

ZESCO LIMITED

NORTH WESTERN ELECTRICIFICATION GRID PROJECT

ENVIRONMENTAL AND SOCIAL MANAGEMENT PLAN

ENVIRONMENT AND SOCIAL AFFAIRS DEPARTMENT

9/20/2013



LIST OF ABBREVIATIONS AND ACRONYMS

AIDS	Acquired Immuno Deficiency Syndrome
ECO	Environmental Coordinator
ECZ	Environmental Council of Zambia
ESIA	Environmental and Social Impact Assessment
ESMP	Environmental and Social Management Plan
EMS	Environmental Management Systems
ERB	Energy Regulation Board
GIS	Geographical information Systems
HIV	Human Immune Virus
HSMP	Health and Safety Management Plan
Km	Kilometres
KW	Kilowatts
kV	kilovolts
MW	Mega watts
NHCC	National Heritage Conservation Commission
PAPs	Project Affected Persons
RAP	Resettlement Action Plan
PMU	Project Management Unit
RHC	Rural Health Center
STIs	Sexually Transmitted Infections
ZAWA	Zambia Wildlife Authority
ZEMA	Zambia Environmental Management Agency

DEFINITION OF TERMS

Alternatives: The evaluation of alternatives to projects to project development in ESIA (timing, location, technologies etc) including the no go or no development option.

Baseline: A description of the biophysical and socio-economic state of the environment at a given time, prior to development of a particular project.

Biota: All living plants and animals in a given area

Biodiversity: the variety of life on earth

Biophysical: Pertaining to the natural environment

Contamination: Pollution

Conservation: The preservation of natural resources for use by future generations.

Consultation: A process of communication with those potentially affected by a project, policy, plan or program

Cumulative effects: Changes to the environment that are caused by an action in combination with other past, present and future actions.

Endangered Species: An animal or plant in danger of extinction

Environment: The surroundings within which humans exist and that are made up of:

- i) The land, water and atmosphere of the earth;
- ii) Micro-organisms, plant and animal life;
- iii) Any part or combination of i) and ii) and the interrelationships among and between them; and
- iv) The physical, chemical, aesthetic and cultural properties and conditions of the foregoing that influence human health and well-being;

Environmental aspect/issue: elements of an organisation's activities, products or services which can interact with the environment.

Environmental Audit: A systematic, documented verification process of objectively obtaining and evaluating audit evidence to determine whether specified environmental activities events, conditions, management systems or information about these matters conform to audit criteria, and communicating the results of this process to the client.

Environmental Impact: Any change to the environment, whether adverse or beneficial, wholly or partially resulting from activities, products or services

Environmental and Social Impact Assessment (ESIA): An ESIA is the process of identifying, evaluating and mitigating all the relevant effect of development proposals including biophysical, social and others. It is an investigation and evaluation of the impacts of activities on the natural environment, socio-economic conditions and cultural heritage.

Environmental and Social Management Plan (ESMP): A plan that seeks to achieve a required end state of the environment and describes how activities, that could have a negative impact, will be managed and monitored and how impacted areas will be rehabilitated.

Ecosystem: An interconnected and symbiotic grouping of microorganisms, fungi, plants and animals.

Environmental Audit: An environmental management tool consisting of a periodic and objective evaluation of an organisation and installations to assess compliance with regulatory and other requirements, as defined by audit criteria

Fauna: Can refer to the animal life or classification of animals of a certain region, time period or environment

Flora: Can refer to a group of plants, a disquisition of a group of plants, as well as to bacteria

Groundwater: water found beneath the earth's surface

Habitat: the home of a plant or animal

Impact: The consequence of an action or activity on the human or natural environment. Impacts may be positive, negative or neutral

Irreversible: A result whereby once occurred cannot be changed or reverted to its prior state

Issue: A concern regarding an environmental impact, consequence or effect after an activity

Landfill: A disposal area for waste that is eventually covered with soil.

Magnitude: The size or degree of a predicted impact

Mitigation: Prescribed actions taken to prevent, avoid, reduce or minimize the impacts or potential adverse effects, of a project

Monitoring: A combination of observation and measurement to assess the environmental and social performance of a project and its compliance with the ESIA/ESMP, or other approval and regulatory conditions.

