td>
<td>Throughout construction phase Implementation: Contractor Monitoring: Owner’s Engineer</td>
<td>Hat roost surveys undertaken systematically prior to clearing.</td>
<td>Included in the construction contract.</td>
</tr>
<tr>
<td>Bats</td>
<td>Disturbance or destruction of bat roosts, particularly of Near Threatened species potentially inside the Project area.</td>
<td>Site preparation. Construction activities.</td>
<td>Where major bat roosts 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 (see details in BMMP).</td>
<td>Throughout construction phase Implementation: Contractor Monitoring: Owner’s Engineer</td>
<td>Active roosts of identified species protected (no clearing/construction until roost is abandoned).</td>
<td>Included in the construction contract.</td>
</tr>
<tr>
<td>Avifauna</td>
<td>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).</td>
<td>Site preparation. Construction activities.</td>
<td>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 (see details in BMMP).</td>
<td>Throughout construction phase Implementation: Contractor, Avifaunal Specialist Monitoring: Owner’s Engineer</td>
<td>Active nests of identified species protected (no clearing/construction until nest is abandoned when chicks are mature).</td>
<td>Included in the construction contract.</td>
</tr>
<tr>
<td>Avifauna</td>
<td>Modification and degradation of bird habitats. Disturbance and modification of local communities. Displacement as a result of disturbance of the resident Red List avifauna.</td>
<td>Construction activities.</td>
<td>Compensate any loss of breeding/nesting sites by the creation of suitable habitats elsewhere, notably from enhancement of degraded habitats (see details in BMMP).</td>
<td>Throughout construction phase Implementation: Contractor Monitoring: Owner’s Engineer</td>
<td>Breeding/nesting sites identified in bird survey and impacted by line are compensated.</td>
<td>Included in revegetation plan.</td>
</tr>
<tr>
<td>Avifauna</td>
<td>Bird and bats collisions with the powerlines.</td>
<td>Construction activities.</td>
<td>Place bird diverters on the earth wire/ground wire spans to make the line more visible to birds and bats, near ecologically sensitive areas (rivers, wetlands, dambos, agricultural lands associated with staging areas, bird migration corridors, and large rivers). Preliminary Collision Mitigation areas are in section 6.2.3.3 of the ESIA and will be further detailed in the BMMP.</td>
<td>Throughout construction phase Implementation: Contractor Monitoring: Owner’s Engineer</td>
<td>All line sections described in the BMMP and recommended following walkthrough survey are equipped with bird diverters.</td>
<td>Included in the construction contract.</td>
</tr>
<tr>
<td>Environmental and/or Social Components</td>
<td>Potential Impacts Addressed</td>
<td>Sources of Impact</td>
<td>Management Measure</td>
<td>Implementation Timing / Responsibilities</td>
<td>Performance Indicators</td>
<td>Costs</td>
</tr>
<tr>
<td>----------------------------------------</td>
<td>-----------------------------</td>
<td>------------------</td>
<td>--------------------</td>
<td>------------------------------------------</td>
<td>------------------------</td>
<td>-------</td>
</tr>
</tbody>
</table>
| Avifauna                               | Priority species mortality as a result of collisions with motor vehicles. | Construction activities. | Construction vehicles must utilise 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 utilising the roads, particularly during dusk and down periods (see details in BMMP). | Throughout construction phase  
- Implementation: Contractor  
- Monitoring: Owner’s Engineer | No bird mortalities. | Included in the construction contract. |
| Aquatic habitats and associated fauna   | Local degradation of aquatic and semi-aquatic habitats and associated fauna and flora disturbances. | Site preparation.  
Construction activities. | Avoid construction of temporary access roads along river banks, dams, or in areas where soils are saturated. | Throughout construction phase  
- Implementation: Contractor  
- Monitoring: Owner’s Engineer | Temporary access roads in identified sensitive areas minimized. | Included in the construction contract. |
| Aquatic habitats and associated fauna   | Local degradation of aquatic and semi-aquatic habitats and associated fauna and flora disturbances. | Site preparation.  
Construction activities. | Maintain fish passage when watercourse road crossings are unavoidable by utilizing clear span bridges or open-bottom culverts. Install diversion structures (canals, dikes, and coffers) that neither obstruct fish movements nor diminish habitat width to less than 2/3 of the current water bodies, including rivers, wetlands, etc. (see details in BMMP). | Throughout construction phase  
- Implementation: Contractor  
- Monitoring: Owner’s Engineer | Drainage capacity of installed culverts equal or higher than confirmed rainy season flow rate at each watercourse crossing. | Included in the construction contract. |
| Aquatic habitats and associated fauna   | Local degradation of aquatic and semi-aquatic habitats and associated fauna and flora disturbances. | Site preparation.  
Construction 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. | Throughout construction phase  
- Implementation: Contractor  
- Monitoring: Owner’s Engineer | 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 the construction contract. |
| Aquatic habitats and associated fauna   | Local degradation of aquatic and semi-aquatic habitats and associated fauna and flora disturbances. | Site preparation.  
Construction activities. | Do not allow any temporary access roads to be built inside wetland areas such as dambos during the construction phase. | Throughout construction phase  
- Implementation: Contractor  
- Monitoring: Owner’s Engineer | Construction activities in wetlands performed only during the dry season. | Included in the construction contract. |
| Aquatic habitats and associated fauna   | Local degradation of aquatic and semi-aquatic habitats and associated fauna and flora disturbances. | Site preparation.  
Construction 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. | Throughout construction phase  
- Implementation: Contractor  
- Monitoring: Owner’s Engineer | Minimized work near watercourses or wetlands. | Included in the construction contract. |
| Aquatic habitats and associated fauna   | Local degradation of aquatic and semi-aquatic habitats and associated fauna and flora disturbances. | Site preparation.  
Construction activities. | Conduct activities in work areas close to aquatic habitats during the dry season to minimize disturbance of sensitive shoreline and wetland areas. | Throughout construction phase  
- Implementation: Contractor  
- Monitoring: Owner’s Engineer | Activities in the wet season reduced to the extent possible. | Included in the construction contract. |
| Aquatic habitats and associated fauna   | Local degradation of aquatic and semi-aquatic habitats and associated fauna and flora disturbances. | Site preparation.  
Construction activities. | Do not operate heavy machinery in wetland areas with standing or running water. | Throughout construction phase  
- Implementation: Contractor  
- Monitoring: Owner’s Engineer | No heavy machinery operated in wetlands, standing or moving water. | Included in the construction contract. |
<table>
<thead>
<tr>
<th>Environmental and/or Social Components</th>
<th>Potential Impacts Addressed</th>
<th>Sources of Impact</th>
<th>Management Measure</th>
<th>Implementation Timing / Responsibilities</th>
<th>Performance Indicators</th>
<th>Costs</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aquatic habitats and associated fauna</td>
<td>Local degradation of aquatic and semi-aquatic habitats and associated flora and fauna disturbances.</td>
<td>Construction activities.</td>
<td>After termination of construction work, restore natural river bed conditions (minor bed, natural obstacles, etc.).</td>
<td>Throughout construction phase, after conclusion of work activities in a given area:</td>
<td>Natural river bed conditions restored as required.</td>
<td>Included in the construction contract.</td>
</tr>
<tr>
<td>Aquatic habitats and associated fauna</td>
<td>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 Oreochromis macrochir habitats.</td>
<td>Construction activities. Transportation and traffic.</td>
<td>Use wet mat or bridge for vehicle and machinery movement inside permanent wetlands to avoid the need for building a road.</td>
<td>Throughout construction phase: Implementation: Contractor Monitoring: Owner’s Engineer</td>
<td>No road building in permanent wetlands.</td>
<td>Included in the construction contract.</td>
</tr>
<tr>
<td>Infrastructures</td>
<td>Need for relocation of certain infrastructure.</td>
<td>Infrastructure.</td>
<td>Relocation of infrastructures that need to be relocated.</td>
<td>Throughout construction phase: Implementation: Contractor Monitoring: Owner’s Engineer</td>
<td>No infrastructure services completely cut by construction works. Demolished infrastructure rebuilt quickly.</td>
<td>Included in the construction contract.</td>
</tr>
<tr>
<td>Land use</td>
<td>Loss of arable, grazing, and pastoral lands. Disruption of farming activities by construction works.</td>
<td>Resettlement.</td>
<td>Validate with traditional authorities the location of temporary areas to be used during construction activities.</td>
<td>Throughout construction phase: Implementation: Contractor Monitoring: Owner’s Engineer</td>
<td>Always obtain local leaders’ approvals prior to establishing temporary work areas.</td>
<td>Included in the construction contract.</td>
</tr>
<tr>
<td>Infrastructure</td>
<td>Increase in traffic and traffic perturbation.</td>
<td>Transportation and traffic.</td>
<td>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.</td>
<td>Throughout construction phase: Implementation: Contractor Monitoring: Owner’s Engineer</td>
<td>No transportation activities at peak traffic times.</td>
<td>Included in the construction contract.</td>
</tr>
<tr>
<td>Infrastructure</td>
<td>Increased traffic and disturbance of traffic flow.</td>
<td>Construction activities.</td>
<td>Coordinate with TAZARA and TAZAMA so that the line’s installation work will be done without interrupting their operations.</td>
<td>Throughout construction phase: Implementation: Contractor Monitoring: Owner’s Engineer</td>
<td>Proper authorizations obtained from TAZAMA and TAZARA prior to commencement of works near their installations.</td>
<td>Included in the construction contract.</td>
</tr>
<tr>
<td>Employment and economic development</td>
<td>Temporary loss of crops.</td>
<td>Site preparation. Construction activities.</td>
<td>Carefully select the landing area of falling trees to minimize damage to crops.</td>
<td>Throughout construction phase: Implementation: Contractor Monitoring: Owner’s Engineer</td>
<td>No damage to crops due to tree felling.</td>
<td>Included in the construction contract.</td>
</tr>
<tr>
<td>Safety and public health</td>
<td>Increased stress-related disturbances (noise, dust, and air pollution).</td>
<td>Site preparation. Construction activities. Transportation and traffic.</td>
<td>Locate access roads and lay down areas away from residences to the extent possible.</td>
<td>Throughout construction phase: Implementation: Contractor Monitoring: Owner’s Engineer</td>
<td>Daily inspection by the Contractor of access roads for excessive noise. Contractor / Owner’s Engineer to maintain records of complaints on noise and vibration levels, and follow-up corrective measures.</td>
<td>Included in the construction contract.</td>
</tr>
</tbody>
</table>

WSP

ENVIRONMENTAL AND SOCIAL MANAGEMENT PLAN FOR THE ZAMBIA-TANZANIA POWER INTERCONNECTION PROJECT

ESMP

WSP REF: 191-00831-00

3-13
<table>
<thead>
<tr>
<th>Environmental and/or Social Components</th>
<th>Potential Impacts Addressed</th>
<th>Sources of Impact</th>
<th>Management Measure</th>
<th>Implementation Timing / Responsibilities</th>
<th>Performance Indicators</th>
<th>Costs</th>
</tr>
</thead>
<tbody>
<tr>
<td>Safety and public health</td>
<td>Occupational health and safety hazards and risks.</td>
<td>Site preparation. Construction activities. Transportation and traffic. Waste and hazardous materials management. Purchase of materials, goods and services. Presence of workers.</td>
<td>All accidents, incidents, injuries, or near misses reported and investigated while formally monitoring the implementation and communication of control and/or preventive measures.</td>
<td>Throughout the construction phase Implementation: PIU &amp; Contractor</td>
<td>Record keeping of all accidents, incidents and near misses reported, and proof of investigation and implementation of preventative measures.</td>
<td>Included in the construction contractor.</td>
</tr>
<tr>
<td>Workers' health and safety</td>
<td>Accidents and physical injuries involving residents.</td>
<td>Site preparation. Construction activities. Transportation and traffic.</td>
<td>Place signs and fences around construction areas, where necessary.</td>
<td>Throughout construction phase Implementation: Contractor Monitoring: Owner's Engineer</td>
<td>Construction areas properly secured.</td>
<td>Included in the construction contract.</td>
</tr>
<tr>
<td>Workers' health and safety</td>
<td>Risk of accidents and physical injuries involving local workers and residents.</td>
<td>Construction activities. Presence of workers.</td>
<td>Supply drinking water and maintain its quality to ensure sanitation at the construction sites.</td>
<td>Throughout construction phase Implementation: Contractor Monitoring: Owner's Engineer</td>
<td>Supply of constant good quality drinking water at the work sites.</td>
<td>Included in the construction contract.</td>
</tr>
<tr>
<td>Gender aspects</td>
<td>Risk of increased incidences of STDs and HIV/AIDS.</td>
<td>Presence of workers.</td>
<td>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.</td>
<td>Throughout construction phase Implementation: Contractor and PIU Monitoring: Owner’s Engineer</td>
<td>Distance between worker camps and other human settlements always kept at 1 km or more.</td>
<td>Included in the construction contract.</td>
</tr>
<tr>
<td>Gender aspects</td>
<td>Risk of increased incidences of STDs and HIV/AIDS.</td>
<td>Presence of workers.</td>
<td>Favour hiring of local workers</td>
<td>Throughout construction phase Implementation: Contractor Monitoring: Owner’s Engineer</td>
<td>Foreign workers hired only when locals are not available and/or qualified.</td>
<td>Included in the construction contract.</td>
</tr>
<tr>
<td>Communities and social cohesion</td>
<td>Tension with outside workers.</td>
<td>Presence of workers.</td>
<td>Follow a strict “official” recruitment process whereby all workers need to present their application through official offices, and that all workers require written contracts</td>
<td>Throughout construction phase Implementation: Contractor Monitoring: Owner’s Engineer</td>
<td>No recruitment outside official offices.</td>
<td>Included in the construction contract.</td>
</tr>
<tr>
<td>Gender aspects</td>
<td>Risk of increased incidences of STDs and HIV/AIDS.</td>
<td>Presence of workers.</td>
<td>Prepare and implement an 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.</td>
<td>Throughout construction phase Implementation: Contractor Monitoring: Owner’s Engineer</td>
<td>HIV/AIDS prevention program developed and approved by Owner’s Engineer prior to beginning of construction activities.</td>
<td>Included in the construction contract.</td>
</tr>
<tr>
<td>Gender aspects</td>
<td>Risk of increased incidences of STDs and HIV/AIDS.</td>
<td>Presence of workers.</td>
<td>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 grievance mechanism in place. Implement the GBV and SEA Action Plan.</td>
<td>Throughout construction phase Implementation: Contractor Monitoring: Owner’s Engineer</td>
<td>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 beginning of any construction works in their vicinity.</td>
<td>Included in the construction contract.</td>
</tr>
<tr>
<td>Gender aspects</td>
<td>Risk of increased incidences of STDs and HIV/AIDS.</td>
<td>Presence of workers.</td>
<td>Screen health of potential employees as part of the recruitment process.</td>
<td>Throughout construction phase Implementation: Contractor Monitoring: Owner’s Engineer</td>
<td>Health screenings implemented prior to hiring, and regularly during employment.</td>
<td>Included in the construction contract.</td>
</tr>
<tr>
<td>Environmental and/or Social Components</td>
<td>Potential Impacts Addressed</td>
<td>Sources of Impact</td>
<td>Management Measure</td>
<td>Implementation Timing / Responsibilities</td>
<td>Performance Indicators</td>
<td>Costs</td>
</tr>
<tr>
<td>----------------------------------------</td>
<td>----------------------------</td>
<td>------------------</td>
<td>--------------------</td>
<td>------------------------------------------</td>
<td>------------------------</td>
<td>-------</td>
</tr>
</tbody>
</table>
| Safety and public health Workers' health and safety | Risk of accidents and physical injuries involving local workers and residents. | Presence of workers. | Maintain construction 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). | Throughout construction phase  
  - Implementation: Contractor  
  - Monitoring: Owner’s Engineer | Camps maintained in satisfactory condition. | Included in the construction 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. | Throughout construction phase  
  - Implementation: Contractor  
  - Monitoring: Owner’s Engineer | Availability of health care services throughout construction phase. | Included in the construction 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. | Require Contractor(s) to hire security workers in order to ensure the safety of workers and community members, as well as prevent theft and vandalism. | Throughout construction phase  
  - Implementation: Contractor, Owner’s Engineer, and PIU | Security guards on duty full time (24hrs) whenever camp is in operation. | Included in the construction contract. |
| Communities and social cohesion Gender aspects | Women being sidetracked from the compensation and decision-making processes. Marginalization of women during employment process. | 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. | Prior to construction phase  
  - Implementation: PIU | Proportion of female PAPs vs. total PAPs compensated under the final RAP, similar to preliminary RAP. | 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. | Throughout construction phase  
  - Implementation: Contractor  
  - Monitoring: Owner’s Engineer | Percentage of women employees. No wage inequalities. | Included in the construction contract. |
| Communities and social cohesion Safety and public health Noise and vibrations | Inadequate communication with communities and stakeholders. Accidents and physical injuries involving workers or residents. Increase in noise and vibration levels. | Construction activities. | If blasting is required for a tower’s installation, the local population will be advised in advance to prevent nuisances. | Throughout construction phase  
  - Implementation: Contractor  
  - Monitoring: Owner’s Engineer | No unannounced blasting. | Included in the construction contract. |
3.1.2 OPERATION

E&S measures proposed to mitigate negative impacts or enhance the positive impacts during the operation phase are presented in Table 3-2.
<table>
<thead>
<tr>
<th>Environmental and/or Social Components</th>
<th>Potential Impacts</th>
<th>Sources of Impact</th>
<th>Mitigation Measure</th>
<th>Implementation Timing/ Responsibilities</th>
<th>Performance Indicators</th>
<th>Costs</th>
</tr>
</thead>
<tbody>
<tr>
<td>All</td>
<td>Cross-cutting</td>
<td>Cross-cutting</td>
<td>Continue implementation of ESMS throughout operation phase</td>
<td>Project lifetime / ZESCO</td>
<td>Reporting executed as per scheduled in ESMS.</td>
<td>ZESCO operation budget</td>
</tr>
<tr>
<td>Air quality</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Noise and vibrations</td>
<td>Temporary air quality deterioration</td>
<td>Maintenance and repairs</td>
<td>Maintain equipment and machinery in good running condition, including brakes, mufflers, silencers, catalyzers, and clean (power washed), free of leaks, and excess oil and grease.</td>
<td>Project lifetime / ZESCO</td>
<td>Monthly inspections of vehicles and equipment.</td>
<td>ZESCO operation budget</td>
</tr>
<tr>
<td>Hydrography and water resources</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Safety and public health</td>
<td>Temporary air quality deterioration</td>
<td>Maintenance and repairs</td>
<td>Restrict speed on loose surface roads to 20 km/h during dry or dusty conditions and install signposts where relevant.</td>
<td>Project lifetime / ZESCO</td>
<td>Contractor / Owner’s Engineer to maintain records of complaints on noise and air quality, and follow-up with corrective measures.</td>
<td>ZESCO operation budget</td>
</tr>
<tr>
<td>Soil</td>
<td>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. Risk of accidents and physical injuries involving local workers and residents.</td>
<td>Maintenance and repairs</td>
<td>Develop and implement an Emergency Measures Plan. This plan must include an emergency response in case of fire (including at substations), major soil erosion, and seismic events.</td>
<td>Prior to beginning of operations ZESCO</td>
<td>Emergency Measures Plan adopted prior to beginning of operation phase.</td>
<td>$60,000 for development and purchase of spill kits</td>
</tr>
<tr>
<td>Hydrography and water resources</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Safety and public health</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Workers' health and safety</td>
<td>Occupational health and safety hazards and risks</td>
<td>Presence and operation of the line, substations, and access roads. Transportation and traffic. Maintenance and repairs. Waste and hazardous materials management. Purchase of materials, goods, and services. Presence of workers.</td>
<td>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 &amp; 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.</td>
<td>At the planning stage of the operation activities and as conditions change ZESCO</td>
<td>Risk assessment completed.</td>
<td>ZESCO operation budget</td>
</tr>
<tr>
<td>Safety and public health</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Workers' health and safety</td>
<td>Occupational health and safety hazards and risks</td>
<td>Presence and operation of the line, substations, and access roads. Transportation and traffic. Maintenance and repairs. Waste and hazardous materials management. Purchase of materials, goods, and services. Presence of workers.</td>
<td>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.</td>
<td>Throughout the operation phase ZESCO</td>
<td>Records of audits and inspections being performed.</td>
<td>ZESCO operation budget</td>
</tr>
<tr>
<td>Environmental and/or Social Components</td>
<td>Potential Impacts</td>
<td>Sources of Impact</td>
<td>Mitigation Measure</td>
<td>Implementation Timing/ Responsibilities</td>
<td>Performance Indicators</td>
<td>Costs</td>
</tr>
<tr>
<td>----------------------------------------</td>
<td>------------------</td>
<td>------------------</td>
<td>--------------------</td>
<td>----------------------------------------</td>
<td>------------------------</td>
<td>-------</td>
</tr>
<tr>
<td>Safety and public health</td>
<td>Workers' health and safety</td>
<td>Occupational health and safety hazards and risks</td>
<td>Presence and operation of the line, substations and access roads, Transportation and traffic, Maintenance and repairs, Waste and hazardous materials management, Purchase of materials, goods, and services, Presence of workers.</td>
<td>All accidents, incidents, injuries, or near misses reported and investigated while formally monitoring the implementation and communication of control and/or preventive measures.</td>
<td>Throughout the operation phase</td>
<td>ZESCO operation budget</td>
</tr>
<tr>
<td>Safety and public health</td>
<td>Workers' health and safety</td>
<td>Occupational health and safety hazards and risks</td>
<td>Presence and operation of the line, substations and access roads, Transportation and traffic, Maintenance and repairs, Waste and hazardous materials management, Purchase of materials, goods, and services, Presence of workers.</td>
<td>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.</td>
<td>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</td>
<td>ZESCO operation budget</td>
</tr>
<tr>
<td>Soils Hydrography and water resources</td>
<td>Changes in soil’s chemical properties and risk of soil contamination</td>
<td>Groundwater contamination</td>
<td>Waste and hazardous materials management</td>
<td>Regularly inspect all equipment at substations that may contain contaminants, such as transformers.</td>
<td>Project lifetime/ ZESCO</td>
<td>Large stationary equipment inspected twice a year. ZESCO operation budget</td>
</tr>
<tr>
<td>Soils Hydrography and water resources</td>
<td>Changes in soil’s chemical properties and risk of soil contamination</td>
<td>Surface water contamination</td>
<td>Waste and hazardous materials management</td>
<td>Project lifetime/ ZESCO</td>
<td>Large stationary equipment inspected twice a year. ZESCO operation budget</td>
<td></td>
</tr>
<tr>
<td>Soil Hydrography and water resources</td>
<td>Changes in soil’s chemical properties and risk of soil contamination</td>
<td>Groundwater contamination</td>
<td>Waste and hazardous materials management</td>
<td>Project lifetime/ ZESCO</td>
<td>No ignitable, reactive, flammable, corrosive, or toxic materials stored elsewhere than labelled containers. ZESCO operation budget</td>
<td></td>
</tr>
<tr>
<td>Soil Hydrography and water resources</td>
<td>Changes in soil’s chemical properties and risk of soil contamination</td>
<td>Modifications of surface water quality with a risk of contamination</td>
<td>Waste and hazardous materials management</td>
<td>Project lifetime/ ZESCO</td>
<td>Secure storage of all hazardous materials. ZESCO operation budget</td>
<td></td>
</tr>
<tr>
<td>Soils Hydrography and water resources</td>
<td>Changes in soil’s chemical properties and risk of soil contamination</td>
<td>Groundwater contamination</td>
<td>Waste and hazardous materials management</td>
<td>Project lifetime/ ZESCO</td>
<td>Implementation of proper refueling procedures. ZESCO operation budget</td>
<td></td>
</tr>
<tr>
<td>Soils Hydrography and water resources</td>
<td>Changes in soil’s chemical properties and risk of soil contamination</td>
<td>Surface water contamination</td>
<td>Waste and hazardous materials management</td>
<td>Project lifetime/ ZESCO</td>
<td>Record keeping of all accidents, incidents, and near misses reported, and proof of investigation and implementation of preventative measures. ZESCO operation budget</td>
<td></td>
</tr>
<tr>
<td>Environmental and/or Social Components</td>
<td>Potential Impacts</td>
<td>Sources of Impact</td>
<td>Mitigation Measure</td>
<td>Implementation Timing/ Responsibilities</td>
<td>Performance Indicators</td>
<td>Costs</td>
</tr>
<tr>
<td>---------------------------------------</td>
<td>----------------------------------------------------------------------------------</td>
<td>--------------------------------------------------------</td>
<td>------------------------------------------------------------------------</td>
<td>----------------------------------------</td>
<td>------------------------</td>
<td>-----------------------------</td>
</tr>
<tr>
<td>Soils Hydrography and water resources</td>
<td>Changes in soil’s chemical properties and risk of soil contamination.</td>
<td>Waste and hazardous materials management.</td>
<td>Provide portable spill containment and cleanup equipment on site and training in the equipment deployment.</td>
<td>Project lifetime/ ZESCO Spill containment and cleanup equipment onsite.</td>
<td>ZESCO operation budget</td>
<td></td>
</tr>
<tr>
<td>Soils Hydrography and water resources</td>
<td>Changes in soil’s chemical properties and risk of soil contamination.</td>
<td>Waste and hazardous materials management.</td>
<td>Train workers on the correct transfer and handling of fuels and chemicals and in response to spills.</td>
<td>Project lifetime/ ZESCO Evidence of adequate training.</td>
<td>ZESCO operation budget</td>
<td></td>
</tr>
<tr>
<td>Soil Hydrography and water resources</td>
<td>Changes in soil’s chemical properties and risk of soil contamination.</td>
<td>Waste and hazardous materials management.</td>
<td>Control and reduce at the source the production of waste and hazardous waste.</td>
<td>Project lifetime/ ZESCO Waste production minimized.</td>
<td>ZESCO operation budget</td>
<td></td>
</tr>
<tr>
<td>Noise</td>
<td>Increase in noise and vibration levels</td>
<td>Maintenance and repairs</td>
<td>Restrict noise and vibration generating activities near residential or institutional sensitive receptors to the period considered as daytime (between 7 am and 7 pm).</td>
<td>Project lifetime/ ZESCO National noise standards respected.</td>
<td>ZESCO operation budget</td>
<td></td>
</tr>
<tr>
<td>Terrestrial flora Avifauna Terrestrial Fauna</td>
<td>Impairment of natural habitats and associated flora communities</td>
<td>Maintenance and repairs</td>
<td>Maintain all work inside the access road and ROW footprints to reduce encroachment on natural habitats (see details in BMMP).</td>
<td>Project lifetime/ ZESCO No maintenance nor repair works outside ROW and access road.</td>
<td>ZESCO operation budget</td>
<td></td>
</tr>
<tr>
<td>Terrestrial flora</td>
<td>Impairment of natural habitats and associated flora communities</td>
<td>Maintenance and repairs</td>
<td>Clearly mark the extent of vegetation control in the ROW. Identify and mark the vegetation to be preserved along sections of the ROW (see details in BMMP).</td>
<td>Project lifetime/ ZESCO ROW limits clearly marked.</td>
<td>ZESCO operation budget</td>
<td></td>
</tr>
<tr>
<td>Soil Terrestrial flora Terrestrial fauna Aquatic habitats and associated fauna</td>
<td>Change in soil properties Maintenance of the vegetation in early stage of regeneration Impairment of natural habitats and associated flora communities Reduction of habitat quality for fauna species with more strict ecological requirements Disturbances of the water’s physical and chemical characteristics causing modifications in aquatic habitats and associated fauna Potential introduction of invasive alien species</td>
<td>Maintenance and repairs Undertake selective control of the vegetation in dambos and riparian habitat 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 (see details in BMMP).</td>
<td>Project lifetime/ ZESCO Scrubby and herbaceous cover maintained all along the wayleave.</td>
<td>ZESCO operation budget</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Terrestrial flora Employment and economic development</td>
<td>Impairment of natural habitats and associated flora communities Increased pressure on natural resources</td>
<td>Maintenance and repairs Make chopped woody resources and residues available to local population in order to reduce additional pressure on natural resources (see details in BMMP).</td>
<td>Project lifetime/ ZESCO Chopped woody resources and residues not in the ROW.</td>
<td>ZESCO operation budget</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Environmental and/or Social Components</td>
<td>Potential Impacts</td>
<td>Sources of Impact</td>
<td>Mitigation Measure</td>
<td>Implementation Timing/ Responsibilities</td>
<td>Performance Indicators</td>
<td>Costs</td>
</tr>
<tr>
<td>---------------------------------------</td>
<td>-----------------------------------------------------------------------------------------------------------------------------------------------------</td>
<td>------------------------------------------------------------------------------------------------------</td>
<td>-------------------------------------------------------------------------------------------------------</td>
<td>-------------------------------------------------------------</td>
<td>-------------------------------------------------------------</td>
<td>--------------------------------------------</td>
</tr>
<tr>
<td>Terrestrial flora</td>
<td>Impairment of natural habitats and associated flora communities</td>
<td>Maintenance and repairs</td>
<td>Use mechanical method for vegetation control inside the ROW. Forbid use of chemical pesticides to control vegetation in the ROW (see details in BMMP).</td>
<td>Project lifetime/ ZESCO</td>
<td>No chemical products used in maintenance of ROW and wayleave.</td>
<td>ZESCO operation budget</td>
</tr>
<tr>
<td>Aquatic habitats and associated fauna</td>
<td>Disturbances of the water’s physical and chemical characteristics causing modifications in aquatic habitats and associated fauna</td>
<td>Maintenance and repairs</td>
<td>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 (see details in BMMP).</td>
<td>Project lifetime/ ZESCO</td>
<td>IAS monitoring program ready at the beginning of operational phase. Monitoring conducted at least every 5 years.</td>
<td>Development: $10,000 Operation: $10,000/year</td>
</tr>
<tr>
<td>Terrestrial fauna</td>
<td>Disturbances of the water’s physical and chemical characteristics causing modifications in aquatic habitats and associated fauna.</td>
<td>Maintenance and repairs</td>
<td>Implement a bat mortality monitoring program (and training) in partnership with experts and local communities or NGOs (see details in BMMP).</td>
<td>Project lifetime/ ZESCO</td>
<td>Bat mortality monitoring program ready at the beginning of operational phase. Data to be included: monitoring of bat mortality (in partnership with local communities) Number of dead specimens (species involved) related to period and location.</td>
<td>Operation: $40,000/year (quarterly surveys) $8,000 (one-off training course)</td>
</tr>
<tr>
<td>Aquatic habitats and associated fauna</td>
<td>Effects on wetland special status species and species of conservation interest. Potential introduction of invasive alien species</td>
<td>Maintenance and repairs</td>
<td>Implement a bat mortality monitoring program (and training) in partnership with experts and local communities or NGOs (see details in BMMP).</td>
<td>Project lifetime/ ZESCO</td>
<td>Mitigation measures developed, implemented and monitored if required. Mitigation measures implementation budget to be developed if MMs are required.</td>
<td>ZESCO operation budget</td>
</tr>
<tr>
<td>Terrestrial fauna</td>
<td>Risks of bat collisions and electrocution</td>
<td>Presence and operation of line, substations, and access roads</td>
<td>Develop specific mitigation measures for species that are involved in mortality (see details in BMMP).</td>
<td>Project lifetime ZESCO, Bat Specialist</td>
<td>Mitigation measures developed, implemented and monitored if required.</td>
<td>ZESCO operation budget</td>
</tr>
<tr>
<td>Terrestrial fauna</td>
<td>Risks of bat collisions and electrocution</td>
<td>Presence and operation of line, substations, and access roads</td>
<td>Develop specific mitigation measures for species that are involved in mortality (see details in BMMP).</td>
<td>Project lifetime ZESCO, Bat Specialist</td>
<td>Mitigation measures developed, implemented and monitored if required.</td>
<td>ZESCO operation budget</td>
</tr>
<tr>
<td>Terrestrial fauna</td>
<td>Disturbance of large mammal migrations.</td>
<td>Maintenance activities along the line.</td>
<td>Minimize ROW maintenance activities along and during seasonal migration routes for large mammals (see details in BMMP).</td>
<td>Project lifetime/ ZESCO</td>
<td>ROW management activities minimized along migration routes during migration seasons of large mammals.</td>
<td>ZESCO operation budget</td>
</tr>
<tr>
<td>Avifauna</td>
<td>Bird collisions and risks of electrocution</td>
<td>Presence and operation of line, substations, and access roads</td>
<td>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 (see details in BMMP).</td>
<td>Project lifetime/ ZESCO</td>
<td>Bird mortality monitoring program ready for implementation at the beginning of operational phase. Data to be included: number of mortalities, species involved, and location Mitigation measures developed and implemented if required. Implementation budget to be developed if mitigation measures are required.</td>
<td>Operation: $55,000/year (quarterly surveys) $8,000 (one-off training course)</td>
</tr>
<tr>
<td>Avifauna</td>
<td>Bird electrocution</td>
<td>Operation of substations</td>
<td>Monitoring of bird electrocutions encountered during routine inspection of the substation yards ZESCO substation Managers (see details in BMMP).</td>
<td>Project lifetime/ ZESCO</td>
<td>Data to be included: number of mortalities, species involved, and location Mitigation measures developed and implemented if required.</td>
<td>ZESCO operation budget</td>
</tr>
<tr>
<td>Avifauna</td>
<td>Bird collisions and risks of electrocution</td>
<td>Presence and operation of line, substations and access roads</td>
<td>Coordinate land planning by local authorities in order to prevent implementation of infrastructures or land uses that may constitute an attraction for birds such as landfills (see details in BMMP).</td>
<td>Project lifetime/ ZESCO</td>
<td>Yearly coordination meetings with local authorities.</td>
<td>ZESCO operation budget</td>
</tr>
<tr>
<td>Environmental and/or Social Components</td>
<td>Potential Impacts</td>
<td>Sources of Impact</td>
<td>Mitigation Measure</td>
<td>Implementation Timing/ Responsibilities</td>
<td>Performance Indicators</td>
<td>Costs</td>
</tr>
<tr>
<td>----------------------------------------</td>
<td>------------------</td>
<td>------------------</td>
<td>--------------------</td>
<td>----------------------------------------</td>
<td>------------------------</td>
<td>-------</td>
</tr>
<tr>
<td>Avifauna</td>
<td>Modification and alteration of bird habitats, with associated modifications in fauna communities</td>
<td>Maintenance and repairs</td>
<td>Schedule ROW management activities to avoid breeding and nesting seasons of bird species with special status (see details in BMMP).</td>
<td>Project lifetime/ ZESCO</td>
<td>ROW management activities minimized during nesting seasons of bird species with special status.</td>
<td>ZESCO operation budget</td>
</tr>
<tr>
<td>Avifauna</td>
<td>Bird collisions and risks of electrocution</td>
<td>Maintenance and repairs</td>
<td>Maintenance of mitigation measures (bird flight diverters and insulating materials) for the operational life span of the powerlines and the equipment within the substation yards (see details in BMMP).</td>
<td>Project lifetime/ ZESCO</td>
<td>Mitigation measures in good working order, thereby preventing bird mortality.</td>
<td>ZESCO operation budget</td>
</tr>
<tr>
<td>Aquatic habitats and associated fauna</td>
<td>Disturbances of the water’s physical and chemical characteristics causing modifications in aquatic habitats and associated fauna</td>
<td>Maintenance and repairs</td>
<td>Avoid the destabilization of shores, and sediment or other pollutant rejection in watercourses during road and wayleave maintenance.</td>
<td>Project lifetime/ ZESCO</td>
<td>Careful road maintenance.</td>
<td>ZESCO operation budget</td>
</tr>
<tr>
<td>Land use</td>
<td>Land use restrictions within the ROW</td>
<td>Maintenance and repairs</td>
<td>Allow grazing and cultivation in the ROW, provided plantations do not exceed 2 m in height.</td>
<td>Project lifetime/ ZESCO</td>
<td>Grazing and low-lying crops allowed in ROW.</td>
<td>ZESCO operation budget</td>
</tr>
<tr>
<td>Gender aspects</td>
<td>Occasional infringement of machinery on crops for maintenance purposes</td>
<td>Maintenance and repairs</td>
<td>Plan for maintenance activities to be conducted outside of the growing and grazing seasons.</td>
<td>Project lifetime/ ZESCO</td>
<td>Maintenance activities minimized during growing and grazing seasons.</td>
<td>ZESCO operation budget</td>
</tr>
<tr>
<td>Employment and economic development</td>
<td>Creation of jobs</td>
<td>Maintenance and repairs</td>
<td>Apply human resource policies favoring local labor.</td>
<td>Project lifetime/ ZESCO</td>
<td>Target 90% of local labour for unskilled tasks.</td>
<td>ZESCO operation budget</td>
</tr>
<tr>
<td>Employment and economic development</td>
<td>Creation of jobs</td>
<td>Maintenance and repairs</td>
<td>Implement training programs to build local capacity.</td>
<td>Project lifetime/ ZESCO</td>
<td>Target 25% of local labor for skilled tasks.</td>
<td>ZESCO operation budget</td>
</tr>
<tr>
<td>Employment and economic development</td>
<td>Creation of jobs</td>
<td>ROW management Maintenance and repairs</td>
<td>Disclose information on newly created business opportunities.</td>
<td>Prior to operation and entire project lifetime/ ZESCO</td>
<td>Information published from beginning of operation phase.</td>
<td>ZESCO operation budget</td>
</tr>
<tr>
<td>Infrastructure</td>
<td>Increased electricity provision</td>
<td>Presence and operation of line, substations, and access roads</td>
<td>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.</td>
<td>Prior to operation and entire project lifetime/ REA</td>
<td>Rural electrification projects launched at beginning of operation.</td>
<td>REA budget</td>
</tr>
<tr>
<td>Infrastructure</td>
<td>Increased reliability of water provision</td>
<td>Presence and operation of line, substations, and access roads</td>
<td>Rural electrification: study the possibility of providing water provision infrastructure</td>
<td>Prior to operation and entire Project lifetime/ REA</td>
<td>Studies launched at beginning of operation.</td>
<td>REA budget</td>
</tr>
<tr>
<td>Gender aspects</td>
<td>Effects on women due to crop loss</td>
<td>Maintenance and repairs</td>
<td>Encourage the recruitment of female workers.</td>
<td>ZESCO</td>
<td>Gender employee policy adopted at beginning of operations phase. Target 30% of female workers.</td>
<td>ZESCO operation budget</td>
</tr>
<tr>
<td>Safety and public health</td>
<td>Risk of electrocution caused by equipment breakdowns, illegal connections, steel theft, and all other forms of unsafe contact</td>
<td>Presence and operation of line, substations, and access roads</td>
<td>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.</td>
<td>Prior to operation and entire Project lifetime/ ZESCO</td>
<td>Target: no electrocutions over the line's lifecycle.</td>
<td>See Training Program</td>
</tr>
<tr>
<td>Safety and public health</td>
<td>Risk of electrocution caused by equipment breakdowns, illegal connections, steel theft, and all other forms of unsafe contact</td>
<td>Presence and operation of line, substations and access roads</td>
<td>Install warning signs and anti-climbing devices on pylons.</td>
<td>Project lifetime/ ZESCO</td>
<td>Signs installed from onset of operation phase.</td>
<td>n/a (project cost)</td>
</tr>
<tr>
<td>Environmental and/or Social Components</td>
<td>Potential Impacts</td>
<td>Sources of Impact</td>
<td>Mitigation Measure</td>
<td>Implementation Timing/ Responsibilities</td>
<td>Performance Indicators</td>
<td>Costs</td>
</tr>
<tr>
<td>---------------------------------------</td>
<td>----------------------------------------------------------------------------------</td>
<td>----------------------------------------------------------------------------------</td>
<td>----------------------------------------------------------------------------------</td>
<td>-----------------------------------------------</td>
<td>------------------------</td>
<td>------------------------</td>
</tr>
<tr>
<td>Safety and public health</td>
<td>Risk of electrocution caused by equipment breakdowns, illegal connections, steel theft, and all other forms of unsafe contact</td>
<td>Presence and operation of line, substations, and access roads</td>
<td>Ensure the development of local and regional emergency plans in case of infrastructure breakdowns, especially near roads or residential areas.</td>
<td>Prior to operation and entire Project lifetime/ ZESCO</td>
<td>Emergency plans adopted from onset of operation phase</td>
<td>Development: $20,000</td>
</tr>
<tr>
<td>Safety and public health</td>
<td>Risk of electrocution caused by equipment breakdowns, illegal connections, steel theft, and all other forms of unsafe contact</td>
<td>Presence and operation of line, substations, and access roads</td>
<td>Monitor and control illegal connections.</td>
<td>Project lifetime/ ZESCO</td>
<td>Target: 0 illegal connections</td>
<td>ZESCO operation budget</td>
</tr>
<tr>
<td>Safety and public health</td>
<td>Theft of equipment and vandalism, community members safety</td>
<td>Presence and operation of line, substations, and workers' camp, presence of workers</td>
<td>Hiring of security personnel.</td>
<td>Project lifetime/ ZESCO</td>
<td>Target: 0 acts of vandalism or theft</td>
<td>ZESCO operation budget</td>
</tr>
<tr>
<td>Safety and public health</td>
<td>Exposure to disease</td>
<td>Presence of workers</td>
<td>Prepare a Community Health and Safety Plan.</td>
<td>Prior to construction and entire Project lifetime/ ZESCO</td>
<td>Community Health and Safety Plan to be available to guide Contractors prior to beginning of construction.</td>
<td>ZESCO operation budget</td>
</tr>
<tr>
<td>Communities and social cohesion gender</td>
<td>Tension between local populations and outside workers</td>
<td>Presence of workers</td>
<td>Maintain the Stakeholder Engagement Plan and GRM during Project operation</td>
<td>Prior to operation and entire Project lifetime/ ZESCO</td>
<td>Community Engagement Plan ready for implementation prior to beginning of operations.</td>
<td>ZESCO operation budget</td>
</tr>
<tr>
<td>Landscape</td>
<td>Permanent alteration to the landscape</td>
<td>Presence and operation of line, substations and access roads</td>
<td>Create visual barriers to reduce line visibility in sensitive areas when possible.</td>
<td>Prior to operation and entire Project lifetime/ ZESCO</td>
<td>Sensitive viewpoints identified and protected</td>
<td>ZESCO operation budget</td>
</tr>
</tbody>
</table>
3.1.3 DECOMMISSIONING