Natural Habitats: Land and water areas where most of the indigenous plant and animal species are still present, and either are legally protected, officially proposed for protection, or unprotected but of known high conservation value.

Physical cultural resources: Important sources of valuable historical and scientific information, assets for economic and social development, and integral parts of a people's cultural identify and practices

Protected Area: A clearly defined geographical space, recognised, dedicated and managed through legal or other effective means, to achieve the long term conservation of nature with associated ecosystem services and cultural values

Residual Impact: those impacts that remain after the application of mitigation measures

Risk: The likelihood of occurrence of an adverse project effect

Significance: The relative importance of an issue or impact to society

Site: the extent of the area where the proposed power line and its auxiliary facilities will be located

Social Impact Assessment: A component of EIA that assesses the impacts of a project, policy, plan or program on people and society

Stakeholder: someone who has an interest in the outcome of a project, or a decision affecting them.

EXECUTIVE SUMMARY

The Environmental and Social Management Plan (ESMP) for the north Western Electrification Project component providing a link between ESIA recommendations, legislative commitments and practical environmental and social outcomes. It also identifies the principles, approach, procedures and methods that will be used to control and minimize the environmental and social impacts of all construction and operational activities associated with the project. The ESMP will capture the ESIA commitments listed in the Environmental impacts and mitigation measures of any conditions of approval issued by the Zambian Government and any requirements of lending institutions associated with the project. ESMP will also define the framework that contractors will be required to follow when preparing their more detailed construction and operations environmental and social management plans. Contractors working on the project will be contractually obliged to comply with the relevant environmental requirements, specifications and procedures set out in the ESMP.

In the Northwestern Province (NWP) ZESCO Limited supplies electricity to five districts namely Mwinilunga, Mufumbwe, Kabompo, Zambezi and Chavuma from isolated Diesel Generation Stations located in each district. The older districts (Mwinilunga, Kabompo, and Zambezi) have been on diesel power supply for over forty years now. Solwezi and Kasempa are the only two districts in the province that are supplied from the national hydro power grid.

Power supply from the diesel power stations is characterized by high operational costs, inadequate capacity, very low reliability and high emissions. ZESCO Limited has therefore long sought to replace diesel generated power supply with reliable and cost effective power from the national grid by connecting all the diesel power stations to the grid. By the year 2000, ZESCO Limited was operating ten diesel stations country wide, but by 2007, four such stations had been replaced by grid supply while two new stations were installed in two newly designated districts.

Despite having great potential for mining and agricultural development, NWP generally remains underdeveloped due to insufficient and unreliable power supply. It is against this background that the Government of the Republic of Zambia through ZESCO Limited, intends to connect the 5 NWP Districts still on diesel, to the National Grid at 132 kilo Volts (kV) through a transmission line from Lumwana substation to Chavuma and another line from Lumwana to Mwinilunga.

The ESMP will involve multiple institutions and responsibilities shared between ZESCO, the Contractor, Regulators, Consultants and Local Authorities.

All management plans prepared will be implemented throughout the construction and operation phases of the project including plans relating to the following activities:

- Construction
- Biodiversity protection
- Environmental and social issues
- Safety issues affecting both workers and members of the community
- Physical Cultural Resources
- Additional studies that may be required to provide more baseline information for the project and
- Training and capacity building in all aspects of the ESMP

All these will include the following general components;

- Identified issues and impacts
- Performance targets
- Mitigation and management measures
- Monitoring requirements and activities
- Implementation schedules and
- Responsibilities and lines of communication

Environmental and social supervision shall be conducted during project construction to ensure compliance of the contractor with ESMP provisions and other Zambian regulatory requirements. Monitoring shall also be done during construction and operations to verify the success of mitigation measures and to conduct additional baseline sampling. The ESMP outlines reporting and communication procedures to ensure that ESMP provisions are communicated and reported at all levels of the project, including local communities.

A key component of ESMP success depends on effective capacity building and training of staff and all others involved in the ESMP. These efforts will also be assisted by the implementation of technical assistance by outside consultants.

The ESMP shall be considered a controlled document and should be updated annually, following a reportable incident or plan update.