E&S measures proposed to mitigate negative impacts or enhance positive impacts during the decommissioning phase are presented in Table 3-3. 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 3-3 Management Measures to be implemented during the Decommissioning Phase

<table>
<thead>
<tr>
<th>Environmental and/or Social Components</th>
<th>Potential Impacts Addressed</th>
<th>Sources of Impact</th>
<th>Management Measure</th>
<th>Implementation Timing / Responsibilities</th>
<th>Performance Indicators</th>
<th>Costs</th>
</tr>
</thead>
</table>
| 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/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. | Prior to decommissioning phase  
  - Development: Contractor  
  - Approval: Owner’s Engineer and PIU | 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 & 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. | Prior to decommissioning phase  
  - ZESCO | 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. | Prior to decommissioning phase  
  - Contractor | No decommissioning works undertaken before all required permits and authorizations are secured. | Included in the decommissioning contract |
| Air quality                            | Temporary air quality deterioration. | Site preparation. 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. | Prior to decommissioning phase  
  - Development: Contractor  
  - Approval: Owner’s Engineer and PIU | Waste and hazardous waste management plan approved by Owner’s Engineer prior to initiation of decommissioning phase. | Included in the decommissioning contract |
  - Development: Contractor  
  - Approval: Owner’s Engineer and PIU | Hazardous materials management plan approved by Owner’s Engineer prior to initiation of decommissioning phase. | Included in the decommissioning contract |
  - Development: Contractor  
  - Approval: Owner’s Engineer and PIU | Emergency measures plan approved by Owner’s Engineer prior to initiation of decommissioning phase. | Included in the decommissioning contract |
<table>
<thead>
<tr>
<th>Environmental and/or Social Components</th>
<th>Potential Impacts Addressed</th>
<th>Sources of Impact</th>
<th>Management Measure</th>
<th>Implementation Timing / Responsibilities</th>
<th>Performance Indicators</th>
<th>Costs</th>
</tr>
</thead>
<tbody>
<tr>
<td>Safety and public health Workers’ health and safety</td>
<td>Occupational health and safety hazards and risks.</td>
<td>Site preparation. Decommissioning activities. Transportation and traffic. Waste and hazardous materials management. Purchase of materials, goods and services. Presence of workers.</td>
<td>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 &amp; 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.</td>
<td>Prior to beginning of decommissioning phase – Implementation: PIU &amp; Contractor</td>
<td>Risk assessment completed.</td>
<td>Included in the decommissioning contract.</td>
</tr>
<tr>
<td>Safety and public health Workers’ health and safety</td>
<td>Occupational health and safety hazards and risks.</td>
<td>Site preparation. Decommissioning activities. Transportation and traffic. Waste and hazardous materials management. Purchase of materials, goods and services. Presence of workers.</td>
<td>All accidents, incidents, injuries or near misses reported and investigated while formally monitoring the implementation and communication of control and/or preventive measures.</td>
<td>Throughout the decommissioning phase – Implementation: PIU &amp; Contractor</td>
<td>Record keeping of all accidents, incidents and near misses reported and proof of investigation and implementation of preventative measures.</td>
<td>Included in the decommissioning contractor.</td>
</tr>
<tr>
<td>Safety and public health Workers’ health and safety</td>
<td>Occupational health and safety hazards and risks.</td>
<td>Site preparation. Decommissioning activities. Transportation and traffic. Waste and hazardous materials management. Purchase of materials, goods and services. Presence of workers.</td>
<td>Training specific to decommissioning site to be provided to the workforce as well as any employee, contractor, sub-contractors or visitor accessing the Project site. Training specific to decommissioning site shall be provided before being on-site.</td>
<td>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: – Implementation: PIU &amp; Contractor</td>
<td>Record of training completed.</td>
<td>Included in the decommissioning contractor.</td>
</tr>
<tr>
<td>Soils Land use Employment and economic development</td>
<td>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.</td>
<td>Decommissioning activities. Transportation and traffic.</td>
<td>Restrict transportation to the identified access by clearly marking out the limit of the ROW and access roads.</td>
<td>Throughout decommissioning phase – Implementation: Contractor Monitoring: Owner’s Engineer</td>
<td>Limits of ROW and access roads marked prior to beginning of works in a given area.</td>
<td>Included in the decommissioning contract.</td>
</tr>
<tr>
<td>Environmental and/or Social Components</td>
<td>Potential Impacts Addressed</td>
<td>Sources of Impact</td>
<td>Management Measure</td>
<td>Implementation Timing / Responsibilities</td>
<td>Performance Indicators</td>
<td>Costs</td>
</tr>
<tr>
<td>--------------------------------------</td>
<td>-------------------------------------------------------------------------------------------</td>
<td>----------------------------------------------------------------------------------</td>
<td>-----------------------------------------------------------------------------------</td>
<td>-----------------------------------------------------------------------------------------------------------</td>
<td>-------------------------------------------------------------------------------------------</td>
<td>-------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td></td>
<td>Soils</td>
<td>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.</td>
<td>Decommissioning activities. Transportation and traffic.</td>
<td>Through decommissioning phase&lt;br&gt;− Implementation: Contractor&lt;br&gt;− Monitoring: Owner’s Engineer</td>
<td>Equipment and vehicle movements outside the line route and access roads’ ROW restricted to a minimum.</td>
<td>Included in the decommissioning contract.</td>
</tr>
<tr>
<td>Environmental and/or Social Components</td>
<td>Potential Impacts Addressed</td>
<td>Sources of Impact</td>
<td>Management Measure</td>
<td>Implementation Timing / Responsibilities</td>
<td>Performance Indicators</td>
<td>Costs</td>
</tr>
<tr>
<td>---------------------------------------</td>
<td>------------------------------------------------------------------------------------------</td>
<td>----------------------------------------------------------------------------------</td>
<td>-----------------------------------------------------------------------------------</td>
<td>-----------------------------------------------------------------------------------</td>
<td>----------------------------------------------------------------------------------------</td>
<td>----------------------------------------------------------------------</td>
</tr>
<tr>
<td>Air quality Safety and public health</td>
<td>Temporary air quality deterioration. Greenhouse gas emissions. Increased stress related to nuisances.</td>
<td>Decommissioning activities.</td>
<td>Restrict speed on loose surface roads to 20 km/h during dry or dusty conditions and install signposts where relevant.</td>
<td>Throughout decommissioning phase</td>
<td>Daily inspection by the Contractor of decommissioning areas for excessive nuisance dust, noise and air pollutants. Contractor / Owner’s Engineer to maintain records of complaints on noise and air quality, and follow-up with corrective measures.</td>
<td>Included in the decommissioning contract.</td>
</tr>
<tr>
<td>Noise and vibrations Safety and public health</td>
<td>Increase in noise and vibration levels. Increased stress related to nuisances. Site preparation. Decommissioning activities. Transportation and traffic.</td>
<td>Maintain noise levels at or below national thresholds.</td>
<td>Throughout decommissioning phase</td>
<td>Daily inspection by the Contractor of decommissioning areas for excessive nuisance dust, noise and air pollutants. Contractor / Owner’s Engineer to maintain records of complaints on noise and air quality, and follow-up with corrective measures.</td>
<td>Included in the decommissioning contract.</td>
<td></td>
</tr>
<tr>
<td>Soils Hydrography and water resources</td>
<td>Soil erosion in erosion-prone areas. Surface water contamination.</td>
<td>Decommissioning activities.</td>
<td>Operate machinery on land in a way that minimizes disturbance to the banks of watercourses.</td>
<td>Throughout decommissioning phase</td>
<td>No machinery operations inside top-of-bank of watercourses.</td>
<td>Included in the decommissioning contract.</td>
</tr>
<tr>
<td>Soils Hydrography and water resources</td>
<td>Soil erosion in erosion-prone areas. Modifications of surface water quality with a risk of contamination. Site preparation. Decommissioning activities. Transportation and traffic.</td>
<td>Prepare and implement erosion and sediment control plans, particularly in areas identified as having high erosion potential.</td>
<td>Prior to decommissioning phase Prior to initiation of decommissioning phase Development: Contractor Approval: Owner’s Engineer and PIU</td>
<td>Erosion and sediment control plan approval by Owner’s Engineer prior to initiation of decommissioning phase.</td>
<td>Included in the decommissioning contract.</td>
<td></td>
</tr>
<tr>
<td>Soils Hydrography and water resources</td>
<td>Soil compaction in work areas.</td>
<td>Decommissioning activities.</td>
<td>Throughout decommissioning phase</td>
<td>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.</td>
<td>Included in the decommissioning contract.</td>
<td></td>
</tr>
<tr>
<td>Soils Hydrography and water resources</td>
<td>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</td>
<td>Nitrogen compounds. 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.</td>
<td>Throughout decommissioning phase</td>
<td>No ignitable, reactive, flammable, corrosive or toxic materials stored elsewhere than in labelled containers.</td>
<td>Included in the decommissioning contract.</td>
<td></td>
</tr>
<tr>
<td>Soils Hydrography and water resources</td>
<td>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.</td>
<td>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.</td>
<td>Throughout decommissioning phase</td>
<td>Secure storage of all hazardous materials. Secure storage of all hazardous materials. Inspections to ensure proper storage handling techniques are being followed.</td>
<td>Included in the decommissioning contract.</td>
<td></td>
</tr>
<tr>
<td>Environmental and/or Social Components</td>
<td>Potential Impacts Addressed</td>
<td>Sources of Impact</td>
<td>Management Measure</td>
<td>Implementation Timing / Responsibilities</td>
<td>Performance Indicators</td>
<td>Costs</td>
</tr>
<tr>
<td>---------------------------------------</td>
<td>--------------------------------------------------------------------------------------------</td>
<td>---------------------------------------------------------------------------------</td>
<td>-----------------------------------------------------------------------------------</td>
<td>----------------------------------------------------------------------------------------------------------</td>
<td>--------------------------------------------------------------------------------------</td>
<td>------------------------</td>
</tr>
</tbody>
</table>
| 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.          | Throughout decommissioning phase  
  - Implementation: Contractor  
  - Monitoring: Owner’s Engineer  
  
  Throughout decommissioning phase  
  - Implementation: Contractor  
  - Monitoring: Owner’s Engineer | 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 the production of waste and hazardous waste.                              | Throughout decommissioning phase  
  - Implementation: Contractor  
  - Monitoring: Owner’s Engineer  
  
  Throughout decommissioning phase  
  - Implementation: Contractor  
  - Monitoring: Owner’s Engineer | Production of waste and hazardous waste reduced to a minimum.                      | Included in the decommissioning contract.                                          |
| Soils Terrestrial flora Landscape      | Soil compaction in work areas.                                                              | Transportation and traffic                                                      | Decompress soils following decommissioning with appropriate equipment.                                   | Throughout decommissioning phase  
  - Implementation: Contractor  
  - Monitoring: Owner’s Engineer  
  
  Throughout decommissioning phase  
  - Implementation: Contractor  
  - Monitoring: Owner’s Engineer | 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                                                      | Re-vegetate areas of bare and disturbed soils as soon as possible with native species.                    | Throughout decommissioning phase  
  - Implementation: Contractor  
  - Monitoring: Owner’s Engineer  
  
  Throughout decommissioning phase  
  - Implementation: Contractor  
  - Monitoring: Owner’s Engineer | Bare and disturbed areas revegetated as required.                                    | Included in the decommissioning contract.                                          |
| Hydrography and water resources        | Changes in hydrology. Impairment of hydrological dynamics leading to disturbances and alterations. | Decommissioning activities                                                      | Maintain hydrological connectivity upstream/downstream in the area. When stream crossings are unavoidable, construct suitable culverts to allow sufficient water supply to maintain viable fish habitat. | Throughout decommissioning phase  
  - Implementation: Contractor  
  - Monitoring: Owner’s Engineer  
  
  Hydrological connectivity maintained in all work sites impacting watercourses. | Hydrological connectivity maintained in all work sites impacting watercourses. | Included in the decommissioning contract.                                          |
| Hydrography and water resources        | 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 dambo and communal grazing sites. If unavoidable, reduce access to the extent possible. | Throughout decommissioning phase  
  - Implementation: Contractor  
  - Monitoring: Owner’s Engineer  
  
  No material piling in watercourses and wetland areas. | Included in the decommissioning contract.                                          | Included in the decommissioning contract.                                          |
| Hydrography and water resources        | 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                                                      | Implement and strict procedures for in-water works.                                                  | Throughout decommissioning phase  
  - Implementation: Contractor  
  - Monitoring: Owner’s Engineer  
  
  Included in the decommissioning contract. | In-water works rules approved by Owner’s 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. | Throughout decommissioning phase  
  - Implementation: Contractor  
  - Monitoring: Owner’s Engineer  
  
  Included in the decommissioning contract. | 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. | Throughout decommissioning phase  
  - Implementation: Contractor  
  - Monitoring: Owner’s Engineer  
  
  Required silt barriers installed | Included in the decommissioning contract.                                          | 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.                  | Throughout decommissioning phase  
  - Implementation: Contractor  
  - Monitoring: Owner’s Engineer  
  
  Groundwater seepage pumped out during excavations. | Included in the decommissioning contract.                                          | Included in the decommissioning contract.                                          |
<table>
<thead>
<tr>
<th>Environmental and/or Social Components</th>
<th>Potential Impacts Addressed</th>
<th>Sources of Impact</th>
<th>Management Measure</th>
<th>Implementation Timing / Responsibilities</th>
<th>Performance Indicators</th>
<th>Costs</th>
</tr>
</thead>
</table>
| Terrestrial flora                     | Restoration of natural habitat area and of its associated flora | Decommissioning activities (revegetation). | Establish a revegetation plan to recreate natural habitats in the project footprint. | At the end of decommissioning phase  
Implementation: Contractor  
Monitoring: Owner’s Engineer | Revetement plan developed prior to beginning of decommissioning phase  
Vegetation cover in the project footprint. | Included in the decommissioning contract. |
| Terrestrial fauna                     | Reduction of fragmentation of terrestrial habitat and degradation in some areas along the ROW. Restoration of natural habitat for vulnerable species, Ansellia Africana, and other species of conservation concern such as Pterocarpus angolensis. Restoration of natural habitat for fruit bats, specifically the Near-Threatened African Straw-coloured Fruit Bat. Restoration of ecosystem services. | 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. | Throughout decommissioning phase  
Implementation: Contractor  
Monitoring: Owner’s Engineer | Limits of ROW marked prior to beginning of works in a given area. | Included in the decommissioning contract. |
| Avifauna                             | 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. | Throughout decommissioning phase  
Implementation: Contractor  
Monitoring: Owner’s Engineer | Maintain vegetation in a 10m shoreline and on steep slopes when compatible with ROW operation. | Included in the decommissioning contract. |
| Terrestrial flora                     | Potential introduction of invasive alien species. | 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. | Throughout decommissioning phase  
Implementation: Contractor  
Monitoring: Owner’s Engineer | Decommissioning equipment cleansed as required. | Included in the decommissioning contract. |
| 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. | Throughout decommissioning phase  
Implementation: Contractor  
Monitoring: Owner’s Engineer | IAS specimens managed as required. | Included in the decommissioning contract. |
| Air quality                           | 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. | Throughout decommissioning phase  
Implementation: Contractor  
Monitoring: Owner’s Engineer | Exposed soils rehiltadated as soon as possible following decommissioning activities. | Included in the decommissioning contract. |
| 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. | Throughout decommissioning phase  
Implementation: Contractor  
Monitoring: Owner’s Engineer | 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. | Throughout decommissioning phase  
Implementation: Contractor  
Monitoring: Owner’s Engineer | 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 cofferds) that neither obstruct fish movements nor diminish habitat width to less than 2/3 of the current water bodies, including rivers, wetlands, etc. | Throughout decommissioning phase  
Implementation: Contractor  
Monitoring: Owner’s Engineer | Drainage capacity of installed culverts equal or higher than confirmed rainy season flow rate at each watercourse crossing. | Included in the decommissioning contract. |
<table>
<thead>
<tr>
<th>Environmental and/or Social Components</th>
<th>Potential Impacts Addressed</th>
<th>Sources of Impact</th>
<th>Management Measure</th>
<th>Implementation Timing / Responsibilities</th>
<th>Performance Indicators</th>
<th>Costs</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aquatic habitats and associated fauna</td>
<td>Local degradation of aquatic and semi-aquatic habitats and associated fauna and flora disturbances. disappointed aquatic habitats and associated fauna</td>
<td>Site preparation Decommissioning activities</td>
<td>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.</td>
<td>Throughout decommissioning phase Implementation: Contractor Monitoring: Owner’s Engineer</td>
<td>Minimize vegetation clearing in wetlands and in a 50 m buffer zone at watercourse crossings. Disturbed riparian areas restored after conclusion of works.</td>
<td>Included in the decommissioning contract.</td>
</tr>
<tr>
<td>Aquatic habitats and associated fauna</td>
<td>Site preparation Decommissioning activities</td>
<td>Do not allow any temporary access roads to be built inside wetland areas during the decommissioning phase.</td>
<td>Throughout decommissioning phase Implementation: Contractor Monitoring: Owner’s Engineer</td>
<td>Decommissioning activities in wetlands performed only during the dry season.</td>
<td></td>
<td>Included in the decommissioning contract.</td>
</tr>
<tr>
<td>Aquatic habitats and associated fauna</td>
<td>Site preparation Decommissioning activities</td>
<td>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 of ensuring human uses and areas of higher ecological integrity.</td>
<td>Throughout decommissioning phase Implementation: Contractor Monitoring: Owner’s Engineer</td>
<td>Minimized work near watercourses or wetlands.</td>
<td></td>
<td>Included in the decommissioning contract.</td>
</tr>
<tr>
<td>Aquatic habitats and associated fauna</td>
<td>Site preparation Decommissioning activities</td>
<td>Conduct activities in works areas close to aquatic habitats during the dry season to reduce disturbance of sensitive shoreline and wetland areas.</td>
<td>Throughout decommissioning phase Implementation: Contractor Monitoring: Owner’s Engineer</td>
<td>Activities in the wet season minimized.</td>
<td></td>
<td>Included in the decommissioning contract.</td>
</tr>
<tr>
<td>Aquatic habitats and associated fauna</td>
<td>Site preparation Decommissioning activities</td>
<td>Do not operate heavy machinery in wetland areas with standing or running water.</td>
<td>Throughout Decommissioning phase Implementation: Contractor Monitoring: Owner’s Engineer</td>
<td>No heavy machinery operated in wetlands and standing or moving waters.</td>
<td></td>
<td>Included in the decommissioning contract.</td>
</tr>
<tr>
<td>Aquatic habitats and associated fauna</td>
<td>Decommissioning activities</td>
<td>After completion of decommissioning work, restore natural river bed conditions (minor bed, natural obstacles, etc.).</td>
<td>Throughout Decommissioning phase, after conclusion of work activities in a given area Implementation: Contractor Monitoring: Owner’s Engineer</td>
<td>Natural river bed conditions restored as required.</td>
<td></td>
<td>Included in the decommissioning contract.</td>
</tr>
<tr>
<td>Aquatic habitats and associated fauna</td>
<td>Decommissioning activities</td>
<td>Use wetland mat or bridge for vehicle and machinery movement inside permanent wetlands to avoid the need for building a road.</td>
<td>Throughout decommissioning phase Implementation: Contractor Monitoring: Owner’s Engineer</td>
<td>No road building in permanent wetlands.</td>
<td></td>
<td>Included in the decommissioning contract.</td>
</tr>
<tr>
<td>Aquatic habitats and associated fauna</td>
<td>Decommissioning activities</td>
<td>Validate with local Leaders which temporary areas are to be used during decommissioning activities.</td>
<td>Throughout decommissioning phase Implementation: Contractor Monitoring: Owner’s Engineer</td>
<td>Always obtain local Leaders’ approval prior to establishing temporary work areas.</td>
<td></td>
<td>Included in the decommissioning contract.</td>
</tr>
<tr>
<td>Land use</td>
<td>Resettlement</td>
<td></td>
<td>Throughout decommissioning phase Implementation: Contractor Monitoring: Owner’s Engineer</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Employment and economic development</td>
<td>Inflation risk</td>
<td>Purchase of materials, goods, and services</td>
<td>Prior to the decommissioning phase Development: PIU</td>
<td>Procurement policies developed and included in Contractor contract.</td>
<td></td>
<td>Included in PIU operating budget.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Environmental and/or Social Management Plan for the Zambia-Tanzania Power Interconnection Project**

**ESMP**

**WSP REF.: 191-09831-00**

**WSP**
<table>
<thead>
<tr>
<th>Environmental and/or Social Components</th>
<th>Potential Impacts Addressed</th>
<th>Sources of Impact</th>
<th>Management Measure</th>
<th>Implementation Timing / Responsibilities</th>
<th>Performance Indicators</th>
<th>Costs</th>
</tr>
</thead>
</table>
| 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. | Throughout decommissioning phase  
  - Implementation: Contractor  
  - Monitoring: Owner’s Engineer | Proper authorizations obtained from TAZARA 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. | Throughout decommissioning phase  
  - Implementation: Contractor  
  - Monitoring: Owner’s Engineer | Daily inspection by the Contractor of access roads for excessive noise.  
  Contractor / Owner’s 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. | Throughout decommissioning phase  
  - Implementation: Contractor  
  - Monitoring: Owner’s Engineer | Landowners duly notified about decommissioning schedule and activities. | 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 | Implement and follow-up on grievance redress mechanism. | Throughout decommissioning phase  
  - Implementation: Owner’s Engineer  
  - Coordination: PIU | Grievance mechanism functional throughout the decommissioning phase. | Unknown |
| Safety and public health               | 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. | Throughout decommissioning phase  
  - Implementation: Contractor  
  - Monitoring: Owner’s Engineer | Equipment and excavation work areas properly secured. | Included in the decommissioning contract. |
| Safety and public health               | Accidents and physical injuries involving residents                                       | Site preparation, Decommissioning activities, Transportation and traffic | Place signs and fences around decommissioning areas, where necessary. | Throughout decommissioning phase  
  - Implementation: Contractor  
  - Monitoring: Owner’s Engineer | Decommissioning areas properly secured. | Included in the decommissioning contract. |
| Safety and public health               | Risk of accidents and physical injuries involving local workers and residents             | Decommissioning activities          | Require all Contractors and Subcontractors to comply with relevant WB health and safety requirements and ZESCO’s corporate policy. | Prior to beginning of decommissioning phase  
  - Implementation: PIU & Contractor | WB H&S requirements and ZESCO corporate policy integrated in Contractor and Subcontractors contracts. | Included in the decommissioning contract. |
| Safety and public health               | Risk of accidents and physical injuries involving local workers and residents             | Decommissioning activities          | Develop and implement an H&S management plan to protect every worker involved in decommissioning, even temporary workers. | Prior to beginning of decommissioning phase  
  - Implementation: Contractor  
  - Monitoring: Owner’s Engineer | H&S management plan approved by Owner’s Engineer prior to initiation of decommissioning phase. | Included in the decommissioning contract. |
| Safety and public health               | Risk of accidents and physical injuries involving local workers and residents             | Decommissioning activities          | Supply drinking water and maintain its quality to ensure sanitation at the decommissioning sites. | Throughout decommissioning phase  
  - Implementation: Contractor  
  - Monitoring: Owner’s Engineer | Supply of constant good quality drinking water at the work sites. | Included in the decommissioning contract. |
| Safety and public health Gender aspects | Risk of increased incidences of STDs and HIV/AIDS                                      | Presence of workers                | Locate worker camps at a minimum distance of 1 km from towns and villages. | Throughout decommissioning phase  
  - Implementation: Contractor  
  - Monitoring: Owner’s Engineer | Distance between workers’ camps and other human settlements always kept at 1 km or more. | Included in the decommissioning contract. |
| Safety and public health Gender aspects | Risk of increased incidences of STDs and HIV/AIDS                                      | Presence of workers                | Favour hiring of local workers. | Throughout decommissioning phase  
  - Implementation: Contractor  
  - Monitoring: Owner’s Engineer | Foreign workers hired only when locals are not available and/or qualified. | 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. | Throughout decommissioning phase  
  - Implementation: Contractor  
  - Monitoring: Owner’s Engineer | No recruitment outside official offices. | Included in the decommissioning contract. |
| Safety and public health Gender aspects | Risk of increased incidences of STDs and HIV/AIDS                                      | Presence of workers                | Prepare and implement an 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. | Throughout decommissioning phase  
  - Implementation: Contractor  
  - Monitoring: Owner’s Engineer | HIV/AIDS prevention program developed and approved by Owner’s Engineer prior to beginning of decommissioning activities. | Included in the decommissioning contract. |
<table>
<thead>
<tr>
<th>Environmental and/or Social Components</th>
<th>Potential Impacts Addressed</th>
<th>Sources of Impact</th>
<th>Management Measure</th>
<th>Implementation Timing / Responsibilities</th>
<th>Performance Indicators</th>
<th>Costs</th>
</tr>
</thead>
</table>
| Safety and public health Gender aspects | Risk of increased incidences of 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. | Throughout decommissioning phase  
- Implementation: Contractor  
- Monitoring: Owner’s Engineer | 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 infract at beginning of employment.  
All communities sensitized on HIV/AIDS, other STDs, as well as on the grievance mechanism prior to beginning of any decommissioning works in their vicinity. | Included in the decommissioning contract. |
| Safety and public health Gender aspects | Risk of increased incidences of STDs and HIV/AIDS | Presence of workers | Screen health of potential employees as part of the recruitment process. | Throughout decommissioning phase  
- Implementation: Contractor  
- Monitoring: Owner’s Engineer | Health screenings implemented prior to hiring, and regularly during employment. | Included in the decommissioning contract. |
| 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. | Throughout decommissioning phase  
- Implementation: Contractor  
- Monitoring: Owner’s Engineer | 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. | Throughout decommissioning phase  
- Implementation: Contractor  
- Monitoring: Owner’s Engineer | 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 | Presence of workers | Require Contractor(s) to hire security workers to ensure the safety of workers and community members, as well as to prevent theft and vandalism. | Throughout decommissioning phase  
- Implementation: Contractor,  
Owner’s Engineer, and PIU | 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 sexual abuse by workers and especially child abuse | 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. | Throughout decommissioning phase  
- Implementation: Contractor,  
Owner’s Engineer, and PIU | Security guards on duty full time (24hrs) whenever camp is in operation. | Included in the decommissioning contract. |
| Safety and public health Gender aspects | 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. | Prior to beginning of decommissioning phase  
- Implementation: Contractor  
- Monitoring: Supervising Engineer | 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 conflicts)  
Tension with outside workers | Presence of workers  
Land access  
Resettlement  
Displacement of economic activities | Maintain the Stakeholder Engagement Plan | Throughout decommissioning phase  
- Implementation: Contractor,  
Owner’s Engineer, and PIU | 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 GHV action plan during decommissioning. | See action plan for details on responsibilities. | See action plan for details on monitoring. | Provision for the GHV 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. | Throughout decommissioning phase  
- Implementation: PIU | Signed land entry and exit agreement with traditional authorities. | 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. | Throughout decommissioning phase  
- Implementation: Contractor  
- Monitoring: Owner’s Engineer | Percentage of women employees. No wage inequalities. | Included in the decommissioning contract. |
4 INSTITUTIONAL FRAMEWORK AND ACTION PLANS

Responsibilities for the implementation and monitoring of elements in the Environmental and Social Management Plan (ESMP) are shared between various stakeholders, including relevant ministries, competent authorities, ZESCO, and its Contractors. This chapter also includes several action plans.

4.1 OVERALL ESMP MANAGEMENT DURING PREPARATION AND CONSTRUCTION PHASES

Figure 4-1 illustrates the proposed overall ESMP implementation structure at the pre-construction / construction phases.

Figure 4-1 Institutional Framework for ESMP Implementation, Pre-construction/Construction Phase

More details on the GRM focal points and the GBV Service Providers are provided in the Stakeholder Engagement Plan (SEP), Grievance Redress Mechanism (GRM), and Gender Based Violence (GBV) Action Plan (sections 4.4 to 4.6).
4.2 INSTITUTIONS IN CHARGE OF THE ESMP

The following sections detail the responsibilities of Project actors.

4.2.1 GOVERNMENT OF ZAMBIA AND PROJECT SPONSORS

The Government of Zambia oversees the Project’s high-level planning, financing, and implementation via the Ministry of Energy and Water Development and the Ministry of Finance.

Financial partners, for their part, also contribute to the Project’s high-level planning before financing its construction. Their environmental and social safeguards provide guidance regarding Project design and implementation mechanics to reduce and properly manage its environmental and social impacts.

4.2.2 PROJECT OWNER: ZESCO BOARD AND MANAGEMENT

As the Project owner, ZESCO will have ultimate responsibility for proper Project and ESMP implementation. Under the structure illustrated above, the roles attributed to its Board and Management are as follows:

— Be the interface between ZESCO and financial partners regarding environmental and social issues;
— Ensure applicable financial partner safeguard policies are implemented and respected, by analyzing Environmental and Social (E&S) monitoring reports received from the Project Implementation Unit (PIU), E&S Specialist, and other partners, and identifying gaps against financial partners’ safeguard policies;
— Ensure ESMP measures are included in bidding and contractual documents;
— Take ultimate technical decisions regarding environmental and social problems raised or observed by other Project stakeholders, if need be;
— Guide and support the top management and technical management regarding the Project’s environmental management;
— Ensure the environmental and social management process is working well and significant adverse and irreversible impacts are avoided where possible;
— Centralize all information and documentation regarding the Project’s E&S management.

4.2.3 PROJECT IMPLEMENTATION UNIT (PIU)

To allow for the Project preparation and implementation processes to be carried out effectively, it is proposed that a PIU be created. This organization should be created within ZESCO but be fully dedicated to the Project implementation. It should consist of a technical team to coordinate technical aspects of the Project implementation, a Health and Safety Coordinator that will develop and oversee the implementation of the Health and Safety Plan, and an environmental and social team that will oversee the ESMP (including the SEP and GRM) and RAP implementation, under authority of a PIU Coordinator. It is recommended that the terms of references for the abovementioned 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 at least one (1) year before the beginning of construction works. The PIU should be in place to monitor construction activities and associated impacts. It is anticipated that the PIU will need to be fully operational for the entire length of construction, after which a reduced team will monitor long-term Project impacts on communities and households. It is also proposed that the PIU have offices located in easily accessible communities to facilitate transport and contact with the local population and local authorities. The PIU coordinator 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 team will be composed of National Engineers and Experts, supervised by ZESCO’s Principal Project Engineers. Environmental and social staff will be composed of Experts from fields such as environment, ecology, agronomy, and sociology. Environmental specialists with experience implementing management plans and mitigation measures, supervising works, and conducting environmental monitoring (i.e., water quality and noise monitoring), and environmental audits will be required. Additionally, botanists or technicians from the Department of Forestry will be required to supervise works during ROW vegetation clearing to identify, and relocate if possible, species of conservation concern. Social specialists with experience in resettlement and the implementation of a grievance redress mechanism will also be required (see section 4.2.4). These Experts may come from ZESCO’s professional staff. The PIU’s environmental and social staff would act under the authority of ZESCO’s Principal Environment Officer.

The PIUs dedicated Health and Safety Coordinator will be identified at the onset of Project preparation. The Health and Safety Coordinator will be responsible for overseeing the development of a Health and Safety Plan that will outline the roles and responsibilities of all those who will be involved in the Project, or who will have access to the job site. The Health and Safety Plan will outline requirements to implement the plan, including necessary resources, training, equipment, and costs. The PIU, through the Health and Safety Coordinator, will be responsible for auditing activities throughout all stages of the Project to ensure they are completed according to the Health and Safety Plan and in line with ZESCO’s SHEQ Policy (Appendix 3-1).

The PIU’s environmental and social team would be responsible for monitoring the implementation of the ESMP and RAP during the pre-construction and construction phases. As such, it’s main responsibilities would include:

— pre-construction phase:
  ▪ Coordinate E&S aspects of Project procurement, inter alia inclusion of E&S aspects (ESMP & RAP, as well as the World Bank’s General Environmental Management Conditions for Construction Contracts) in Contractor(s) and Owner’s Engineer tender documents and contracts. The General Environmental Management Conditions for Construction Contracts can be found in Appendix 4-1;
  ▪ Coordinate population resettlement & compensation, as well as implementation of other RAP measures;
  ▪ Stakeholder engagement;
  ▪ Supervise the GRM.

— construction phase:
  ▪ Supervise proper implementation of ESMP & RAP when relevant during construction;
  ▪ Stakeholder engagement;
  ▪ Supervise the GRM and the GBV Action plan.

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.

The day to day implementation and supervision of both the RAP and ESMP will be conducted with help from the Owner’s Engineer (see below 4.1.5).
For the RAP, the responsibilities of the PIU Coordinator will include:

- Coordinating and managing the development and implementation of the resettlement plan;
- 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 the 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 complaints and suggestions system;
- 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) for the RAP implementation to appropriate government authorities, TANESCO, and the Contractor in charge of the line construction;
- 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 to be endorsed by the PAPs, the competent governmental authorities, and by the PIU.

Community and household fears regarding the non-payment of the claims are important and widespread. To reduce those fears, it is strongly recommended that the approval to begin construction of the transmission line be conditional to the submission of a satisfactory progress report from the PIU. This report must clearly establish, with the support of evidence, that compensation was paid, and that resettlement projects were successfully carried out prior to the initiation of the construction phase. The confirmation of the witness NGO for this report is essential.

Also, as a mitigation measure, the PIU should clearly identify a cut-off date for the verification survey, and for new compensation claims, disclose it well in advance to the PAPs and their Representatives, and provide PAPs with the necessary contact information and procedures to fill in their compensation claims prior to the cut-off date.

4.2.4 **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 provide independent advice and report on grievance management, GBV management, and resettlement management.

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 implement the GRM and GBV Action Plan on the field and provide comments and recommendations. Project rightsholders will be informed of their role and functions and will require access to Representatives, in a confidential manner if need be, to explain and discuss their difficulties or grievances and receive assistance to present them.

### 4.2.5 SUPERVISING ENGINEER

The Supervising Engineer’s role is to represent ZESCO to monitor proper Project implementation. As such, the Supervising Engineer will monitor proper implementation of the Project’s technical, environmental, and social aspects. Generally, his 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 SHS topics.

The Supervising Engineer will appoint qualified environmental and social specialists (see section 4.2.3) who will be responsible for the following main tasks:

- **Prior to initiation of construction:**
  - Verification and approval of Lead Contractor’s candidates as Environmental Specialists, based on their qualifications;
  - Verification and approval of the detailed ESMP and RAP implementation plans during the Project construction phase, for elements under the Contractor’s control (C - ESMP) to be prepared by the Contractors’ Environmental Specialists;
  - Verification and approval of the Contractors’ various management plans (e.g., waste management plan and workers GRM);
  - Verification and approval of training provided to the Contractors’ and Subcontractors’ staff;
  - Review of Contractors’ C - ESMP to ensure environmental and social risks are assessed and mitigation measures are put in place before activities commence;
  - Contribute to the development of the Health and Safety Plan.

- **During construction:**
  - Review of Contractors’ C - ESMP to ensure environmental and social risks are assessed and mitigation measures are put in place before activities commence;
  - Monitor adequate implementation of the C - ESMP by the Contractors and Subcontractors, with systematic audit controls;
  - Control the quality and quantity of E&S reports produced by the Contractors;
  - Monitor ongoing Project’s environmental and social impacts and the GRM;
  - Oversee communication by the Contractor against the C - ESMP, and control the way in which the Contractor manages complaints issued by the public through the GRM;
  - Participate in the GBV Action Plan;
  - Implement a Stakeholder Engagement Plan;
  - Oversee implementation of the Health and Safety Plan;
- Produce biweekly E&S monitoring reports for the PIU, including:
  - analysis of Contractors’ environmental management reports;
  - results of the surveillance of complaints and critical incidents and accidents handled by the Contractor;
  - complaints handled directly;
  - level of implementation of the Project’s ESMP, worksite ESMP, and observed deviations;
  - identify unanticipated impacts (not identified in the ESMP);
  - results of the controls implemented regarding the communication and awareness activities carried out and planned by the Contractor.
- Oversee complaints issued by the Contractor;
- When necessary, take decisions concerning the implementation of the C - ESMP.

The Supervising Engineer’s assignment should come to an end at the end of the Project’s pre-construction and construction phases.

4.2.6 CONTRACTORS

Several Contractors will be selected, two for the line (working in different areas) and one for the Nakonde substation, an associated facility to the ZTIP Project to be built as part of the ICBC Project. In addition, land preparation (e.g., clearing of trees, leveling, etc.) may require an additional Contractor.

Each Contractor shall appoint qualified Environmental Specialists prior to work (as part of the tender process). After approval of their qualifications, the Contractor’s Environmental 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 them in their C - ESMP. As such, their main tasks would be the following:

- Prior to initiation of construction:
  - Preparation of the C - ESMP for elements under the Contractors’ control to be submitted to the Supervising Engineer and PIU within a short timeframe before commencing physical work;
  - Preparation of all plans and policies required by the ESMP including the Code of Conduct and the SEP;
  - Training of relevant Contractor and Subcontractor staff on C - ESMP to ensure integration in general planning of works including induction training on the Code of Conduct.

- During construction:
  - Measurement of environmental and social parameters listed in section 6.1 on worksites. Those measurements are to be done before, during, and after completion of works at a given site to assess efficiency of mitigation measures;
  - Ensure permanent field E&S surveillance of construction works conducted by the Contractor and Subcontractors;
  - Environmental management of the worksites and monitoring of works, particularly with respect to C - ESMP implementation by foremen and workers;
  - Produce weekly E&S reports to the Supervising Engineer detailing the state of C - ESMP implementation;
  - Declare accidents, incidents, and events that may affect the quality of the environment and/or the human environment;
Answer, and take necessary actions regarding complaints by the affected population including infringement to the Code of Conduct (when the complaint is related to the Contractor);

Participate in the GBV Action Plan;

Implement a Stakeholder Engagement Plan and 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.

The Contractors should also appoint dedicated health & safety staff who would be responsible for the application of health and safety obligations and reporting on H&S issues. All applicable national health & safety regulations, as well as ZESCO SHEQ policy (see Appendix 3-1) and standards, will have to be respected. In the absence of specific rules, it is suggested to use, where appropriate, the WHO or World Bank standards.

The Contractors must hold all necessary licenses and permits before the work begins. It will befall on them 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.

The Contractors’ contracts should end at the end of the Project’s pre-construction and construction phases.

### 4.3 OPERATION PHASE

As Project Owner and Operator, ZESCO should be the only body directly concerned with ESMP implementation at the Project’s operation phase.

ZESCO will therefore be responsible for following through with, and implementing all, mitigation and monitoring measures provided in the ESMP for that phase.

### 4.4 FRAMEWORK OF THE STAKEHOLDER ENGAGEMENT PLAN

#### 4.4.1 INTRODUCTION

A SEP is a communication plan that details how communication with communities, workers, and stakeholders will be conducted both in terms of information disclosure and in terms of communication. It is a dynamic document, to be maintained and adjusted to achieve goals. Since it involves several actors, it is important to design and agree upon the approach to engagement.

The SEP objectives are as follow:

- Enhance social acceptability of the Project;
- Ensure meaningful and inclusive communication is undertaken throughout the Project life cycle with affected communities, stakeholders, and workers;
- Communicate on issues that could potentially affect communities;
- Ensure relevant environmental and social information is disclosed and disseminated.

This framework needs to be completed and adapted by the PIU, the construction Contractors, and Supervising Engineer to become operational.
The framework provides room for adaptation based on site realities, constraints, and discussions with stakeholders. It provides sufficient detail to allow measures to be covenanted in the contract agreement and to ensure the construction Contractors and Supervising Engineer comply with WB requirements, and to ensure they understand the issues at hand. All Contractors and the Supervising Engineer will need to adapt, implement, and maintain a SEP based on the following definitions:

─ Adapting means to adjust the framework of the action plan into an operational document based on site realities, exchanges with surrounding communities, discussions with the PIU, and on Project features. This adaptation needs to be reflected and included in the C - ESMP;

─ Implement means to carry out the described activities and ensure they are efficient in attaining the SEP objectives;

─ Maintain means to ensure continuous improvement of the SEP by monitoring its performances, since the SEP is a dynamic document. It also means to manage changes and to regularly review the action plan. Lastly, maintaining it also means providing dedicated resources for the Project life span.

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

─ the Terms of Reference (ToR);

─ financial and technical proposals;

─ contract agreements.

Since each Project Actor will need to design his own approach to engagement, this framework is divided in two sections: one section designated for ZESCO PIU and one section designated for the construction Contractors and the Supervising Engineer. They are discussed further below.

### 4.4.2 SEP FOR ZESCO PROJECT IMPLEMENTATION UNIT (PIU)

This Framework of SEP is designed for the PIU and covers both Project preparation and construction. If the PIU already has a SEP, this framework can be used to modify it to reflect the requirements of the World Bank.

### 4.4.2.1 ACTIVITIES

The PIU shall carry out the following activities early in the Project:

─ Define clear roles and responsibilities, and designate specific personnel to be responsible for the implementation and monitoring of stakeholder engagement activities;

─ Present previous stakeholder engagement activities (tracking previous activities);

─ Identify and analyze stakeholders;

─ Plan how the engagement with stakeholders will take place and how grievances will be dealt with;

─ Outline a process for disclosure of information;

─ Consult with stakeholders;

─ Monitoring and reporting.

If some of these activities are already conducted as part of the PIU’s regular activities, they need to be upgraded to comply with the following requirements.
The PIU will have to design, implement, and maintain a SEP for its activities based on this framework. The SEP shall include a separate section for each of the following activities.

**DEFINE CLEAR ROLES, RESPONSIBILITIES, AND DESIGNATE SPECIFIC PERSONNEL**

The first activity to be conducted by ZESCO is to define the roles and responsibilities of specific personnel within the PIU to carry out the SEP, and in fact, the overall management of Environmental, Social, Health and Safety (ESHS) issues related to the Project.

Implementation of a SEP requires capacity and human resources, it can be undertaken by an existing specialist at ZESCO, however it is always recommended that this specialist be on site close to the Project area instead of in Lusaka or Ndola. This may require funds and time to ensure communication is efficient.

**PRESENTATION OF PREVIOUS STAKEHOLDER ENGAGEMENT ACTIVITIES**

Since the Project is currently taking place and some engagement activities may have already been carried out, it is important that ZESCO provides, in the SEP, a summary of past communication activities conducted in the framework of the Project, including past grievances redress mechanism, communication with Chiefs, etc. Minutes of meetings are to be presented in this section as well as consultation outcomes (decisions, activities).

**STAKEHOLDER IDENTIFICATION AND ANALYSIS**

Stakeholder identification and analysis shall be an ongoing activity. In the framework of this current ESIA and ESMP, ZESCO and the Consultant have identified and described the different stakeholders, including Project affected parties and other interested parties and vulnerable groups. However, this activity is to be continuously undertaken and must go beyond the Consultant’s mandate.

**PLANNING HOW ENGAGEMENT WILL TAKE PLACE AND HOW GRIEVANCES WILL BE DEALT WITH**

The SEP shall describe the method used to encourage participation in consultations, and how the views of differently affected groups will be captured, including vulnerable people and women.

Since stakeholder engagement with local individuals and communities depends substantially on community Representatives like village headmen and Chiefs, ZESCO will make reasonable efforts to ensure views of individuals are accurately transmitted at a grassroot level.

The SEP needs to be composed of several components tailored for each stage of the Project from the preparation to the operation.

The SEP should also be adjusted depending on the different target groups and their interests. As such, there should be three components in the SEP, including:

- an overarching SEP;
- a SEP for the community and local authorities;
- a SEP for internal stakeholders.

Each of the above-mentioned SEPs should adopt a different approach and be adapted to the appropriate stage of the Program (i.e., planning, construction, or operations).

The three components of the SEP are illustrated in Figure 4-2.
The **Overarching SEP**. This SEP details the broad communication principles that apply for all stakeholders and outlines ZESCO’s (the implementing agency) commitments regarding development of the ESMP, the means of communication and the type of disclosure of E&S performances and the calendar of activities. The following requirements relate to the Overarching SEP:

- This document needs to briefly present key E&S activities;
- This document is to be disclosed to all relevant stakeholders;
- This document is to be updated on a regular basis.

The **SEP for the community and local leaders** consists of external engagement through community consultations and a participation process for meaningful involvement of the communities in the Project. Local leaders include both TAs and DCs.

The **SEP for internal stakeholders**: internal engagement should be done through regular meetings with the involved governmental agencies, SAPP and the lenders. Internal engagement also aims at enhancing synergy between governmental stakeholders. Internal engagement will require regular meetings with the involved governmental agencies. This will particularly be meaningful since the Project is a transboundary project.

The SEP needs to be tailored for each stage of the Project (e.g., planning, construction, and operation) as shown in Figure 4-3.

- **Planning stage**: the SEP will deal with issues related to land use and access (e.g., land pre-entry and exit procedures and agreements with landowners and users for the commencement of construction activities and during maintenance, disclosing work calendar in each community), negotiation on compensation with Project Affected Persons (PAPs), community consultation and approval, etc. It should provide adapted information for each type of stakeholder. ZESCO shall manage this SEP.

- **Construction stage**: the SEP which deals specifically with construction related issues such as safety of communities and workers, monitoring of E&S performance of contractors, work surveillance, advancement of work, etc. All actors are responsible for having their own SEP: ZESCO, Contractors, and the Supervising Engineer.

- **Operation stage** deals with the operation of the Project, the economic performances, etc. ZESCO shall manage this SEP.
During project planning (preparation), the SEP shall be accompanied by a GRM which will be focused on resettlement activities. GRM will allow communities and stakeholders to communicate with Project Actors about their opinions, grievances, fears and their questions. It shall be publicly advertised and transparent. The framework for the GRM is presented in this ESMP.

During project construction, the Contractors and the Supervising Engineer will have their own SEP that will follow the same framework and will include a GRM. The framework of the GRM and SEP for the construction Contractors and Supervising Engineers are presented in separate sections.

**DISCLOSURE OF PROJECT INFORMATION**

The SEP shall provide a strategy for disclosure of information detailing the type of information that will be disclosed and the targeted stakeholders.

ZESCO will disclose Project information through the SEP to allow stakeholders to understand the risks and impacts of the Project and potential opportunities. ZESCO will provide stakeholders with access to the following information:

- The purpose, nature, and scale of the Project and its activities;
- The duration of proposed Project activities;

**Figure 4-3** SEP for each Stage and Project Actors
— Potential risks and impacts of the Project on local communities, and proposals for mitigating these risks and impacts especially those that might disproportionately affect vulnerable and disadvantaged groups, and describing the differentiated measures taken to avoid and reduce impacts;
— The proposed stakeholder engagement process highlighting the ways in which stakeholders can participate;
— The time and venue of proposed public consultation meetings, and the process by which meetings will be notified, summarized, and reported;
— The process and means by which grievances can be raised and will be addressed.

CONSULTATION WITH STAKEHOLDERS

The SEP shall include a clear communication strategy detailing the frequency of meetings and the means of communication.

Stakeholder engagement shall be accompanied by regular consultations and meetings with the community.

Each consultation with stakeholders will be completed in a meaningful way that provides stakeholders with opportunities to express their views on Project risks, impacts, and mitigation measures, and allows ZESCO to consider and respond to them. Meaningful consultation means:

— consultation begins early in the Project planning process to gather initial views on the Project proposal and inform Project design;
— encouraged stakeholder feedback, particularly as a way of informing Project design and engagement by stakeholders in the identification and mitigation of environmental and social risks and impacts;
— continuous and ongoing identification of risks and impacts as they arise;
— prior disclosure and dissemination of relevant, transparent, objective, meaningful, and easily accessible information in a timeframe that enables consultations with stakeholders in a culturally appropriate format understandable to all stakeholders;
— considers and responds to feedback;
— supports active and inclusive engagement with Project-Affected Persons (PAPs);
— is free of external manipulation, interference, coercion, discrimination, and intimidation;
— ZESCO shall maintain, and disclose, documented records of stakeholder engagement (such as minutes of meetings).

As part of this mandate, communication has begun to establish the basis for stakeholder engagement. This approach is to be maintained throughout the Project life span.

MONITORING AND REPORTING

Based on the requirements and procedures presented, and monitoring, ZESCO will write, implement, and regularly update the SEP. The following are performance indicators to monitor, and reports to develop and include in this action plan.

MONITORING

The following are performance indicators to monitor:

— Number of meetings held with internal and external stakeholders;
— Number of recorded external grievances from PAPs and stakeholders, the number of responses provided to stakeholders, and number of grievances addressed.
REPORTING

ZESCO shall write, implement, and regularly update the SEP and GRM to reflect the following:

- Overarching SEP Policy;
- SEP and GRM for external communication including the maintenance of a database of grievances and responses to these;
- SEP for internal communication.

ZESCO will document the outcomes of meetings with communities in reports (e.g., minutes, memo, etc.).

The SEP’s, and its GRM’s, core principle is that all communications and decisions derived from meetings and community consultations be documented and recorded. Therefore, a SEP and GRM must be:

- associated with regular reports disclosed to relevant stakeholders. Reporting and disclosure of results and advancement of works shall be adapted for each type of audience and stage. Regular E&S reports disclosing all relevant information on E&S performances and other topics are necessary as part of the SEP;
- Associated with E&S objectives of continuous improvement;
- Integrated in an Environmental and Social Management System (ESMS).

4.4.3 SEP FOR THE CONSTRUCTION CONTRACTORS AND THE SUPERVISING ENGINEER

This SEP Framework is aimed at the construction Contractors and the Supervising Engineer since they have the greatest day to-day presence on the ground, it is a SEP tailored for the construction phase.

The following activities shall be covenanted in the bidding documents for the construction Contractors and the Supervising Engineer.

STAKEHOLDER MAPPING

Upon on-site mobilization, the construction Contractors, with the help of the PIU, shall carry out stakeholder mapping to identify and describe:

- Project affected communities;
- vulnerable groups;
- traditional authorities such as village headmen and Chiefs;
- district-level agencies, their roles, and responsibilities;
- NGOs and their work in the study area;
- other programs or projects in the study area that may interact with the Project.

This activity shall be accompanied by courtesy visits to identified stakeholders to present the Contractors and the Supervising Engineer.
SEP

Each construction Contractor and the Supervising Engineer will have to adapt, implement, and maintain the following SEP framework. The SEP should be adjusted depending on the different target groups and their interests. As such, the SEP will be made of three components, each with an appropriate approach, outlined as follows:

1 An Overarching SEP which details the overall communication principles that apply for all stakeholders and states the Contractors/Supervising Engineer E&S Policy and its commitments, presents the C-ESMP, the means of communication and the type of disclosure of E&S performance, the calendar of activities, and details the performance objectives. The overarching SEP shall present the chain of responsibilities regarding E&S issues (e.g., communication, monitoring, and reporting). The overarching SEP document must be disclosed to all stakeholders and will be regularly updated.

2 SEP for affected communities and local authorities, which consist of external engagement. This SEP shall detail the communication strategy of the Contractors/Supervising Engineer with affected communities. It should detail how the Contractors/Supervising Engineer intend to undertake the following activities:
   a Participating in the GRM and taking part in GBV Resolution Mechanism (see GBV Action Plan). GRM will allow affected communities and stakeholders to communicate with the Contractors and Supervising Engineer about their opinions, grievances, concerns, and questions. The GRM will be accompanied by regular community participatory meetings to discuss grievances and to allow communities to express themselves. The Contractor’s E&S Specialists will meet with the GRM focal point on a weekly basis to collect written grievances and record them in a database and provide responses in reasonable and timely manner. A registry of frequently asked questions and answers will be made available at the office of the supervising engineer and construction contractor.
   b Participating at regular meetings with external stakeholders such as NGOs and traditional authorities.
   c Participating to regular meetings with affected communities. The “Informed Consultation and Participation” approach is recommended to build and maintain constructive relationships with communities. To that end, contractors shall have a transparent approach and shall disclose relevant information about their E&S performance and Project related risks. Also, the Contractors and Supervising Engineer shall document the minutes of meetings with communities which shall include the summary of main points and concerns raised by stakeholders and how these were considered.
   d Disclosing regular E&S reports with all relevant information on E&S performances.

3 SEP for internal stakeholders: internal engagement should be done through regular meetings with the involved governmental agencies at district and national levels, workers, and the lenders. Internal engagement also aims at enhancing synergy between governmental stakeholders.

For each component of the SEP, an engagement approach needs to be designed by the Contractors and Supervising Engineer detailing:
   ─ the list of stakeholders (based on stakeholder mapping);
   ─ frequency of consultations;
   ─ how stakeholders will be notified for upcoming meetings;
   ─ the method of communication and venue;
   ─ the list of documents and reports that will be disclosed;
   ─ the resources required to animate consultations;
   ─ how minutes will be written, recorded, and disclosed;
   ─ how grievances will be addressed (i.e., the time frame for addressing grievances and questions);
how coordination with governmental agencies (such as ZEMA) and ZESCO’s PIU will be ensured when it comes to addressing grievances that are out of the scope of the Contractors/Supervising Engineer.

The PIU shall assist the construction Contractors and the Supervising Engineer in designing the engagement approach and in organizing and animating meetings with affected communities. In cases where the PIU assists the Contractors and Supervising Engineer in communication and meetings, the Contractors and Supervising Engineer are still required to provide minutes of the discussion.

**MONITORING AND REPORTING**

**MONITORING**

The main performance indicator to monitor the construction Contractors and the Supervising Engineer are the number of meetings held with internal and external stakeholders.

**REPORTING**

Based on the requirements presented above and monitoring, the construction Contractors and the Supervising Engineer shall write and regularly update the SEP for the construction phase with the following sections:

- Report on stakeholder mapping describing stakeholders and their interests in the Project;
- Overarching SEP;
- SEP for external communication;
- SEP for internal communication.

In addition, the construction Contractors and Supervising Engineer will document the outcomes of meetings with communities in their E&S reports (e.g., minutes, memos, etc.).

The SEP core principle is that all communications and decisions made during meetings and community consultations be documented. Therefore, the SEP must be:

- associated with regular reports and disclosed to relevant stakeholders. Reporting and disclosure of E&S performances will be adapted for each type of audience and shall present monitoring results of all action plans;
- associated with E&S objectives of continuous improvement. Therefore, the SEP shall be regularly updated as the Project progresses, and new stakeholders are identified along the transmission line.

**RECOMMENDATIONS FOR COMMUNICATION**

It is important for both the Contractor and the Supervising Engineer to ensure proper social engagement at grassroots level at the onset of the Project. Engagement will be aim at all levels (e.g., community level), not only at Chief level, as interests of traditional authorities are sometimes different from those of community members.

It is important for the Contractors to clearly delineate their involvement and roles (and liability) so they do not get drawn into unmanageable grievances. The SEP shall be clear on the contractors’ responsibilities in addressing grievances and resolving issues. In many instances, they shall defer grievances to the PIU or the Government and shall liaise with them to convey grievances.

Communication with the local community should be in the language that they understand, expressed through meetings, one on one interactions, and written responses to their grievances.

The Contractor and Supervising Engineer shall invest time in several meetings at inception as it is the key period to engage in communication. All risks will be flagged and communicated early, especially as they relate to safety risks associated with construction sites.
4.5 FRAMEWORK OF THE GRIEVANCE REDRESS MECHANISM

4.5.1 INTRODUCTION

The GRM mechanism allows for record keeping and the tracking of comments and grievances from affected communities. The objective of the GRM is to ensure grievances from communities and external stakeholders are responded to and managed appropriately.

This framework must be understood by the construction Contractors and Supervising Engineer who will take active part in the management of grievances. This framework must be provided to the focal point in charge of the GRM as they will be responsible for collecting grievances.

The framework provides room for adaptation based on site realities, constraints, and discussions with stakeholders. It provides sufficient detail to allow for measure to be covenanted in the contract agreement and to ensure the construction Contractors, Supervising Engineer, and GRM focal point comply with WB requirements and understand the issues at stake.

The framework of this action plan will be covenanted in various binding documents of the construction Contractors, Supervising Engineer, and the GRM focal point, including:

- the Terms of Reference (ToR);
- financial and technical proposals;
- contract agreements.

As stated in section 3.1 above, the GRM will be applicable to the Project as well as to the ICBC Project so as to reduce cumulative impacts arising from successive implementation of those two projects.

4.5.2 ACTORS AND ACTIVITIES

GRM activities involve several actors, each with specific roles depending on the different phases of the Project and each revolving around a central actor: the GRM focal points shall be maintained throughout Project preparation and construction phases.

<table>
<thead>
<tr>
<th>Project preparation</th>
<th>Project construction</th>
</tr>
</thead>
<tbody>
<tr>
<td>Consultant hired by the implementing agency (ZESCO)</td>
<td>Project implementation unit of the implementing agency</td>
</tr>
<tr>
<td>Project implementation unit of the implementing agency</td>
<td>Construction Contractors</td>
</tr>
<tr>
<td>Procurement Specialist of the implementing agency</td>
<td>Supervising Engineer</td>
</tr>
<tr>
<td>Bidders</td>
<td>GRM focal point</td>
</tr>
<tr>
<td>NGO involved in the RAP (if any)</td>
<td>Community Based Champions</td>
</tr>
<tr>
<td>GRM focal point</td>
<td>GBV service provider</td>
</tr>
<tr>
<td>Community Based Champions</td>
<td>Village headmen</td>
</tr>
</tbody>
</table>

Figure 4-4 GRM Activities during Project Preparation and Project Construction
The GRM covers both Project preparation and construction as shown in Figure 4-5 (because these two phases bear most social risks), however, key points are outlined below for clarity:

— Double arrows represent a two-way process of communication where answers must be provided for all grievances;
— The PIU can always take part in collection of grievances with stakeholders as their regular activities;
— The GRM focal point is the central actor in the process, and composition and roles of the focal point are described below, all grievances from communities and stakeholders are conveyed to her/him;
— If required, a GBV Service Provider is to be hired in cases of GBV, its composition and roles are described in the GBV Action Plan;
— During Project preparation, the GRM focal point may convey grievances to several Project actors:
  ▪ The PIU, since many decisions regarding compensation and resettlement will be taken by the PIU;
  ▪ The RAP Consultant and/or the NGO in charge of compensation distribution and implementation of the RAP (if any);
  ▪ Village headmen for conflict resolution.
— During Project construction, the GRM focal point may convey grievances to several Project actors, specifically:
  ▪ the PIU;
  ▪ the Supervising Engineer;
  ▪ the construction Contractors. Contractors have, in turn, a role to play in the Workers’ GRM which is a dedicated mechanism for all workers;
  ▪ Village headmen for conflict resolution.
Figure 4-5  Overall Presentation of the GRM
4.5.2.1 PROJECT PREPARATION

This part of the GRM concerns the RAP since it is the most impacting Project preparation.

Table 4-2 presents the responsibilities of each GRM actor. Activities revolve around the involvement of GRM focal points, one for each district.

These GRM focal points are the center points to deal with grievances and shall involve community-based Champions that are well respected Representatives of the concerned area. Examples of members can include religious figures, leaders of women associations, teachers, etc. GRM focal points are better suited for large projects rather than the customary way of dealing with grievances. The rationale for the focal point is presented in chapter 6 of the ESIA. Nonetheless, meetings with stakeholders have highlighted that there is always a need to involve village headmen in the grievance redress mechanism (for conflict resolution) as shown in Figure 4-4.

Depending on the way resettlement is handled, it will be important to implement GRM focal points in each district so that people do not need to travel long distances to convey their grievances.

Figure 4-4 shows the overall GRM procedure for Project preparation. When a PAP lodges a complaint to the GRM focal point, the focal point must:

- explain the GRM to the PAP;
- document the complaint. The focal point should have a template form to complete where questions can be posed, or grievances or complaints can be documented. However, return of experience has shown that most grievances are verbally transmitted or written on pieces of paper, therefore, the GRM must be flexible (e.g., submissions in person, by phone, or text message). The focal point will transcribe grievances and record them in a database and communicate responses in a reasonable and timely manner. A registry of frequently asked questions and answers shall be made available at the office of the PIU and in a community venue (e.g., district office, etc.). The GRM focal point shall have an “open house” attitude;
- ask the PAPs if they wish to remain anonymous. In the case that they wish to remain anonymous, the phone number, name, and identification information must not be transmitted. This is particularly relevant if the complaint relates to GBV (see GBV Action Plan);
- meet with the concerned party which can be the PIU, the Consultant in charge of RAP implementation, or the village headman (or all of them) to discuss possible responses and actions. An answer is then provided to the complainant. If the answer requires a specific activity or decision, such as reevaluating assets or compensation, the complainant will have to accept or reject the proposed activity or decision. In cases of land disputes, the GRM focal point must arrange for negotiations between complainants and involve traditional authorities. As a last resort, the focal point must provide guidance on available legal remedies for ownership claims and claims on asset evaluation.
- Close the case once a decision has been made and keep records of such decisions.

The GRM and the focal point shall be presented to communities and traditional authorities during a dedicated public consultation as part of the RAP process.

To avoid being overloaded with general grievances, it is recommended that a registry of frequently asked questions and answers be developed by the PIU early in the process of resettlement. This registry shall include general information on the Project, such as:

- detailed Project schedule, including start of work, method of construction, resettlement schedule and details such as eligibility criteria, compensation, and assistance package;
- photographs of typical pylons and worksites;
- decisions regarding the use of the wayleave by communities and the presentation of activities allowed and forbidden under the transmission line.
### Table 4-1 GRM Actors during Project Preparation

<table>
<thead>
<tr>
<th>Project Actors</th>
<th>Responsibility Regarding this Action Plan</th>
</tr>
</thead>
<tbody>
<tr>
<td>Consultant hired by the implementing agency to produce the E&amp;S safeguard instrument (ESIA, RAP, and ESMP)</td>
<td>The Consultant has, during the development of the SEP and the GRM, met with affected communities at several occasions during the ESIA and RAP preliminary stages. Communities’ grievances were noted and the feasibility of implementing along the transmission line GRM focal point assessed. The Consultant is the author of the GRM framework which is based on international best practices and was designed in close collaboration with local stakeholders.</td>
</tr>
<tr>
<td>Project implementation unit (PIU) of the implementing agency (ZESCO)</td>
<td>The PIU has the responsibility to oversee the GRM and assist the various Project actors during meetings with the communities. In many cases, the PIU must provide answers to grievances and shall have a staff dedicated to record all answers and decisions. Any action to undertake during Project preparation must be done by the PIU. The PIU has the overall responsibility to ensure compliance of the GRM and to enforce it, especially during resettlement. The PIU must communicate with Project stakeholders including the lenders.</td>
</tr>
<tr>
<td>Procurement Specialist of the implementing agency (ZESCO)</td>
<td>The procurement Specialist has the responsibility to convey GRM information in legal terms into the various bidding and contractual documents. He has the responsibility to include financial leverage in case of non-compliances.</td>
</tr>
<tr>
<td>NGO involved in the RAP</td>
<td>NGOs usually have the responsibility of implementing RAP measures such as compensation distribution, and signed agreements. They should be in charge of monitoring GRM efficiency as well. If no NGOs are hired for these tasks, the PIU will carry them out.</td>
</tr>
<tr>
<td>GRM focal point (one per district)</td>
<td>The GRM focal points manage the GRM and have the responsibility to collect and manage grievances and conflicts and keep an updated database of grievances during Project preparation, including grievances regarding resettlement and compensations. In case of conflicts related to claims of land ownership, the GRM focal point shall liaise with village headmen which are in charge of reaching agreements between claimants. GRM focal points have the responsibility to implement their activities in a transparent and inclusive way, free from coercion. They must avoid all forms of elite capture. They are accountable to the PIU.</td>
</tr>
<tr>
<td>Community Based Champions</td>
<td>Community Based Champions are well respected members of the community that can be selected by the PIU to become informants for the GRM focal point or the GBV Service Provider. They must receive training on the GRM.</td>
</tr>
<tr>
<td>Village headmen</td>
<td>Conflicts related to claims of land ownership shall be handled by village headmen and Chiefs which are in charge of reaching agreements between claimants. Village headmen shall also be involved in communication with GRM focal point and shall be consulted to find concerted solutions to land conflicts.</td>
</tr>
</tbody>
</table>

### 4.5.2.2 PROJECT CONSTRUCTION

According to the Final Feasibility Study (Aecom, 2017), the transmission line will take 3 years to build. Two Contractors will be selected for construction. In addition, land preparation (e.g., clearing of trees, leveling, etc.) will require an additional Contractor. The GRM concerns all Contractors that will be involved in the Project construction.

Table 4-2 presents the responsibility of each GRM actor. Activities revolve around the ongoing involvement of the GRM focal point and the involvement of a GBV Service Provider whenever necessary. This Service Provider is presented in the GBV action plan in the next section.
During construction, a specific workers’ GRM is to be implemented by all Contractors. The Workers’ GRM shall follow the following procedures:

- Each Contractor shall have a grievance box accessible to all workers;
- When a worker wants to lodge a complaint, the dedicated staff (the Contractor’s ESHS Specialist) must:
  - explain the mechanism to the worker;
  - write down the complaint with the worker;
  - ask the worker if she/he wishes to remain anonymous, in which case the phone number, name, and identification information must not be transmitted;
  - meet with the concerned party which can be the PIU, management of the Contractor or the Supervising Engineer to discuss about possible answers and actions. An answer is then provided to the complainant. As a last resort, the Contractor’s ESHS Specialist must provide guidance on available legal remedies.

The Contractor’s ESHS Specialist closes the case when a decision is taken and must keep records of all decisions.

If the worker is afraid of retaliation from the employer, they need to be aware that they can meet with the Supervising Engineer or the GRM focal point.

The worker’s GRM, the Contractor’s ESHS Specialist, the Supervising Engineer, and the GRM focal point shall be presented to workers upon hiring.

<table>
<thead>
<tr>
<th>Table 4-2 GRM Actors during Construction</th>
</tr>
</thead>
<tbody>
<tr>
<td>Project Actors</td>
</tr>
<tr>
<td>Project implementation unit (PIU) of the implementing agency (ZESCO)</td>
</tr>
<tr>
<td>Construction Contractors</td>
</tr>
</tbody>
</table>
### Project Actors and Responsibility Regarding this Action Plan

<table>
<thead>
<tr>
<th>Project Actors</th>
<th>Responsibility Regarding this Action Plan</th>
</tr>
</thead>
<tbody>
<tr>
<td>Supervising Engineer</td>
<td>The Supervising Engineer has the responsibility to supervise and monitor all Contractors’ activities including those that are required in this ESMP, the C-ESMP, and contractual documents. His role regarding the GRM is to participate whenever there are community meetings, follow up on the GRM with the Contractors and GRM focal point, and GBV Service Provider. If a worker is afraid of retaliation, the Supervising Engineer will meet with the worker and take note of the grievances, for this purpose, the Supervising Engineer must have an open house attitude toward Contractors’ workers. The Supervising Engineer must collaborate with the GRM focal point to make sure that all important grievances are conveyed to them, in case of GBV, the Supervising Engineer has the responsibility of contacting the PIU, this role is further described in the GBV Action Plan.</td>
</tr>
<tr>
<td>GRM focal point</td>
<td>GRM focal points have the responsibility to implement the GRM and work in a transparent and inclusive way, free from coercion. They are accountable to the PIU and the Supervising Engineer. They must be trained on the GRM. It is recommended that the same focal points that were implemented during Project preparation be maintained to widen grievances to all situations related to construction activities (e.g., nuisances, workers' behaviors, GBV, etc.).</td>
</tr>
<tr>
<td>GBV Service Provider</td>
<td>The role of the GBV Service Provider is to deal with any GBV complaints and organize GBV Resolution Mechanisms and take part in the GVB Action Plan. The GBV Service Provider does not necessarily need to be a medical center or a OSC but needs to bring the victims to the clinic or OSC in severe cases of GBV and need to be experienced in providing support to victims.</td>
</tr>
<tr>
<td>Community Based Champions</td>
<td>Community Based Champions are well respected members of the community that can be selected to become informants for the GRM focal point or the GBV Service Provider. They must be trained on the GRM.</td>
</tr>
<tr>
<td>Village headmen</td>
<td>Village headmen shall be consulted whenever necessary to solve local affairs.</td>
</tr>
</tbody>
</table>

### 4.5.3 MONITORING AND REPORTING

#### 4.5.3.1 MONITORING

GRM monitoring during preparation is to be done by the NGO involved in the RAP (or the PIU).

GRM monitoring during construction is to be done by the Supervising Engineer.

Monitoring of the Workers’ GRM is to be done by both the Contractors and the Supervising Engineer.

The following are performance indicators to monitor for both the preparation and construction phases:

- Number of recorded external grievances (communities), number of answers provided to stakeholders, and number of cases solved;
- Number of grievances deferred to the PIU or the Government.

#### 4.5.3.2 REPORTING

The NGO involved in the RAP (or the PIU) must regularly report the performances of the GRM during Project preparation (mainly during the resettlement procedure).
The Supervising Engineer and Contractors must regularly report (as part of the E&S reports) the performances of the GRM during Project construction.

### 4.5.4 CAPACITY BUILDING

It is recommended that implementation of the GRM be managed by a focal point in each district and be assisted by Community based Champions made of local well-respected members of the community. However, they may not be accustomed to a formal GRM where grievances need to be recorded in a database and where procedures need to be put in place. For this purpose, it is important that capacity building be provided for the focal point and that basic funds be allocated for its proper functioning (transportation and fuel).

### 4.6 FRAMEWORK OF THE GBV ACTION PLAN

#### 4.6.1 INTRODUCTION

The two main objectives of this GBV action plan are to implement measures to prevent project-related GBV and measures to address any situations related to GBV.

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 victim 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 OSC) as presented in the ESIA. These must be familiar with working with gender issues to benefit from their return of experience;
- Be evidenced-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 construction Contractors and Supervising Engineer who will take active part in the GBV management. This framework must be provided to the GBV Service Provider as he will be in charge of addressing complaints related to GBV.

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

There is significant synergy 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.

4.6.2 ACTORS AND ACTIVITIES

GBV preventive and corrective measures and activities involve several actors, each acting in the different phases of the Project.

The ESIA has recommended several measures, each are 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 (the SEP is presented in a separate action plan);
- Code of conduct for all workers (formal, informal, and those from Subcontractors, such as security personnel, etc.);
- Awareness program for all workers and community members;
- Measures against child labor;
- Corrective measures: involvement of a GBV Service Provider.
4.6.2.1 PROJECT PREPARATION

Table 4-3 presents the responsibilities of each actor.

Table 4-3 GBV Action Plan Actors during Project Preparation

<table>
<thead>
<tr>
<th>Project Actors</th>
<th>Responsibility Regarding this Action Plan</th>
</tr>
</thead>
<tbody>
<tr>
<td>Consultant hired by the implementing agency</td>
<td>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. These potential Service Providers are presented in the last section of this action plan.</td>
</tr>
</tbody>
</table>
| Project implementation unit of the implementing agency | The PIU shall supervise this action plan and take part of the following prevention measures:  
  — Proper workers and Supervising Engineer camp design;  
  — Management of workers’ influx.  
  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:  
  — translate GBV measures into contractual requirements;  
  — evaluate Contractors’ proposal and include environmental and social criteria in the selection process;  
  — include measures regarding workers and Supervising Engineer camp design. |
| Bidders                                              | Bidders shall provide their proposal considering requirements from 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 a land or is a victim of property grabbing. |

TRANSLATING GBV MEASURES INTO CONTRACTUAL REQUIREMENTS

The bidding document and contracts for construction Contractors shall include 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 set out how adequate GBV prevention measures will be paid for in the contract. The responsibility for implementing many of the prevention measures must cascade down to the Contractor (and often Subcontractors) who has 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:

— number of past failures to complete the contract;  
— length of time in business;  
— self-assessment of past client relationships;
self-assessment of relationships with surrounding communities and stakeholders presenting past claims by NGOs, claims by traditional authorities, etc.;

past projects concerned by an ESIA, ESMP, RAP, and monitoring and auditing activities.

The bidding document and contract for construction Contractors shall reflect the new requirements of the World Bank as highlighted in the document “Summary of ESHS Enhancements Standard Procurement Documents (SPDs) & Standard Bidding Documents (SBDs)”. This document highlights that:

bidders are required to make a declaration listing any civil works 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 ESHS management strategy required to manage the key ESHS risks of the Project;

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 this C-ESMP will be reviewed and approved by the Client / Supervision Consultant (in consultation with the Design Engineers), and the Bank before construction of the TL is allowed to proceed;

bidders will be required to provide an ESHS Performance Security in the form of a bank guarantee;

a provisional sum should be included for ESHS outcomes which would see Contractors paid for reasonable costs of implementing 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 bills of quantities for clearly defined 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 in the contract. Lastly, the quality of the proposed ESHS Specialists should be assessed during the evaluation of proposals. Bidders should be aware that removal of personnel 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 must mention that work will be supervised for compliance regarding E&S measures;

contracts must contain financial leverage. Use of contractual remedies is recommended, including suspension of disbursements, and delay on payment until there is clear evidence of an improvement of the contractor’s performance.

Bidding documents and contracts for the Supervising Engineer (SE) shall also include certain specific measures from the ESMP and outline the SE 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 they are, in fact, implemented:

Requirements to foresee dedicated staff with appropriate qualifications and experience to manage specific social and environmental impacts;

Requirements to produce regular E&S report to assess compliance with GBV and other E&S measures;

Requirements to develop a SE Code of Conduct and to take active part in the GRM;

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);
- C182 - Worst Forms of Child Labour Convention, 1999 (No. 182).
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 also recommended that Contractor’s self-assessment of previous relationships with surrounding communities and stakeholders be verified.

ENSURING WOMEN ARE NOT LEFT BEHIND

ZESCO shall ensure women participate in the negotiation process and are aware of the amount given as compensation.

ZESCO shall ensure women are consulted during all stages of compensation. For this purpose, compensation sign-offs and agreements shall be signed by both men and women.

In cases of risk of property grabbing or impacts on female headed households, the GBV Service Provider shall be engaged by ZESCO to provide legal support and provide awareness training to village headmen to ensure displaced women have equal access to land.

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;
- signs in the local language shall be displayed around the camp signalling to workers and the community that the Project site is an area where GBV is prohibited;
- if feasible, bus tickets shall be provided for national workers to get back to their family on weekends and holidays.

4.6.2.2 PROJECT CONSTRUCTION

Table 4-4 presents the responsibility of each actor.
### Table 4-4 GBV Actors during Project Construction

<table>
<thead>
<tr>
<th>Project Actors</th>
<th>Responsibility Regarding this Action Plan</th>
</tr>
</thead>
</table>
| Project implementation unit of the implementing agency                        | 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 take part of the GBV complaint team (see below for explanation).                                                                                                                     |
| Construction Contractors                                                      | 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 also have the responsibility to include GBV prevention measures in Subcontractors’ contracts.  
Contractors must design, implement, and maintain a Code of Conduct (CoC) for all workers (formal, informal, and those from Subcontractors).  
Contractors must implement an awareness program.  
The Contractors must report all cases of GBV to the PIU and participate in the GBV Resolution Mechanism and take part of the GBV complaint team (see below for explanation).  
The Contractors must take corrective action in cases of GBV from their staff.  
Contractors’ managers must be trained on the GBV Action Plan.                                                                                                                                  |
| Supervising Engineer                                                          | The Supervising Engineer must design, implement, and maintain a Code of Conduct (CoC) for all staff.  
The Supervising Engineer must implement an awareness program.  
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.                                                                                                                                |
| GRM focal point                                                               | 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.                                                                                                         |
| GBV Service Provider(s)                                                       | The main preventive and corrective measures developed in the ESIA relates to the involvement of GBV Service Provider(s).  
The GBV Service Provider shall be responsible for:  
  ─ training the main Project actors in GBV, these are the Contractors and the Supervising Engineer;  
  ─ 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;  
  ─ developing a GBV Allegation Procedure to receive and handle GBV complaints either directly or indirectly through the GRM committee;  
  ─ assessing the nature of complaints;  
  ─ providing the victim with support which should include advice and referral on health services, and psychological and legal support;  
  ─ communicating with the PIU and the World Bank on the case;  
  ─ proposing for the appropriate remedy to be applied to the perpetrator through a GBV Resolution Mechanism;  
  ─ liaising with the relevant district-level agencies that could provide support during awareness and sensitization (Ministry of Education and Ministry of Community Development and Social Services). |
| Clinic or OSC if the Service Provider cannot provide medical support for severe cases | The clinic or OSC shall provide necessary medical support for cases that require medical assistance and emergency treatment.                                                                                                                                     |
Project Actors | Responsibility Regarding this Action Plan
---|---
Community Based Champions | Community Based Champions are well respected members of the community 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 in this action plan. They shall be involved at two levels:
- Induction training with all workers: it is recommended that the VSU animate the induction training and that police officers be wearing their uniform to ensure workers understand the law regarding GBV;
- Take part in the GBV complaint team and ensure legal prosecution in case of unlawful act (see below for explanation).

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;
- 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.

CODE OF CONDUCT FOR ALL WORKERS (FORMAL, INFORMAL, AND THOSE FROM SUBCONTRACTORS)

The Contractors and Supervising Engineer will design, implement, and maintain a CoC based on the following principles:

- 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. 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).

The Contractor and Supervising Engineer will design, implement, and maintain a CoC following this framework. The CoC shall include the following sections:

1. An introduction on commitments to comply with applicable laws, rules, and regulations including ILO conventions 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;
A paragraph defining Project-related GBV risks and how the Contractor intends to prevent GBV amongst his workers and Subcontractor workers;

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).

A paragraph stating the commitment to protect children (i.e., including prohibitions against sexual abuse, or unacceptable behavior towards children);

A commitment to report violations of the CoC to the local law enforcement;

A commitment to collaborate with GBV Service Providers and to be audited by an external person such as the Supervising Engineer;

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;

A commitment on induction training and awareness programs including the frequency of these trainings;

Lastly a paragraph on how the Contractor intends to monitor GBV and the dedicated Specialist to manage ESHS issues.

The Code of Conduct should be written in plain language and be signed by each worker 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.

AWARENESS PROGRAM FOR ALL WORKERS AND COMMUNITY MEMBERS

An HIV and STD awareness program is the basic requirement for all workers and community members, it was the most commonly proposed measure by community members during the 2017 rounds of public consultations.

In addition, the awareness program must be implemented and include induction trainings to all workers and staff and cover the Code of Conduct and the GRM. Upon completion of this training, workers will be asked to sign a document confirming that they followed the training course and understand the implication of the Code of Conduct as presented above. This induction training and its budget shall be developed as part of the Contractor C-ESMP (see ESMP) and shall include hiring NGOs and medical staff. During these induction trainings, the local police law enforcement from the VSU shall be present to explain the national laws that make sexual harassment and gender-based violence a punishable offence.
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.

The main risk 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.

**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.

**CORRECTIVE MEASURES: INVOLVEMENT OF A GBV SERVICE PROVIDER**

Based on information from the ESIA, the PIU shall be responsible for identifying a potential GBV Service Provider early in the process, in cases of GBV (see last section with recommendation for GBV Service Providers). The GRM focal point shall also be trained to collect allegations.

Figure 4-5 illustrates the overall procedure for disseminating information on the GBV action plan, detecting GBV, and addressing GBV. Explanations are provided in the following sections.
Figure 4-7  GBV Action Plan Overall Procedure
DISSIMATING 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 understand what defines a GBV victim (B). The overall procedure shall be presented during these campaigns.

Best practices recommend not to limit the scope of the action plan to victims of workers but also to include all GBV whether it is directly related to the action of workers (non-community members) or not. GBV victims 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.

DETECTING GBV

This stage is represented by Numbers 1, 3, and 4.

In order to detect GBV, three mechanisms shall be in place:

1. A 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.

INVOLVING GBV SERVICE PROVIDERS

This stage is represented by Numbers 5 and 6.

This stage requires involving a GBV Service Provider (if the victim was not already detected by such Providers). The GBV shall be mobilized on site to meet the victim.

OFFERING THE VICTIM SUPPORT

This stage is represented by Number 2.

GBV Service providers shall offer psychological support to the victim 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 victim. The VSU is in charge of legal procedures against the perpetrator. The VSU shall accompany the GBV Service Provider on site so the victim can file a complaint without having to spend money going to town.
GBV RESOLUTION MECHANISM

This stage is represented by Numbers 7, 8, 9, 10, 11, and 12.

The GBV Service Provider shall be responsible to implement a GBV Resolution Mechanism. This resolution mechanism is as follow:

- A GBV complaints team (7) is designated and includes a member of the Contractor, a member of the Project implantation unit, a member of the Supervising Engineer, and the VSU for suspected unlawful acts;
- With the consent of the victim, the case is reviewed and the GBV complaints team collectively agrees upon the appropriate action and work-related sanction (11). Reasonable adjustments should be made to the alleged perpetrator’s or victim’s work schedule and work environment, preferably by moving the perpetrator rather than the victim. The employer should provide adequate leave to victims seeking services;
- 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 confidentiality of women needs to be guaranteed, it is not recommended to involve traditional authorities in the GBV complaints team.

Specific funds should also be set apart for a GBV Service Provider.

4.6.2.3 PROJECT OPERATION AND MAINTENANCE

During maintenance, the risk of GBV must be addressed by ZESCO. ZESCO shall provide a training to all workers on GBV. However, given the fact that maintenance is an isolate activity, a specific institutional set-up such as the permanent involvement of a GBV Service Provider is not feasible.

4.6.3 MONITORING AND REPORTING

4.6.3.1 MONITORING

GBV indicators may include:

- successful implementation of an agreed upon GBV action plan;
- the number of delivered training/induction courses related to GBV;
- the percentage of workers that have signed a CoC;
- the percentage of workers that have attended the CoC induction training;
- trends in complaints based on categories of GBV.
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.

### 4.6.3.2 REPORTING

The supervision Consultant should monitor and report on the effectiveness of the GBV action plan implementation to prevent and mitigate GBV risks associated with the Project. Reporting should be done monthly, it is critical that the supervision Consultant have appropriately qualified social and environmental Specialists for this task.

The GBV Service Provider shall also be in charge of writing confidential reports on a regular basis destined to the PIU and the World Bank. These reports shall describe the cases when a GBV Resolution Mechanism was put in place.

### 4.6.4 CAPACITY BUILDING

It is recommended that the central actor of the GBV action plan be a well experienced Service Provider. However, he may not be used for formal resolution mechanisms where procedures need to be put in place. For this purpose, it is important that capacity building be provided for this Service Provider and that funds be allocated for his proper functioning (e.g., fuel and vehicle).

In addition, it is recommended that capacity building be provided to Rural Health Centers (RHC) so that they can assist GBV Service Providers in offering first medical support to GBV victims and pre-assessing the medical need before the GBV Service Provider comes to site and takes the victim to the OSC or a clinic.

### 4.6.5 POTENTIAL SERVICE PROVIDERS

Potential Service Providers are divided in two categories, both categories must be involved in the action plan:

1. NGOs or district-level agencies (such as the VSU) or Chiefs to carry out awareness programs (preventive measures);
2. Institutions to address cases of GBV and medical, legal, or psychological support.

Potential Service Providers can be sourced from:

- local existing NGOs such as DOPE, YWCA;
- District Aids Task Force (DATF);
- the district-level Ministry of Education that carries out GBV sensitization at the school level;
- the district-level Ministry of Community Development and Social Services that carries out communication and sensitization regarding GBV;
- the Police VSU to carry out awareness with workers and address legal prosecution;
- the district-level ministry of health to involve existing OSC in the action plan and to determine, in the absence of an OSC, the appropriate RHC, clinic, or hospital to address severe cases of GBV;
- both Chiefs that are anti-GBV Champions: Chieftainess Nawaitwika and Chief Chikwanda. However, as mentioned in the ESIA, this report does not recommend that in any cases the customary court by-passes the legal system involving the VSU because of the presence of foreigner workers and workers that are not from the community. This boundary in Chief involvement shall be clearly stated prior to their involvement.
In addition, the District Administrative Officers (DAOs) who are also District Gender Focal Points in charge of the GBV Task Force should be involved at the administrative level to develop Memorandum of Understandings with future GBV Service Providers (this task force gathers all GBV Service Providers of the district).
5 INSTITUTIONAL CAPACITY-BUILDING AND TRAINING NEEDS

Effective environmental and social management is based on a collaborative approach involving shared responsibilities among stakeholders. The Project Management Unit (PMU), specifically the environmental and social management committee, are key players 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. Concerned authorities, such as the Ministry of Environment, play a key role in judging the acceptability and effectiveness of environmental and social management plans.

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 program. 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 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 PMU, NGOs, and rural associations, promote greater community involvement in Project development, environmental and social performance, and continuous improvement;
- Through the PMU'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 continuous improvement of environmental and social practices as well as improved compliance with legal requirements and international best practices. Table 5-1 presents the main aspects of the capacity building and training program. Some specific aspects are discussed below.