Initial start-up costs for implementing the ESMP are estimated to be US\$295,000.

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1.0 ENVIRONMENTAL MANAGEMENT PLAN FRAMEWORK

1.1 Introduction

1.2 Project Background

The Government of the Republic of Zambia (GRZ) seeks to improve the foundation for economic development, and one of the fundamental elements is to provide sustainable energy to all parts of the country.

In pursuit of this objective, GRZ through ZESCO Limited commenced electricity supply to the Northwestern Province in 1971 by installing diesel generation plants in Mwinilunga, Kasempa, Kabompo, and Zambezi; the then key Districts of the Northwestern Province. In due course, additional diesel power plants were installed at Mufumbwe and Chavuma while the one at Kasempa was decommissioned after Kasempa was connected to the grid in 2004.

Thus, in the Northwestern Province, ZESCO has been operating diesel power stations for about 40 years now and for the better part of these 40 years, electricity supply from these stations has been characterized by:-

- Inadequate capacity. Due to high investment and running costs, the installed capacity has remained more or less stagnant over time. Any capacity increment has been small and not sized to match rising demand. This has curtailed new connections, thereby limiting access to electricity.
- Low reliability of supply. It is not uncommon for the limited supply to be available for only a few hours per day due to fuel rationing in order to conserve the expensive fuel. In the rainy season, it becomes impossible to deliver fuel to some stations due to impassable road conditions. Additionally machine breakdowns are frequent with long repair times and it is not unusual to have a total power supply failure lasting several weeks. This has a tailing effect on vital services such as water supply.
- Very high operational costs. High maintenance costs, high machine replacement costs, and the very high fuel costs due to the ever rising price of oil result in very high operating costs. In today's terms diesel generation costs are of the order of 35Cents/kWh while grid electricity costs are of the order of 6Cents/kWh. The result is that ZESCO spends about US\$4 Million per year on fuel alone to operate the five diesel stations in the Northwestern Province. The corresponding revenue is less than 10% of the generation fuel cost.

These power supply constraints are a major hindrance to improving the quality of life in the Northwestern Province and other rural areas. They have hindered the emergence of local small businesses which are important for poverty reduction and improvement of the quality of life for rural men, women and children.

An Environmental Impact Assessment (EIA) Study for the proposed project shall be undertaken by ZESCO Limited in accordance with the Environmental Protection and Pollution Control Act of 1991, Statutory Instrument No. 28 of 1997 – The Environmental Impact Assessment Regulations. The EIA study will identify potential impacts and recommend measures to mitigate adverse impacts while maximizing positive impacts. An Environmental Project Brief (EPB) for the first phase of this project, which involves the connection of Mufumbwe District to the grid from Kasempa Turn Off (Nselauke), was approved by the ECZ in 2009.

The second phase of the proposed project therefore shall involve the connection of Kabompo, Mufumbwe, Mumbezhi, Lukulu, Zambezi and Chavuma districts to the national grid. Another segment of the project shall comprise the construction of a transmission line from Lumwana to Mwinilunga.

An Environmental and Social Management Plan (EMSP) shall be developed to facilitate the implementation of the mitigation measures. The EMSP shall have various sections outlining procedures, activities and stages of implementing the mitigation measure. For instance, the introduction of the EMSP shall outline the background to the activities to be undertaken as provided for in the detailed technical and tender documents. Background information to the project, purpose of the EMP, awareness (health, safety etc) and monitoring (compliance) programmes shall also be outlined in the EMSP.

1.3 Main Components of the EMSP

The main components of the EMSP shall include:

- **Awareness and training:** with general code of conduct (for contractors, employees etc), employment and recruitment procedures, protection and management of cultural, heritage and/or archeological sites, protection of infrastructure and property, anti-poaching, health, safety, compensation procedures, working hours. etc.
- **Waste Management:** refuse and waste management, water pollution control, sanitation, waste oil and solid waste, stock piles and spoil dumps management.
- **General guidelines on project implementation:** that shall include: camp site selection criteria, temporary works, road signage, plant and equipment service area, explosives and other construction materials storage, fuel storage and workshop area, borrow pits and quarry sites, access roads and road transport, water supply and services on site.
- **Environmental Management:** slope protection, erosion protection, noise pollution control, air pollution control, water pollution control, vegetation management (bush clearing, plant species protection, cut wood management), landscaping and rehabilitation of construction sites, monitoring and audit programme.
- **Work plan** and phasing of environmental management plan implementation activities with responsible persons or parties.
- Air Quality and Odour Management Plan;
- Waste Management Plan;
- Ecology Management Plan;
- Emergency Management Plan;
- Erosion and Sediment Control Plan;
- Traffic Management Plan;
- Health, Safety and Security Management Plan; and
- Archaeological and Cultural Management Plan (Chance-Find)