### Table 5-1 Capacity-Building and Training Program

<table>
<thead>
<tr>
<th>Recipients</th>
<th>Training Mode</th>
<th>Topics</th>
<th>Agency Providing the Training</th>
<th>Approximate Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>Environmental employees of the electricity society</td>
<td>Workshops and seminars, Case studies at other existing project sites</td>
<td>Global view of environmental aspects for energy projects, Environmental rules and by-laws related to energy projects, ESMP implementation, Specific workshops on health and safety, Specific workshops on documentation management (quality procedures)</td>
<td>Ministerial delegation, National external Consultants, International Experts</td>
<td>US $100,000</td>
</tr>
<tr>
<td>Recipients</td>
<td>Training Mode</td>
<td>Topics</td>
<td>Agency Providing the Training</td>
<td>Approximate Cost</td>
</tr>
<tr>
<td>------------------------------------</td>
<td>-------------------------------------------------------------------------------</td>
<td>-------------------------------------------------------------------------------------------</td>
<td>---------------------------------------------------</td>
<td>----------------------------------------</td>
</tr>
<tr>
<td>Ministries, local authorities, and NGO</td>
<td>Technical training on ESMP monitoring and updating</td>
<td>Specific workshops on environmental monitoring</td>
<td>Ministerial delegation</td>
<td>US $100,000 (US $50,000 material)</td>
</tr>
<tr>
<td>Site operation and line maintenance staff</td>
<td>Workshops, Case studies at existing project sites, Training at the Project site</td>
<td>ESMP implementation, Environmental best practices, Integration of environmental and social management measures in plans and specifications, Environmental work supervision, Environmental and social monitoring</td>
<td>Ministerial delegation, National external Consultants, International Experts</td>
<td>US $25,000</td>
</tr>
<tr>
<td>Contractor staff</td>
<td>Technical training, Case studies at existing project sites, Training at the Project site</td>
<td>Environmental global perspective, Environmental rules and by-laws, ESMP implementation, Environmental supervision, Management of respectful, environmental, and health and safety (for workers and communities) construction</td>
<td>National external Consultants, International Experts</td>
<td>US $25,000</td>
</tr>
<tr>
<td>Communities</td>
<td>Presentations in communities</td>
<td>Appraisal of risks and opportunities related to the construction and operation of the powerline, 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, Awareness campaign against seasonal bushfire practices</td>
<td>Contractors and NGOs, Local external Consultants</td>
<td>US $20,000</td>
</tr>
</tbody>
</table>

### 5.1 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. 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.
5.2 COMMUNITIES’ AWARENESS AND TRAINING

Finally, experience gained from other transmission line projects reveals that some inhabitants still construct various structures within the wayleave and that accidents with locals occur as a result. 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.

5.3 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 contents of the training program to address capacity shortcomings.

A specific budget for this task is reserved in the ESMP budget.
6 MONITORING PLAN

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

Performance monitoring involves two components:

- Monitoring of the implementation of identified management measures and plans, during pre-construction, construction, and operation phases;

- Monitoring of selected environmental and social indicators associated with expected impact sources, and changes on environmental and social components associated with project implementation, during operation phase.

The environmental and social performance monitoring consolidates all needed monitoring activities planned to ensure a proper implementation. Monitoring, inspections, and verifications will be carried out regularly to control compliance with the set up of procedures and plans. The discrepancies will be corrected and incorporated into existing practices, and documented. The nature and causes of issues will be analyzed.

The environmental and social performance monitoring provides an outline to ensure the project’s environmental and social compliance during pre-construction, construction, and operation 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 environmental and social management committee of the Project’s management unit.

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 operational phase.

Monitoring of three action plans developed in Chapter 4, the Gender-Based Violence Action Plan, the Grievance Redress Mechanism, and the Stakeholder Engagement Plan is detailed in their respective action plan. In addition, monitoring of resettlement (economical and/or physical), is detailed in the stand-alone Resettlement Action Plan report.

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 be regularly 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.
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 monitoring program include:

- overseeing the application of management measures contained in the ESIA and in plans and specifications;
- 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.

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. Main biodiversity surveillance measures for flora and fauna are included in this ESMP, but these will be further detailed in a Biodiversity Management and Monitoring Plan.

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>
<thead>
<tr>
<th>Monitored Component</th>
<th>Supervision Method</th>
<th>Standards / Targets</th>
<th>Location</th>
<th>Frequency</th>
<th>Responsibility</th>
<th>Supervision</th>
</tr>
</thead>
<tbody>
<tr>
<td>Soil integrity</td>
<td>Visual inspection of construction sites and access roads. Evaluate the time needed</td>
<td>Avoid or control the installation of erosive processes. Reduce soil compaction.</td>
<td>Along the ROW, access roads,</td>
<td>Continuously during preconstruction and construction activities.</td>
<td>PIU Monitoring Specialist. Supervising Engineer.</td>
<td>PIU Environmental committee.</td>
</tr>
<tr>
<td></td>
<td>to apply emergency measures plan (EMP) and implement corrective actions, if needed.</td>
<td>Avoid soil profile structure destruction. Avoid soil contamination.</td>
<td>and work areas.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Ensure contaminated soils are properly managed.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hydrology</td>
<td>Visual observations of water flow.</td>
<td>Ensure there is no obstruction to water flow and that culverts are appropriately</td>
<td>At rivers, streams, and wetlands</td>
<td>Continuously during works on water and near aquatic environments.</td>
<td>PIU Monitoring Specialist. Supervising Engineer.</td>
<td>PIU Environmental committee.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>sized, well installed, and properly functioning.</td>
<td>crossed by the ROW.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Water quality</td>
<td>Analysis of pH, TSS, turbidity, phosphorus, BOD, coliform bacteria, and temperature</td>
<td>Avoid significant degradation of baseline conditions.</td>
<td>Selected sites along rivers,</td>
<td>Once a month during construction work on water and near aquatic environments.</td>
<td>PIU Monitoring Specialist. Supervising Engineer.</td>
<td>PIU Environmental committee.</td>
</tr>
<tr>
<td></td>
<td>(presence of oil, waste, etc.). Evaluate the time needed to apply emergency measures</td>
<td></td>
<td>streams, and wetlands crossed by</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>plan (EMP) and to implement corrective actions, if needed.</td>
<td></td>
<td>the ROW.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Air quality</td>
<td>Visual inspection of construction sites and access roads for dust; verification</td>
<td>Avoid significant degradation of baseline conditions.</td>
<td>Along ROW, access roads,</td>
<td>Continuously during preconstruction and construction activities.</td>
<td>PIU Monitoring Specialist. Supervising Engineer.</td>
<td>PIU Environmental committee.</td>
</tr>
<tr>
<td></td>
<td>that equipment and machinery are maintained and properly functioning.</td>
<td></td>
<td>and work areas.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Loss of riverine habitats</td>
<td>Field observations with the support of satellite imagery in riverine habitats.</td>
<td>Reduced areas of lost riverine habitats.</td>
<td>Along ROW, where riverine</td>
<td>Continuously during preconstruction and construction activities</td>
<td>PIU Monitoring Specialist. Supervising Engineer.</td>
<td>PIU Environmental committee.</td>
</tr>
<tr>
<td></td>
<td>Important to take pictures and describe the habitats prior to and after impact (see</td>
<td></td>
<td>habitats are found.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>details in BMMP).</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Monitored Component</td>
<td>Supervision Method</td>
<td>Standards / Targets</td>
<td>Location</td>
<td>Frequency</td>
<td>Responsibility</td>
<td>Supervision</td>
</tr>
<tr>
<td>---------------------</td>
<td>--------------------</td>
<td>---------------------</td>
<td>----------</td>
<td>-----------</td>
<td>---------------</td>
<td>-------------</td>
</tr>
<tr>
<td>Loss of forested areas</td>
<td>Field observations with the support of satellite imagery in forested habitats. Important to take pictures and describe the habitats prior to impact and after (see details in BMMP).</td>
<td>Reduced areas of lost forested habitats.</td>
<td>Along ROW, where forested habitats are found.</td>
<td>Continuously during preconstruction and construction activities.</td>
<td>PIU Monitoring Specialist. Supervising Engineer.</td>
<td>PIU Environmental committee.</td>
</tr>
<tr>
<td>Vegetation integrity</td>
<td>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 powerline. Visual inspection of construction sites and access roads (see details in BMMP).</td>
<td>Avoid significant degradation outside the ROW. Protection of flora species with conservation status.</td>
<td>ROW and substation site.</td>
<td>During vegetation removal in the ROW.</td>
<td>PIU Monitoring Specialist. Supervising Engineer.</td>
<td>PIU Environmental committee.</td>
</tr>
<tr>
<td>Vegetation success of the rehabilitated areas</td>
<td>Field observations in rehabilitated areas and flora surveys (see details in BMMP).</td>
<td>Success of the habitat rehabilitation (vegetation density and flora species diversity).</td>
<td>In rehabilitated areas.</td>
<td>After construction activities.</td>
<td>PIU Monitoring Specialist. Supervising Engineer.</td>
<td>PIU Environmental committee.</td>
</tr>
<tr>
<td>Bird conservation</td>
<td>Pre-construction inspection (avifaunal walk-through) of the final powerline route alignment and road access routes to identify Red List species that may be breeding within the ROW and its immediate surroundings (1km radius) to ensure the impacts to breeding species (if any) are adequately managed (see details in BMMP).</td>
<td>Avoid nest destruction, especially destruction of active nests or those of threatened species.</td>
<td>ROW and substation sites.</td>
<td>During vegetation removal in the ROW.</td>
<td>PIU Monitoring Specialist. Supervising Engineer.</td>
<td>PIU Environmental committee.</td>
</tr>
<tr>
<td>Fauna protection</td>
<td>Visual inspection of construction sites and access roads. Large mammal surveys using indirect methods i.e. spoor or dung counts (see details in BMMP).</td>
<td>Avoid habitat loss and disturbances for local fauna.</td>
<td>ROW and substation sites.</td>
<td>During vegetation removal in the ROW.</td>
<td>PIU Monitoring Specialist. Supervising Engineer.</td>
<td>PIU Environmental committee.</td>
</tr>
<tr>
<td>Monitored Component</td>
<td>Supervision Method</td>
<td>Standards / Targets</td>
<td>Location</td>
<td>Frequency</td>
<td>Responsibility</td>
<td>Supervision</td>
</tr>
<tr>
<td>---------------------</td>
<td>--------------------</td>
<td>---------------------</td>
<td>----------</td>
<td>-----------</td>
<td>---------------</td>
<td>-------------</td>
</tr>
<tr>
<td>Bat conservation</td>
<td>Undertake a pre-construction inspection in the final powerline route alignment and road access routes to identify any major bat roosts within or close to the areas to be cleared (see details in BMMP).</td>
<td>Avoid disturbance or destruction of bat roosts, particularly of Near Threatened species potentially inside the project area.</td>
<td>ROW and substation sites.</td>
<td>During vegetation removal in the ROW.</td>
<td>PIU Monitoring Specialist. Supervising Engineer.</td>
<td>PIU Environmental committee.</td>
</tr>
<tr>
<td>Nuisance felt by neighbouring communities</td>
<td>Complaint and concern management processes and surveys among communities.</td>
<td>Reduce impacts on the quality of life of people in or around populated areas during works.</td>
<td>Along ROW and substation sites, especially in populated areas.</td>
<td>Continuously during preconstruction and construction activities.</td>
<td>PIU Monitoring Specialist. Supervising Engineer.</td>
<td>PIU Environmental committee.</td>
</tr>
<tr>
<td>Local and regional economies</td>
<td>Assessment of local communities' involvement in works or in the procurement of goods and services to the Contractor.</td>
<td>Enhance positive impacts and improve the local economy.</td>
<td>Neighbouring communities along ROW.</td>
<td>During construction.</td>
<td>PIU Monitoring Specialist. Supervising Engineer.</td>
<td>PIU Environmental committee.</td>
</tr>
<tr>
<td>Land use</td>
<td>Visual inspection of construction sites and access roads, as well as properties used for crops, livestock, and other activities.</td>
<td>Avoid encroachment into areas used by neighbouring communities not identified in the plans and specifications.</td>
<td>ROW and substation sites.</td>
<td>Continuously during preconstruction and construction activities.</td>
<td>PIU Monitoring Specialist. Supervising Engineer.</td>
<td>PIU Environmental committee.</td>
</tr>
<tr>
<td>All social components</td>
<td>Supervise the implementation of the C-ESMP by Contractors.</td>
<td>The C-ESMP should reflect all environmental and social and H&amp;S contract requirements that will set the standards.</td>
<td>In all areas under construction whether by the main Contractors or their Subcontractors, including workers’ camps and batching plants or borrow pits.</td>
<td>During construction.</td>
<td>PIU Monitoring Specialist. Supervising Engineer.</td>
<td>PIU Environmental committee.</td>
</tr>
<tr>
<td>All social components</td>
<td>Supervise the implementation of the Grievance Redress Mechanism (GRM) and the Stakeholder Engagement Plan (SEP).</td>
<td>All performance indicators as set in the GRM and the SEP.</td>
<td>In all areas under construction whether by the main Contractors or their Subcontractors, including workers’ camps and batching plants, or borrow pits.</td>
<td>During construction.</td>
<td>All actors as presented in the GRM and the SEP.</td>
<td>All actors as presented in the GRM and the SEP.</td>
</tr>
<tr>
<td>Monitored Component</td>
<td>Supervision Method</td>
<td>Standards / Targets</td>
<td>Location</td>
<td>Frequency</td>
<td>Responsibility</td>
<td>Supervision</td>
</tr>
<tr>
<td>---------------------</td>
<td>--------------------</td>
<td>---------------------</td>
<td>----------</td>
<td>-----------</td>
<td>---------------</td>
<td>-------------</td>
</tr>
<tr>
<td>Gender</td>
<td>Supervise the implementation of the Gender-Based Violence (GBV) Action Plan.</td>
<td>At performance indicators as set in the GBV Action Plan.</td>
<td>In all areas under construction whether by the main Contractors or their Subcontractors, including workers' camps and batching plants, or borrow pits.</td>
<td>During construction.</td>
<td>All actors as presented in the GBV Action Plan.</td>
<td>All actors as presented in the GBV Action Plan.</td>
</tr>
</tbody>
</table>
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 improved 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 ROW’s initial conditions will have to be undertaken at the end of the work. The baseline data collected will be compared with the data collected during monitoring.
### Table 6-2  Environmental and Social Monitoring Components

<table>
<thead>
<tr>
<th>Component</th>
<th>Method</th>
<th>Standards/Targets</th>
<th>Location</th>
<th>Frequency</th>
<th>Responsibility</th>
<th>Approximate Cost (USD)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Noise level</td>
<td>Noise measurement (dBA)</td>
<td>WBG Noise Level Guidelines during facility operations, summarized as follows:</td>
<td>Sampling in communities and dwellings closest to the substations.</td>
<td>Annually for the first five years of operation.</td>
<td>ZESCO.</td>
<td>$5,000 per annum</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Receptor</th>
<th>One Hour $L_{Aeq}$ (dBA)</th>
<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></td>
<td>45</td>
</tr>
<tr>
<td>Industrial, commercial</td>
<td>70</td>
<td></td>
<td>70</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Component</th>
<th>Method</th>
<th>Standards/Targets</th>
<th>Location</th>
<th>Frequency</th>
<th>Responsibility</th>
<th>Approximate Cost (USD)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Electromagnetic fields</td>
<td>Sampling with proper devices (μT).</td>
<td>The World Bank suggests that average and peak exposure levels should remain below the ICNIRP recommendation for General Public Exposure².</td>
<td>Along the ROW with representative sample of zones with human activities, such as crop areas, urban and rural zones, etc.</td>
<td>Annually for the first five years of operation.</td>
<td>TANESCO.</td>
<td>To be combined with noise monitoring.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>ICNIRP Exposure Limits for General Public Exposure to Electric and Magnetic Fields³</td>
<td>Frequency Electric Field (V/m)</td>
<td>Magnetic Field (μT)</td>
<td>50 Hz</td>
<td>5000</td>
</tr>
<tr>
<td>Soil integrity</td>
<td>Visual inspection of construction sites and access roads.</td>
<td>Avoid the installation of erosive processes or control them. Reduce soil compaction. Avoid soil profile structure destruction.</td>
<td>Work areas in used and around pylons.</td>
<td>Annually during the whole operational phase.</td>
<td>ZESCO.</td>
<td>Included in ZESCO operating budget.</td>
</tr>
<tr>
<td>Surface water quality</td>
<td>Analysis of pH, TSS, turbidity, phosphorus, BOD, coliform bacteria, and temperature. Visual detection of pollution or contamination signs (i.e., presence of oil, waste, etc.). Evaluate the time needed to apply the emergency measures plan (EMP) and to implement corrective actions, if needed.</td>
<td>Avoid significant degradation in relation with baseline conditions.</td>
<td>Selected sites along rivers and streams crossed by the ROW. Downstream of electric substations.</td>
<td>Twice per year for the first five years, in rainy season and in dry season. Then once every two years.</td>
<td>ZESCO.</td>
<td>$7,500 per annum.</td>
</tr>
</tbody>
</table>

² [Link](https://www.ifc.org/wps/wcm/connect/7b65ce6b-129d-4634-993c-12f85c0674b3/Final%2BBElectric%2BTTransmission%2Band%2BDistribution.pdf?MOD=AJPERES&CVID=jqeI4Rs&id=1323162154847)
³ ICNIRP (1998): “Guidelines for limiting exposure to time-varying electric, magnetic, and electromagnetic fields (up to 300 GHz)”.
<table>
<thead>
<tr>
<th>Component</th>
<th>Method</th>
<th>Standards/Targets</th>
<th>Location</th>
<th>Frequency</th>
<th>Responsibility</th>
<th>Approximate Cost (USD)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Plant communities</td>
<td>Evaluate the composition of plant communities via flora surveys (species diversity and composition) (see details in BMMP).</td>
<td>Follow the plants communities’ evolution after eventual degradation from openings and border effects. Identification of invasive species.</td>
<td>In the different types of habitats found in the ROW, focussing on areas with higher ecological integrity.</td>
<td>Annually for the first five years, then once every two years.</td>
<td>ZESCO.</td>
<td>$10,000 per annum.</td>
</tr>
<tr>
<td>Integrity of aquatic habitats</td>
<td>Evaluate the integrity of aquatic habitats (level of degradation) (see details in BMMP).</td>
<td>Maintenance of the quality of aquatic habitats.</td>
<td>Zones where streams and wetlands are crossed.</td>
<td>Annually for the first five years, then once every two years.</td>
<td>ZESCO.</td>
<td>To be combined with surface water quality program.</td>
</tr>
<tr>
<td>Wildlife poaching</td>
<td>Validate the intensity of hunting for meat market along the ROW with wildlife officers (see details in BMMP).</td>
<td>Avoid trafficking of bush meat hunted from the line's ROW and access roads.</td>
<td>In areas within a 5 km distance from existing roads.</td>
<td>Annually for the first ten years.</td>
<td>ZESCO.</td>
<td>$10,000 per annum.</td>
</tr>
<tr>
<td>Bat activity near the powerline</td>
<td>Recording bat activity (passes per hour, species, etc.) using mobile and static bat detectors at selected locations along the powerline and in rehabilitated areas (see details in BMMP).</td>
<td>Use of Project area and rehabilitated areas by bats.</td>
<td>Along the powerline and in rehabilitated areas.</td>
<td>Twice a year in different seasons.</td>
<td>ZESCO.</td>
<td>$15,000 per annum.</td>
</tr>
<tr>
<td>Bat mortality monitoring program</td>
<td>Monitoring of bat mortality (in partnership with local communities and experts)/ number of dead specimens (species involved) related to period and location (see details in BMMP).</td>
<td>No significant bat mortality.</td>
<td>Along the powerline.</td>
<td>A minimum of 4 times/year in the first 5 years of operation, thereafter ongoing monitoring to be determined according to initial results.</td>
<td>ZESCO.</td>
<td>Operation: $40,000/year (quarterly surveys) $8,000 (one-off training course).</td>
</tr>
<tr>
<td>Estimates of bird activity along the powerline</td>
<td>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. (see details in BMMP).</td>
<td>NA.</td>
<td>Along the powerline in areas where bird activities are susceptible to being more intense.</td>
<td>Every two months during the first two years. After the first two years, twice a year during peak periods of activity.</td>
<td>ZESCO.</td>
<td>$15,000 per annum during first two years. $5,000 per annum thereafter.</td>
</tr>
<tr>
<td>Component</td>
<td>Method</td>
<td>Standards/Targets</td>
<td>Location</td>
<td>Frequency</td>
<td>Responsibility</td>
<td>Approximate Cost (USD)</td>
</tr>
<tr>
<td>--------------------------------------------------------------------------</td>
<td>------------------------------------------------------------------------</td>
<td>----------------------------------------------------------------------------------</td>
<td>---------------------</td>
<td>--------------------------------------------------------------------------</td>
<td>----------------</td>
<td>------------------------</td>
</tr>
<tr>
<td>Use of pylons or powerline as a roost or nest location</td>
<td>Dedicated field observations. Mapping analysis of birds’ use of the powerline and the pylons (see details in BMMP).</td>
<td>Number of roosting/nesting birds on towers. Location of the nests. Number and % of placed platforms (if required). Breeding success.</td>
<td>Along the powerline.</td>
<td>Quarterly surveys for the first five years. If nests are active, monthly surveys to assess breeding success.</td>
<td>ZESCO.</td>
<td>To be combined with estimates of bird activity along the powerline.</td>
</tr>
<tr>
<td>Use of rehabilitated areas by birds</td>
<td>Bird surveys to assess bird diversity and density (see details in BMMP).</td>
<td>Use of rehabilitated areas and planted trees by birds.</td>
<td>Rehabilitated areas.</td>
<td>Five years after the rehabilitation, every two years.</td>
<td>ZESCO.</td>
<td>$5,000 every two years.</td>
</tr>
<tr>
<td>Bird mortality as a result of collisions with the powerline and electrocution within substations</td>
<td>Bird mortality monitoring programme (and training workshop) in partnership with Experts and local communities and/or NGOs. The programme will also enable the review mitigation measures according to their efficacy and durability and develop alternative specific mitigation measures for species that are continually affected.</td>
<td>No significant bird mortality. Ensure appropriate mitigation measures are in place.</td>
<td>Along the powerline in areas where bird activities are likely to be more significant.</td>
<td>A minimum of 4 times/year in first 5 years of operation, thereafter ongoing monitoring to be negotiated with ZESCO.</td>
<td>ZESCO.</td>
<td>Operation: $55,000/year (quarterly surveys) $8,000 (once-off training course)</td>
</tr>
<tr>
<td>Mammal communities</td>
<td>Indirect survey methods for large mammals i.e. spoor and scat counts along tracks and roads in the ROW (presence/absence and abundance). Direct survey methods for surrogate or indicator taxa in the ROW (see details in BMMP).</td>
<td>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.</td>
<td>Along the powerline in important ecological habitats.</td>
<td>During the wet and dry seasons, every two years.</td>
<td>ZESCO.</td>
<td>$5,000 every two years.</td>
</tr>
<tr>
<td>Component</td>
<td>Method</td>
<td>Standards/Targets</td>
<td>Location</td>
<td>Frequency</td>
<td>Responsibility</td>
<td>Approximate Cost (USD)</td>
</tr>
<tr>
<td>-----------</td>
<td>--------</td>
<td>-------------------</td>
<td>----------</td>
<td>-----------</td>
<td>---------------</td>
<td>------------------------</td>
</tr>
<tr>
<td>Social and Economic advantages for local communities</td>
<td>Monitoring the rate of rural electrification and number of development projects. Monitoring of local content objectives (local employment, service contracts locally sourced) with explicit attention to opportunities made available to women</td>
<td>Maximizing economic benefits for communities.</td>
<td>Communities within 10 km of the ROW and substation sites.</td>
<td>Annually.</td>
<td>ZESCO.</td>
<td>To be included in the ZESCO operating budget.</td>
</tr>
<tr>
<td>Employees' health and safety</td>
<td>Complete register of the cause and type of workers' injuries/accidents.</td>
<td>No injuries or accidents.</td>
<td>Employees working in the line.</td>
<td>Annually.</td>
<td>ZESCO.</td>
<td>To be included in the ZESCO operating budget.</td>
</tr>
<tr>
<td>Community health</td>
<td>Register on HIV/AIDS prevalence in local population.</td>
<td>No propagation attributable to the Project.</td>
<td>Communities in the ROW and near substation sites.</td>
<td>Annually.</td>
<td>ZESCO.</td>
<td>To be included in the ZESCO operating budget.</td>
</tr>
<tr>
<td>Community health</td>
<td>Complete register of the cause and type of injuries and accidents within communities.</td>
<td>No injuries or accidents.</td>
<td>Communities in the ROW and near substation sites.</td>
<td>Annually.</td>
<td>ZESCO in collaboration with local communities.</td>
<td>To be included in the ZESCO operating budget.</td>
</tr>
<tr>
<td>All social components</td>
<td>Continuously monitor and update the Stakeholder Engagement Plan.</td>
<td>Performance indicators as developed in the SEP.</td>
<td>At stakeholder and community locations.</td>
<td>Frequency as set in the SEP.</td>
<td>ZESCO.</td>
<td>To be confirmed; however, not likely to exceed $5,000 per annum.</td>
</tr>
</tbody>
</table>
7 IMPLEMENTATION SCHEDULE

On top of being a reference source in the management of Project environmental impacts, the ESMP is also a guide for the application of various steps and procedures that are necessary for its sound implementation. The following provides an overview of the key steps necessary to ensure the efficiency of the ESMP, avoid redundant efforts, and to make sure 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. Because several individuals must contribute to the PIU calls for a sound selection of the members. 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, nearly six months are attributed to the identification, selection, and preparation (including training) of the PIU team.

Once the final ROW is selected, the pre-construction phase will lead to land acquisitions associated with resettlement, and compensations of affected households. It is proposed that compensation of affected households start one year prior to the beginning of construction activities. 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. In the first year of the operation phase, some ESMP measures 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 the environmental and social indicators. A detailed ESMP implementation schedule is proposed in Table 7-1.
### Figure 7-1  ESMP and RAP Implementation Schedule – Line and Substations

<table>
<thead>
<tr>
<th>Tasks per Phase</th>
<th>Year 1</th>
<th>Year 2</th>
<th>Year 3</th>
<th>Year 4</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1 2 3 4 5 6 7 8 9 10 11 12</td>
<td>1 2 3 4 5 6 7 8 9 10 11 12</td>
<td>1 2 3 4 5 6 7 8 9 10 11 12</td>
<td>1 2 3 4 5 6 7 8 9 10 11 12</td>
</tr>
<tr>
<td><strong>Pre-Construction Phase</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Preparation and approval of Biodiversity Management and Monitoring Plan (BMMP)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Study of Impacts on Mwela Art Site (by NHCC)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Compensation of PAPs (compensation sign-off, as detailed in the RAP)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Setting up of the PIU</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Preparation and approval of the C-ESMP</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Recruitment of GRM Focal Point and agreements or MoU with potential GBV Service Providers</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Information and awareness-raising of communities</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Feedback to affected communities (every 3 months the 1st year and twice a year after)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Marking of the ROW</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Survey of properties</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Annual environmental audit</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Construction Phase</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Clearing of the ROW</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Tower erection, stringing and sagging</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>C-ESMP supervision and follow-up of mitigation</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Annual environmental audit</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Site test and commissioning</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Operation and Maintenance phases</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Evaluation of ESMP performance</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Annual environmental audit</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
8 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 8-1 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 (see stand-alone report).

Figure 8-1 Preliminary ESMP Budget Estimate Based on Main Costs

<table>
<thead>
<tr>
<th>Phase</th>
<th>Item</th>
<th>Cost (USD)</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Lump Sum</td>
<td>Yearly</td>
<td></td>
</tr>
<tr>
<td>Pre-Construction/Construction</td>
<td>Organizational Capacity Assessment</td>
<td>$50,000</td>
<td>n/a</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Implementation of the RAP</td>
<td>See RAP</td>
<td>n/a</td>
<td></td>
</tr>
<tr>
<td></td>
<td>PIU operating budget</td>
<td>$240,000</td>
<td>n/a</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(4 staff for environmental &amp; social management, 4 years)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Capacity building and training program</td>
<td>$320,000</td>
<td>n/a</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Development of Environmental and Social Management System based on</td>
<td>$150,000</td>
<td>n/a</td>
<td></td>
</tr>
<tr>
<td></td>
<td>ZESCO SHEQ Policy</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Development of Compensation Plan for loss of terrestrial habitats</td>
<td>$150,000</td>
<td>n/a</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Compensation plan for restoration of miombo woodland in the Kanona</td>
<td>$80,000</td>
<td>n/a</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Forest Reserve</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Involvement of a botanist or a technician from the Forestry Department</td>
<td>$45,000</td>
<td>n/a</td>
<td></td>
</tr>
<tr>
<td></td>
<td>for vegetation clearing activities</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Implementation and follow-up on the Grievance Redress Mechanism</td>
<td>$75,000</td>
<td>n/a</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(GRM)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Implementation of the Gender-Based Violence Action Plan</td>
<td>$75,000</td>
<td>n/a</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Sub-total</td>
<td>$945,000</td>
<td>$240,000</td>
<td></td>
</tr>
<tr>
<td>Operation</td>
<td>Development of an Emergency Response Plan including the purchase of</td>
<td>$60,000</td>
<td>n/a</td>
<td></td>
</tr>
<tr>
<td></td>
<td>spill kits</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Monitoring program to evaluate the composition of plant communities</td>
<td>$10,000</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>(via flora surveys)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Invasive flora species control program</td>
<td>$10,000</td>
<td>$10,000</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Program to monitor the prevalence of wildlife poaching</td>
<td>$10,000</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Monitoring of bat activity near powerline and use of pylons or</td>
<td>$15,000</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>powerlines as roosts</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Bat mortality monitoring program</td>
<td>$8,000</td>
<td>$40,000</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Monitoring program to assess use of rehabilitated areas by birds</td>
<td>$5,000</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Monitoring program to assess presence, abundance, and distribution</td>
<td>$5,000</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>of large mammal species</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Development and implementation of a bird mortality monitoring program</td>
<td>$8,000</td>
<td>$55,000</td>
<td></td>
</tr>
<tr>
<td></td>
<td>including management measures</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Description</td>
<td>Agent 1</td>
<td>Agent 2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>-----------------------------------------------------------------------------</td>
<td>---------</td>
<td>---------</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Adjustments to siting of bird diverters if required by results of bird monitoring program</td>
<td>unknown</td>
<td>unknown</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Development of local and regional emergency plans in case of infrastructure breakdowns, especially near roads or residential areas</td>
<td>$20,000</td>
<td>n/a</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Sub-total</strong></td>
<td><strong>$106,000</strong></td>
<td><strong>$150,000</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Preliminary grand total</strong></td>
<td><strong>$1,051,000</strong></td>
<td><strong>$390,000</strong></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

* Installation of additional bird diverters may be required according to results from the mortality monitoring program.
9 REFERENCES


— INTERNATIONAL COMMISSION ON NON-IONIZING RADIATION PROTECTION (ICNIRP), 1998: *Guidelines for limiting exposure to time-varying electric, magnetic, and electromagnetic fields* (up to 300 GHz).


APPENDIX

1-1 SCOPING REPORT AND TERMS OF REFERENCE SUBMISSION TO ZEMA
REF: S&CS/ESU/091/17

22 May 2017

The Director General
Zambia Environmental Management Agency
P O Box 35131
LUSAKA

Dear Sir

SUBMISSION OF THE SCOPING AND TERMS OF REFERENCES REPORTS FOR THE PROPOSED NAKONDE-KABWE 330KV TRANSMISSION LINE ON THE ZAMBIA-TANZANIA-KENYA POWER INTERCONNECTION PROJECT

The Governments of Zambia, Tanzania and Kenya have agreed to interconnect their power systems for the transfer of power among the three countries. In Zambia, the project consists of the construction of a 330kV power transmission line to facilitate the transfer of power to the North and to the South, linking the Nile Basin Initiative (NBI)/Eastern Africa Power Pool (EAPP) countries to the Southern African Power Pool (SAPP). The project is strategically aimed at promoting and enhancing electricity trade, improve the power security and reliability of supply; and to contribute to economic development and regional integration.

In compliance with environmental regulatory requirements, we wish to submit the attached Scoping and Terms of References reports for your approval, as a prerequisite to the Environmental and Social Impact Assessment study for the project.

We are very grateful for your guidance and look forward to strengthened cooperation in our undertaking to sustainably support the development of the nation.

Yours faithfully
ZESCO LIMITED

NSWANA CHANGALA
DIRECTOR - STRATEGY & CORPORATE SERVICES

All correspondence to be addressed to the Managing Director
ZESCO Limited, Stand No. 6949 Great East Road, P.O. Box 33304, Lusaka-Zambia
Tel: +260-211-361111, Fax: +260-211-222753, E-mail: zesco@zesco.co.zm
www.zesco.co.zm
June 27, 2017

The Managing Director
ZESCO Limited
Great East Road
LUSAKA.

Dear Sir,


Reference is made to the Terms of Reference (ToRs) and Scoping report for the above mentioned project that you submitted to the Zambia Environmental Management Agency (ZEMA) on June 2, 2017. This is in accordance with the provisions of the Environmental Management Act No. 12 of 2011 read together with the Environmental Impact Assessment Regulations Statutory Instrument No. 28 of 1997.

Kindly be advised that the review of the Terms of Reference and Scoping Report indicates that the general objectives are acceptable. The Agency therefore has no objection with you proceeding with the study. You are advised to include but not limited to, the issues presented in the attachment during the study.

Do not hesitate to contact the undersigned should there be issues herein that you wish to have clarified.

The Agency looks forward to continuing working with you.

Yours faithfully,

David Kapindula
Manager- South
For/ Director General
ZAMBIA ENVIRONMENTAL MANAGEMENT AGENCY
ISSUES TO BE INCLUDED IN THE DRAFT ENVIRONMENTAL IMPACT STATEMENT REPORT

1. Climate
   - Review of climate through review of literature, collect and analyze the local meteorological data around the project area/route.

2. Air Quality study
   - Thorough review of literature, collection and review of the local meteorological data around the project area;
   - State and analyze different sources of air quality;
   - Evaluate the existing air quality around the project area/route, which may be affected due to the development.

3. Waste Generation
   - Establish the baseline situation with regards to categories of waste according to construction waste, domestic waste e.t.c;
   - Impacts of waste to the surrounding communities.

4. Land Use and Tenure
   The consultant will examine the following:
   - Current zoning classification of the site;
   - Current use of the site and adjacent properties;
   - Existing structures on the site and if such structures will be demolished;
   - Existing wetlands and other protected areas (if any);
   - Existing hazardous waste sites;
   - Land use compatibility assessment;
   - Existing farmland, residential and business relocation.

5. Landscape
   - Effects on the aesthetic quality of the landscape;
   - Effects on the character of the area;
   - Effects on the preservation of service of scenic views and valued features;
   - Effect on natural features such as streams;
   - Visual impacts (features, removal of vegetation);
   - Compatibility with surrounding areas; and
   - Effects on natural heritage sites.
6. **Geology and Hydrogeology**

The consultant will examine the following:

- Review of literature, collect and analyze the local geological data of the project site;
- Assessment of rock formation of the project area;
- Assessment of hydrogeology of the project area.

7. **Hydrology**

- Assessment of movements and distribution of water;
- Assessment of occurrence of water in the area;
- Investigate the existing water quality of the area;
- Assessment of the depth for the existing boreholes;
- Water Quality-Surface and Ground water Quality.

8. **Noise and Vibrations**

The consultant will examine the following:

- The affects on the surrounding communities;
- Evaluate the noise impact due to the project development.
- Determine the sources of noise in the project area and how the proposed constructions will affect the surrounding communities;
- Determine the baseline Noise levels; and
- Evaluate the noise impacts due to the project development.

9. **Socio-economic Environment**

The consultant will examine the following:

- Specialized study on the Social economic profile;
- Assessment of nearby settlements, compensation issues, farms, burial sites, shrines in the project area;
- Assessment of Social Institutions in the area and assessment of the available NGOs in the project area;
- Identify the educational facilities in the area and the enrolment, dropout and pass rates;
- HIV/AIDS and other diseases and the projects likely to influence on the disease;
- Customs, value systems, social classes, hierarchical relationships and kinship structure;
- Assessment of the community development issues in the area; and
- Assessment of community capacity to self sustain themselves and social welfare situation.

10. **Anthropological factors**

The consultant will examine the following:

- Linguistics of the people in the project area;
- Cultural rites
- Ethnic groups concerned by the project, and their living habits;
- Vulnerable populations in any confrontation with other cultures, etc; and
- Archaeology, Art, artefacts etc.
APPENDIX

2-1 PROJECT COMPONENT COORDINATES
Projected coordinates UTM 36S WGS84 (m)
Segment

Nakonde to
Tanzania/Zambia Border
330 kV line ASSOCIATED FACILITY

Kasama to Nakonde 330
kV line

Mpika to Kasama 330 kV
line

Pensulo to Mpika 330 kV
line

Angle Point Number
ZT1
ZT2
ZT3
ZT4
ZT5
ZT6
ZT7
ZT8
ZT8_line
CB1_Line = A59
KN1
KN2
KN3
KN4
KN5
KN6
KN7
KN8
KN9
KN10
KN11
KN12
KN13
KN14
KN15
KN16
KN17
KN18
KN19
KN20
KN21
KN22
KN23
KN24
KN25
KN26
KN27
KN28
KN29
MK1
MK2
MK3
MK4
MK5
MK6
MK6
MK7
MK8
MK9
MK10
MK11
MK12
MK 13
MK 14
MK 15
MK16
MK17
MK18
MK19
MK20
MK21
MK22
MK23
MK24
PM2
PM3
PM4
PM5
PM6
PM7
PM8
PM9
PM9A
PM9B
PM9C
PM10
PM11
PM12A
PM12B
PM12C
PM13
PM14
PM15
PM16
PM17

Geographic coordinates WGS84 (decimal degrees)

X

Y

LONGITUDE

LATITUDE

Chainage (m)

456951,00
456921,00
456213,00
456191,00
454973,00
454696,00
456837,00
457546,00
457816,00
457857,00
298355,00
298466,00
302389,00
302392,00
302972,00
304871,00
306087,00
306073,00
306354,00
311267,00
348443,00
350243,00
350873,00
355474,00
355646,00
360020,00
374699,00
374274,00
385312,00
390638,00
391699,00
392412,00
395371,00
418904,00
423431,00
431349,00
440188,00
450493,00
456463,00
326471,00
323987,00
322822,00
311809,00
310139,00
301446,00
301446,00
287152,00
293548,00
292524,00
295330,00
295318,00
296261,00
299483,00
301224,00
302379,00
301955,00
302147,00
301125,00
301040,00
299559,00
301943,00
302352,00
298435,00
298322,00
222382,00
222590,00
222893,00
228016,00
228522,00
230841,00
241016,00
243632,00
257657,00
260377,00
264667,00
279598,00
279884,00
291142,00
293917,00
293824,00
302725,00
311437,00
320389,00
326231,00
326326,00

8963877,00
8964003,00
8964271,00
8965225,00
8968751,00
8971241,00
8974949,00
8975834,00
8976433,00
8976524,00
8868400,00
8868084,00
8864202,00
8864248,00
8863672,00
8864293,00
8869128,00
8869227,00
8870333,00
8873860,00
8906885,00
8907861,00
8909045,00
8913130,00
8915514,00
8917169,00
8928577,00
8930667,00
8936125,00
8952289,00
8952609,00
8953826,00
8953666,00
8960475,00
8966544,00
8970865,00
8971378,00
8963321,00
8963760,00
8687123,00
8687027,00
8688095,00
8718707,00
8723623,00
8759157,00
8759157,00
8782041,00
8791053,00
8793807,00
8805388,00
8810128,00
8812829,00
8816492,00
8822595,00
8828799,00
8829162,00
8836817,00
8847312,00
8847586,00
8857178,00
8858733,00
8864189,00
8868065,00
8868389,00
8558111,00
8558361,00
8558391,00
8555801,00
8556085,00
8554408,00
8554352,00
8565387,00
8579665,00
8582630,00
8586796,00
8602004,00
8602167,00
8636974,00
8639718,00
8643414,00
8661743,00
8663195,00
8673783,00
8685722,00
8686977,00

32,607928
32,607661
32,601214
32,601026
32,589969
32,587472
32,607007
32,613470
32,615931
32,616305
31,159078
31,160074
31,195679
31,195708
31,200973
31,218338
31,229680
31,229557
31,232177
31,277186
31,617730
31,634180
31,639969
31,682069
31,683722
31,723656
31,857831
31,854022
31,954772
32,003731
32,013404
32,019930
32,046878
32,261370
32,302710
32,374883
32,455373
32,549111
32,603487
31,406868
31,384064
31,373429
31,274076
31,259040
31,181396
31,181396
31,051899
31,110933
31,101725
31,128041
31,128196
31,136966
31,166618
31,182858
31,193743
31,189888
31,192046
31,183263
31,182501
31,169482
31,191326
31,195340
31,159790
31,158776
30,440384
30,442324
30,445118
30,492083
30,496772
30,517989
30,611753
30,636808
30,767164
30,792445
30,832269
30,970832
30,973475
31,079403
31,105089
31,104473
31,187402
31,267508
31,350317
31,404592
31,405530

-9,373080
-9,371941
-9,369505
-9,360878
-9,328970
-9,306453
-9,272930
-9,264936
-9,259519
-9,258695
-10,231648
-10,234510
-10,269803
-10,269388
-10,274624
-10,269106
-10,225458
-10,224562
-10,214578
-10,182932
-9,885935
-9,877177
-9,866494
-9,829723
-9,808173
-9,793360
-9,690675
-9,671762
-9,622725
-9,476690
-9,473824
-9,462836
-9,464357
-9,403293
-9,348487
-9,309541
-9,305033
-9,378036
-9,374131
-11,871827
-11,872566
-11,862850
-11,585535
-11,541006
-11,219318
-11,219318
-11,011651
-10,930560
-10,905609
-10,801083
-10,758236
-10,733873
-10,700936
-10,645861
-10,589839
-10,586536
-10,517347
-10,422421
-10,419940
-10,333154
-10,319220
-10,269919
-10,234680
-10,231745
-13,030333
-13,028094
-13,027850
-13,051710
-13,049189
-13,064545
-13,065935
-12,966456
-12,838583
-12,812003
-12,774686
-12,638341
-12,636888
-12,323072
-12,298449
-12,265038
-12,099921
-12,087307
-11,992096
-11,884480
-11,873139

0,0
129,0
887,0
1841,0
5572,0
8076,0
12359,0
13492,0
14149,0
14249,0
0,0
335,0
5854,0
5900,0
6718,0
8716,0
13701,0
13801,0
14943,0
20990,0
70717,0
72764,0
74106,0
80258,0
82648,0
87325,0
105916,0
108049,0
120362,0
137381,0
138489,0
139900,0
142863,0
167361,0
174933,0
183953,0
192807,0
205888,0
211874,0
0,0
2487,0
4067,0
36600,0
41792,0
78374,0
78374,0
105355,0
116406,0
119344,0
131261,0
136001,0
138861,0
143740,0
150086,0
156397,0
156955,0
164612,0
175157,0
175444,0
185150,0
187996,0
193467,0
198978,0
199321,0
0,0
326,0
630,0
6371,0
6951,0
9813,0
19988,0
31329,0
51343,0
55367,0
61347,0
82659,0
82988,0
119571,0
123473,0
127170,0
147546,0
156379,0
170244,0
183535,0
184794,0

NBI/NELSAP
ESIA (Final) - Tanzania-Zambia Power Interconnection Study - Zambia

Principal
Angles (°)
0,00
-56,08
67,93
-17,75
12,70
36,35
8,71
-14,48
0,01
0,00
0,00
-25,95
-130,97
131,07
-62,91
-57,77
-22,17
22,30
40,07
-5,94
13,15
-33,52
20,38
-44,27
65,15
-17,13
-63,64
75,18
-45,45
54,98
-42,85
62,73
-19,23
-37,14
24,66
25,30
41,34
-42,23
0,00
0,00
44,73
27,70
1,02
5,02
-18,24
-18,24
67,35
-55,76
34,02
-13,76
19,39
22,09
-25,41
-5,38
-59,98
50,87
-7,00
-11,67
8,46
65,66
-52,60
-49,59
26,07
0,00
0,00
44,59
32,47
-56,12
65,18
-35,56
-76,98
31,15
-1,96
3,31
1,37
15,85
-42,40
27,40
-46,76
27,34
54,64
-40,32
-14,14
-21,74
0,00

WSP
No 131-23540-00
October 2017


APPENDIX

2-2

FINAL FEASIBILITY DRAWINGS AND OUTLINE OF TOWERS TO BE BUILT
FEASIBILITY STUDY, CONCEPTUAL DESIGN AND TENDER DOCUMENTS OF TANZANIA-ZAMBIA POWER INTERCONNECTION STUDY

400 kV - DOUBLE CIRCUIT SUSPENSION TYPE (0°-2°)

TRANSVERSE FACE

SECTION A-A

SECTION B-B

SECTION C-C

+4.5 m BODY EXTENSION

NOTES:
1. ALL DIMENSIONS SHOWN ARE IN MILLIMETERS.
2. ALL DIMENSIONS ARE TYPICAL; FINAL DIMENSIONS SHALL BE DETERMINED BY TENDERERS FOLLOWING THE REQUIREMENTS OF THE TECHNICAL SPECIFICATION.
3. MINIMUM APPROACH DISTANCE UNDER LIVE WORKING = 2.0 m

THIS DRAWING SHOULD NOT BE USED FOR CONSTRUCTION PURPOSES. IT IS FOR GUIDANCE ONLY AS TO THE SCOPE OF WORK INVOLVED.
FEASIBILITY STUDY, CONCEPTUAL DESIGN AND TENDER DOCUMENTS OF TANZANIA-ZAMBIA POWER INTERCONNECTION STUDY

330 kV - SINGLE CIRCUIT RIGID TOWER IN ZAMBIA SUSPENSION TYPE (0°-2°)

Rev.
Drawing No: A
Date: June 2017

SECTION A-A

SECTION B-B

SECTION C-C

SECTION D-D

SECTION E-E

SECTION F-F

SECTION G-G

SECTION H-H

SECTION J-J

LONGITUDINAL FACE

TRANSVERSE FACE

NOTES:
1. All dimensions shown are in millimeters.
2. All dimensions are typical; final dimensions shall be determined by tenderers following the requirements of the technical specification.
3. Minimum approach distance under live working = 2.4 m

This drawing should not be used for construction purposes. It is for guidance only as to the scope of work involved.
APPENDIX

2-3 SUBSTATION CONFIGURATION DRAWINGS
Nakonde substation layout drawing is still preliminary and is to be updated in upcoming project stages.