It is envisaged that project staff shall include a full time Environmental Coordinator to enhance implementation of the environmental mitigation measures through the Environmental Management Plan. All awareness programmes (on health, safety, wild life conservation) to construction workers and communities in the project area shall be conducted in liaison with but not limited to Health Department, Forestry Department and in consultation with community leaders in the project area.

1.4 Monitoring Programme

The monitoring programme shall be implemented by ZESCO Limited in collaboration with appropriate stakeholders and Government Departments operating in the project area. The monitoring programme shall concentrate among others but shall not be limited to the following:

- Camp site selection
- Labour recruitment approaches and manning levels
- Construction practices
- Effectiveness of health awareness programme
- Effective of environmental protection awareness campaigns
- General implementation of the EMSP.

Table 1 Mitigation Budget and Responsible Agency

ACTIVITY	IMPLEMENTING AGENCY	ESTIMATED COST US\$
• Land acquisition & Resettlement	ZESCO Limited	<i>50,000.00</i>
2.0 Health Education	Ministry of Health	<i>10,000.00</i>
3.0 Access and Roads	Contractor(s)	<i>50,000.00</i>
4.0 Natural Resources Management	Forestry and National Heritage Conservation Commission (NHCC)	<i>50,000.00</i>
5.0 Heritage Assessment	National Heritage Conservation Commission (NHCC)	<i>5000.00</i>
6.0 Monitoring & Auditing	ZESCO and Forestry	<i>30,000.00</i>

7.0 Statutory Fees payments	ZESCO	<i>100,000.00</i>
Estimated Total Mitigation Budget		295,000.00

2.0 PROJECT DESCRIPTION

2.1 Location

The proposed project designated as the –connection of Northwestern Province to the National Grid at 132kV will originate from the substation at Lumwana and will connect Mufumbwe, Kabompo, Zambezi and Chavuma. A second line will start from Lumwana substation to Mwinilunga. The main Chiefdoms in the immediate project area include Chizela, Sikufele, Ishindi, Ndungu, Mukumbi, Musele and Sailunga. Figure 1 below shows the location of the project area.

The proposed power lines will have a way-leave size of 32meters wide (thus, 16m on either side of the power lines).

Appendix 2 is a map showing the proposed line route.

2.3 Project Objectives

The main objective of the proposed project is to replace the diesel power stations in the five districts of NW Province with clean, efficient and more reliable form of electricity by connecting them to the national grid. The replacement of diesel generators by hydro power will have a number of benefits such as:

- increasing access to electricity to other remote areas in the districts;
 - reduction in pollution from gaseous emissions;
 - provisions of sufficient and firm power for other developments in the areas;
 - general improvement in the living conditions of the areas
- **Power Transmission Project Scope**

The proposed grid connection project shall consist of the following scope of works:

- Construction of a total of 450 km of 132kV sub-transmission lines from Lumwana substation through Mufumbwe, Kabompo and

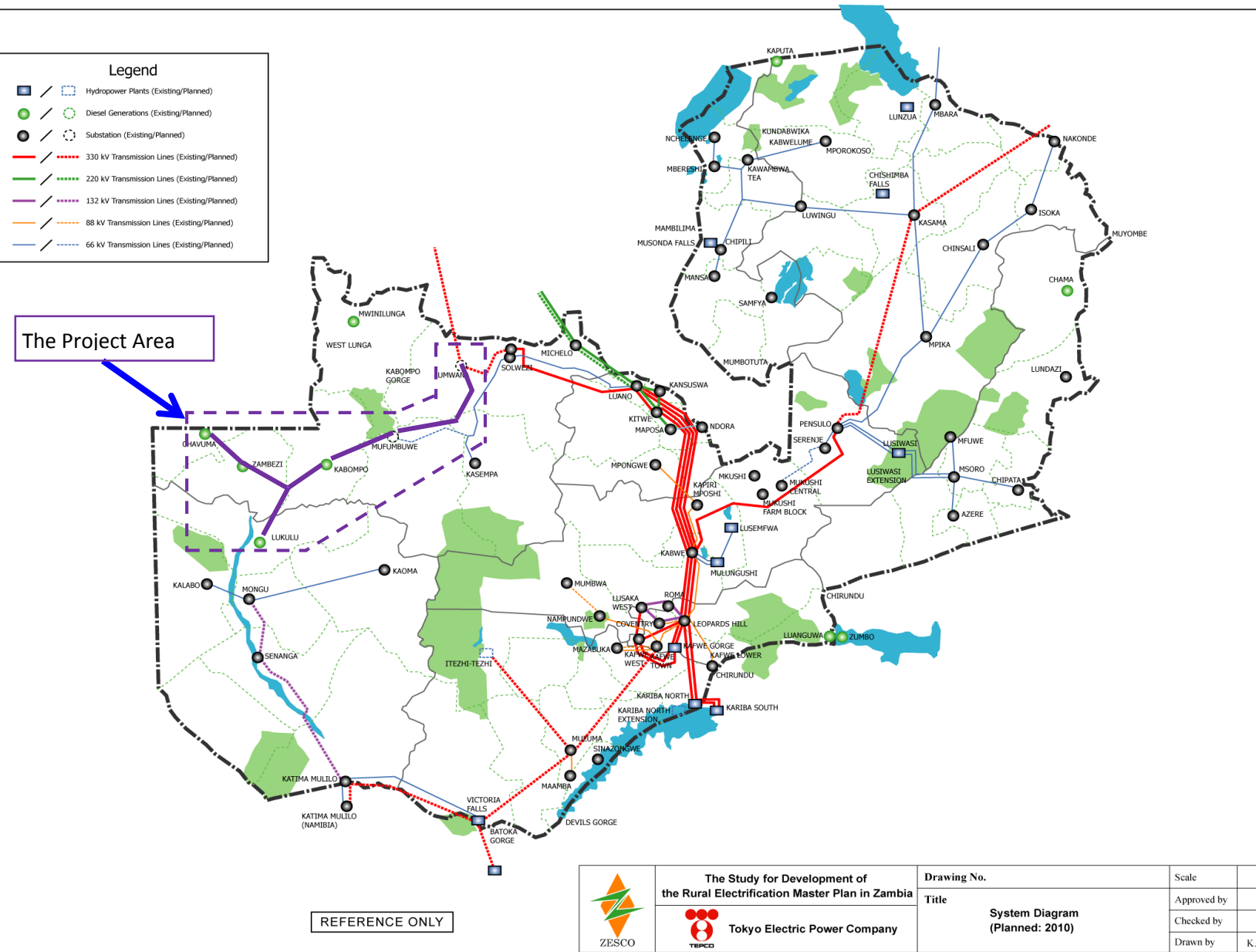


Figure 1: Location map for the project area

- Zambezi to Chavuma. The connection of Mwinilunga to the grid shall be done through the construction of a line from Lumwana substation.
- Construction of five 132-66/33/11kV tap down load centre substations, one at each of the five sites of diesel generation; viz Mufumbwe, Kabompo, Zambezi, Chavuma and Lukulu plus another at Mumbeji.
- Establishment of a Network Control Centre at Solwezi for supervision and control of the 66-132kV grid.

2.4 Project Cost

The estimated capital costs of the project, excluding the EIA study the RAP costs and contingency are as summarised here-under.