Currently available information on layout is presented on drawing below.
APPENDIX

2-4 DETAILS OF THE CONSTRUCTION SCHEDULE
### SCHEDULE OF IMPLANTATION OF TRANSMISSION LINES IN ZAMBIA

#### 330 kV Nakonde-Kasama-Mpika-Pensulo Single Circuit Transmission Lines (603.25 km)

| Description of Activities | No. | Phase of Construction | Project months Duration | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | 25 | 26 |
| Effective Date of Contract and Start-up Meeting | 1   |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Mobilisation of Contractor | 2   |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Detailed Survey | 3   |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Preparation of Project Schedule | 4   |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Preparation of Plans and Profiles | 5   |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Review and Approval of Contractors Documents | 6   |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Soil Investigations | 7   |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Manufacture of Equipment | 8   |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Supply of Equipment | 9   |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Completion of Supply at Site | 10  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Approval of Foundation List | 11  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Foundation Construction Stub Setting | 12  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Tower Erection | 13  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Supervision of Erection | 14  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Stringing and Sagging | 15  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Site Test and Commissioning | 16  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Completion of Pre-commissioning | 17  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Summary of Contract | 18  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |

**Color Code**
- **Owner’s Engineer Activity**
- **Contractor Activity**

---

**Figure 13.2** Transmission Lines in Zambia
### SCHEDULE OF IMPLANTATION OF SUBSTATIONS IN ZAMBIA

| No. | Description of Activities                                                                 | Project Months Duration | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 |
|-----|------------------------------------------------------------------------------------------|-------------------------|---|---|---|---|---|---|---|---|---|----|----|----|----|----|----|----|----|----|----|----|----|
| 1   | Effective Date of Contract and Start-up Meeting                                           |                         |   |   |   |   |   |   |   |   |   |    |    |    |    |    |    |    |    |    |    |    |    |
| 2   | Mobilisation of Contractor                                                               | 2                       |   |   |   |   |   |   |   |   |   |    |    |    |    |    |    |    |    |    |    |    |    |
| 3   | Detailed Survey                                                                         | 2                       |   |   |   |   |   |   |   |   |   |    |    |    |    |    |    |    |    |    |    |    |    |
| 4   | Preparation of Project Schedule                                                          | 1                       |   |   |   |   |   |   |   |   |   |    |    |    |    |    |    |    |    |    |    |    |    |
| 5   | Contractor Detailed Design                                                                | 11                      |   |   |   |   |   |   |   |   |   |    |    |    |    |    |    |    |    |    |    |    |    |
| 6   | Review and Approval of Contractor Documents                                               | 11                      |   |   |   |   |   |   |   |   |   |    |    |    |    |    |    |    |    |    |    |    |    |
| 7   | Manufacture of Equipment                                                                 | 12                      |   |   |   |   |   |   |   |   |   |    |    |    |    |    |    |    |    |    |    |    |    |
| 8   | Civil Works                                                                              |                         |   |   |   |   |   |   |   |   |   |    |    |    |    |    |    |    |    |    |    |    |    |    |
| 9   | Site Preparation, Earth Works, Surfacing and Gravelling                                  | 8                       |   |   |   |   |   |   |   |   |   |    |    |    |    |    |    |    |    |    |    |    |    |
| 10  | Foundation and Buildings                                                                  | 4                       |   |   |   |   |   |   |   |   |   |    |    |    |    |    |    |    |    |    |    |    |    |
| 11  | Supervision of Installation and Erection                                                  | 12                      |   |   |   |   |   |   |   |   |   |    |    |    |    |    |    |    |    |    |    |    |    |
| 12  | Approval of Commissioning and Testing                                                    | 1                       |   |   |   |   |   |   |   |   |   |    |    |    |    |    |    |    |    |    |    |    |    |
| 13  | Contract Summary                                                                         | 20                      |   |   |   |   |   |   |   |   |   |    |    |    |    |    |    |    |    |    |    |    |    |

**Color Code**
- Blue: Owner's Engineer Activity
- Green: Contractor Activity

**Figure 13-4 Substations in Zambia**

Final Feasibility Report – 60309266 EX-00574 – October 5, 2017

376
APPENDIX

3-1 WBG EHS GUIDELINES - ELECTRIC TRANSMISSION AND DISTRIBUTION
Introduction

The Environmental, Health, and Safety (EHS) Guidelines are technical reference documents with general and industry-specific examples of Good International Industry Practice (GIIP). When one or more members of the World Bank Group are involved in a project, these EHS Guidelines are applied as required by their respective policies and standards. These industry sector EHS guidelines are designed to be used together with the General EHS Guidelines document, which provides guidance to users on common EHS issues potentially applicable to all industry sectors. For complex projects, use of multiple industry-sector guidelines may be necessary. A complete list of industry-sector guidelines can be found at: www.ifc.org/ifcext/enviro.nsf/Content/EnvironmentalGuidelines

The EHS Guidelines contain the performance levels and measures that are generally considered to be achievable in new facilities by existing technology at reasonable costs. Application of the EHS Guidelines to existing facilities may involve the establishment of site-specific targets, with an appropriate timetable for achieving them.

The applicability of the EHS Guidelines should be tailored to the hazards and risks established for each project on the basis of the results of an environmental assessment in which site-specific variables, such as host country context, assimilative capacity of the environment, and other project factors, are taken into account. The applicability of specific technical recommendations should be based on the professional opinion of qualified and experienced persons.

When host country regulations differ from the levels and measures presented in the EHS Guidelines, projects are expected to achieve whichever is more stringent. If less stringent levels or measures than those provided in these EHS Guidelines are appropriate, in view of specific project circumstances, a full and detailed justification for any proposed alternatives is needed as part of the site-specific environmental assessment. This justification should demonstrate that the choice for any alternate performance levels is protective of human health and the environment.

Applicability

The EHS Guidelines for Electric Power Transmission and Distribution include information relevant to power transmission between a generation facility and a substation located within an electricity grid, in addition to power distribution from a substation to consumers located in residential, commercial, and industrial areas. Annex A provides a summary of industry sector activities.

This document is organized according to the following sections:

Section 1.0 — Industry-Specific Impacts and Management
Section 2.0 — Performance Indicators and Monitoring
Section 3.0 — References and Additional Sources
Annex A — General Description of Industry Activities
1.0 Industry-Specific Impacts and Management

The following section provides a summary of EHS issues associated with electric power transmission and distribution that occur during the construction and operation phases of a facility, along with recommendations for their management. Additional recommendations for the management of environmental issues during the construction and decommissioning phases of power transmission and distribution systems are provided in the General EHS Guidelines. Examples of the impacts addressed in the General EHS Guidelines include:

• Construction site waste generation;
• Soil erosion and sediment control from materials sourcing areas and site preparation activities;
• Fugitive dust and other emissions (e.g., from vehicle traffic, land clearing activities, and materials stockpiles);
• Noise from heavy equipment and truck traffic;
• Potential for hazardous materials and oil spills associated with heavy equipment operation and fueling activities.

1.1 Environmental

Environmental issues during the construction phase of power transmission and distribution projects specific to this industry sector include the following:

• Terrestrial habitat alteration
• Aquatic habitat alteration
• Electric and magnetic fields
• Hazardous materials

Terrestrial Habitat Alteration

The construction and maintenance of transmission line rights-of-way, especially those aligned through forested areas, may result in alteration and disruption to terrestrial habitat, including impacts to avian species and an increased risk of forest fires.

Construction of Right-of-Way

Right-of-way construction activities may transform habitats, depending on the characteristics of existing vegetation, topographic features, and installed height of the transmission lines. Examples of habitat alteration from these activities includes fragmentation of forested habitat; loss of wildlife habitat, including for nesting; establishment of non-native invasive plant species; and visual and auditory disturbance due to the presence of machinery, construction workers, transmission towers, and associated equipment.

Recommended measures to prevent and control impacts to terrestrial habitats during construction of the right-of-way include:

• Site transmission and distribution rights-of-way, access roads, lines, towers, and substations to avoid critical habitat through use of existing utility and transport corridors for transmission and distribution, and existing roads and tracks for access roads, whenever possible;
• Installation of transmission lines above existing vegetation to avoid land clearing;

2 Also known as a “wayleave” or “easement” in some countries, but referred to as right-of-way for the purposes of these Guidelines.

3 Alteration of terrestrial habitat for construction of transmission and distribution projects may also yield benefits for wildlife such as the creation of protective nesting, rearing, and foraging habitat for certain species; the establishment of travel and foraging corridors for ungulates and other large mammals; and nesting and perching opportunities for large bird species atop transmission towers and associated infrastructures. California Energy Commission (2005).

4 Considering potential for electrical interference with telecommunication lines and railway lines due to mutual induction.
Avoidance of construction activities during the breeding season and other sensitive seasons or times of day;

- Revegetation of disturbed areas with native plant species;
- Removal of invasive plant species during routine vegetation maintenance (see right-of-way maintenance section below);
- Management of construction site activities as described in relevant sections of the General EHS Guidelines.

**Right-of-Way Maintenance**

Regular maintenance of vegetation within the rights-of-way is necessary to avoid disruption to overhead power lines and towers. Unchecked growth of tall trees and accumulation of vegetation within rights-of-way may result in a number of impacts, including power outages through contact of branches and trees with transmission lines and towers; ignition of forest and brush fires; corrosion of steel equipment; blocking of equipment access; and interference with critical grounding equipment.

Regular maintenance of rights-of-way to control vegetation may involve the use of mechanical methods, such as mowing or pruning machinery that may disrupt wildlife and their habitats, in addition to manual hand clearing and herbicide use. Vegetation management should not eradicate all vegetation, but aim to maintain trees and plant growth that may negatively affect infrastructure at a level that is under an economically-damaging threshold. Excessive vegetation maintenance may remove unnecessary amounts of vegetation resulting in the continual replacement of successional species and an increased likelihood of the establishment of invasive species.

Recommended measures to prevent and control impacts from right-of-way vegetation maintenance include:

- Implementation of an integrated vegetation management approach (IVM). The selective removal of tall-growing tree species and the encouragement of low-growing grasses and shrubs is the common approach to vegetation management in transmission line rights-of-way. Alternative vegetation management techniques should be selected based on environmental and site considerations including potential impacts to non-target, endangered and threatened species;

- Removal of invasive plant species, whenever possible, cultivating native plant species;
- Scheduling activities to avoid breeding and nesting seasons for any critically endangered or endangered wildlife species;
- Observing manufacturer machinery and equipment guidelines, procedures with regard to noise, and oil spill prevention and emergency response;
- Avoiding clearing in riparian areas;
- Avoiding use of machinery in the vicinity of watercourses.

An integrated approach to vegetation management may indicate that use of herbicides is the preferred approach to control fast-growing vegetation within transmission and distribution rights-of-way. In this case, the following guidance on herbicide application, storage, and handling should be considered.

If herbicides (in this sector, herbicides are the most common type of pesticide used) application is warranted, they should be managed to avoid their migration into off-site land or water.

5 Mowing with heavy-duty power equipment may be used to control growth of ground covers and prevent the establishment of trees and shrubs in the right-of-way. Herbicides, in combination with mowing, may control fast-growing weedy species that have a potential to mature to heights over those permitted within the right-of-way. Trimming and pruning may be utilized at the boundaries of rights-of-way to maintain corridor breadth and prevent the encroachment of tree branches. Hand removal or removal of vegetation, while labor intensive, may be used in the vicinity of structures, streams, fences, and other obstructions which make the use of machinery difficult or dangerous.
environments (see Pesticides under the Hazardous Materials section).

**Forest Fires**
If underlying growth is left unchecked, or slash from routine maintenance is left to accumulate within right-of-way boundaries, sufficient fuel can accumulate that may promote forest fires.

Recommended measures to prevent and control risk of forest fire include:

- Monitoring right-of-way vegetation according to fire risk;
- Removing blowdown and other high-hazard fuel accumulations;
- Time thinning, slashing, and other maintenance activities to avoid forest fire seasons;
- Disposal of maintenance slash by truck or controlled burning. Controlled burning should adhere to applicable burning regulations, fire suppression equipment requirements, and typically must be monitored by a fire watcher;
- Planting and managing fire resistant species (e.g. hardwoods) within, and adjacent to, rights-of-way;
- Establishing a network of fuel breaks of less flammable materials or cleared land to slow progress of fires and allow fire fighting access.

---

8 As an example, the British Columbia Transmission Corporation (BCTC) maintains a Wildfire Risk Management System (WRMS) that classifies wildfire risk and provides a variety of corresponding mitigation measures. See (Blackwell et al., 2004).

9 Controlled burning should only be performed after considering potential impacts to air quality and according to the local air quality management requirements.

9 Birds and bats may be electrocuted by power lines in one of three ways: i) Simultaneously touching an energized wire and a neutral wire; ii) Simultaneously touching two live wires; and iii) Simultaneously touching an energized wire and any other piece of equipment on a pole or tower that is bonded to the earth through a ground wire. Raptor Protection Video Group (2000)

10 Larger species (e.g. hawks, falcons, owls, vultures, cranes, egrets, and ravens) are at particular risk of simultaneously touching two wires or components while flying due to their long wing spans. Anderson (1991)

10 Further information is available from Avian Power Line Interaction Committee (2005) and the U.S. Fish and Wildlife Service (2005).

Environmental, Health, and Safety Guidelines  
ELECTRIC POWER TRANSMISSION AND DISTRIBUTION  

- Considering the installation of underground transmission and distribution lines in sensitive areas (e.g. critical natural habitats);
- Installing visibility enhancement objects such as marker balls, bird deterrents, or diverters.\textsuperscript{13}

\textbf{Aquatic Habitat Alteration}

Power transmission and distribution lines, and associated access roads and facilities, may require construction of corridors crossing aquatic habitats that may disrupt watercourses and wetlands, and require the removal of riparian vegetation. In addition, sediment and erosion from construction activities and storm water runoff may increase turbidity of surface watercourses.

Recommended measures to prevent and control impacts to aquatic habitats include:

- Site power transmission towers and substations to avoid critical aquatic habitat (e.g. watercourses, wetlands, and riparian areas), as well as fish spawning habitat, and critical fish over-wintering habitat;
- Maintaining fish access when road crossings of watercourses are unavoidable by utilizing clearspan bridges, open-bottom culverts, or other approved methods;
- Minimizing clearing and disruption to riparian vegetation;
- Management of construction site activities as described in the relevant sections of the \textbf{General EHS Guidelines}.

\textbf{Marine Habitat Alteration}

Transmission across ocean stretches may require use of submarine transmission cables on the ocean floor. Submarine cables are also occasionally used to transmit high-voltage power across long stretches of water to islands and other locations that are inaccessible by conventional techniques. Cables are installed using a cable-laying vessel and a remotely operated, underwater vehicle. Issues associated with marine habitat alteration include disruption to intertidal vegetation (e.g. eelgrass), coral reefs, and marine life, including marine mammals, and sedimentation resulting in turbidity and reductions in water quality.

Recommended measures to prevent and control impacts to marine habitats include:

- Locating and siting cable routes, and shore access, to avoid critical marine habitats (e.g. breeding grounds and eelgrass) and coral reefs;
- Burying submarine cables when traversing sensitive intertidal habitat;
- Monitoring cable laying path for presence of marine mammals;
- Avoiding laying submarine cable during fish and marine mammals breeding periods, calving periods, and spawning seasons.

\textbf{Electric and Magnetic Fields}

Electric and magnetic fields (EMF) are invisible lines of force emitted by and surrounding any electrical device (e.g. power lines and electrical equipment). Electric fields are produced by voltage and increase in strength as the voltage increases. Electric field strength is measured in volts per meter (V/m). Magnetic fields result from the flow of electric current and increase in strength as the current increases. Magnetic fields are measured in units of gauss (G) or tesla (T), where 1T equals 10,000G. Electric fields are shielded by materials that conduct electricity, and other materials, such as trees and building \textsuperscript{13} Several studies have found that bird diverters that are installed to increase the visibility of power lines reduce collision rates considerably. Crowder and Rhodes (1999).
materials. Magnetic fields pass through most materials and are difficult to shield. Both electric and magnetic fields decrease rapidly with distance. Power frequency EMF typically has a frequency in the range of 50 – 60 Hertz (Hz), and is considered Extremely Low Frequency (ELF). 14

Although there is public and scientific concern over the potential health effects associated with exposure to EMF (not only high-voltage power lines and substations, but also from everyday household uses of electricity), there is no empirical data demonstrating adverse health effects from exposure to typical EMF levels from power transmissions lines and equipment. 15 However, while the evidence of adverse health risks is weak, it is still sufficient to warrant limited concern. 16

Recommendations applicable to the management of EMF exposures include:

- Evaluating potential exposure to the public against the reference levels developed by the International Commission on Non-Ionizing Radiation Protection (ICNIRP). 17 18 Average and peak exposure levels should remain below the ICNIRP recommendation for General Public Exposure 19;
- Considering siting new facilities so as to avoid or minimize exposure to the public. Installation of transmission lines or other high voltage equipment above or adjacent to residential properties or other locations intended for highly frequent human occupancy, (e.g. schools or offices), should be avoided;
- If EMF levels are confirmed or expected to be above the recommended exposure limits, application of engineering techniques should be considered to reduce the EMF produced by power lines, substations, or transformers. Examples of these techniques include:
  - Shielding with specific metal alloys 20
  - Burying transmission lines 21
  - Increasing height of transmission towers
  - Modifications to size, spacing, and configuration of conductors

Hazardous Materials

Hazardous materials in this sector include insulating oils / gases (e.g. Polychlorinated Biphenyls [PCB] and sulfur hexafluoride [SF6]), and fuels, in addition to chemicals or products for wood preservation for poles and associated wood construction material. The use of herbicides for right-of-way vegetation maintenance is discussed in the above section on ‘Right-of-Way Maintenance’.

---

14 National Institute of Environmental Health Sciences (2002)
15 International Commission on Non-Ionizing Radiation Protection (ICNIRP) (2001); International Agency for Research on Cancer (2002); U.S. National Institute of Health (2002); Advisory Group to the Radiation Protection Board of the UK (2001), and U.S. National Institute of Environmental Health Sciences (1999)).
16 U.S. National Institute of Environmental Health Sciences (2002)
17 ICNIRP is a non-governmental organization formally recognized by the World Health Organization (WHO), which published the “Guidelines for Limiting Exposure to Time-varying Electric, Magnetic, and Electromagnetic Fields” following reviews of all the peer-reviewed scientific literature, including thermal and non-thermal effects. The standards are based on evaluations of biological effects that have been established to have health consequences. The main conclusion from the WHO reviews is that exposures below the limits recommended by the ICNIRP international guidelines do not appear to have any known consequence on health.
18 An additional source of information is the Institute of Electrical and Electronics Engineers. See IEEE (2005).
19 The ICNIRP exposure guidelines for General Public Exposure are listed in Section 2.1 of this Guideline.
20 This is effective for reduction of electric field exposure, but not for reduction of magnetic field exposure.
21 Ibid.
**Insulating Oils and Fuels**

Highly-refined, mineral insulating oils are used to cool transformers and provide electrical insulation between live components. They are typically found in the largest quantities at electrical substations and maintenance shops. Sulfur Hexafluoride (SF6) may also be used as a gas insulator for electrical switching equipment and in cables, tubular transmission lines, and transformers. SF6 may be used as an alternative to insulating oils. However, the use of SF6, a greenhouse gas with a significantly higher global warming potential (GWP) than CO2, should be minimized. In cases the gas is used for applications involving high voltages (>350 KV), equipment with a low leakage rate (<99 percent) should be used.

Liquid petroleum fuels for vehicles and other equipment may also be used and stored at transmission and distribution projects. Recommendations for prevention and control of hazards associated with spill prevention, emergency response, clean-up, and contaminated soil remediation are addressed in the General EHS Guidelines.

Polychlorinated Biphenyls (PCB) were widely used as a dielectric fluid to provide electrical insulation, although their use has been largely discontinued due to potential harmful effects on human health and the environment. Recommendations for the management of PCB include:

- Replacing existing transformers and other electrical equipment containing PCB, and ensuring appropriate storage, decontamination, and disposal of contaminated units;
- Prior to final disposal, retired transformers and equipment containing PCB should be stored on a concrete pad with curbs sufficient to contain the liquid contents of these containers should they be spilled or leaked. The storage area should also have a roof to prevent precipitation from collecting in the storage area. Disposal should involve facilities capable of safely transporting and disposing of hazardous waste containing PCB;[22]
- Surrounding soil exposed to PCB leakage from equipment should be assessed, and appropriate removal and/or remediation measures should be implemented, as addressed in the section on contaminated soil in the General EHS Guidelines.

**Wood Preservatives**

The majority of wooden utility poles are treated with pesticide preservatives to protect against insects, bacteria, and fungi, and to prevent rot. The preservatives most commonly used for power poles are oil-based pesticides such as creosote, pentachlorophenol (PCP), and chromated copper arsenate (CCA). Use of these preservatives is being limited in some countries due to their toxic effects on the environment. While in use, poles may leach preservatives into soils and groundwater, however, levels are highest directly beside poles and decrease to within normal levels at approximately 30 centimeters (cm) distance from the pole.[23] The most significant potential environmental impacts occur at specialized wood treatment facilities if not managed appropriately.

Poles should be pretreated at an appropriate facility to ensure chemical fixation and prevent leaching, and to impede the formation of surface residues at the right-of-way.[24] Further

---

22 For a complete discussion on the identification and management of PCB in this industry sector, please see the UNEP publication “PCB Transformers and Capacitors: From Management to Reclassification and Disposal” (2002). Available at: http://www.chem.unep.ch/pops/pdf/PCBtranscap.pdf
23 Zagury et al. (2003)
24 Lebow and Tippie (2001)
Recommended measures to prevent and control the impacts of wood preservatives at the point of use include:

- Evaluating the cost and benefit of using alternative pole materials (e.g. steel, concrete, and fiberglass);
- Consider use of alternative preservatives (e.g. copper azote);
- Undertake appropriate disposal of used poles. Landfill facilities should be capable of handling wastes that may have chemical leaching properties. Disposal through incineration or through recycling should consider associated air emissions and secondary product residues of preservative chemicals.

**Pesticides**

Pesticide use should be established as part of an Integrated Pest Management (IPM) strategy and a documented Pest Management Plan (PMP). The following stages should be considered when designing and implementing an IPM strategy, giving preference to alternative pest management strategies, with the use of synthetic chemical pesticides as a last option.

**Alternatives to Pesticide Application** - The following alternatives to pesticides should be considered:

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

**Pesticide Application** - If pesticide application is warranted, users should take the following precautions:

- Train personnel to apply pesticides and ensure that personnel have received applicable certifications or equivalent training where such certifications are not required;
- Review the manufacturer’s directions on maximum recommended dosage or treatment, as well as published reports on using the reduced rate of pesticide application without loss of effect, and apply the minimum effective dose;
- Apply pesticides based on criteria (e.g. field observations, weather data, time of treatment, and dosage) and maintain a pesticide logbook to record such information;
- Avoid the use of pesticides that fall under the World Health Organization Recommended Classification of Pesticides by Hazard Classes 1a and 1b;
- Avoid the use of pesticides that fall under the World Health Organization Recommended Classification of Pesticides by Hazard Class II if the project host country lacks restrictions on distribution and use of these chemicals, or if they are likely to be accessible to personnel without proper training.

---

25 Examples of certification schemes are provided by the US EPA (2006), which classifies pesticides as either “unclassified” or “restricted” and requires workers that apply unclassified pesticides to be trained according to the Worker Protection Standard (40 CFR Part 170) for Agricultural Pesticides. It further requires restricted pesticides to be applied by or in the presence of a certified pesticide applicator.
equipment, and facilities to handle, store, apply, and dispose of these products properly;

- Avoid the use of pesticides listed in Annexes A and B of the Stockholm Convention, except under the conditions noted in the convention;\(^{26}\)

- Use only pesticides that are manufactured under license and registered and approved by the appropriate authority and in accordance with the Food and Agriculture Organization's (FAO) International Code of Conduct on the Distribution and Use of Pesticides;\(^{27}\)

- Use only pesticides that are labeled in accordance with international standards and norms, such as the FAO Revised Guidelines for Good Labeling Practice for Pesticides;\(^{28}\)

- Select application technologies and practices designed to reduce unintentional drift or runoff only as indicated in an IPM program, and under controlled conditions;

- Maintain and calibrate pesticide application equipment in accordance with manufacturer’s recommendations;

- Establish untreated buffer zones or strips along water sources, rivers, streams, ponds, lakes, and ditches to help protect water resources.

**Pesticide Handling and Storage** - Contamination of soils, groundwater, or surface water resources, due to accidental spills during transfer, mixing, and storage of pesticides should be prevented by following the hazardous materials storage and handling recommendations presented in the General EHS Guidelines. Additional recommendations include the following:

- Store pesticides in their original packaging, in a dedicated, dry, cool, frost-free, and well aerated location that can be locked and properly identified with signs, with access limited to authorized people.\(^{29}\) No human or animal food may be stored in this location. The store room should also be designed with spill containment measures and sited in consideration of potential for contamination of soil and water resources;

- Mixing and transfer of pesticides should be undertaken by trained personnel in ventilated and well lit areas, using containers designed and dedicated for this purpose.

- Containers should not be used for any other purpose (e.g. drinking water). Contaminated containers should be handled as hazardous waste, and should be treated accordingly. Disposal of containers contaminated with pesticides should be done in a manner consistent with FAO guidelines and with manufacturer’s directions;\(^{30}\)

- Purchase and store no more pesticide than needed and rotate stock using a “first-in, first-out” principle so that pesticides do not become obsolete.\(^{31}\) Additionally, the use of obsolete pesticides should be avoided under all circumstances;\(^{32}\) A management plan that includes measures for the containment, storage and ultimate destruction of all obsolete stocks should be prepared in accordance to guidelines by FAO and consistent with country commitments under the Stockholm, Rotterdam and Basel Conventions.

- Collect rinse water from equipment cleaning for reuse (such as for the dilution of identical pesticides to concentrations used for application);

---


\(^{27}\) FAO (2002)

\(^{28}\) FAO (2002)

\(^{29}\) FAO (2002)

\(^{30}\) See FAO Guidelines for the Disposal of Waste Pesticides and Pesticide Containers.

\(^{31}\) See FAO (1996).

\(^{32}\) See the FAO publication on pesticide storage and stock control manual. FAO Pesticide Disposal Series No. 3 (1996).
Environmental, Health, and Safety Guidelines

ELECTRIC POWER TRANSMISSION AND DISTRIBUTION

April 30, 2007

10

• Ensure that protective clothing worn during pesticide application is either cleaned or disposed of in an environmentally responsible manner
• Implement groundwater supply wellhead setbacks for pesticide application and storage
• Maintain records of pesticide use and effectiveness.

1.2 Occupational Health and Safety

Most occupational health and safety issues during the construction, operation, maintenance, and decommissioning of electric power distribution projects are common to those of large industrial facilities, and their prevention and control is discussed in the General EHS Guidelines. These impacts include, among others, exposure to physical hazards from use of heavy equipment and cranes; trip and fall hazards; exposure to dust and noise; falling objects; work in confined spaces; exposure to hazardous materials; and exposure to electrical hazards from the use of tools and machinery.

Occupational health and safety hazards specific to electric power transmission and distribution projects primarily include:

• Live power lines
• Working at height
• Electric and magnetic fields
• Exposure to chemicals

Live Power Lines

Workers may be exposed to occupational hazards from contact with live power lines during construction, maintenance, and operation activities. Prevention and control measures associated with live power lines include:

• Only allowing trained and certified workers to install, maintain, or repair electrical equipment;

Deactivating and properly grounding live power distribution lines before work is performed on, or in close proximity, to the lines;

Ensuring that live-wire work is conducted by trained workers with strict adherence to specific safety and insulation standards. Qualified or trained employees working on transmission or distribution systems should be able to achieve the following:\33:

○ Distinguish live parts from other parts of the electrical system
○ Determine the voltage of live parts
○ Understand the minimum approach distances outlined for specific live line voltages
○ Ensure proper use of special safety equipment and procedures when working near or on exposed energized parts of an electrical system

Workers should not approach an exposed energized or conductive part even if properly trained unless:

○ The worker is properly insulated from the energized part with gloves or other approved insulation; or,
○ The energized part is properly insulated from the worker and any other conductive object; or,
○ The worker is properly isolated and insulated from any other conductive object (live-line work).

Where maintenance and operation is required within minimum setback distances, specific training, safety measures, personal safety devices, and other precautions should be defined in a health and safety plan. (Table 2 in Section 2.2 provides recommended minimum safety setbacks for workers);

33 Further information is available from the Occupational Safety and Health Administration (OSHA). Available at: http://www.osha.gov/SLTC/powertransmission/standards.html
Environmental, Health, and Safety Guidelines
ELECTRIC POWER TRANSMISSION AND DISTRIBUTION

Workers not directly associated with power transmission and distribution activities who are operating around power lines or power substations should adhere to local legislation, standards, and guidelines relating to minimum approach distances for excavations, tools, vehicles, pruning, and other activities;

- Minimum hot stick distances may only be reduced provided that the distance remaining is greater than the distance between the energized part and a grounded surface.

Working at height on poles and structures
Workers may be exposed to occupational hazards when working at elevation during construction, maintenance, and operation activities. Prevention and control measures for working at height include:

- Testing structures for integrity prior to undertaking work;
- Implementation of a fall protection program that includes training in climbing techniques and use of fall protection measures; inspection, maintenance, and replacement of fall protection equipment; and rescue of fall-arrested workers, among others;
- Establishment of criteria for use of 100 percent fall protection (typically when working over 2 meters above the working surface, but sometimes extended to 7 meters, depending on the activity). The fall protection system should be appropriate for the tower structure and necessary movements, including ascent, descent, and moving from point to point;
- Installation of fixtures on tower components to facilitate the use of fall protection systems;
- Provision of an adequate work-positioning device system for workers. Connectors on positioning systems should be compatible with the tower components to which they are attached;
- Hoisting equipment should be properly rated and maintained and hoist operators properly trained;
- Safety belts should be of not less than 16 millimeters (mm) (5/8 inch) two-in-one nylon or material of equivalent strength. Rope safety belts should be replaced before signs of aging or fraying of fibers become evident;
- When operating power tools at height, workers should use a second (backup) safety strap;
- Signs and other obstructions should be removed from poles or structures prior to undertaking work;
- An approved tool bag should be used for raising or lowering tools or materials to workers on structures.

Electric and magnetic fields
Electric and magnetic fields (EMF) are described in Section 1.1 above. Electric utility workers typically have a higher exposure to EMF than the general public due to working in proximity to electric power lines.

Occupational EMF exposure should be prevented or minimized through the preparation and implementation of an EMF safety program including the following components:

- Identification of potential exposure levels in the workplace, including surveys of exposure levels in new projects and the use of personal monitors during working activities;

34 A 1994 study estimated the average exposure of electrical workers (including jobs in electric utilities and other industries) in Los Angeles, California to be 9.6 milligauss (mG), compared to 1.7 mG for workers in other fields (S. J. London et al., 1994).

35 Although detailed studies of workplace exposure to EMF in the United States, Canada, France, England, and several Northern European countries have found no conclusive link or correlation between typical occupational EMF exposure and adverse health effects, some studies have identified a possible association between occupational exposure to EMF and cancer, such as brain cancer (U.S. National Institute of Environmental Health Sciences 2002) indicating there is evidence to warrant limited concern.
• Training of workers in the identification of occupational EMF levels and hazards;

• Establishment and identification of safety zones to differentiate between work areas with expected elevated EMF levels compared to those acceptable for public exposure, limiting access to properly trained workers;

• Implementation of action plans to address potential or confirmed exposure levels that exceed reference occupational exposure levels developed by international organizations such as the International Commission on Non-Ionizing Radiation Protection (ICNIRP), and the Institute of Electrical and Electronics Engineers (IEEE)\(^\text{36}\). Personal exposure monitoring equipment should be set to warn of exposure levels that are below occupational exposure reference levels (e.g. 50 percent). Action plans to address occupational exposure may include limiting exposure time through work rotation, increasing the distance between the source and the worker, when feasible, or the use of shielding materials.

Exposure to chemicals

Occupational exposures to chemicals in this sector primarily include handling of pesticides (herbicides) used for right-of-way maintenance, and exposure to PCB in transformers and other electrical components.

Pesticides

Occupational health and safety impacts associated with pesticides are similar to those for other hazardous substances, and their prevention and control are discussed in the General EHS Guidelines. Potential exposures to pesticides include dermal contact and inhalation during their storage, preparation and application. The effect of such impacts may be increased by climatic conditions such as wind, which may increase the chance of unintended drift, or high temperatures, which may deter the use of personal protective equipment (PPE). Recommendations specific to the use of pesticides include:

• Train personnel to apply pesticides and ensure that personnel have received the necessary certifications,\(^\text{37}\) or equivalent training where such certifications are not required;

• Respect post-treatment intervals to avoid operator exposure during reentry to crops with residues of pesticides;

• Ensure hygiene practices are followed (in accordance to FAO and PMP) to avoid exposure of family members to pesticides residues.

PCBs

Maintenance shops and other facilities, and activities may involve potential contact with PCB or PCB-contaminated machinery. Recommendations for chemical exposure, including PCB, are addressed in the General EHS Guidelines.\(^\text{38}\)

1.3 Community Health and Safety

Community health and safety impacts during the construction and decommissioning of transmission and distribution power lines are common to those of most large industrial facilities, and

\(^{36}\) The ICNIRP exposure guidelines for Occupational Exposure are listed in Section 2.2 of this Guideline.

\(^{37}\) The US EPA classifies pesticides as either “unclassified” or “restricted.” All workers that apply unclassified pesticides must be trained according to the Worker Protection Standard (40 CFR Part 170 and 171) for Agricultural Pesticides. Restricted pesticides must be applied by or in the presence of a certified pesticide applicator. For more information, see http://www.epa.gov/pesticides/health/worker.htm

are discussed in the General EHS Guidelines. These impacts include, among others, dust, noise, and vibration from construction vehicle transit, and communicable diseases associated with the influx of temporary construction labor. In addition to general health and safety standards outlined in the General EHS Guidelines, the operation of live power distribution lines and substations may generate the following industry-specific impacts:

- Electrocution
- Electromagnetic interference
- Visual amenity
- Noise and Ozone
- Aircraft Navigation Safety

**Electrocution**

Hazards most directly related to power transmission and distribution lines and facilities occur as a result of electrocution from direct contact with high-voltage electricity or from contact with tools, vehicles, ladders, or other devices that are in contact with high-voltage electricity. Recommended techniques to prevent these hazards include:

- Use of signs, barriers (e.g. locks on doors, use of gates, use of steel posts surrounding transmission towers, particularly in urban areas), and education / public outreach to prevent public contact with potentially dangerous equipment;
- Grounding conducting objects (e.g. fences or other metallic structures) installed near power lines, to prevent shock.

**Electromagnetic Interference**

The corona of overhead transmission line conductors and high-frequency currents of overhead transmission lines may result in the creation of radio noise. Typically, transmission line rights-of-way and conductor bundles are created to ensure radio reception at the outside limits remains normal. However, periods of rain, sleet or freezing rain sharply increases the streaming corona on conductors and may affect radio reception in residential areas near transmission lines.

**Visual Amenity**

Power transmission and distribution are necessary to transport energy from power facilities to residential communities, but may be visually intrusive and undesirable to local residents. To mitigate the visual impact of power distribution projects, the following mitigation measures should be implemented:

- Extensive public consultation during the planning of power line and power line right-of-way locations;
- Accurate assessment of changes in property values due to power line proximity;
- Siting power lines, and designing substations, with due consideration to landscape views and important environmental and community features;
- Location of high-voltage transmission and distribution lines in less populated areas, where possible;
- Burying transmission or distribution lines when power must be transported through dense residential or commercial areas.

**Noise and Ozone**

Noise in the form of buzzing or humming can often be heard around transformers or high voltage power lines producing corona. Ozone, a colorless gas with a pungent odor, may also be produced. Neither the noise nor ozone produced by power
distribution lines or transformers carries any known health risks.\textsuperscript{39}

The acoustic noise produced by transmission lines is greater with high voltage power lines (400-800 kilo volts [kV]) and even greater with ultra-high voltage lines (1000 kV and higher)\textsuperscript{40}. Noise from transmission lines reaches its maximum during periods of precipitation, including rain, sleet, snow or hail, or as the result of fog. The sound of rain typically masks the increase in noise produced by the transmission lines, but during other forms of precipitation (e.g. snow and sleet) and fog, the noise from overhead power lines can be troubling to nearby residents.

Measures to mitigate this impact may be addressed during project planning stages to locate rights-of-way away from human receptors, to the extent possible. Use of noise barriers or noise canceling acoustic devices should be considered as necessary.

\textbf{Aircraft Navigation Safety}

Power transmission towers, if located near an airport or known flight paths, can impact aircraft safety directly through collision or indirectly through radar interference. Aircraft collision impacts may be mitigated by:

- Avoiding the siting of transmission lines and towers close to airports and outside of known flight path envelopes;
- Consultation with regulatory air traffic authorities prior to installation;
- Adherence to regional or national air traffic safety regulations;
- Use of buried lines when installation is required in flight sensitive areas.

\textsuperscript{39} WHO (1998)
\textsuperscript{40} Gerasimov (2003)

\section*{2.0 Performance Indicators and Monitoring}

\subsection*{2.1 Environment}

\textbf{Emissions and Effluent Guidelines}

The power transmission and distribution sector does not typically give rise to significant air emissions or effluents. Where dust or potentially contaminated water runoff exists, site operations should comply with principles and guidelines described in the \textit{General EHS Guidelines} to meet ambient air and surface water guidelines. Table 1 lists exposure limits for general public exposure to electric and magnetic fields published by the International Commission on Non-Ionizing Radiation Protection (ICNIRP).

\begin{table}[h]
\centering
\begin{tabular}{|l|c|c|}
\hline
\textbf{Frequency} & \textbf{Electric Field (V/m)} & \textbf{Magnetic Field (µT)} \\
\hline
50 Hz & 5000 & 100 \\
60 Hz & 4150 & 83 \\
\hline
\end{tabular}
\caption{ICNIRP exposure limits for general public exposure to electric and magnetic fields.}
\end{table}

\textbf{Environmental Monitoring}

Environmental monitoring programs for this sector should be implemented to address all activities that have been identified to have potentially significant impacts on the environment during normal operations and upset conditions. Environmental monitoring activities should be based on direct or indirect indicators of emissions, effluents, and resource use applicable to the particular project. Monitoring frequency should be sufficient to provide representative data for the parameter being monitored.
Monitoring should be conducted by trained individuals following monitoring and record-keeping procedures and using properly calibrated and maintained equipment. Monitoring data should be analyzed and reviewed at regular intervals and compared with the operating standards so that any necessary corrective actions can be taken. Additional guidance on applicable sampling and analytical methods for emissions and effluents is provided in the \textit{General EHS Guidelines}.

\section*{2.2 Occupational Health and Safety}

\textbf{Occupational Health and Safety Guidelines}

Occupational health and safety performance should be evaluated against internationally published exposure guidelines, of which examples include the Threshold Limit Value (TLV\textsuperscript{®}) occupational exposure guidelines and Biological Exposure Indices (BEIs\textsuperscript{®}) published by American Conference of Governmental Industrial Hygienists (ACGIH),\textsuperscript{41} the Pocket Guide to Chemical Hazards published by the United States National Institute for Occupational Health and Safety (NIOSH),\textsuperscript{42} Permissible Exposure Limits (PELs) published by the Occupational Safety and Health Administration of the United States (OSHA),\textsuperscript{43} Indicative Occupational Exposure Limit Values published by European Union member states,\textsuperscript{44} or other similar sources.

Additional indicators specifically applicable to electric power transmission and distribution activities include the minimum safe working distances for trained employees listed in Table 2 and the ICNIRP exposure limits for occupational exposure to electric and magnetic fields listed in Table 3.

\begin{table}[h]
\centering
\begin{tabular}{|l|l|}
\hline
\textbf{Voltage Range (phase to phase – Kilovolts)} & \textbf{Minimum Working and Clear Hot Stick Distance (meters)} \\
\hline
2.1 to 15 & 0.6 \\
15.1 to 35 & 0.71 \\
35.1 to 46 & 0.76 \\
46.1 to 72.5 & 0.91 \\
72.6 to 121 & 1.01 \\
138 to 145 & 1.06 \\
161 to 169 & 1.11 \\
230 to 242 & 1.5 \\
345 to 362 & 2.13\textsuperscript{b} \\
500 to 552 & 3.35\textsuperscript{b} \\
700 to 765 & 4.5\textsuperscript{b} \\
\hline
\end{tabular}
\caption{Alternating Current - Minimum Working Distances for Trained Employees\textsuperscript{a}}
\end{table}

\begin{table}[h]
\centering
\begin{tabular}{|l|l|l|}
\hline
\textbf{Frequency} & \textbf{Electric Field (V/m)} & \textbf{Magnetic Field (µT)} \\
\hline
50 Hz & 10,000 & 500 \\
60 Hz & 8300 & 415 \\
\hline
\end{tabular}
\caption{ICNIRP exposure limits for occupational exposure to electric and magnetic fields.}
\end{table}

\textsuperscript{a} Available at: http://www.acgih.org/TLV/ and http://www.acgih.org/store/
\textsuperscript{b} Available at: http://www.cdc.gov/niosh/npg/
\textsuperscript{c} Available at: http://www.osha.gov/pls/oshaweb/owadisp.show_document?p_table=STANDARDS&p_id=9992
\textsuperscript{d} Available at: http://europe.osha.eu.int/good_practice/risks/ds/elec/

\section*{Accident and Fatality Rates}

Projects should try to reduce the number of accidents among project workers (whether directly employed or subcontracted) to a rate of zero, especially accidents that could result in lost work time, different levels of disability, or even fatalities. Facility rates may be benchmarked against the performance of facilities in this sector in developed countries through consultation with...
Occupational Health and Safety Monitoring

The working environment should be occupational hazards relevant to the specific project. Monitoring should be designed and implemented by accredited professionals as part of an occupational health and safety monitoring program. Facilities should also maintain a record of occupational accidents and diseases and dangerous occurrences and accidents. Additional guidance on occupational health and safety monitoring programs is provided in the General EHS Guidelines.

---

46 Accredited professionals may include Certified Industrial Hygienists, Registered Occupational Hygienists, or Certified Safety Professionals or their equivalent.
3.0 References and Additional Sources


Danish Agricultural Advisory Service (DAAS), 2000. Reduced pesticide use without loss of effect.


Annex A: General Description of Industry Activities

Electric power transmission is the bulk transfer of electricity from one place to another. Typically, power transmission occurs between a power generation facility and a substation located in close proximity to consumers. Power distribution refers to the delivery of electricity from a substation to consumers located in residential, commercial, and industrial areas.

Due to the large amount of power involved, transmission-level voltages are generally considered those above 110 kilo volts (kV). Voltages between 110 kV and 33 kV are typically considered sub-transmission voltages, but are occasionally used for long transmission systems with light loads. Voltages of less than 33 kV are representative of distribution projects.

Electric power transmission and distribution systems are often located in conjunction with highway, road, and other rights-of-way to minimize both costs and disturbance to ecological, socio-economic and cultural resources. Other factors, including land value, view sheds, archaeological resources, geotechnical hazards, accessibility, parks and other important features also contribute to the locating of transmission and distribution line right-of-way alignments.

Project development and construction activities typically include access road construction or upgrade, site preparation and development, removal of select vegetation, if any, and the grading and excavation of soils for the installation of structural foundations and site utilities. These activities are typical of industrial development projects and depend upon a number of factors, including topography, hydrology, and desired site layout, among others. Activities generally associated with the development and construction of power transmission and distribution include land clearing for transmission line rights-of-way, access road construction or upgrade, equipment staging areas, substation construction and/or upgrade, site preparation, and installation of transmission line components (e.g. transmission towers and substations, access and maintenance roads).

Operational activities may include maintenance of access to the transmission lines, towers and substations (e.g. low-impact trails or new/improved access roads) and vegetation management. Upgrades and maintenance for existing infrastructure are a consideration throughout the life cycle of the project.

Power transmission and distribution facilities are decommissioned when they are obsolete, damaged (e.g. by corrosion) or replaced due to increased power demand. Many power facilities are replaced with new or updated equipment at the same site or right-of-way. Decommissioning activities depend on the proposed subsequent use of the site, environmental sensitivities (e.g. natural grasslands) and the project specifics (e.g. aboveground or underground power lines). Activities may include demolition and removal of the installed infrastructure (e.g. transmission towers, substations, aboveground and underground utilities and road decommissioning) and reclamation of the project site, including ground stabilization and re-vegetation.

The following sections provide a description of the facilities and activities associated with the construction and operation of power transmission and distribution projects. Facilities and activities common to transmission and distribution projects, including right-of-way management and substations, are outlined below as well as facilities unique to transmission and distribution systems, including towers and utility poles. Typical components of a power transmission and distribution project are illustrated in Figure A-1.
Power Transmission Systems

The electric power transmission system is often referred to as a grid. Redundant paths and lines are provided so that power can be routed from any generation facility to any customer area through a variety of routes, based on the economics of the transmission path and the cost of power. The redundant paths and lines also allow power flow to be rerouted during planned maintenance and outages due to weather or accidents.

Power transmission occurs via a system of aboveground power lines and towers located between a power plant and a substation. When crossing a dense residential area is necessary, transmission and distribution systems can also be buried within underground conduits. Though the transmission efficiency is typically lower for underground lines and installation and maintenance are costly, locating the transmission system underground reduces impacts on land values, visual aesthetics, and vegetation loss. Submarine cables placed on the ocean floor by cable-laying boats are also occasionally used to transmit high-voltage power across long stretches of water to islands and other locations that are inaccessible by conventional techniques. Submarine cables are typically self-contained and fluid-filled to provide insulation over long distances.

Regional transmission grids consist of several large transmission systems connected by substations that are designed to transport electricity as efficiently as possible. Transmission networks can cover thousands of kilometers and encompass tens of thousands of towers. Energy is typically transmitted using a three-phase alternating current (AC) that is more efficient than a single phase. Energy is generally produced at low voltage (up to 30 kV) at a generating facility and then stepped up by a power station transformer to a higher voltage in order to reduce resistance and reduce the percentage of energy lost during transmission over a long distance. For long distance transmission, electricity is usually transmitted at voltages between 110 and 1200 kV. At extremely high voltages, such as those over 2000 kV, corona discharge energy losses associated with charged conductors can offset benefits of reductions in energy losses from reduced resistance. Over long distances, energy can also be transmitted via High Voltage Direct Current (HVDC). In these instances, smaller losses in energy and lower construction costs offset the need to construct conversion stations at each end of the transmission line to convert the direct current to alternating current for use in distribution systems.

Transmission towers or pylons are utilized to suspend high-voltage overhead power lines. These systems usually transmit three-phase electric power (the common method for transmission of high-voltage lines of over 50 kV) and, therefore, are designed to carry three (or multiples of three) conductors. One or two ground conductors are often added at the top of each tower for lightning protection. Transmission towers can be constructed from steel, concrete, aluminum, wood and reinforced plastic. The wire conductors on high-voltage lines are generally constructed of aluminum, or aluminum reinforced with steel strands. Each transmission tower or support structure must be constructed to support the load imposed on it by the conductors. As a result, foundations for transmission towers can be large and costly, particularly in areas where ground conditions are poor such as in wetlands. Guy wires can be utilized to stabilize transmission towers and resist some of the force of the conductors.

There are three main types of transmission powers or pylons used in a transmission system. Suspension towers support straight stretches of a transmission line. Deviation towers are

---

47 A corona discharge is an electrical discharge resulting from the ionization of the air around the conductor, generally generating power losses and ambient noise.
located at points where a transmission line changes direction. Terminal towers are located at the end of overhead transmission lines where they connect with substations or underground cables.

The most common type of transmission tower or pylon used for high-voltage power lines is a steel lattice structure. Tubular steel monopoles are also used to support high or medium voltage transmission lines, usually in urban areas. Transmission towers constructed of a steel framework can be used to support lines of all voltages, but they are most often used for voltages over 50 kV. Lattice towers can be assembled on the ground and erected by cable (which uses a large laydown area), erected by crane, or, in inaccessible areas, by helicopter. Transmission towers typically range from approximately 15 to 55 meters (m) in height.\textsuperscript{48}

Wooden transmission towers consisting of single poles, H-frames, or shapes resembling A’s or V’s are also commonly used to support high-voltage transmission lines. Wooden transmission towers are limited by the height of available trees (approximately 30m), and generally carry voltages of between 23 kV and 230 kV, lower than those carried by steel lattice transmission towers\textsuperscript{49}. Aluminum towers are often used in remote areas where they can be transported in and installed by helicopter. Towers of reinforced plastic are now available, but high costs currently restrict their use.

For underground transmission lines, the three wires used to transmit the three-phase power must be located in individual pipes or conduits. These pipes are covered in thermal concrete and surrounded in thermal backfill materials. Underground cable conduit systems typically require trenches of at least 1.5m in depth and width. Due to difficulties in dissipating heat, underground conduits are typically not used for high-voltage transmission lines over 350 kV.\textsuperscript{50}

**Power Distribution Systems**

Prior to consumer use, high-voltage energy is stepped down to a lower voltage aboveground line for use in sub-transmission or distribution systems. Distribution lines typically vary from 2.5 to 25 kV. Finally, the energy is transformed to low voltage at the point of residential or commercial use. This voltage ranges between 100 and 600 volts (V) depending on country and customer requirements. Power distribution poles (or utility or telephone poles) are typically constructed of wood, but steel, concrete, aluminum and fiberglass are also used. Distribution poles are typically spaced no further than 60m apart and are at least 12m in height.\textsuperscript{51} Wooden distribution poles are limited by the height of available trees (approximately 30m).

**Electrical Substations**

Electrical substations are stations along the electricity transmission and distribution system that transform voltage from low to high or high to low using transformers. Step-up transformers are used to increase voltage while decreasing current, while step-down transformers are used to decrease voltage while increasing current. Substations typically consist of one or more transformers, as well as switching, control, and protection equipment. Substations can be located in fenced enclosures, underground, or inside buildings.

There are two main types of electrical substations. Transmission substations contain high-voltage switches used to connect together high-voltage transmission lines or to allow specific

\textsuperscript{48} United Kingdom Parliament (2001)  
\textsuperscript{49} Great River Energy (2006)  
\textsuperscript{50} American Transmission Company (2005)  
\textsuperscript{51} United States of America Department of Defense (2004)
systems to be isolated for maintenance. Distribution substations are used to transfer power from the transmission system to the distribution system. Typically at least two transmission or sub-transmission lines enter a distribution substation, where their voltage is reduced to a value suitable for local consumption. Distribution substations can also be used to isolate faults in either the transmission or distribution systems. Complicated distribution substations containing high-voltage switching, switching, and backup systems are often located within large urban centers.

Rights-of-Way Management
Both aboveground transmission and distribution projects require rights-of-way to protect the system from windfall, contact with trees and branches, and other potential hazards that may result in damage to the system, power failures, or forest fires. Rights-of-way are also utilized to access, service, and inspect transmission and distribution systems. Underground distribution lines also require rights-of-way where excavation is prohibited or strictly monitored, construction activity is limited, and access to lines can be achieved if necessary. Being larger systems transmitting higher voltages, transmission rights-of-way are typically much larger than those for distribution systems and, consequently, require more extensive management.

Right-of-ways widths\(^{52}\) for transmission lines range from 15 to 100m depending on voltage and proximity to other rights-of-way (typical range is between 15 and 30m)\(^{53}\). For overhead distribution power lines up to 35 kV, 12 to 24m corridors (6 to 12m on each side) are recommended\(^{54}\). Access roads are often constructed in conjunction, or within, transmission line rights-of-way to provide access for maintenance and upkeep of the system.

To avoid disruption to overhead power lines and towers, regular maintenance of vegetation within the rights-of-way is required. Unchecked growth of tall trees and accumulation of vegetation within rights-of-way can result in a number of impacts including power outages through contact of branches and trees with transmission lines and towers; ignition of forest and brush fires; corrosion of steel equipment; blocking of equipment access; and interference with critical grounding equipment.

Regular maintenance and clearing of rights-of-way prevents natural forest succession and the establishment and growth of tall trees. Typically, tall trees of approximately 4.5m or more are not permitted within aboveground rights-of-way.\(^{55}\) Underground rights-of-way have far fewer vegetation restrictions, though trees with deep tap roots that may interfere with duct banks are usually prohibited from being grown within the right-of-way. Vegetation maintenance of rights-of-way can be accomplished with the following measures.

Mowing with heavy-duty power equipment is used to control growth of ground covers and prevent the establishment of trees and shrubs in the right-of-way. Herbicides, in combination with mowing, control fast-growing weedy species that have a potential to mature to heights over those permitted within the right-of-way. Trimming and pruning is utilized at the boundaries of rights-of-way to maintain corridor breadth and prevent the encroachment of tree branches. Hand removal or removal of vegetation is costly and time-consuming but is often used in the vicinity of structures, streams, fences, and other obstructions making the use of machinery difficult or dangerous.

\(^{52}\) For example, Duke Energy prescribes 21-meter minimum rights-of-way for voltages between 44 and 100 kV, 46-meter minimum rights-of-way for voltages of 230 kV, and 61-meter minimum rights-of-way for voltages of 525 kV (Duke Energy, 2006).
\(^{53}\) Santee Cooper (2002)
\(^{54}\) United States of America Department of National Defense (2004)
\(^{55}\) Georgia Power (2006)
Figure A-1: Electric Power Transmission and Distribution
APPENDIX

3-2 ZESCO SHEQ POLICY
We at ZESCO believe that integrating and continually improving the quality of our service, management of the environment and operational risks are a key to business sustainability, supply of reliable and quality electricity to the expectation of our customers' needs and compliance with relevant legal and regulatory requirements.

We have therefore established, implemented and are maintaining an Integrated Safety, Health, Environment and Quality (SHEQ) Management System, based on the requirements of ISO 9001, ISO 14001, OHSAS 18001, and ISO27001 international standards by complying with the objectives and targets by:

- minimizing risk and eliminating harm to employees, customers and the environment;
- ensure elimination of waste;
- minimizing risks and guarantee confidentiality, integrity and availability to our Information Communications and Technology (ICT) systems;
- ensuring reliable and safe supply of electricity that sustains business continuity;
- identifying, developing and maintaining the required resources to deliver reliable and high quality power supply to our customers safely as per their identified needs;
- effectively communicating with all stakeholders on all matters relating to SHEQ and service provision.

It is the duty of each ZESCO employee and contractors to comply with the SHEQ policy to enable ZESCO achieve its strategic objectives and establish and entrench a SHEQ driven culture within the Corporation.

Victor M. Mundende
Managing Director
APPENDIX

3-3  WBG EHS GUIDELINES
    - WASTE
    MANAGEMENT
1.6 Waste Management

Applicability and Approach .................................46
General Waste Management ................................47
   Waste Management Planning ..............................47
   Waste Prevention ...........................................47
   Recycling and Reuse ......................................48
   Treatment and Disposal ..................................48
Hazardous Waste Management ............................48
   Waste Storage .............................................48
   Transportation ..........................................49
   Treatment and Disposal .................................49
   Commercial or Government Waste Contractors ....49
   Small Quantities of Hazardous Waste ...............50
   Monitoring ...............................................50

Applicability and Approach
These guidelines apply to projects that generate, store, or handle any quantity of waste across a range of industry sectors. It is not intended to apply to projects or facilities where the primary business is the collection, transportation, treatment, or disposal of wastes. Specific guidance for these types of facilities is presented in the Environmental Health and Safety (EHS) Guidelines for Waste Management Facilities.

A waste is any solid, liquid, or contained gaseous material that is being discarded by disposal, recycling, burning or incineration. It can be byproduct of a manufacturing process or an obsolete commercial product that can no longer be used for intended purpose and requires disposal.

Solid (non-hazardous) wastes generally include any garbage, refuse. Examples of such waste include domestic trash and garbage; inert construction / demolition materials; refuse, such as metal scrap and empty containers (except those previously used to contain hazardous materials which should, in principle, be managed as a hazardous waste); and residual waste from industrial operations, such as boiler slag, clinker, and fly ash.

Hazardous waste shares the properties of a hazardous material (e.g. ignitability, corrosivity, reactivity, or toxicity), or other physical, chemical, or biological characteristics that may pose a potential risk to human health or the environment if improperly managed. Wastes may also be defined as “hazardous” by local regulations or international conventions, based on the origin of the waste and its inclusion on hazardous waste lists, or based on its characteristics.

Sludge from a waste treatment plant, water supply treatment plant, or air pollution control facility, and other discarded material, including solid, liquid, semisolid, or contained gaseous material resulting from industrial operations needs to be evaluated on a case-by-case basis to establish whether it constitutes a hazardous or a non-hazardous waste.

Facilities that generate and store wastes should practice the following:

- Establishing waste management priorities at the outset of activities based on an understanding of potential Environmental, Health, and Safety (EHS) risks and impacts and considering waste generation and its consequences
- Establishing a waste management hierarchy that considers prevention, reduction, reuse, recovery, recycling, removal and finally disposal of wastes.
- Avoiding or minimizing the generation waste materials, as far as practicable
- Where waste generation cannot be avoided but has been minimized, recovering and reusing waste
• Where waste can not be recovered or reused, treating, destroying, and disposing of it in an environmentally sound manner

General Waste Management
The following guidance applies to the management of non-hazardous and hazardous waste. Additional guidance specifically applicable to hazardous wastes is presented below. Waste management should be addressed through a Waste management system that addresses issues linked to waste minimization, generation, transport, disposal, and monitoring.

Waste Management Planning
Facilities that generate waste should characterize their waste according to composition, source, types of wastes produced, generation rates, or according to local regulatory requirements. Effective planning and implementation of waste management strategies should include:

• Review of new waste sources during planning, siting, and design activities, including during equipment modifications and process alterations, to identify expected waste generation, pollution prevention opportunities, and necessary treatment, storage, and disposal infrastructure
• Collection of data and information about the process and waste streams in existing facilities, including characterization of waste streams by type, quantities, and potential use/disposition
• Establishment of priorities based on a risk analysis that takes into account the potential EHS risks during the waste cycle and the availability of infrastructure to manage the waste in an environmentally sound manner
• Definition of opportunities for source reduction, as well as reuse and recycling

• Definition of procedures and operational controls for on-site storage
• Definition of options / procedures / operational controls for treatment and final disposal

Waste Prevention
Processes should be designed and operated to prevent, or minimize, the quantities of wastes generated and hazards associated with the wastes generated in accordance with the following strategy:

• Substituting raw materials or inputs with less hazardous or toxic materials, or with those where processing generates lower waste volumes
• Applying manufacturing process that convert materials efficiently, providing higher product output yields, including modification of design of the production process, operating conditions, and process controls
• Instituting good housekeeping and operating practices, including inventory control to reduce the amount of waste resulting from materials that are out-of-date, off-specification, contaminated, damaged, or excess to plant needs
• Instituting procurement measures that recognize opportunities to return usable materials such as containers and which prevents the over ordering of materials
• Minimizing hazardous waste generation by implementing stringent waste segregation to prevent the commingling of non-hazardous and hazardous waste to be managed

Examples of waste prevention strategies include the concept of Lean Manufacturing found at http://www.epa.gov/epaoswer/hazwaste/minimize/lean.htm
Recycling and Reuse
In addition to the implementation of waste prevention strategies, the total amount of waste may be significantly reduced through the implementation of recycling plans, which should consider the following elements:

- Evaluation of waste production processes and identification of potentially recyclable materials
- Identification and recycling of products that can be reintroduced into the manufacturing process or industry activity at the site
- Investigation of external markets for recycling by other industrial processing operations located in the neighborhood or region of the facility (e.g., waste exchange)
- Establishing recycling objectives and formal tracking of waste generation and recycling rates
- Providing training and incentives to employees in order to meet objectives

Treatment and Disposal
If waste materials are still generated after the implementation of feasible waste prevention, reduction, reuse, recovery and recycling measures, waste materials should be treated and disposed of and all measures should be taken to avoid potential impacts to human health and the environment. Selected management approaches should be consistent with the characteristics of the waste and local regulations, and may include one or more of the following:

- On-site or off-site biological, chemical, or physical treatment of the waste material to render it non-hazardous prior to final disposal
- Treatment or disposal at permitted facilities specially designed to receive the waste. Examples include: composting operations for organic non-hazardous wastes; properly designed, permitted and operated landfills or incinerators designed for the respective type of waste; or other methods known to be effective in the safe, final disposal of waste materials such as bioremediation.

Hazardous Waste Management
Hazardous wastes should always be segregated from non-hazardous wastes. If generation of hazardous waste can not be prevented through the implementation of the above general waste management practices, its management should focus on the prevention of harm to health, safety, and the environment, according to the following additional principles:

- Understanding potential impacts and risks associated with the management of any generated hazardous waste during its complete life cycle
- Ensuring that contractors handling, treating, and disposing of hazardous waste are reputable and legitimate enterprises, licensed by the relevant regulatory agencies and following good international industry practice for the waste being handled
- Ensuring compliance with applicable local and international regulations

Waste Storage
Hazardous waste should be stored so as to prevent or control accidental releases to air, soil, and water resources in area location where:

---

51 International requirements may include host-country commitments under the Basel Convention on the Control of Transboundary Movements of Hazardous Waste and their disposal (http://www.basel.int/) and Rotterdam Convention on the prior Inform Consent Procedure for Certain Hazardous Chemicals and Pesticides in International Trade (http://www.pic.int/)
General EHS Guidelines: Environmental Waste Management

- Waste is stored in a manner that prevents the commingling or contact between incompatible wastes, and allows for inspection between containers to monitor leaks or spills. Examples include sufficient space between incompatibles or physical separation such as walls or containment curbs.
- Store in closed containers away from direct sunlight, wind, and rain.
- Secondary containment systems should be constructed with materials appropriate for the wastes being contained and adequate to prevent loss to the environment.
- Secondary containment is included wherever liquid wastes are stored in volumes greater than 220 liters. The available volume of secondary containment should be at least 110 percent of the largest storage container, or 25 percent of the total storage capacity (whichever is greater), in that specific location.
- Provide adequate ventilation where volatile wastes are stored.

Hazardous waste storage activities should also be subject to special management actions, conducted by employees who have received specific training in handling and storage of hazardous wastes:

- Provision of readily available information on chemical compatibility to employees, including labeling each container to identify its contents.
- Limiting access to hazardous waste storage areas to employees who have received proper training.
- Clearly identifying (label) and demarcating the area, including documentation of its location on a facility map or site plan.
- Conducting periodic inspections of waste storage areas and documenting the findings.

- Preparing and implementing spill response and emergency plans to address their accidental release (additional information on Emergency Plans in provided in Section 3 of this document).
- Avoiding underground storage tanks and underground piping of hazardous waste.

Transportation

On-site and Off-site transportation of waste should be conducted so as to prevent or minimize spills, releases, and exposures to employees and the public. All waste containers designated for off-site shipment should be secured and labeled with the contents and associated hazards, be properly loaded on the transport vehicles before leaving the site, and be accompanied by a shipping paper (i.e., manifest) that describes the load and its associated hazards, consistent with the guidance provided in Section 3.4 on the Transport of Hazardous Materials.

Treatment and Disposal

In addition to the recommendations for treatment and disposal applicable to general wastes, the following issues specific to hazardous wastes should be considered:

Commercial or Government Waste Contractors

In the absence of qualified commercial or government-owned waste vendors (taking into consideration proximity and transportation requirements), facilities generating waste should consider using:

- Have the technical capability to manage the waste in a manner that reduces immediate and future impact to the environment.
- Have all required permits, certifications, and approvals of applicable government authorities.
Environmental, Health, and Safety (EHS) Guidelines
GENERAL EHS GUIDELINES: ENVIRONMENTAL
WASTE MANAGEMENT

- Have been secured through the use of formal procurement agreements

In the absence of qualified commercial or government-owned waste disposal operators (taking into consideration proximity and transportation requirements), project sponsors should consider using:

- Installing on-site waste treatment or recycling processes
- As a final option, constructing facilities that will provide for the environmental sound long-term storage of wastes on-site (as described elsewhere in the General EHS Guidelines) or at an alternative appropriate location up until external commercial options become available

Small Quantities of Hazardous Waste
Hazardous waste materials are frequently generated in small quantities by many projects through a variety of activities such as equipment and building maintenance activities. Examples of these types of wastes include: spent solvents and oily rags, empty paint cans, chemical containers; used lubricating oil; used batteries (such as nickel-cadmium or lead acid); and lighting equipment, such as lamps or lamp ballasts. These wastes should be managed following the guidance provided in the above sections.

Monitoring
Monitoring activities associated with the management of hazardous and non-hazardous waste should include:

- Regular visual inspection of all waste storage collection and storage areas for evidence of accidental releases and to verify that wastes are properly labeled and stored. When significant quantities of hazardous wastes are generated and stored on site, monitoring activities should include:
  - Inspection of vessels for leaks, drips or other indications of loss
  - Identification of cracks, corrosion, or damage to tanks, protective equipment, or floors
  - Verification of locks, emergency valves, and other safety devices for easy operation (lubricating if required and employing the practice of keeping locks and safety equipment in standby position when the area is not occupied)
  - Checking the operability of emergency systems
  - Documenting results of testing for integrity, emissions, or monitoring stations (air, soil vapor, or groundwater)
  - Documenting any changes to the storage facility, and any significant changes in the quantity of materials in storage

- Regular audits of waste segregation and collection practices
- Tracking of waste generation trends by type and amount of waste generated, preferably by facility departments
- Characterizing waste at the beginning of generation of a new waste stream, and periodically documenting the characteristics and proper management of the waste, especially hazardous wastes
- Keeping manifests or other records that document the amount of waste generated and its destination
- Periodic auditing of third party treatment, and disposal services including re-use and recycling facilities when significant quantities of hazardous wastes are managed by third parties. Whenever possible, audits should include site visits to the treatment storage and disposal location
- Regular monitoring of groundwater quality in cases of Hazardous Waste on site storage and/or pretreatment and disposal
- Monitoring records for hazardous waste collected, stored, or shipped should include:
  - Name and identification number of the material(s) composing the hazardous waste
  - Physical state (i.e., solid, liquid, gaseous or a combination of one, or more, of these)
  - Quantity (e.g., kilograms or liters, number of containers)
  - Waste shipment tracking documentation to include, quantity and type, date dispatched, date transported and date received, record of the originator, the receiver and the transporter
  - Method and date of storing, repacking, treating, or disposing at the facility, cross-referenced to specific manifest document numbers applicable to the hazardous waste
  - Location of each hazardous waste within the facility, and the quantity at each location
APPENDIX

3-4 WBG EBRD GUIDELINES - WORKER ACCOMMODATIONS
The EBRD is an international financial institution that supports projects from central Europe to central Asia. Investing primarily in private sector clients whose needs cannot be fully met by the market, we foster transition towards open and democratic market economies. In all our operations we follow the highest standards of corporate governance and sustainable development.

IFC, a member of the World Bank Group, creates opportunity for people to escape poverty and improve their lives. We foster sustainable economic growth in developing countries by supporting private sector development, mobilising private capital, and providing advisory and risk mitigation services to businesses and governments. Our new investments totalled US$ 15 billion in fiscal 2009, helping play a prominent role in addressing the financial crisis. For more information, visit www.ifc.org.

About this guidance note
This Guidance Note is aimed at providing practical guidance to IFC and EBRD specialists, consultants and clients on the processes and standards that should be applied to the provision of workers’ accommodation in relation to projects funded by IFC or the EBRD. Applying appropriate standards to the construction and operation of worker housing falls within the performance requirements on labour and working conditions expected of clients by both institutions. The Guidance Note also provides examples of good practice approaches that businesses have successfully applied in their operations. IFC and the EBRD have not financed all the projects or companies mentioned in the Note. Some of the information in the Note originates from publicly available sources such as company web sites. IFC and the EBRD have not verified the accuracy of such information nor the companies’ practices. This Guidance Note is not intended to establish policy itself; and any issues arising in an IFC- or EBRD-financed project will be assessed and addressed in the context of the particular circumstances of that project. The EBRD and IFC recognise that there are no comprehensive international regulations relating to workers’ accommodation, and that good and best practices are constantly evolving. The EBRD and IFC intend to update this Guidance Note to reflect such developments, and would welcome feedback and comments from users to contribute to this process. Comments should be sent to environmentalandsocial@ebrd.com and asksustainability@ifc.org

Contents
EXECUTIVE SUMMARY 1
INTRODUCTION 2
PART I: PLANNING AND ASSESSING REQUIREMENTS FOR WORKERS’ ACCOMMODATION 4
I. Assessing the need for workers’ accommodation 5
   A. Availability of workforce 5
   B. Availability of existing housing 5
II. Assessing impacts of workers’ accommodation on communities 6
   A. Specific impacts during the construction phase 7
   B. Community infrastructure 7
   C. Community services and facilities 7
   D. Local businesses and local employment 7
   E. Community health and safety 7
   F. Community cohesion 7
   G. Land acquisition and resettlement 7
   H. Dismantling and reinstatement 7
III. Types of workers’ accommodation 9
PART II: STANDARDS FOR AND MANAGEMENT OF WORKERS’ ACCOMMODATION 11
I. Standards for workers’ accommodation 11
   A. National/local standards 11
   B. General living facilities 11
   C. Room/dormitory facilities 13
   D. Sanitary and toilet facilities 14
   E. Canteen, cooking and laundry facilities 14
   F. Standards for nutrition and food safety 16
   G. Medical facilities 17
   H. Leisure, social and telecommunication facilities 18
II. Managing workers’ accommodation 18
   A. Management and staff 18
   B. Charging fees for accommodation and services 19
   C. Health and safety on site 19
   D. Security of workers’ accommodation 20
   E. Workers’ rights, rules and regulations on workers’ accommodation 21
   F. Consultation and grievance mechanisms 22
   G. Management of community relations 22
ANNEX I: CHECKLIST ON WORKERS’ ACCOMMODATION 24
Workers’ accommodation: processes and standards

Public guidance note by IFC and the EBRD

EXECUTIVE SUMMARY

This guidance note addresses the processes and standards that should be applied to the provision of workers’ accommodation in relation to projects funded by the EBRD or IFC. Applying appropriate standards to the construction and operation of worker housing falls within the performance requirements on labour issues expected of clients by both organisations.

There is a range of different types of workers’ accommodation that may be required by various projects and at different stages within projects, including temporary exploration camps, construction camps and permanent dormitories. Specific issues arise in relation to each of these. This note reviews various international, national, private sector and public sector standards and guidance that are more generally applicable. In some cases clear standards or good practice have been identified. In others, we present a range of standards that provide some flexibility and adaptability within the local context. In these cases, compliance with at least the minimum standard is expected.

Issues for consideration are organised in terms of a staged process to be undertaken in planning, constructing and then operating worker housing facilities. These issues may be relevant to the direct client or to (sub)contractors undertaking particular elements of a project, such as construction or management of facilities. In cases where contractors are used, it is important to set up appropriate mechanisms and processes (reporting/monitoring) to ensure that performance requirements are complied with.

At the initial stage of any project, there is a need to assess whether accommodation for workers is required, and if so, whether this can be provided within existing local communities or whether new facilities should be constructed. The likely impact on local communities and the housing market of either option should be assessed.

Before constructing any facilities, other potential impacts should be evaluated. These may include the impact of construction, and the effect of a new housed labour force on community services, such as health, and on community cohesion and safety. These assessments should form part of a project’s Environmental and Social Impact Assessment.

The next step is to consider the standards to be applied for the location, arrangement and construction of any facilities. Issues here include consideration of a safe and healthy location, application of appropriate construction standards, provision of adequate and sanitary living conditions and provision of appropriate leisure and health facilities.

There are no universally applicable international regulations relating to workers’ accommodation standards in general. However, there are some international standards/guidance on food safety, water sanitation and waste management that should be applied, and national or local building regulations that must be complied with.

Lastly, when the accommodation has been completed, there are issues around its operation and management. These include the type of staff who will manage it, development of appropriate management policies, such as security and grievance procedures, and ongoing liaison with local communities. All such policies should be subject to regular review.
INTRODUCTION

This guidance note looks at the provision of housing or accommodation for workers by employers and the issues that arise from the planning, construction and management of such facilities.

Generally, workers are housed by their employers in cases where, either the number or the type of workers required cannot be sourced from or accommodated within local communities. Thus provision of workers’ accommodation is often associated with the importation of an external workforce into an area. This can occur because the local labour supply or skills base is inadequate, because the workers are simply not available due to the remote location of the worksite or the particular skills required or because labour requirements can only be satisfied by migrant workers due to the nature of the work or the working conditions.

Provision of worker housing may relate to a temporary phase of a project (for example an exploration or construction camp) or may be more permanent (for example a factory dormitory or plantation camp). Depending on the type of accommodation, there are a range of considerations relating to both the living conditions of the workers themselves, and to the impact that workers’ housing facilities may have on surrounding communities. The provision of workers’ accommodation is a frequent component of large-scale projects funded by institutions such as the EBRD or IFC.

This note is aimed at providing practical guidance to IFC and EBRD specialists, consultants and clients on appropriate policies and standards relating to workers’ accommodation. Both the EBRD and IFC apply environmental and social performance standards in relation to their investments that include provisions on labour and working conditions. The EBRD has included a specific provision in its Environmental and Social Policy addressing workers’ accommodation; paragraph 16 of Performance Requirement 2 (PR2) stipulates:

Where a client provides accommodation for workers, the accommodation shall be appropriate for its location and be clean, safe and, at a minimum, meet the basic needs of workers. In particular, the provision of accommodation shall meet national legislation and international good practice in relation, but not restricted, to the following: the practice for charging for accommodation; the provision of minimum amounts of space for each worker; provision of sanitary, laundry and cooking facilities and potable water; the location of accommodation in relation to the workplace; any health, fire safety or other hazards or disturbances and local facilities; the provision of first aid and medical facilities; and heating and ventilation. Workers’ freedom of movement to and from the employer-provided accommodation shall not be unduly restricted.

IFC Performance Standard 2 (PS2) aims to promote “safe and healthy working conditions, and to protect and promote the health of workers.” Arguably this covers living conditions as well when these are the responsibility of employers. IFC Guidance Note 2 on Labour and Working Conditions specifically mentions the potential danger of forced labour when housing is provided to workers in lieu of payment or where inappropriate charges for housing are levied.

In some instances, for example during construction phases of projects, workers will not be directly engaged by the EBRD’s or IFC’s clients, but by (sub)contractors. However, both the EBRD and IFC require their clients to ensure that non-employee

Box 1 - Construction camp built and operated by a Chinese contractor

This example illustrates the different mechanisms and processes which can be set up in order to ensure that workers’ accommodation standards are being implemented by contractors.

Antea, a Greek client of the EBRD and IFC, and a subsidiary of Titan Cement Co, has contracted out the construction of a cement factory in Albania to a Chinese contractor. The construction involves bringing in 700 migrant workers and housing them in workers’ accommodation. As part of the contract with the construction company, Antea has included a Code of Conduct and specific language referring to compliance with national labour law, ILO conventions and IFC PS2 and has developed a supervision and monitoring plan (including safety and labour audits) to ensure the construction company is in compliance with all requirements stated in PS2, that living conditions in particular comply with the guidance provided by the EBRD/IFC and that all conditions enhance a safe and good working and living environment. Safety training courses and integration of best practices in accident prevention have been instigated, while solid waste and wastewater generated in the camp is managed in accordance with Albanian regulations and IFC/EBRD guidelines.
workers, engaged by contractors or other intermediaries to work on a project site to perform work related to the core function of the project, are covered by most of the provisions within PS2 and PR2, including (in the EBRD’s case) paragraph 16 on workers’ accommodation. To this end, clients should set up mechanisms and processes to ensure that contractors and other intermediaries comply with the EBRD’s/IFC’s standards. This should involve including contractual covenants related to workers’ accommodation standards, reviewing contractor agreements, implementing reporting mechanisms and monitoring the implementation of workers’ accommodation standards.

A process approach

There are several stages to the process of addressing issues raised by workers’ accommodation. These are:
- assessing whether housing is needed for the project and if so, what sort
- assessing impacts on local communities and planning mitigation of potential negative impacts
- awareness of the national and local regulatory framework
- determining the standards to apply to the location of facilities, the construction of housing and provision of facilities
- managing accommodation.

There are no comprehensive international regulations relating to workers’ accommodation. However, there are legal and regulatory instruments and guidance that relate to particular aspects of the provision of worker housing.1 This guidance note is based on a review of these instruments and legislation, as well as guidelines and best practices produced by a range of different private and public sector actions at national and international level. As such, the processes and standards cited often represent a range of acceptable practice. Those correspond to the Benchmark paragraphs under each section. The particular standard to be applied will depend on criteria such as the type of project, location, climate and length of project. In all cases at least the minimum standard included in a given range should be applied. However, depending on the particular circumstances the minimum standard may not always be acceptable, in which case the EBRD/IFC will agree an appropriate higher standard with the client, based on the environmental and social due diligence.

Figure 1: Workers’ accommodation, assessment and management process

<table>
<thead>
<tr>
<th>Need assessment</th>
<th>Impact assessment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Is there a need for workers’ accommodation?</td>
<td>Determine specific impacts of the workers’ accommodation construction phase (including security and involuntary resettlement)</td>
</tr>
<tr>
<td>Assess the availability of the local workforce</td>
<td>Assess existing community infrastructures, services and facilities</td>
</tr>
<tr>
<td>Assess the availability of existing housing</td>
<td>Understand the local business and employment context</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Construction</th>
</tr>
</thead>
<tbody>
<tr>
<td>Which accommodation standards are needed?</td>
</tr>
<tr>
<td>Identify and review the international, national, regional and sectoral regulations which address workers’ accommodation</td>
</tr>
<tr>
<td>Apply mandatory provisions and use non-binding provisions as guidance</td>
</tr>
<tr>
<td>Apply at least the minimum requirements set out in this guidance note</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Management</th>
</tr>
</thead>
<tbody>
<tr>
<td>What management systems are required?</td>
</tr>
<tr>
<td>Design management plans covering health and safety, security, workers’ and communities’ rights</td>
</tr>
<tr>
<td>Appoint the right staff or contract the right companies</td>
</tr>
<tr>
<td>Implement management plans</td>
</tr>
<tr>
<td>Set up complaint/grievance and conflict resolution mechanisms (for both workers and communities)</td>
</tr>
<tr>
<td>Review policies</td>
</tr>
</tbody>
</table>

---

1. See footnotes under Part I, introductory remark
PART I: PLANNING AND ASSESSING REQUIREMENTS FOR WORKERS’ ACCOMMODATION

In considering worker housing, it is important to first be aware of the international, national and local regulatory framework. At a general level, several international instruments recognise a right to an adequate standard of housing for everyone or for specific categories of the population as part of respecting human rights.\(^2\) To ensure the full realisation of this right, binding instruments generally require the State to take appropriate steps and measures. For workers, the recognition of such a right has been included in ILO Conventions and Recommendations for both Plantations and for Safety and Health in Agriculture, and in the ILO Recommendation 115 on Workers’ Housing (1961) in particular. Although the latter is a non-binding recommendation providing guidance on policy, legislation and practice to the State and to the national authorities in charge of housing in particular, it offers useful guidance on what is expected from employers who provide housing to their employees, and it specifies a number of housing standards (See Box 2).

Box 2 - ILO Workers’ Housing Recommendation 115

- It is generally not desirable for employers to provide housing for their workers directly and employers should use alternatives where possible. If there are no alternatives, specific attention should be paid to renting arrangements, workers’ rights and housing standards. In addition, the possibility of worker-occupants acquiring, for a fair price, ownership of housing provided by the employer should also be examined.

- Renting arrangements should be fair. Adequate and decent housing should not cost the worker more than a reasonable proportion of their income and should never include a speculative profit.

- The employer should be entitled to repossess the accommodation within a reasonable time in the event of termination of the worker’s contract of employment and the worker should be entitled to a reasonable period of continued occupancy and/or fair compensation when he ceases to exercise his employment.

- During the time workers spend in the workers’ accommodation they should enjoy their fundamental human rights and freedom of association in particular. Workers’ accommodation arrangements should not restrict workers’ rights and freedoms.