Table 1 : Cost Estimate of grid connection project

Item	Description	Line Distance (km)	Line Cost (MUSD)	Substation Cost (MUSD)	Total Cost (MUSD)	Cumulative Totals (MUSD)
1	Solwezi Substation	-	-	2.5	2.5	2.5
2	Connection of Mufumbwe	110	9.9	1.6	11.5	14.6
3	Connection of Kabompo	115	10.35	2.5	12.85	27.45
4	Connection of Mumbeji	70	6.75	1.6	8.35	35.8
5	Connection of Zambezi	70	6.30	2.5	8.8	44.6
6	Connection of Chavuma	80	7.2	1.6	8.8	53.4
7	Connection of Mwnilunga from Lumwana	200				
8	TOTALS	650				

- **Project Design**

The proposed power lines will be of the standard 132kV structure which will be on steel towers. Each tower covers a base area of approximately 1.8m x 1m.

2.5 Project Construction Activities

The following is the description of typical line construction activities. Specific environmental protection measures and standard construction specifications are included in the ZESCO way-leave clearing guidelines.

During the detailed way-leave selection process, the center line and the boundaries of the way-leave was established within 32m wide preferred corridor, based on the results of the field work. The construction will be done by an independent contractor supervised by ZESCO.

2.5.1 Clearing

It is the practice of ZESCO to clear all the way-leave by removing standing vegetation with the exception of vegetation around watercourses. This practice is employed to ensure that sufficient clearance is maintained between the conductor and the ground, and to facilitate maintenance of the line should repairs be required.

Clearing of ZESCO lines is normally conducted through tender to contractors. The contractor is responsible for completing the work as outlined in the tender document.

Merchantable timber within the clearing zone is salvaged where practical, according to the requirements outlined in all relevant contracts. Some wood waste may be used by the local communities as wood fuel as well as for erosion and sedimentation control. No burning of wood waste shall occur.

Personnel from ZESCO will be on site during the clearing operation to provide quality control and supply the contractor information that may be required.

2.5.2 Erecting Structures

Where possible, structure sites are established with minimal grubbing. However, in particularly steep terrain, a flat area may be constructed for the structure site. The structures maybe assembled horizontally on the ground and set in place by a crane. An alternative method which may be used is to assemble the structure vertically one piece at a time at the structure location.

2.5.3 Stringing Conductor

Once the structures are erected, a tractor (or equivalent vehicle) strings the conductor and overhead shield wires through pulleys attached to the insulators. The conductor wires are attached by hand to the insulators. The shield wires provide a path to the ground for lightning strikes.

2.5.4 Installation of Counterpoise

Counterpoise is installed in areas where ground resistance is high in order to improve grounding, and reduce the number of lightning caused outages on the line.

2.5.5 Substations

The load centre substations shall be of the one transformer type, again for reasons of cost optimization. These transformers may be of the three winding type in order to provide two outputs of 33kV and 11kV respectively. 11kV supply shall feed into the existing 11kV distribution networks within the Bomas, while 33kV shall be for supply to load centers that are far from the Bomas. The tentative transformer sizes are 12.5/8/2.5MVA, 132-66/33/11kV for the 3 winding type and 3.16MVA, 132-66/33kV for the two winding type.

HV switchgear for each of the above substations shall be of the air insulated type, conventional or compact or modular depending on market prices. The MV and LV switchgear at the load centre substations shall be of the indoor compact gas insulated type. The substations shall be complete with a control building, guard house, water and sanitation.

To guarantee acceptable security of supply, a trailer mounted mobile transformer shall be supplied as part of the spares and be kept at a centrally located place that minimizes emergency deployment time.

2.5.6 Clean-up

Clean-up activities shall be on-going as construction progresses, and involves the removal of all work materials from the construction site, and installation of erosion control and stabilization techniques, where required.

2.5.7 Re-vegetation

The way-leave will be allowed to re-vegetate naturally, under the vegetation control program. An active re-vegetation program shall be implemented in erodible areas (i.e. road crossings, watercourse crossings), areas of critical wildlife habitat, etc.

2.5.8 Access

The proposed power line way-leave will traverse and intersect several existing public and private roads and forest roads. Existing roads will be used as much as practical to access the way-leave. Existing roads and trails used by forestry department and ZAWA will be used where appropriate. In more remote areas, access roads will be built or constructed during the clearing and construction phases as required. It is anticipated that few new access roads will be constructed for this project.

2.5.9 Project Operation and Maintenance Activities

The proposed power lines will be operated and maintained by ZESCO in accordance with standard procedures designed to ensure the integrity of the power line system.