- Housing standards should include special attention to the following:
  - minimum space allocated per person or per family (floor area; cubic volume; or size and number of rooms)
  - supply of safe water in the workers’ dwelling in such quantities as to provide for all personal and household uses
  - adequate sewage and garbage disposal systems
  - appropriate protection against heat, cold, damp, noise, fire, and disease-carrying animals, and, in particular, insects
  - adequate sanitary and washing facilities, ventilation, cooking and storage facilities and natural and artificial lighting
  - a minimum degree of privacy both between individual persons within the household and for the members of the household against undue disturbance by external factors
  - the suitable separation of rooms devoted to living purposes from quarters for animals.

- Where accommodations are provided for single workers or workers separated from their families, additional housing standards should be considered:
  - a separate bed for each worker
  - separate gender accommodation
  - adequate sanitary conveniences
  - common dining rooms, canteens, rest and recreation rooms and health facilities, where not otherwise available in the community.

---

1948 Universal Declaration of Human Rights (Article 25)
1965 Convention on the elimination of all forms of racial discrimination (Article 5)
1966 International Covenant on Economic, Social and Cultural Rights (Article 11.1)
1979 Convention on the elimination of all forms of discrimination against women (Article 14.2)
At a national or regional level, regulations tend to contain only general provisions requiring employers to provide a decent standard of accommodation to workers. However, in some jurisdictions there are detailed regulations or standards setting out a comprehensive framework to be applied. There may also be building regulations relating to issues such as sanitation, safety or building materials that must be adhered to. Therefore, national regulations and standards are the first place to look when determining the necessary standards for living facilities. However, responsibility for planning and building standards may well lie with regional or local levels of government, so it is important that these local authorities are consulted. Provisions on workers’ accommodation can also be found in policy, guidelines or codes of practice adopted by a wide variety of actors such as international bodies, industry associations, national, regional or local authorities. Compliance with national and local law is the basic and essential requirement.

**Benchmarks**

1. The international/national/local regulatory frameworks on workers’ accommodation have been reviewed.

2. Identified mandatory provisions on workers’ accommodation are implemented thoroughly.

I. Assessing the need for workers’ accommodation

Before building and running workers’ accommodation, it is important to understand the local housing and labour markets and the potential effects the building of new facilities may have on the surrounding communities.

A. Availability of workforce

At the initial scoping phase of a project, it is important to consider whether workers’ accommodation is needed at all. In this respect, it is worth analysing the project’s workforce requirements including skills and likely numbers over the project cycle and to assess the capacity of the local population to meet those workforce requirements either from its current base or as a result of training. It is preferable to source labour from the local communities as this has many advantages; not only in terms of reducing the need for workers’ accommodation, but also as it will increase the direct and indirect benefits to the community arising from the project. This approach is strongly supported by the EBRD and IFC. Any national/local requirements to promote local employment opportunities must also be taken into account. It should be noted that even in the absence of such requirements, new recruitment on EBRD/IFC-financed projects must not be discriminatory.

**Benchmarks**

1. There has been an assessment of workers’ availability in the neighbouring communities.

2. There has been an assessment of the skills and competencies of the local workforce and how those skills and competencies fit the project needs.

3. There has been an assessment of opportunities to train the local workforce to fulfil the project’s needs.

B. Availability of existing housing

If local workers are unavailable or not sufficiently skilled, the question arises of whether external workers can be accommodated within the existing local housing capacity or whether new facilities are needed. In general, the decision to utilise host-community accommodation or to develop on-site accommodation will be based on factors such as whether project development is occurring near to larger, established population centres and on the capacity of any nearby communities, quality of housing stock and the capacity of the environment to assimilate a new workforce.

If existing capacity is available, in the form, for example, of lodging with local families, hotels, hostels or rented housing, the impact on the local communities and housing market should be assessed. Such off-site housing may create a wide range of economic opportunities such as rental income for local people or development of local businesses (shops and restaurants for instance), which are positive project impacts, and may also result in improvements to existing housing stock. However, off-site housing may also be associated with a range of adverse social impacts including increased demands on infrastructure, services and utilities, development of illicit trade activities (drugs, prostitution, selling of stolen goods) and inflation in local rent and other subsistence items with detrimental

---

3. See for example:
   - United States - Occupational Health and Safety Act (Standards 29, paragraph 1910.142)
   - Brazil - Health and safety regulation in the agricultural, livestock farming, forestry and aquaculture sectors, 2005
   - Malaysia - Workers’ minimum standards of housing and amenities Act, 1990
   - South Africa - Basic condition of employment Act, 1997
   - New South Wales, Australia - Rural Workers Accommodation Act, 1969
   - Western Australia - Construction camp regulations, 1970
   - Dubai Municipality - Labour camp specifications (last updated in 2007)

4. See for example:
   - New South Wales, Australia - Accommodation for rural agricultural work, code of practice, 2006
   - Singapore - Code of practice on environmental health, 2005
   - Israel - Guide for Migrant Workers, Housing
   - ILO - Code of Practice, safety and health in forestry work, 1998
   - City of Geraldton-Greenough, Western Australia, Local planning policy - Temporary accommodation camps, 2006
   - Sustainable Agriculture Network Standards, 5.14, 2009
consequences for the local population. If a project anticipates that the workforce is to be resident within the local communities it is good practice to provide financing options for local residents to develop and/or improve hostels for instance.

Conversely, to provide on-site housing opportunities minimises workforce-host community interactions and reduces the pressure on existing infrastructures and can also pre-empt the development of various external activities such as prostitution.

In some cases, it may be feasible and beneficial to offer workers or certain categories of workers an option between self-accommodation and company-provided accommodation with varying compensation accordingly.

To avoid or mitigate the most negative impacts, it is important to conduct a comprehensive assessment of the housing market and the likely impact of the various options for workers’ accommodation. For larger projects, this assessment will best be done at the stage of the project’s Environmental and Social Impact Assessment (ESIA). Measures resulting from this assessment will need to be incorporated in tendering and contracting documentation. Furthermore, in cases where local facilities are utilised, potential mitigation measures for adverse impacts such as increased inflationary rates on local costs must be assessed in the ESIA, and procedures that will be implemented to monitor this must also be presented.

**Benchmarks**

1. Prior to building any workers’ accommodation, a comprehensive assessment of the local housing market has been conducted and the different types of housing available in the surrounding communities have been identified. For larger projects this assessment has been conducted at the stage of the project’s Environmental and Social Impact Assessment.

2. There has been an assessment on communities of the impact of using existing housing opportunities.

3. Measures to mitigate adverse impacts on the local housing market have been identified and included in the Environmental and Social Action Plan (ESAP) or other relevant action plan.

**II. Assessing impacts of workers’ accommodation on communities**

Where the need to provide new workers’ accommodation is identified, it is important to consider how this will impact on the surrounding communities. This may be relevant both to the construction phase of the camp (or other accommodation) and during its operation. Risk identification and assessments specific to the workers’ accommodation should be undertaken as part of the Environmental and Social Impact Assessment and any related development of an Environmental and Social Action Plan. This assessment can also be used to determine whether contact between non-local workforce and local communities should be encouraged or minimised.

**Box 3 - Singapore National Environment Agency - Code of Practice on Environmental Health, 2005**

The following guidelines shall be used for stand-alone dormitories.

- If the dormitory does not provide a separate space for cupboards/locker rooms, the minimum room space shall be 4 square metres per person (assuming a height of 2.4m).
- If the dormitory provides a separate space for cupboards/locker rooms, the minimum room space shall be 3 square metres per person (assuming a height of 2.4m).
- The room shall be adequately ventilated and lit.
- Adequate number of toilets and sanitary fittings shall be provided (1 toilet, 1 hand wash basin, 1 urinal and 1 bathroom with bench per 15 male workers).
- Where cooking area is to be provided in the dormitories, such provisions shall be in accordance with the requirements stipulated under Section 2.4 of the latest edition of Singapore Standard CP 102.

The above Singapore guidelines are mentioned as an example of “soft” regulations only. The standards described above may be inappropriate in different environments. Other standards apply in other countries.
A. Specific impacts during the construction phase

The construction of workers’ accommodation and its potential impacts on communities should be managed in the same way as for construction of the project itself. Impacts need to be identified and may include health and safety, disturbance issues arising from construction, including traffic (dust, noise and vibration), and involuntary resettlement issues (including physical and economical displacement) when the erecting of workers’ accommodation entails land acquisition.

B. Community infrastructure

Workers’ influx in the vicinity of a community may strain existing infrastructure, in particular the water and sanitation, electricity and transport systems. Impacts of the worker facility should be avoided or mitigated, and included within the assessment of the overall project.

In general, where facilities are developed close to local communities it is important to provide adequate transport systems to preserve the right of workers’ freedom of movement if they are not to become effectively “trapped”. This should be balanced against the need to prevent any unnecessary disruption of and/or to the local communities. Therefore it may be appropriate to limit worker movements, but any restriction should be clearly justified by the need to avoid the disruption of local communities, in particular local communities’ transport infrastructures – and to provide maximum security and safety to both workers and communities (see PART II, Section E “Workers’ rights, rules and regulations on workers’ accommodation”, below at page 21).

C. Community services and facilities

Depending on the size of the workers’ accommodation, conditions of engagement (accompanied or unaccompanied) and the level of services offered to those workers, it may be necessary to assess the impact of workers on local medical, social, educational and recreational services and facilities, potentially to the detriment of nearby communities. It must be ensured that such services and facilities can meet increased demand. If not, services must be available to the workers on site.

D. Local businesses and local employment

Local businesses such as shops, restaurants or bars are likely to benefit from their proximity to workers’ living facilities. However, there may also be negative issues that need to be managed such as increases in local prices, crime, prostitution or alcohol consumption (see below Part II, section E).

E. Community health and safety

The presence of a large number of workers, principally males, can give rise to an increased spread of communicable diseases such as HIV/AIDS in particular and other sexually transmitted diseases. In addition, special attention should be paid to risks such as road accidents, and other detrimental consequences of increased traffic generated by the project (dust, noise, and pollution). If the proposed project has major-accident hazards associated with it, emergency response and evacuation plans in accordance to PS4/PR4 will also need to be in place.

F. Community cohesion

The impact of the presence of workers with different lifestyles or cultural backgrounds on the host community needs to be assessed and managed, in particular issues such as religious or other cultural proscriptions, local traditions and community structure and the relationship between men and women.

G. Land acquisition and resettlement

Impacts and mitigation plans relating to land used for workers’ accommodation facilities should be managed in the same way as for the project as a whole. As far as possible, land acquisition should be avoided or minimised.

H. Dismantling and reinstatement

Dismantling and reinstatement of workers’ accommodation should be taken into account at the outset of the project in order to avoid any unnecessary lasting impacts of the accommodations on the communities (land use for instance). Where possible and appropriate, the facilities can be handed over to the communities.
Benchmarks
1. A community impact assessment has been carried out as part of the Environmental and Social Assessment of the overall project with a view to mitigate the negative impacts of the workers’ accommodation on the surrounding communities and to enhance the positive ones.

2. The assessment includes potential health and safety impacts on the communities - including disturbances and safety issues caused by traffic (dust, noise, vibration, road accidents, disease) and consequences of land acquisition and involuntary resettlement occurring during the construction phase of the workers’ accommodation.

3. Positive and negative impacts of workers’ accommodation on community infrastructures, services and facilities have been included in the assessment, including specific attention to emergency responses and evacuation plans.

4. Impacts of workers’ accommodation on community local businesses and local employment have been included in the assessment.

5. General impacts of workers’ accommodation on the health of communities (notably the increased risk of road accidents and the increase of communicable diseases) and community social cohesion have been included in the assessment.

6. The assessment includes appropriate mitigation measures to address any adverse impacts identified.

Table 1: A typology of workers’ accommodation

<table>
<thead>
<tr>
<th>Category</th>
<th>Subcategory/examples</th>
<th>Common characteristics</th>
<th>Sectors covered</th>
<th>Key issues</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rural workers’ accommodation</td>
<td>Logging camp</td>
<td>Permanent or seasonal</td>
<td>Forestry</td>
<td>Worker access</td>
</tr>
<tr>
<td></td>
<td>Off-farm accommodation</td>
<td>Remote</td>
<td>Agriculture</td>
<td>Monitoring difficulties</td>
</tr>
<tr>
<td>Plantation housing</td>
<td>Worker village</td>
<td>Permanent and long term</td>
<td>Agriculture</td>
<td>Need to provide sustainable livelihoods</td>
</tr>
<tr>
<td></td>
<td>Off-farm accommodation</td>
<td>Families</td>
<td></td>
<td>Social infrastructures</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Living conditions</td>
</tr>
<tr>
<td>Construction camp</td>
<td>Worker camp</td>
<td>Temporary</td>
<td>Extractives</td>
<td>Enforcement of standards and monitoring difficulties</td>
</tr>
<tr>
<td></td>
<td>Worker village</td>
<td>Migrant workers</td>
<td>Utilities</td>
<td>Relations with the communities</td>
</tr>
<tr>
<td></td>
<td>Mobile worker camp</td>
<td>Gender separation</td>
<td>Infrastructure</td>
<td>Living standards</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Manufacturing</td>
<td>Cost</td>
</tr>
<tr>
<td>Mine camp</td>
<td>Company towns</td>
<td>Long term</td>
<td>Extractives</td>
<td>Relations with communities</td>
</tr>
<tr>
<td></td>
<td>Dormitories</td>
<td>Remote location</td>
<td></td>
<td>Remoteness</td>
</tr>
<tr>
<td></td>
<td>Integrated within existing communities</td>
<td>Gender separation</td>
<td></td>
<td>Living standards</td>
</tr>
<tr>
<td></td>
<td>Commuter (fly-in, fly-out)</td>
<td></td>
<td></td>
<td>Worker access</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Long shifts</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>No rest periods</td>
</tr>
<tr>
<td>Factory dormitory</td>
<td>Permanent</td>
<td></td>
<td>Garments/textiles</td>
<td>Relations with communities</td>
</tr>
<tr>
<td></td>
<td>Urban</td>
<td></td>
<td>toys, electronics</td>
<td>Remoteness</td>
</tr>
<tr>
<td></td>
<td>Internal migrants</td>
<td></td>
<td></td>
<td>Living standards</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Deduction of excessive rent from wages</td>
</tr>
</tbody>
</table>
III. Types of workers’ accommodation

There is a large variety of workers’ living facilities. These may be classified in a number of ways. Table 1 provides one typology. Key criteria may include whether the facilities are temporary or permanent, their location (remote or non-remote), size, or economic sector (agriculture, mining, oil and gas, construction, manufacturing).

The typology above is given as an example only; other classifications are possible. For instance, housing may be categorised in terms of project phases for example, exploration (fly-in, fly-out camps), construction (temporary construction camp often with large proportion of migrant workers) and operational (permanent, dormitory, possible family accommodation).

Depending on the type of project, specific attention should be given to either providing single workers’ accommodation or family accommodation. As a general rule, the more permanent the housing, the greater considerations should be given to enabling workers to live with their families. Such consideration is important where the workforce is

Box 4 - Best practice on home-ownership

When access to property schemes is proposed it is important to guarantee the sustainability of workers’ investments. To this end, the location of the project and of the workers’ accommodation and their integration in existing communities are factors to take into consideration. Caution should be exercised when offering such schemes in remote locations as it might be impossible to create a sustainable community and to develop non-project-related sources of livelihood.

Affordable housing in a sustainable town: A provider of affordable housing in South Africa and a provider of housing development for the mining sector worked together on a project to move away from mining hostels and rental villages to providing home-ownership opportunities to workers. To this end they developed a 400-plus unit in a village 20 km from the mine with the idea to create an economically and socially viable community close to the mine. A concern was to integrate people within existing communities with the necessary social amenities and infrastructures and to put the emphasis on better housing conditions, home ownership and affordable housing for mining workers. The success of the project relied on the ability for the service provider to take into account the often difficult financial situation of workers. To overcome over-indebtedness of workers, specific access to property schemes and programmes have been designed including employer support, economies of scale, low interest rate and stepped payment options.

Affordable housing in a self-sustaining community: An FMO (Netherlands Development Finance Company) client operating a mine in a remote location intends to manage and develop a well-planned, secure and independent village for approximately 1,000 employees. The FMO client is expected to provide residents with basic services, including water, electricity and sewerage as well as education, health services, sports facilities, shops, green areas and places of worship. In addition, provision has been made for a light industrial and small business area to support local business development. The long-term vision is for the Village to grow into a self-sustaining community of over 4,000 houses, which is capable of supporting a variety of small businesses and local enterprises. To support the long-term vision of a self-sustaining village and to provide mine employees with an opportunity to build up cash equity (in the form of a house), the FMO client will promote home ownership. In this context, an employee housing scheme has been designed that allows mine employees in all income categories to acquire title to property through mortgage debt all associated rights and obligations. Participation in the scheme is not a prerequisite for employment. The scheme includes several provisions to ensure affordability of home ownership to all mine employees and to protect employees against downside risks.
not sourced locally and in particular where migrant workers are used. Provision for families will affect the other facilities necessary and the management of the accommodation. Best practice includes:

- To provide workers and their families individual family accommodation comprising bedrooms, sanitary and cooking facilities with an adequate level of privacy allowing families to have a normal family life.

- To provide nurseries, schools, clinics and recreational facilities for children, or to make sure that those services are readily available in the surrounding communities and of good quality.

**Benchmarks**

1. Consideration has been given to provision of family accommodation.

2. When arrangements for family accommodations are in place:
   - families are provided with individual accommodation comprising bedroom, sanitary and cooking facilities
   - adequate nursery/school facilities are provided
   - special attention is paid to providing adequate safety for children.

**Additional issue**

In projects located in rural and remote locations, issues around the question of how workers can travel to their communities/countries of origin might arise. Alternatively, the possibility to create a sustainable community and to bring in the workers’ families might be considered.

**Box 5 - Best practice on migrant workers’ accommodation: Business in the Community - Voluntary Code of Practice on Employing Migrant Workers/Overseas Staff in Great Britain**

The Code, which is designed to guide and reinforce best practice in relation to the employment of migrant workers, points out that migrant workers will often have to travel long distances and be in need of accommodation when they take up a job. Consequently, the Code suggests the following.

- Employers should assist with travel costs incurred by migrant workers during the recruitment stage and the repayment of these costs should follow a clear process and the money paid back at an agreed affordable rate over a specified time period. The total amount repayable should be no more than that lent so that workers are not financially disadvantaged.

- Employers, where possible, should support migrant workers in finding suitable accommodation. Workers should not be required to stay in accommodation provided by the employer but should be free to choose their own if they wish to do so. Where employers do provide accommodation, they should ensure that they do not breach the rules relating to the apportionment of wages for payment for accommodation (the accommodation offset rules).

- Employers should help to ensure that, where workers obtain their own accommodation, they are not being exploited, and offer advice and help if requested.

- Employers should ensure that accommodation which is provided is not overcrowded and does not pose a risk to the health and safety of those living there, and that any agreed notice periods are observed.

---

5. On the increase in the recognition of workers’ rights to family life, the ILO Migrant Workers Convention No 143 calls Member States to take all necessary measures which fall within its competence and collaborate with other Members to facilitate the reunion of the families of all migrant workers legally residing in its territory. In the same way, Art 44.2 of the International Convention on the Protection of the Rights of All Migrant Workers and Members of Their Families requires States Parties to take measures that they deem appropriate and that fall within their competence to facilitate the reunion of migrant workers with their spouses [...], as well as with their minor dependent unmarried children.

PART II: STANDARDS FOR AND MANAGEMENT OF WORKERS’ ACCOMMODATION

I. Standards for workers’ accommodation

This section looks at the principles and standards applicable to the location and construction of workers’ accommodation, including the transport systems provided, the general living facilities, rooms/dormitories facilities, sanitary facilities, canteen and cooking facilities, food safety, medical facilities and leisure/social facilities.

A. National/local standards

The key standards that need to be taken into consideration, as a baseline, are those contained in national/local regulations. Although it is quite unusual to find regulations specifically covering workers’ accommodation, there may well be general construction standards which will be relevant. These may include the following standards:

- **Building construction**: for example, quality of material, construction methods, resistance to earthquakes.

- **Housing and public housing**: in some countries regulations for housing and public housing contain requirements on issues such as the basic amenities, and standards of repair.

- **General health, safety and security**: requirements on health and safety are often an important part of building standards and might include provisions on occupation density, minimal air volumes, ventilation, the quality of the flooring (slip-resistant) or security against intrusion.

- **Fire safety**: requirements on fire safety are common and are likely to apply to housing facilities of any type. This can include provision on fire extinguishers, fire alarms, number and size of staircases and emergency exits, restrictions on the use of certain building materials.

- **Electricity, plumbing, water and sanitation**: national design and construction standards often include very detailed provisions on electricity or plumbing fixtures/fittings, water and sanitation connection/equipment.

Benchmark

1. The relevant national and local regulations have been identified and implemented.

B. General living facilities

Ensuring good standards in living facilities is important in order to avoid safety hazards and to protect workers from diseases and/or illness resulting from humidity, bad/stagnant water (or lack of water), cold, spread of fungus, proliferation of insects or rodents, as well as to maintain a good level of morale. The location of the facilities is important to prevent exposure to wind, fire, flood and other natural hazards. It is also important that workers’ accommodation is unaffected by the environmental or operational impacts of the worksite (for example noise, emissions or dust) but is sufficiently close that workers do not have to spend undue amounts of time travelling from their accommodation to the worksite. Living facilities should be built using adequate materials and should always be kept in good repair, clean and free from rubbish and other refuse.

**Benchmarks**

1. Living facilities are located to avoid flooding and other natural hazards.

2. Where possible, living facilities are located within a reasonable distance from the worksite.

3. Transport from the living facilities to worksite is safe and free.

4. The living facilities are built with adequate materials, kept in good repair and kept clean and free from rubbish and other refuse.

**Drainage**

The presence of stagnant water is a factor of proliferation of potential disease vectors such as mosquitoes, flies and others, and must be avoided.

**Benchmarks**

1. The building site is adequately drained to avoid the accumulation of stagnant water.
Heating, air conditioning, ventilation and light
Heating, air-conditioning and ventilation should be appropriate for the climatic conditions and provide workers with a comfortable and healthy environment to rest and spend their spare time.

**Benchmarks**
1. For facilities located in cold weather zones, the temperature is kept at a level of around 20 degrees Celsius notwithstanding the need for adequate ventilation.

2. For facilities located in hot weather zones, adequate ventilation and/or air conditioning systems are provided.

3. Both natural and artificial lighting are provided and maintained in living facilities. It is best practice that the window area represents not less than 5% to 10% of the floor area. Emergency lighting is provided.

Water
Special attention to water quality and quantity is absolutely essential. To prevent dehydration, water poisoning and diseases resulting from lack of hygiene, workers should always have easy access to a source of clean water. An adequate supply of potable water must be available in the same buildings where bedrooms or dormitories are provided. Drinking water must meet local or WHO drinking water standards and water quality must be monitored regularly. Depending on the local context, it could either be produced by dedicated catchment and treatment facilities or tapped from existing municipal facilities. Drinking water quality is regularly monitored.

**Benchmarks**
1. Access to an adequate and convenient supply of free potable water is always available to workers. Depending on climate, weather conditions and accommodation standards, 80 to 180 litres per person per day are available.

2. Drinking water meets national/local or WHO drinking water standards.

3. All tanks used for the storage of drinking water are constructed and covered as to prevent water stored therein from becoming polluted or contaminated.

Wastewater and solid waste
Wastewater treatment and effluent discharge as well as solid waste treatment and disposal must comply with local or World Bank effluent discharge standards and be adequately designed to prevent contamination of any water body, to ensure hygiene and to avoid the spread of infections and diseases, the proliferation of mosquitoes, flies, rodents, and other pest vectors. Depending on the local context, treatment and disposal services can be either provided by dedicated or existing municipal facilities.

**Benchmarks**
1. Wastewater, sewage, food and any other waste materials are adequately discharged, in compliance with local or World Bank standards – whichever is more stringent – and without causing any significant impacts on camp residents, the biophysical environment or surrounding communities.

2. Specific containers for rubbish collection are provided and emptied on a regular basis. Standards range from providing an adequate number of rubbish containers to providing leak proof, non-absorbent, rust and corrosion-resistant containers protected from insects and rodents. In addition it is best practice to locate rubbish containers 30 metres from each shelter on a wooden, metal, or concrete stand. Such containers must be emptied at regular intervals (to be determined based on temperatures and volumes generated) to avoid unpleasant odours associated with decaying organic materials.

3. Pest extermination, vector control and disinfection are carried out throughout the living facilities in compliance with local requirements and/or good practice. Where warranted, pest and vector monitoring should be performed on a regular basis.

8. ibid
C. Room/dormitory facilities

The standards of the rooms or dormitory facilities are important to allow workers to rest properly and to maintain good standards of hygiene. Overcrowding should be avoided particularly. This also has an impact on workers’ productivity and reduces work-related accidents. It is generally acknowledged that rooms/dormitories should be kept clean and in a good condition. Exposure to noise and odour should be minimised. In addition, room/dormitory design and equipment should strive to offer workers a maximum of privacy. Resorting to dormitories should be minimised and single or double rooms are preferred. Dormitories and rooms must be single-sex.

Benchmarks
1. Rooms/dormitories are kept in good condition.
2. Rooms/dormitories are aired and cleaned at regular intervals.
3. Rooms/dormitories are built with easily cleanable flooring material.
4. Sanitary facilities are located within the same buildings and provided separately for men and women.
5. Density standards are expressed either in terms of minimal volume per resident or of minimal floor space. Usual standards range from 10 to 12.5 cubic metres (volume) or 4 to 5.5 square metres (surface).
6. A minimum ceiling height of 2.10 metres is provided.
7. In collective rooms, which are minimised, in order to provide workers with some privacy, only a reasonable number of workers are allowed to share the same room. Standards range from 2 to 8 workers.
8. All doors and windows should be lockable, and provided with mosquito screens where conditions warrant.
9. There should be mobile partitions or curtains to ensure privacy.
10. Every resident is provided with adequate furniture such as a table, a chair, a mirror and a bedside light.
11. Separate sleeping areas are provided for men and women, except in family accommodation.

Additional issue
Irrespective of whether workers are supposed to keep their facilities clean, it is the responsibility of the accommodation manager to ensure that rooms/dormitories and sanitary facilities are in good condition.

Bed arrangements and storage facilities
The provision of an adequate numbers of beds of an appropriate size is essential to provide workers with decent, safe and hygienic conditions to rest and sleep. Here again, particular attention should be paid to privacy. Consideration should be given to local customs so beds could be replaced by hammocks or sleeping mats for instance.

Benchmarks
1. A separate bed for each worker is provided. The practice of “hot-bedding” should be avoided.
2. There is a minimum space between beds of 1 metre.
3. Double deck bunks are not advisable for fire safety and hygiene reasons, and their use is minimised. Where they are used, there must be enough clear space between the lower and upper bunk of the bed. Standards range from to 0.7 to 1.10 metres.
4. Triple deck bunks are prohibited.
5. Each worker is provided with a comfortable mattress, pillow, cover and clean bedding.
6. Bed linen is washed frequently and applied with repellents and disinfectants where conditions warrant (malaria).
7. Facilities for the storage of personal belongings for workers are provided. Standards vary from providing an individual cupboard for each worker to providing 475-litre big lockers and 1 metre of shelf unit.
8. Separate storage for work boots and other personal protection equipment, as well as drying/airing areas may need to be provided depending on conditions.
D. Sanitary and toilet facilities

It is essential to allow workers to maintain a good standard of personal hygiene but also to prevent contamination and the spread of diseases which result from inadequate sanitary facilities. Sanitary and toilet facilities will always include all of the following: toilets, urinals, washbasins and showers. Sanitary and toilet facilities should be kept in a clean and fully working condition. Facilities should also be constructed of materials that are easily cleanable and ensure privacy. Sanitary and toilet facilities are never shared between male and female residents, except in family accommodation. Where necessary, specific additional sanitary facilities are provided for women.

Benchmarks
1. Sanitary and toilet facilities are constructed of materials that are easily cleanable.
2. Sanitary and toilet facilities are cleaned frequently and kept in working condition.
3. Sanitary and toilet facilities are designed to provide workers with adequate privacy, including ceiling to floor partitions and lockable doors.
4. Sanitary and toilet facilities are not shared between men and women, except in family accommodation.

Toilet facilities

Toilet arrangements are essential to avoid any contamination and prevent the spread of infectious disease.

Benchmarks
1. An adequate number of toilets is provided to workers. Standards range from 1 unit to 15 persons to 1 unit per 6 persons. For urinals, usual standards are 1 unit to 15 persons.
2. Toilet facilities are conveniently located and easily accessible. Standards range from 30 to 60 metres from rooms/dormitories. Toilet rooms shall be located so as to be accessible without any individual passing through any sleeping room. In addition, all toilet rooms should be well-lit, have good ventilation or external windows, have sufficient hand wash basins and be conveniently located. Toilets and other sanitary facilities should be (“must be” in cold climates) in the same building as rooms and dormitories.

E. Canteen, cooking and laundry facilities

Good standards of hygiene in canteen/dining halls and cooking facilities are crucial. Adequate canteen, cooking and laundry facilities and equipments should also be provided. When caterers are contracted to manage kitchens and canteens, special attention should be paid to ensure that contractors take into account and implement the benchmarks below, and that adequate reporting and monitoring mechanisms are in place. When workers can individually cook their meals, they should be provided with a space separate from the sleeping areas. Facilities must be kept in a clean and sanitary condition. In addition, canteen, kitchen, cooking and laundry floors, ceilings and walls should be made of easily cleanable materials.
### Benchmarks

1. Canteen, cooking and laundry facilities are built in adequate and easy to clean materials.

2. Canteen, cooking and laundry facilities are kept in a clean and sanitary condition.

3. If workers can cook their own meals, kitchen space is provided separate from sleeping areas.

### Laundry facilities

Providing facilities for workers to wash both work and non-work related clothes is essential for personal hygiene. The alternative is for the employer to provide a free laundry service.

#### Benchmarks

1. Adequate facilities for washing and drying clothes are provided. Standards range from providing sinks or tubs with hot and cold water, cleaning soap and drying lines to providing washing machines and dryers.

2. When work clothes are used in contact with dangerous substance (for example, application of pesticide), special laundry facilities (washing machines) should be provided.

### Additional issue

When workers are provided with facilities allowing them to individually do their laundry or cooking, it should be the responsibility of each worker to keep the facilities in a clean and sanitary condition. Nonetheless, it is the responsibility of the accommodation manager to make sure the standards are respected and to provide an adequate cleaning, disinfection and pest/vector control service when necessary.

### Canteen and cooking facilities

Canteen and cooking facilities should provide sufficient space for preparing food and eating, as well as conform to hygiene and safety requirements.

#### Benchmarks

1. Canteens have a reasonable amount of space per worker. Standards range from 1 square metre to 1.5 square metres.

2. Canteens are adequately furnished. Standards range from providing tables, benches, individual drinking cups and plates to providing special drinking fountains.

3. Places for food preparation are designed to permit good food hygiene practices, including protection against contamination between and during food preparation.

4. Kitchens are provided with facilities to maintain adequate personal hygiene including a sufficient number of washbasins designated for cleaning hands with clean, running water and materials for hygienic drying.

5. Wall surfaces adjacent to cooking areas are made of fire-resistant materials. Food preparation tables are also equipped with a smooth durable washable surface. Lastly, in order to enable easy cleaning, it is good practice that stoves are not sealed against a wall, benches and fixtures are not built into the floor, and all cupboards and other fixtures and all walls and ceilings have a smooth durable washable surface.

6. All kitchen floors, ceiling and wall surfaces adjacent to or above food preparation and cooking areas are built using durable, non-absorbent, easily cleanable, non-toxic materials.

7. Wall surfaces adjacent to cooking areas are made of fire-resistant materials. Food preparation tables are equipped with a smooth, durable, easily cleanable, non-corrosive surface made of non-toxic materials. Lastly, in order to enable easy cleaning, it is good practice that stoves are not sealed against a wall, benches and fixtures are not built into the floor, and all cupboards and other fixtures have a smooth, durable and washable surface.

8. Adequate facilities for cleaning, disinfecting and storage of cooking utensils and equipment are provided.

9. Food waste and other refuse are to be adequately deposited in sealable containers and removed from the kitchen frequently to avoid accumulation.
F. Standards for nutrition and food safety

When cooking for a number of workers, hygiene and food safety are absolutely critical. In addition to providing safe food, providing nutritious food is important as it has a very direct impact on workers’ productivity and well-being. An ILO study demonstrates that good nutrition at work leads to gains in productivity and worker morale, prevention of accidents and premature deaths and reductions in health care costs.\(^\text{10}\)

**Benchmarks**

1. The WHO 5 keys to safer food or an equivalent process is implemented (see Box 6 below).

2. Food provided to workers contains an appropriate level of nutritional value and takes into account religious/cultural backgrounds; different choices of food are served if workers have different cultural/religious backgrounds.

3. Food is prepared by cooks. It is also best practice that meals are planned by a trained nutritionist.

---

**Box 6 - Five keys to safer food**

**Keep clean**

Wash your hands before handling food and often during food preparation.
Wash your hands after going to the toilet.
Wash and sanitise all surfaces and equipment used for food preparation.
Protect kitchen areas and food from insects, pests and other animals.

While most microorganisms do not cause disease, dangerous microorganisms are widely found in soil, water, animals and people. These microorganisms are carried on hands, wiping cloths and utensils, especially cutting boards and the slightest contact can transfer them to food and cause food borne diseases.

**Separate raw and cooked**

Separate raw meat, poultry and seafood from other foods.
Use separate equipment and utensils such as knives and cutting boards for handling raw foods.
Store food in containers to avoid contact between raw and prepared foods.

Raw food, especially meat, poultry and seafood, and their juices, can contain dangerous microorganisms which may be transferred onto other foods during food preparation and storage.

**Cook thoroughly**

Cook food thoroughly, especially meat, poultry, eggs and seafood.
Bring foods like soups and stews to boiling to make sure that they have reached 70°C. For meat and poultry, make sure that juices are clear, not pink. Ideally, use a thermometer.
Reheat cooked food thoroughly.

Proper cooking kills almost all dangerous microorganisms. Studies have shown that cooking food to a temperature of 70°C can help ensure it is safe for consumption. Foods that require special attention include minced meats, rolled roasts, large joints of meat and whole poultry.

**Keep food at safe temperatures**

Do not leave cooked food at room temperature for more than 2 hours.
Refrigerate promptly all cooked and perishable food (preferably below 5°C).
Keep cooked food piping hot (more than 60°C) prior to serving.
Do not store food too long even in the refrigerator.
Do not thaw frozen food at room temperature.

Microorganisms can multiply very quickly if food is stored at room temperature. By holding at temperatures below 5°C or above 60°C, the growth of microorganisms is slowed down or stopped. Some dangerous microorganisms still grow below 5°C.

**Use safe water and raw materials**

Use safe water or treat it to make it safe.
Select fresh and wholesome foods.
Choose foods processed for safety, such as pasteurised milk.
Wash fruits and vegetables, especially if eaten raw.
Do not use food beyond its expiry date.

Raw materials, including water and ice, may be contaminated with dangerous microorganisms and chemicals. Toxic chemicals may be formed in damaged and mouldy foods. Take care in selection of raw materials and implement simple measures such as washing.

**Source:** World Health Organization, Food Safety


---

G. Medical facilities

Access to adequate medical facilities is important to maintain workers’ health and to provide adequate responses in case of health emergency situations. The availability or level of medical facilities provided in workers’ accommodation is likely to depend on the number of workers living on site, the medical facilities already existing in the neighbouring communities and the availability of transport. However, first aid must always be available on site.

First aid facilities
Providing adequate first aid training and facilities can save lives and prevent minor injuries becoming major ones.

Other medical facilities
Depending on the number of workers living on site and the medical services offered in the surrounding communities, it is important to provide workers with additional medical facilities. Special facilities for sick workers and medical services such as dental care, surgery, a dedicated emergency room can, for instance, be provided.

Benchmarks
1. A number of first aid kits adequate to the number of residents are available.

2. First aid kits are adequately stocked. Where possible a 24/7 first aid service/facility is available.

3. An adequate number of staff/workers is trained to provide first aid.

4. Where possible and depending on the medical infrastructures existing in the community, other medical facilities are provided (nurse rooms, dental care, minor surgery).

Box 7 - UK/HSE First Aid facilities

What should be in a first aid kit?

There is no standard list and it very much depends on the assessment of the needs in a particular workplace:

- a leaflet giving general guidance on first aid, for example HSE leaflet Basic advice on first aid at work
- individually wrapped sterile adhesive dressings (assorted sizes)
- two sterile eye pads
- four individually wrapped triangular bandages (preferably sterile)
- six safety pins
- six medium-sized (approximately 12 cm x 12 cm) individually wrapped sterile unmedicated wound dressings
- two large (approximately 18 cm x 18 cm) sterile individually wrapped unmedicated wound dressings
- one pair of disposable gloves.

What should be kept in the first aid room?

The room should contain essential first aid facilities and equipment. Typical examples of these are:

- a sink with hot and cold running water
- drinking water and disposable cups
- soap and paper towels
- a store for first aid materials
- foot-operated refuse containers, lined with disposable yellow clinical waste bags or a container for the safe disposal of clinical waste
- a couch with waterproof protection, clean pillows and blankets
- a chair
- a telephone or other communication equipment
- a record book for recording incidents where first aid has been given.

Source: UK Health and Safety Executive
H. Leisure, social and telecommunication facilities

Basic leisure and social facilities are important for workers to rest and also to socialise during their free time. This is particularly true where workers’ accommodation is located in remote areas far from any communities. Where workers’ accommodation is located in the vicinity of a village or a town, existing leisure or social facilities can be used so long as this does not cause disruption to the access and enjoyment of local community members. But in any case, social spaces should also be provided on site. Exercise and recreational facilities will increase workers’ welfare and reduce the impact of the presence of workers in the surrounding communities. In addition it is also important to provide workers with adequate means to communicate with the outside world, especially when workers’ accommodation is located in a remote location or where workers live on site without their family or are migrants. Consideration of cultural attitudes is important. Provision of space for religious observance needs to be considered, taking account of the local context and potential conflicts in certain situations.

Benchmarks

1. Basic collective social/rest spaces are provided to workers. Standards range from providing workers multi-purpose halls to providing designated areas for radio, TV, cinema.

2. Recreational facilities are provided. Standards range from providing exercise equipment to providing a library, swimming pool, tennis courts, table tennis, educational facilities.

3. Workers are provided with dedicated places for religious observance if the context warrants.

4. Workers have access to public phones at affordable/public prices (that is, not inflated).

5. Internet facilities can also be provided, particularly where large numbers of expatriates/Third Country Nationals (TCNs) are accommodated.

Box 8 - Examples of social/leisure facilities

In Qatar there is a newly built 170-hectare complex which accommodates contractors and more than 35,000 workers for a project run by a major oil company. At the heart of this complex, the recreation area includes extensive sport facilities, a safety-training centre, an outdoor cinema and a park. The purpose of those facilities goes beyond providing adequate accommodation to the large numbers of contractors and workers on this project but is designed to provide the same level of services as a small town. The accommodation complex has a mayor, as well as a dedicated welfare team which is responsible for the workers’ welfare, cultural festivals and also acts as the community’s advocates.

II. Managing workers’ accommodation

Once the living facilities have been constructed and are operational, effective ongoing management of living facilities is essential. This encompasses issues such as the physical maintenance of buildings, security and consultation with residents and neighbouring communities in order to ensure the implementation of the housing standards in the long term.

A. Management and staff

Worker camps and housing facilities should have a written management plan, including management policies or plans on health and safety, security, living conditions, workers’ rights and representation, relationships with the communities and grievance processes. Part of those policies and plans can take the form of codes of conduct. The quality of the staff managing and maintaining the accommodation facilities will have a decisive impact on the level of standards which are implemented and the well-being of workers (for instance on the food safety or overall hygiene standards). It is therefore important to ensure that managers are competent and other workers are adequately skilled. The manager will be responsible for overseeing staff, for ensuring the implementation of the accommodation standards and for the implementation of the management plans. It is important the accommodation manager has the corresponding authority to do so.
If the facility is being managed by a contractor, as is often the case, the expected housing and management standards should be specified in the relevant contract, and mechanisms to ensure that those standards are implemented should be set up. As part of this process, the accommodation manager (or contractor) should have a duty to monitor the application of the accommodation standards and to report frequently on their implementation to the client.

**Benchmarks**

1. There are management plans and policies especially in the field of health and safety (with emergency responses), security, workers’ rights, relationships with the communities.

2. An appointed person with the adequate background and experience is in charge of managing the workers’ accommodation.

3. If contractors are being used, there are clear contractual management responsibilities and monitoring and reporting requirements.

4. Depending on the size of the accommodation, there is a sufficient number of staff in charge of cleaning, cooking and of general maintenance.

5. Such staff are recruited from the local communities.

6. Staff have received basic health and safety training.

7. Persons in charge of the kitchen are trained in nutrition and food-handling and adequately supervised.

**B. Charging fees for accommodation and services**

Charging fees for the accommodation or the services provided to workers such as food or transport should be avoided where workers do not have the choice to live or eat anywhere else, or if deemed unavoidable, should take into account the specific nature of workers’ accommodation. Any charges should be transparent, discussed during recruitment and specified in workers’ contracts. Any such charges should still leave workers with sufficient income and should never lead to a worker becoming indebted to an employer.

**Benchmarks**

1. When fees are charged, workers are provided with clear information and a detailed description of all payments made such as rent, deposit and other fees.

2. When company housing is considered to be part of workers’ wages, it is best practice that workers are provided with an employment contract clearly specifying housing arrangements and regulations, in particular rules concerning payments and fees, facilities and services offered and rules of notice.

3. When fees are charged, the renting arrangements are fair and do not cost the worker more than a small proportion of income and never include a speculative profit.

4. Food and other services are free or are reasonably priced, never above the local market price.

5. The provision of accommodation or other services by employers as a payment for work is prohibited.

**Additional issue**

To avoid that fair renting arrangements turn into unfair ones, any deposit of advance should be set at a reasonable level and it is best practice that renting prices include a fixed fee covering the water needed and the use of the energy required to the functioning of the heating/cooling/ventilation/cooking systems. However, in such cases it might be necessary to raise workers’ awareness to ensure that workers will use the facilities responsibly, particularly in areas where water is scarce.

**C. Health and safety on site**

The company or body in charge of managing the workers’ accommodation should have the prime responsibility for ensuring workers’ physical well-being and integrity. This involves making sure that the facilities are kept in good condition (ensuring that sanitary standards or fire regulations are respected for instance) and that adequate health and safety plans and standards are designed and implemented.
Benchmarks
1. Health and safety management plans including electrical, mechanical, structural and food safety have been carefully designed and are implemented.

2. The person in charge of managing the accommodation has a specific duty to report to the health authorities the outbreak of any contagious diseases, food poisoning and other important casualties.

3. An adequate number of staff/workers is trained to provide first aid.

4. A specific fire safety plan is prepared, including training of fire wardens, periodic testing and monitoring of fire safety equipment and periodic drills.

5. Guidance on the detrimental effects of the abuse of alcohol and drugs and other potentially harmful substances and the risk and concerns relating to HIV/AIDS and of other health risk-related activities is provided to workers. It is best practice to develop a clear policy on this issue.

6. Workers have access to adequate preventive measures such as contraception (condoms in particular) and mosquito nets.

7. Workers have easy access to medical facilities and medical staff. Where possible, female doctors/nurses should be available for female workers.

8. Emergency plans on health and fire safety are prepared. Depending on the local context, additional emergency plans are prepared as needed to handle specific occurrences (earthquakes, floods, tornadoes).

D. Security of workers’ accommodation

Ensuring the security of workers and their property on the accommodation site is of key importance. To this end, a security plan must be carefully designed including appropriate measures to protect workers against theft and attacks. Policies regarding the use of force (force can only be used for preventive and defensive purposes in proportion to the nature and the extent of the threat) should also be carefully designed. To implement those plans, it may be necessary to contract security services or to recruit one or several staff whose main responsibility is to provide security to safeguard workers and property. Before making any security arrangements, it is necessary to assess the risks of such arrangements to those within and outside the workers’ accommodation and to respect best international practices, including IFC PS4 and EBRD PR4 and applicable law.11 Particular attention should be paid to the safety and security of women workers.

Benchmarks
1. A security plan including clear measures to protect workers against theft and attack is implemented.

2. A security plan including clear policies on the use of force has been carefully designed and is implemented.

3. Security staff have been checked to ensure that they have not been implicated in any previous crimes or abuses. Where appropriate, security staff from both genders are recruited.

4. Security staff have a clear mandate and have received clear instruction about their duties and responsibilities, in particular their duties not to harass, intimidate, discipline or discriminate against workers.

5. Security staff have received adequate training in dealing with domestic violence and the use of force.

6. Security staff have a good understanding about the importance of respecting workers’ rights and the rights of the communities.

7. Body searches are only allowed in specific circumstances and are performed by specially trained security staff using the least-intrusive means possible. Pat down searches on female workers can only be performed by female security staff.

8. Security staff adopt an appropriate conduct towards workers and communities.

9. Workers and members of the surrounding communities have specific means to raise concerns about security arrangement and staff.

E. Workers’ rights, rules and regulations on workers’ accommodation

Freedoms and human rights of workers should be recognised and respected within their living quarters just as within the working environment. House rules and regulations should be reasonable and non discriminatory. It is best practice that workers’ representatives are consulted about those rules. House rules and regulations should not prevent workers from exercising their basic rights. In particular, workers’ freedom of movement needs to be preserved if they are not to become effectively “trapped”. To this end it is good practice to provide workers 24/7 access to the accommodation and free transport services to and from the surrounding communities. Any restriction to this freedom of movement should be limited and duly justified. Penalties for breaking the rules should be proportional and implemented through a proper procedure allowing workers to defend themselves and to challenge the decision taken. The relationship between continuing employment and compliance with the rules of the workers’ accommodation should be clear and particular attention should be paid to ensure that housing rules do not create indirect limitation of the right to freedom of association. Best practice might include a code of conduct relating to the accommodation to be signed together with the contract of employment.

**Benchmarks**

1. Restriction of workers’ freedom of movement to and from the site is limited and duly justified. It is good practice to provide workers 24/7 access to the accommodation site. Any restrictions based on security reasons should be balanced by the necessity to respect workers’ freedom of movement.

2. Where possible, an adequate transport system to surrounding communities is provided. It is good practice to provide workers with free transportation to and from local communities.

3. Withholding workers’ ID papers is prohibited.

4. Freedom of association is expressly respected. Provisions restricting workers’ rights on site should take into account the direct and indirect effect on workers’ freedom of association. It is best practice to provide trade union representatives access to workers in the accommodation site.

5. Workers’ gender and religious, cultural and social backgrounds are respected. In particular, workers should be provided with the possibility of celebrating religious holidays and observances.

6. Workers are made aware of their rights and obligations and are provided with a copy of the internal workers’ accommodation rules, procedures and sanction mechanisms in a language or through a media which they understand.

7. Housing regulations, including those relating to allocation of housing, should be non-discriminatory. Any justifiable discriminatory rules – for example all-male dormitories – should be strictly limited to the rules which are necessary to ensure the smooth running of the worker camp and to maintain a good relationship with the surrounding communities.

8. Where possible, visitor access should be allowed.

9. Decisions should be made on whether to prohibit alcohol, tobacco and third party access or not from the camp and the relevant rules should be clearly communicated to all residents and workers.

10. A fair and non-discriminatory procedure exists to implement disciplinary procedures including the right of workers to defend themselves (see also next section).

---

**Box 9 - Dole housing plantation regulation in Costa Rica**

In every plantation there is an internal accommodation regulation that every worker is required to sign together with his/her employment contract. That document describes the behaviour which is expected from workers at all times and basic rules such as the prohibition of alcohol and the interdiction to make noise after a certain time at night. In case there is any problem concerning the application of those internal rules, a set of disciplinary procedures which have been designed with the workers’ representatives can be enforced. Workers are absolutely free to enter or leave the site and do not have any restrictions in relation to accessing their living quarters. Families are not allowed in the living quarters unless they have been registered for a visit.
F. Consultation and grievance mechanisms

All residents should be made aware of any rules governing the accommodation and the consequences of breaking such rules. Processes that allow for consultation between site management and the resident workers will assist in the smooth running of an accommodation site. These may include a dormitory or camp committee as well as formal processes that allow workers to lodge any grievances about their accommodation.

**Benchmarks**

1. Mechanisms for workers’ consultation have been designed and implemented. It is best practice to set up a review committee which includes representatives elected by workers.

2. Processes and mechanisms for workers to articulate their grievances are provided to workers. Such mechanisms are in accordance with PS2/PR2.

3. Workers subjected to disciplinary proceedings arising from behaviour in the accommodation should have access to a fair and transparent hearing with the possibility to contest decisions and refer the dispute to independent arbitration or relevant public authorities.

4. In case conflicts between workers themselves or between workers and staff break out, workers have the possibility of easily accessing a fair conflict resolution mechanism.

5. In cases where more serious offences occur, including serious physical or mental abuse, there are mechanisms to ensure full cooperation with the police authority (where adequate).

G. Management of community relations

Workers’ living facilities have various ongoing impacts on adjacent communities. In order to manage these, it is good practice to design a thorough community relations management plan. This plan will contain the processes to implement the findings of the preliminary community impact assessment and to identify, manage, mitigate or enhance ongoing impacts of the workers’ accommodation on the surrounding communities. Issues to be taken into consideration include:

- community development – impact of workers’ camp on local employment, possibility of enhancing local employment and income generation through local sourcing of goods and services
- community needs – ways to identify and address community needs related to the arrival of specific infrastructures such as telecommunications, water sanitation, roads, health care, education, housing
- community health and safety – addressing and reducing the risk in the increase in communicable diseases, corruption, trade in illegal substances such as drugs, alcohol (in the Muslim context), petty crimes and other sorts of violence, road accidents
- community social and cultural cohesion – ways to mitigate the impact of the presence of large numbers of foreign workers, often males, with different cultural and religious background, ways to mitigate the possible shift in social, economic and political structures due to changes in access to income generation opportunities.

**Benchmarks**

1. Community relations plans addressing issues around community development, community needs, community health and safety and community social and cultural cohesion have been designed and implemented.

2. Community relations plans include the setting up of a liaison mechanism allowing a constant exchange of information and consultation with the local communities in order to identify and respond quickly to any problems and maintain good working relationships.

3. A senior manager is in charge of implementing the community relations management plan and liaising with the community.

Additional issue

Alcohol is a complex issue and requires a very clear policy from the workers’ accommodation management. If a non-alcohol policy is taken, special attention should be paid to clearly communicate the interdiction, how it applies and the consequences for breaching this rule. Special attention should also be paid to enforce it adequately.
4. The impacts of workers’ accommodation on local communities are periodically reviewed, mitigated or enhanced.

5. Community representatives are provided with an easy means to voice their opinions and to lodge complaints.

6. There is a transparent and efficient process for dealing with community grievances, in accordance with PS1/PR10.

Box 10 - Examples of community relations management

Community consultation in the Baku-Tbilisi-Ceyhan (BTC) pipeline

The BTC pipeline’s Environment and Social Management Plans incorporated a Worker Camp Management Plan to be implemented by the construction contractor. As part of ongoing community liaison over the project as a whole, community liaison officers were appointed for worker camps who were responsible for meeting regularly with communities, identifying issues and addressing community concerns. A particular responsibility was to review HR records and disciplinary logs at worker camps to assess that rules were being implemented effectively and that any community liaison after any incidents was effective.
## ANNEX I: CHECKLIST ON WORKERS’ ACCOMMODATION

<table>
<thead>
<tr>
<th>General regulatory framework</th>
<th>Y</th>
<th>N</th>
<th>N/A</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Have the international/national/local regulatory frameworks been reviewed?</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Are mandatory provisions on workers’ accommodation identified?</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Assessing the need for workers’ accommodation

#### Availability of the workforce

| Has there been an assessment of workers’ availability in the neighbouring communities? |   |   |     |         |
| Has there been an assessment of the skills and competencies of the local workforce and how do those skills and competencies fit the project’s need? |   |   |     |         |
| Has there been an assessment of the possibility of training a local workforce in order to fulfil the project’s needs? |   |   |     |         |

#### Availability of housing

| Has there been a comprehensive assessment of the different type of housing available in the surrounding communities prior to building any workers’ accommodation? |   |   |     |         |
| For a larger project: is that assessment included in the Environmental and Social Impact Assessment? |   |   |     |         |
| Has there been an assessment of the impact on the communities of using existing housing opportunities? |   |   |     |         |
| Have measures to mitigate adverse impacts on the local housing market been identified and included in the Environmental and Social Action Plan (ESAP) or other relevant action plan? |   |   |     |         |
### Assessing impacts of workers’ accommodation on communities

Has a community impact assessment been carried out as part of the Environmental and Social Assessment of the overall project with a view to mitigate the negative impacts of the workers’ accommodation on the surrounding communities and to enhance the positive ones?

<table>
<thead>
<tr>
<th>Y</th>
<th>N</th>
<th>N/A</th>
<th>Comments</th>
</tr>
</thead>
</table>

Have the potential health and safety impacts and consequences of land acquisition and involuntary resettlement occurring during the construction phase of the workers’ accommodation been included in the assessment?

<table>
<thead>
<tr>
<th>Y</th>
<th>N</th>
<th>N/A</th>
<th>Comments</th>
</tr>
</thead>
</table>

Have the impacts of workers’ accommodation on community infrastructures, services and facilities been included in the assessment?

<table>
<thead>
<tr>
<th>Y</th>
<th>N</th>
<th>N/A</th>
<th>Comments</th>
</tr>
</thead>
</table>

Have the impacts on local community’s businesses and local employment been included in the assessment?

<table>
<thead>
<tr>
<th>Y</th>
<th>N</th>
<th>N/A</th>
<th>Comments</th>
</tr>
</thead>
</table>

Have general impacts of workers’ accommodation on communities’ health, (notably the increased risk of road accidents and of communicable diseases), and community social cohesion been included in the assessment?

<table>
<thead>
<tr>
<th>Y</th>
<th>N</th>
<th>N/A</th>
<th>Comments</th>
</tr>
</thead>
</table>

Does the assessment include appropriate mitigation measures to address any adverse impacts identified?

<table>
<thead>
<tr>
<th>Y</th>
<th>N</th>
<th>N/A</th>
<th>Comments</th>
</tr>
</thead>
</table>

### Types of workers’ accommodation

Has consideration been given to provision of family accommodation?

<table>
<thead>
<tr>
<th>Y</th>
<th>N</th>
<th>N/A</th>
<th>Comments</th>
</tr>
</thead>
</table>

Are individual accommodations comprising bedrooms, sanitary and cooking facilities provided as part of the family accommodation?

<table>
<thead>
<tr>
<th>Y</th>
<th>N</th>
<th>N/A</th>
<th>Comments</th>
</tr>
</thead>
</table>

Are adequate nursery/school facilities provided?

<table>
<thead>
<tr>
<th>Y</th>
<th>N</th>
<th>N/A</th>
<th>Comments</th>
</tr>
</thead>
</table>

Is special attention paid to providing adequate safety for children?

<table>
<thead>
<tr>
<th>Y</th>
<th>N</th>
<th>N/A</th>
<th>Comments</th>
</tr>
</thead>
</table>
# Standards for workers’ accommodation

<table>
<thead>
<tr>
<th>National/local standards</th>
<th>Y</th>
<th>N</th>
<th>N/A</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Have the relevant national/local regulations been identified and implemented?</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>General living facilities</th>
<th>Y</th>
<th>N</th>
<th>N/A</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Is the location of the facilities designed to avoid flooding or other natural hazards?</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Are the living facilities located within a reasonable distance from the worksite?</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Is transport provided to worksite safe and free?</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Are the living facilities built using adequate materials, kept in good repair and kept clean and free from rubbish and other refuse?</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Drainage</th>
<th>Y</th>
<th>N</th>
<th>N/A</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Is the site adequately drained?</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Heating, air conditioning, ventilation and light</th>
<th>Y</th>
<th>N</th>
<th>N/A</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Depending on climate are living facilities provided with adequate heating, ventilation, air conditioning and light systems including emergency lighting?</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Water</th>
<th>Y</th>
<th>N</th>
<th>N/A</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Do workers have easy access to a supply of clean/potable water in adequate quantities?</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Does the quality of the water comply with national/local requirements or WHO standards?</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Are tanks used for the storage of drinking water constructed and covered to prevent water stored therein from becoming polluted or contaminated?</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Is the quality of the drinking water regularly monitored?</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
## Wastewater and solid waste

<table>
<thead>
<tr>
<th>Y</th>
<th>N</th>
<th>N/A</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

- Are wastewater, sewage, food and any other waste materials adequately discharged in compliance with local or World Bank standards and without causing any significant impacts on camp residents, the environment or surrounding communities?
- Are specific containers for rubbish collection provided and emptied on a regular basis?
- Are pest extermination, vector control and disinfection undertaken throughout the living facilities?

## Rooms/dormitories facilities

<table>
<thead>
<tr>
<th>Y</th>
<th>N</th>
<th>N/A</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

- Are the rooms/dormitories kept in good condition?
- Are the rooms/dormitories aired and cleaned at regular intervals?
- Are the rooms/dormitories built with easily cleanable flooring material?
- Are the rooms/dormitories and sanitary facilities located in the same buildings?
- Are residents provided with enough space?
- Is the ceiling height high enough?
- Is the number of workers sharing the same room/dormitory minimised?
- Are the doors and windows lockable and provided with mosquito screens when necessary?
- Are mobile partitions or curtains provided?
- Is suitable furniture such as table, chair, mirror, bedside light provided for every worker?
- Are separate sleeping areas provided for men and women?
### Bed arrangements and storage facilities

<table>
<thead>
<tr>
<th></th>
<th>Y</th>
<th>N</th>
<th>N/A</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Is there a separate bed provided for every worker?</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Is the practice of “hot-bedding” prohibited?</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Is there a minimum space of 1 metre between beds?</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Is the use of double deck bunks minimised?</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>When double deck bunks are in use, is there enough clear space between the lower and upper bunk of the bed?</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Are triple deck bunks prohibited?</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Are workers provided with comfortable mattresses, pillows and clean bed linens?</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Are the bed linen washed frequently and applied with adequate repellents and disinfectants (where conditions warrant)?</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Are adequate facilities for the storage of personal belongings provided?</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Are there separate storages for work clothes and PPE and depending on condition, drying/airing areas?</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Sanitary and toilet facilities

<table>
<thead>
<tr>
<th></th>
<th>Y</th>
<th>N</th>
<th>N/A</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Are sanitary and toilet facilities constructed from materials that are easily cleanable?</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Are sanitary and toilet facilities cleaned frequently and kept in working condition?</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Are toilets, showers/bathrooms and other sanitary facilities designed to provide workers with adequate privacy including ceiling to floor partitions and lockable doors?</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Are separate sanitary and toilet facilities provided for men and women?</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Y</td>
<td>N</td>
<td>N/A</td>
<td>Comments</td>
</tr>
<tr>
<td>----------------------------------</td>
<td>---</td>
<td>---</td>
<td>-----</td>
<td>----------</td>
</tr>
<tr>
<td><strong>Toilet facilities</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Is there an adequate number of toilets and urinals?</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Are toilet facilities conveniently located and easily accessible?</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Showers/bathrooms and other sanitary facilities</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Is the shower flooring made of anti-slip hard washable materials?</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Is there an adequate number of hand wash basins and showers/bathrooms facilities provided?</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Are the sanitary facilities conveniently located?</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Are shower facilities provided with an adequate supply of cold and hot running water?</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Canteen, cooking and laundry facilities</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Are canteen, cooking and laundry facilities built with adequate and easy to clean materials?</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Are the canteen, cooking and laundry facilities kept in clean and sanitary condition?</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>If workers cook their own meals, is kitchen space provided separately from the sleeping areas?</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Laundry facilities</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Are adequate facilities for washing and drying clothes provided?</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Canteen and cooking facilities</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Are workers provided with enough space in the canteen?</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Are canteens adequately furnished?</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Are kitchens provided with the facilities to maintain adequate personal hygiene?</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Are places for food preparation adequately ventilated and equipped?</td>
<td>Y</td>
<td>N</td>
<td>N/A</td>
<td>Comments</td>
</tr>
<tr>
<td>---------------------------------------------------------------</td>
<td>---</td>
<td>---</td>
<td>-----</td>
<td>----------</td>
</tr>
<tr>
<td>Are kitchen floor, ceiling and wall surfaces adjacent to or above food preparation and cooking areas built in non-absorbent, durable, non-toxic, easily cleanable materials?</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Are wall surfaces adjacent to cooking areas made of fire-resistant materials and food preparation tables equipped with a smooth, durable, non-corrosive, non-toxic, washable surface?</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Are adequate facilities for cleaning, disinfecting and storage of cooking utensils and equipment provided?</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Are there adequate sealable containers to deposit food waste and other refuse? Is refuse frequently removed from the kitchen to avoid accumulation?</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Standards for nutrition and food safety</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Is there a special sanitary process such as the WHO “5 keys to safer food” implemented in relation to food safety?</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Does the food provided contain appropriate nutritional value?</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Does the food provided take into account workers’ religious/cultural backgrounds?</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Medical facilities</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Are first aid kits provided in adequate numbers?</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Are first-aid kits adequately stocked?</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Is there an adequate number of staff/workers trained to provide first aid?</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Are there any other medical facilities/services provided on site? If not, why?</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Leisure, social and telecommunications facilities</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Are basic social collective spaces and adequate recreational areas provided to workers?</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Are workers provided with dedicated places for religious observance?</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Can workers access a telephone at an affordable/public price?</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Are workers provided with access to internet facilities?</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
### Managing workers’ accommodation

#### Management and staff

<table>
<thead>
<tr>
<th>Question</th>
<th>Y</th>
<th>N</th>
<th>N/A</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Are there carefully designed worker camp management plans and policies</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>especially in the field of health and safety (including emergency responses),</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>security, workers’ rights and relationships with the communities?</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Where contractors are used, have they clear contractual management</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>responsibilities and duty to report?</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Does the person appointed to manage the accommodation have the required</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>background, competency and experience to conduct his mission and is he/she/</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>she provided with the adequate responsibility and authority to do so?</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Is there enough staff to ensure the adequate implementation of housing</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>standards (cleaning, cooking and security in particular)?</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Are staff members recruited from surrounding communities?</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Have the staff received basic health and safety training?</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Are the persons in charge of the kitchen particularly trained in nutrition</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>and food handling and adequately supervised?</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

#### Charging fees for accommodation and services

<table>
<thead>
<tr>
<th>Question</th>
<th>Y</th>
<th>N</th>
<th>N/A</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Are the renting arrangements fair and transparent?</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Are workers provided with adequate information about payment made?</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Where appropriate, are renting arrangements and regulations clearly</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>included in workers’ employment contracts?</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Are food and other services provided for free or reasonably priced, that</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>is, not above the local market price?</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Is the payment in kind for accommodation and services prohibited?</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Health and safety on site</strong></td>
<td><strong>Y</strong></td>
<td><strong>N</strong></td>
<td><strong>N/A</strong></td>
<td><strong>Comments</strong></td>
</tr>
<tr>
<td>------------------------------</td>
<td>-------</td>
<td>-------</td>
<td>---------</td>
<td>--------------</td>
</tr>
<tr>
<td>Have health and safety management plans including electrical, mechanical, structural and food safety been designed and implemented?</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Has the accommodation manager a duty to report to the health authority specific diseases, food poisoning or casualties?</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Is there an adequate number of staff/workers trained in providing first aid?</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Has a specific and adequate fire safety management plan been designed and implemented?</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Is guidance on alcohol, drug and HIV/AIDS and other health risk-related activities provided to workers?</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Are contraception measures (condoms in particular) and mosquito nets (where relevant) provided to workers?</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Do workers have an easy access to medical facilities and medical staff, including female doctors/nurses where appropriate?</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Have emergency plans on health and fire safety been prepared?</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Depending on circumstances, have specific emergency plans (earthquakes, floods, tornadoes) been prepared?</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Security on workers’ accommodation**

<table>
<thead>
<tr>
<th><strong>Y</strong></th>
<th><strong>N</strong></th>
<th><strong>N/A</strong></th>
<th><strong>Comments</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>Has a security plan including clear measures to protect workers against theft and attack been designed and implemented?</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Has a security plan including clear provisions on the use of force been designed and implemented?</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Have the backgrounds of security staff been checked for previous crimes or abuses?</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Has the recruitment of security staff from both genders been considered?</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Have security staff received clear instruction about their duty and responsibility?</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Have security staff been adequately trained in dealing with domestic violence and the use of force?</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
## Workers' rights, rules and regulations on workers' accommodation

<table>
<thead>
<tr>
<th>Question</th>
<th>Y</th>
<th>N</th>
<th>N/A</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Are body searches only performed in exceptional circumstances by specifically trained security staff of both genders?</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Do security staff have a good understanding about the importance of respecting workers’ rights and the rights of the surrounding communities and adopt appropriate conduct?</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Do workers and communities have specific means to raise concerns about security arrangements and staff?</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Are limitations on workers’ freedom of movement limited and justified?</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Is an adequate transport system to the surrounding communities provided?</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Is the practice of withholding workers’ ID papers prohibited?</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Is freedom of association expressly respected?</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Are workers’ religious, cultural and social backgrounds respected?</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Are workers made aware of their rights and obligations and provided with a copy of the accommodations’ internal rules, procedures and sanction mechanisms in a language or through a media they understand?</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Are house regulations non discriminatory, fair and reasonable?</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Are regulations on alcohol, tobacco and third parties’ access to the camp clear and communicated to workers?</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Is a fair and non-discriminatory procedure to implement disciplinary procedures, including the right for workers to defend themselves, set up?</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Y</td>
<td>N</td>
<td>N/A</td>
<td>Comments</td>
<td></td>
</tr>
<tr>
<td>---</td>
<td>---</td>
<td>-----</td>
<td>----------</td>
<td></td>
</tr>
<tr>
<td><strong>Consultation and grievance mechanisms</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Have mechanisms for workers’ consultation been designed and implemented?</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Are workers provided with processes and mechanisms to articulate their grievances in accordance with PS2/PR2?</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Have workers subjected to disciplinary proceedings arising from conduct in the accommodation had access to a fair and transparent hearing with the possibility to appeal the decision?</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Are there fair conflict resolution mechanisms in place?</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>In cases where serious offences occur, are there mechanisms to ensure full cooperation with police authorities?</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Management of community relations</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Have community relation management plans addressing issues around community development, community needs, community health and safety and community social and cultural cohesion been designed and implemented?</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Do community relation management plans include the setting up of liaison mechanisms to allow a constant exchange of information and consultation of the surrounding communities?</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Is there a senior manager in charge of implementing the community relation management plan?</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Is there a senior manager in charge of liaising with the surrounding communities?</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Are the impacts generated by workers’ accommodation periodically reviewed, mitigated or enhanced?</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Are community representatives provided with easy means to voice their opinions and lodge complaints?</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Is there a transparent and efficient process for dealing with community grievances, in accordance with PS1/PR10?</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Acknowledgements

“Workers’ accommodation: processes and standards” is a joint publication of the EBRD and IFC, who co-commissioned Ergon Associates to research and draft the document.

EBRD team:
Environment and Sustainability Department: Alke Schmidt, Michaela Bergman, Debbie Cousins, Frederic Giovannetti, Jeff Jeter
Editorial and Desktop Publishing: Natasha Treloar, Bryan Whitford

IFC team:
Editorial: Anna Hidalgo

Ergon Associates team:
Jean-Baptiste Andrieu, Stuart Bell, Amber Frugte, Steve Gibbons

This version of the Guidance Note benefited from valuable input from a number of external parties including Mary Boomgard (OPIC), Melinda Buckland (BHP Billiton), Kerry Connor (Bechtel), Alan Fine (Anglo Gold Ashanti), George Jaksch (Chiquita), Birgitte B. Nielsen (IFU), Roberto Vega (Dole), Karin Verstralen (FMO), Petter Vilsted (Norfund) and Elizabeth Wild (BP). We would also like to thank all companies that agreed to contribute practical examples.

For more information please contact
EBRD Environment and Sustainability Department, European Bank for Reconstruction and Development (EBRD) One Exchange Square, London EC2A 2JN United Kingdom
Tel: +44 20 7338 6000
Email: environmentalandsocial@ebrd.com

IFC Environment and Social Development Department: International Finance Corporation, 2121 Pennsylvania Ave. NW, Washington, DC 20433, United States
Tel: +1 (202) 473 1000 Fax: +1 (202) 974 4349
Email: asksustainability@ifc.org

© European Bank for Reconstruction and Development and International Finance Corporation, 2009
European Bank for Reconstruction and Development
One Exchange Square London EC2A 2JN United Kingdom
Tel: +44 20 7338 6000 Fax: +44 20 7338 6100 SWIFT: EBRDGB2L

The material in this publication is copyrighted. IFC and the EBRD encourage the dissemination of the content for educational purposes. Content from this publication may be used freely without prior permission, provided that clear attribution is given to IFC and the EBRD and that content is not used for commercial purposes. If you do wish to use it for commercial purposes, please contact the EBRD address above for permission.
APPENDIX

4-1 GENERAL ENVIRONMENTAL MANAGEMENT CONDITIONS FOR CONSTRUCTION CONTRACTS
**General Environmental Management Conditions for Construction Contracts**

**General**

1. In addition to these general conditions, the Contractor shall comply with any specific Environmental Management Plan (EMP) or Environmental and Social Management Plan (ESMP) for the works he is responsible for. The Contractor shall inform himself about such an EMP, and prepare his work strategy and plan to fully take into account relevant provisions of that EMP. If the Contractor fails to implement the approved EMP after written instruction by the Supervising Engineer (SE) to fulfill his obligation within the requested time, the Owner reserves the right to arrange through the SE for execution of the missing action by a third party on account of the Contractor.

2. Notwithstanding the Contractor’s obligation under the above clause, the Contractor shall implement all measures necessary to avoid undesirable adverse environmental and social impacts wherever possible, restore work sites to acceptable standards, and abide by any environmental performance requirements specified in an EMP. In general these measures shall include but not be limited to:

   (a) Minimize the effect of dust on the surrounding environment resulting from earth mixing sites, asphalt mixing sites, dispersing coal ashes, vibrating equipment, temporary access roads, etc. to ensure safety, health and the protection of workers and communities living in the vicinity dust producing activities.

   (b) Ensure that noise levels emanating from machinery, vehicles and noisy construction activities (e.g. excavation, blasting) are kept at a minimum for the safety, health and protection of workers within the vicinity of high noise levels and nearby communities.

   (c) Ensure that existing water flow regimes in rivers, streams and other natural or irrigation channels is maintained and/or re-established where they are disrupted due to works being carried out.

   (d) Prevent bitumen, oils, lubricants and waste water used or produced during the execution of works from entering into rivers, streams, irrigation channels and other natural water bodies/reservoirs, and also ensure that stagnant water in uncovered borrow pits is treated in the best way to avoid creating possible breeding grounds for mosquitoes.

   (e) Prevent and minimize the impacts of quarrying, earth borrowing, piling and building of temporary construction camps and access roads on the biophysical environment including protected areas and arable lands; local communities and their settlements. In as much as possible restore/rehabilitate all sites to acceptable standards.

   (f) Upon discovery of ancient heritage, relics or anything that might or believed to be of archeological or historical importance during the execution of works, immediately report such findings to the SE so that the appropriate authorities may be expeditiously contacted for fulfillment of the measures aimed at protecting such historical or archaeological resources.

   (g) Discourage construction workers from engaging in the exploitation of natural resources such as hunting, fishing, collection of forest products or any other activity that might have a negative impact on the social and economic welfare of the local communities.

   (h) Implement soil erosion control measures in order to avoid surface run off and prevents siltation, etc.

   (i) Ensure that garbage, sanitation and drinking water facilities are provided in construction workers camps.

   (j) Ensure that, in as much as possible, local materials are used to avoid importation of foreign material and long distance transportation.

   (k) Ensure public safety, and meet traffic safety requirements for the operation of work to avoid accidents.

3. The Contractor shall indicate the period within which he/she shall maintain status on site after completion of civil works to ensure that significant adverse impacts arising from such works have been appropriately addressed.
4. The Contractor shall adhere to the proposed activity implementation schedule and the monitoring plan / strategy to ensure effective feedback of monitoring information to project management so that impact management can be implemented properly, and if necessary, adapt to changing and unforeseen conditions.

5. Besides the regular inspection of the sites by the SE for adherence to the contract conditions and specifications, the Owner may appoint an Inspector to oversee the compliance with these environmental conditions and any proposed mitigation measures. State environmental authorities may carry out similar inspection duties. In all cases, as directed by the SE, the Contractor shall comply with directives from such inspectors to implement measures required to ensure the adequacy rehabilitation measures carried out on the bio-physical environment and compensation for socio-economic disruption resulting from implementation of any works.

**Worksite/Campsite Waste Management**

6. All vessels (drums, containers, bags, etc.) containing oil/fuel/surfacing materials and other hazardous chemicals shall be bunded in order to contain spillage. All waste containers, litter and any other waste generated during the construction shall be collected and disposed off at designated disposal sites in line with applicable government waste management regulations.

7. All drainage and effluent from storage areas, workshops and camp sites shall be captured and treated before being discharged into the drainage system in line with applicable government water pollution control regulations.

8. Used oil from maintenance shall be collected and disposed off appropriately at designated sites or be re-used or sold for re-use locally.

9. Entry of runoff to the site shall be restricted by constructing diversion channels or holding structures such as banks, drains, dams, etc. to reduce the potential of soil erosion and water pollution.

10. Construction waste shall not be left in stockpiles along the road, but removed and reused or disposed of on a daily basis.

11. If disposal sites for clean spoil are necessary, they shall be located in areas, approved by the SE, of low land use value and where they will not result in material being easily washed into drainage channels. Whenever possible, spoil materials should be placed in low-lying areas and should be compacted and planted with species indigenous to the locality.

**Material Excavation and Deposit**

12. The Contractor shall obtain appropriate licenses/permits from relevant authorities to operate quarries or borrow areas.

13. The location of quarries and borrow areas shall be subject to approval by relevant local and national authorities, including traditional authorities if the land on which the quarry or borrow areas fall in traditional land.

14. New extraction sites:

   a) Shall not be located in the vicinity of settlement areas, cultural sites, wetlands or any other valued ecosystem component, or on on high or steep ground or in areas of high scenic value, and shall not be located less than 1km from such areas.

   b) Shall not be located adjacent to stream channels wherever possible to avoid siltation of river channels. Where they are located near water sources, borrow pits and perimeter drains shall surround quarry sites.

   c) Shall not be located in archaeological areas. Excavations in the vicinity of such areas shall proceed with great care and shall be done in the presence of government authorities having a mandate for their protection.
d) Shall not be located in forest reserves. However, where there are no other alternatives, permission shall be obtained from the appropriate authorities and an environmental impact study shall be conducted.

e) Shall be easily rehabilitated. Areas with minimal vegetation cover such as flat and bare ground, or areas covered with grass only or covered with shrubs less than 1.5m in height, are preferred.

f) Shall have clearly demarcated and marked boundaries to minimize vegetation clearing.

15. Vegetation clearing shall be restricted to the area required for safe operation of construction work. Vegetation clearing shall not be done more than two months in advance of operations.

16. Stockpile areas shall be located in areas where trees can act as buffers to prevent dust pollution. Perimeter drains shall be built around stockpile areas. Sediment and other pollutant traps shall be located at drainage exits from workings.

17. The Contractor shall deposit any excess material in accordance with the principles of these general conditions, and any applicable EMP, in areas approved by local authorities and/or the SE.

18. Areas for depositing hazardous materials such as contaminated liquid and solid materials shall be approved by the SE and appropriate local and/or national authorities before the commencement of work. Use of existing, approved sites shall be preferred over the establishment of new sites.

**Rehabilitation and Soil Erosion Prevention**

19. To the extent practicable, the Contractor shall rehabilitate the site progressively so that the rate of rehabilitation is similar to the rate of construction.

20. Always remove and retain topsoil for subsequent rehabilitation. Soils shall not be stripped when they are wet as this can lead to soil compaction and loss of structure.

21. Topsoil shall not be stored in large heaps. Low mounds of no more than 1 to 2m high are recommended.

22. Re-vegetate stockpiles to protect the soil from erosion, discourage weeds and maintain an active population of beneficial soil microbes.

23. Locate stockpiles where they will not be disturbed by future construction activities.

24. To the extent practicable, reinstate natural drainage patterns where they have been altered or impaired.

25. Remove toxic materials and dispose of them in designated sites. Backfill excavated areas with soils or overburden that is free of foreign material that could pollute groundwater and soil.

26. Identify potentially toxic overburden and screen with suitable material to prevent mobilization of toxins.

27. Ensure reshaped land is formed so as to be inherently stable, adequately drained and suitable for the desired long-term land use, and allow natural regeneration of vegetation.

28. Minimize the long-term visual impact by creating landforms that are compatible with the adjacent landscape.

29. Minimize erosion by wind and water both during and after the process of reinstatement.

30. Compacted surfaces shall be deep ripped to relieve compaction unless subsurface conditions dictate otherwise.
31. Revegetate with plant species that will control erosion, provide vegetative diversity and, through succession, contribute to a resilient ecosystem. The choice of plant species for rehabilitation shall be done in consultation with local research institutions, forest department and the local people.

**Water Resources Management**

32. The Contractor shall at all costs avoid conflicting with water demands of local communities.

33. Abstraction of both surface and underground water shall only be done with the consultation of the local community and after obtaining a permit from the relevant Water Authority.

34. Abstraction of water from wetlands shall be avoided. Where necessary, authority has to be obtained from relevant authorities.

35. Temporary damming of streams and rivers shall be done in such a way avoids disrupting water supplies to communities down stream, and maintains the ecological balance of the river system.

36. No construction water containing spoils or site effluent, especially cement and oil, shall be allowed to flow into natural water drainage courses.

37. Wash water from washing out of equipment shall not be discharged into water courses or road drains.

38. Site spoils and temporary stockpiles shall be located away from the drainage system, and surface run off shall be directed away from stockpiles to prevent erosion.

**Traffic Management**

39. Location of access roads/detours shall be done in consultation with the local community especially in important or sensitive environments. Access roads shall not traverse wetland areas.

40. Upon the completion of civil works, all access roads shall be ripped and rehabilitated.

41. Access roads shall be sprinkled with water at least five times a day in settled areas, and three times in unsettled areas, to suppress dust emissions.

**Blasting**

42. Blasting activities shall not take place less than 2km from settlement areas, cultural sites, or wetlands without the permission of the SE.

43. Blasting activities shall be done during working hours, and local communities shall be consulted on the proposed blasting times.

44. Noise levels reaching the communities from blasting activities shall not exceed 90 decibels.

**Disposal of Unusable Elements**

45. Unusable materials and construction elements such as electro-mechanical equipment, pipes, accessories and demolished structures will be disposed of in a manner approved by the SE. The Contractor has to agree with the SE which elements are to be surrendered to the Client’s premises, which will be recycled or reused, and which will be disposed of at approved landfill sites.

46. As far as possible, abandoned pipelines shall remain in place. Where for any reason no alternative alignment for the new pipeline is possible, the old pipes shall be safely removed and stored at a safe place to be agreed upon with the SE and the local authorities concerned.

47. AC-pipes as well as broken parts thereof have to be treated as hazardous material and disposed of as specified above.

48. Unsuitable and demolished elements shall be dismantled to a size fitting on ordinary trucks for transport.
Health and Safety

49. In advance of the construction work, the Contractor shall mount an awareness and hygiene campaign. Workers and local residents shall be sensitized on health risks particularly of AIDS.

50. Adequate road signs to warn pedestrians and motorists of construction activities, diversions, etc. shall be provided at appropriate points.

51. Construction vehicles shall not exceed maximum speed limit of 40km per hour.

Repair of Private Property

52. Should the Contractor, deliberately or accidentally, damage private property, he shall repair the property to the owner’s satisfaction and at his own cost. For each repair, the Contractor shall obtain from the owner a certificate that the damage has been made good satisfactorily in order to indemnify the Client from subsequent claims.

53. In cases where compensation for inconveniences, damage of crops etc. are claimed by the owner, the Client has to be informed by the Contractor through the SE. This compensation is in general settled under the responsibility of the Client before signing the Contract. In unforeseeable cases, the respective administrative entities of the Client will take care of compensation.

Contractor’s Health, Safety and Environment Management Plan (HSE-MP)

54. Within 6 weeks of signing the Contract, the Contractor shall prepare an EHS-MP to ensure the adequate management of the health, safety, environmental and social aspects of the works, including implementation of the requirements of these general conditions and any specific requirements of an EMP for the works. The Contractor’s EHS-MP will serve two main purposes:

- For the Contractor, for internal purposes, to ensure that all measures are in place for adequate HSE management, and as an operational manual for his staff.
- For the Client, supported where necessary by a SE, to ensure that the Contractor is fully prepared for the adequate management of the HSE aspects of the project, and as a basis for monitoring of the Contractor’s HSE performance.

55. The Contractor’s EHS-MP shall provide at least:

- a description of procedures and methods for complying with these general environmental management conditions, and any specific conditions specified in an EMP;
- a description of specific mitigation measures that will be implemented in order to minimize adverse impacts;
- a description of all planned monitoring activities (e.g. sediment discharges from borrow areas) and the reporting thereof; and
- the internal organizational, management and reporting mechanisms put in place for such.

56. The Contractor’s EHS-MP will be reviewed and approved by the Client before start of the works. This review should demonstrate if the Contractor’s EHS-MP covers all of the identified impacts, and has defined appropriate measures to counteract any potential impacts.

HSE Reporting

57. The Contractor shall prepare bi-weekly progress reports to the SE on compliance with these general conditions, the project EMP if any, and his own EHS-MP. An example format for a Contractor HSE report is given below. It is expected that the Contractor’s reports will include information on:

- HSE management actions/measures taken, including approvals sought from local or national authorities;
- Problems encountered in relation to HSE aspects (incidents, including delays, cost consequences, etc. as a result thereof);
- Lack of compliance with contract requirements on the part of the Contractor;
- Changes of assumptions, conditions, measures, designs and actual works in relation to HSE aspects; and
- Observations, concerns raised and/or decisions taken with regard to HSE management during site meetings.
58. It is advisable that reporting of significant HSE incidents be done “as soon as practicable”. Such incident reporting shall therefore be done individually. Also, it is advisable that the Contractor keep his own records on health, safety and welfare of persons, and damage to property. It is advisable to include such records, as well as copies of incident reports, as appendixes to the bi-weekly reports. Example formats for an incident notification and detailed report are given below. Details of HSE performance will be reported to the Client through the SE’s reports to the Client.

Training of Contractor’s Personnel

59. The Contractor shall provide sufficient training to his own personnel to ensure that they are all aware of the relevant aspects of these general conditions, any project EMP, and his own EHS-MP, and are able to fulfil their expected roles and functions. Specific training should be provided to those employees that have particular responsibilities associated with the implementation of the EHS-MP. General topics should be:

- HSE in general (working procedures);
- emergency procedures; and
- social and cultural aspects (awareness raising on social issues).

Cost of Compliance

60. It is expected that compliance with these conditions is already part of standard good workmanship and state of art as generally required under this Contract. The item “Compliance with Environmental Management Conditions” in the Bill of Quantities covers these costs. No other payments will be made to the Contractor for compliance with any request to avoid and/or mitigate an avoidable HSE impact.
Example Format: HSE Report

Contract:

Period of reporting:

HSE management actions/measures:
Summarize HSE management actions/measures taken during period of reporting, including planning and management activities (e.g. risk and impact assessments), HSE training, specific design and work measures taken, etc.

HSE incidents:
Report on any problems encountered in relation to HSE aspects, including its consequences (delays, costs) and corrective measures taken. Include relevant incident reports.

HSE compliance:
Report on compliance with Contract HSE conditions, including any cases of non-compliance.

Changes:
Report on any changes of assumptions, conditions, measures, designs and actual works in relation to HSE aspects.

Concerns and observations:
Report on any observations, concerns raised and/or decisions taken with regard to HSE management during site meetings and visits.

Signature (Name, Title Date):
Contractor Representative
Example Format: HSE Incident Notification

Provide within 24 hrs to the Supervising Engineer

Originators Reference No:
Date of Incident: Time:

Location of incident:

Name of Person(s) involved:

Employing Company:

Type of Incident:

Description of Incident:
Where, when, what, how, who, operation in progress at the time (only factual)

Immediate Action:
Immediate remedial action and actions taken to prevent reoccurrence or escalation

Signature (Name, Title, Date):
Contractor Representative