Routine inspections will be conducted on the power lines to ensure line security and public safety. During operation, routine maintenance of the proposed line will be carried out every year during annual way-leave maintenance by ground patrol.

The vegetation along the way-leave will be controlled to minimize conducting power to the ground and ground clearances are not to be exceeded. ZESCO currently uses a combination of mechanical bush control and manual cutting for vegetation according to the ZESCO way-leave guidelines.

2.5.10 Decommissioning and Abandonment Activities

ZESCO facilities are designed and will be operated and maintained to provide safe and efficient service over the long-term. If some facilities need to be decommissioned or abandoned, appropriate technology will be used to ensure that regulatory requirements are met. Decommissioning and abandonment of facilities shall be carried out in a safe, efficient and environmentally sound manner.

Decommissioning and abandonment plans shall be developed after consulting with the ECZ and other government agencies. Site decommissioning shall meet legislative standards and sites shall be left clean.

The Diesel Power Stations in the 5 Districts shall be left as standby power supply for a certain period before they are decommissioned.

2.5.11 Waste

The following sections provide a summary of emissions/waste anticipated to be generated during project construction, operation and maintenance.

2.5.12 Project Labour Requirements

Construction of the proposed power line will occur over a period of 18 to 24 months. During this period the contractor will employ the necessary labour force, in addition to inspectors from ZESCO, which will include environmentalists.

2.6 Raw Materials

The main construction materials on the project shall include but will not be limited to the following construction materials and components:

- Steel for towers, concrete reinforcement, fencing etc
- River sand for concrete works
- Cement for concrete works
- Aggregates for concrete
- Insulators
- Conductors
- Transformers

- Accessories such as bolts and nuts
- Fencing wire for substation

2.7 Products

The main product of the project is electric power that will be transmitted on the proposed line. Hydropower is one of the clean forms of energy that does not cause significant environmental degradation during the operation phase.

2.8 By Products

The resulting by products from the project could include: waste materials from the construction process such as cement bags and other packaging materials, aggregates, steel off cuts, bolts & nuts, wood, waste (domestic) from camp sites, etc.

2.9 Operation Phase

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

2.10 Route Selection

The process of route selection involved the selection of an environmentally, socially, technically and economically acceptable corridor for the proposed power line project from the substation at Kasempa turn off to Chavuma through Mufumbwe, Kabompo, and Zambezi and from Lumwana substation to Mwinilunga.

The corridor selection exercise process relied on input from specialists from a wide variety of disciplines from within ZESCO Limited. This was complimented by input from the local communities within the project area.

The corridor selection included the following elements:

- Selecting an acceptable corridor in consideration of environmental, technical, land use, social and cost factors;
- Minimising the length/distance of the proposed line;
- Minimising land purchase requirements, disturbance to settlers and relocation of households, where possible.

3.0 MANAGEMENT ARRANGEMENTS

3.1 Roles and Responsibilities

This section describes the organizational structure and responsibilities for implementation of the ESMP.

3.1.1 ZESCO (The Employer)

The General responsibilities of ZESCO will include:

- Assisting its contractors with the implementation of the ESMP;
- Monitoring and evaluating the operator's implementation of the ESMP;
- Monitoring key indicators of the Project's environmental impacts and performance;
- Reviewing plans, designs and strategies in relation to environmental, social and health considerations;
- Maintaining appropriate management systems and documentation;
- Preparing and submitting environmental and social documentation to government agencies and lenders as required;
- Following-up non-conformance situations to ensure they have been successfully addressed; and
- Adapting management policies and strategies through lessons learnt.

3.1.2 Project Management Team (PMT)

The Project Management team will be responsible for the following:

- Establishment of an environmental unit, headed by the Project Environmental Manager (ECO) to implement ESMP responsibilities;
- Management, implementation, monitoring and compliance of the ESMP, ESIA and any approval conditions, including construction supervision and performance of all Project staff, contractors and subcontractors;
- Review of ESMP performance and implementation of correction actions, or stop work procedures, in the event of breaches of EMP conditions, that may lead to serious impacts on local communities, or affect the reputation of the project;
- Ensure effective communication and dissemination of the content and requirements of the ESMP to contractors and subcontractors;
- Assisting the contractor with implementation of ESMP sub-plans;
- Monitoring of ESMP and ESIA performance;
- Ensuring compliance to all project social commitments, including implementation of the social management and resettlement plans
- Report environmental performance of the project directly to ZESCO Management
- Report on environmental performance also to ZEMA and other government regulators as required
- Prepare environmental reports summarizing project activities, as required

- Representing the project at community meetings
- Ensuring effective community liaison and fulfilling commitments to facilitate public consultation throughout the project cycle;

3.1.3 The Contractor

The ESMP shall be read as a whole and not in part, and shall be adhered to in totality

- Preparation and implementation of the Construction and Worker Camp Management Plan;
- Preparation and implementation of the Waste Management, House-keeping plan
- Preparation and implementation of the Health and Safety Management Plan (HSMP) during construction; Ensuring that all construction personnel and subcontractors are informed of the intent of the ESMP and are made aware of the required measures for environmental and social compliance and performance;
- During construction, maintaining traffic safety along access roads, with special emphasis on high trafficked areas.

3.1.4 Supervising Engineer

The Supervising Engineer will have the following roles under this ESMP:

- Preparation and implementation of the Environmental Supervision Plan during construction
- Preparation and implementation of the Environmental Monitoring Plan during construction
- Supervision of contractor performance of implementation of the Construction and Work Camp Management Plan
- Reporting any incidents or non-compliance with the ESMP to the PMT
- Ensuring adequate training and education of all staff involved in environmental supervision
- Making recommendations to the PMT regarding ESMP performance as part of an overall commitment to continuous improvement

3.1.5 Environmental Coordinator (ECO)

ZESCO “The Employer” shall appoint an Environmental Manager or Environmental Coordinator (ECO) to take care of environmental and social issues during construction and project implementation. The ECO will lead the PMT Environmental team and will report to the Project Manager. The ECO will participate in all project meetings and the day-to-day running of the project. The ECO will be responsible for organization and scheduling of Task Teams’ environmental and health awareness campaigns, monitoring and audits for various environmental aspects of the project as outlined in the ESIA report. The ECO will also serve as the community liaison officer to receive any complaints from the communities in the project area. The ECO will direct all complaints to the Project Manager or other appropriate officers for action.

The ECO will be responsible for monitoring compliance to all the outlined mitigation measures in the ESIA. Environmental monitoring will mainly concentrate on the following aspects of preventative, mitigation or potential impacts minimization measures during construction:

- site establishment
- excavations

- blasting
- use of heavy duty machinery
- waste management
- safety
- soil erosion
- noise and dust nuisance
- disturbance of archaeological and cultural sites
- deforestation
- wildlife
- general pollution
- disruption of the socio-economic state
- employment and other specified benefits to local communities
- Conflict resolution between the project and the local communities

The Contractor is required to appoint an officer(s) who will be responsible for the management of environmental issues on site. The Contractor's environmental officer(s) shall ensure the implementation of the ESMP guidelines, prepare Action Plans, maintain close liaison with the Employer's ECO and will have meetings regularly.

3.1.6 Safety Officer

The Employer shall appoint a Safety Officer to monitor health and safety issues during project implementation. The Safety Officer(s) will be on site on full-time basis to ensure that safety standards are followed in the daily operations of the Contractor and he/she will report to the Project Manager. The Safety Officer will participate in all project meetings and the day-to-day running of the project. The Safety Officer will be responsible for organizing and scheduling of safety awareness meetings for the workers and the local people. The Safety Officer will collaborate with the ECO on many aspects and may hold joint meeting from time to time.

The Contractor shall be required to appoint safety officers who will be responsible for handling safety issues on site. The Contractor's Safety Officers shall ensure the preparation and implementation of the Health and Safety Action Plan (HSAP) and will maintain close liaison with the Employer's Safety Officer.

3.1.7 Worker Code of Conduct

As the various works are undertaken by the Contractor(s), it is imperative that the Construction Supervisor ensures that all workers on site comply with all laid down environmental mitigation measures in the EIA report. Therefore the Contractor shall prepare a well-articulated Code of Conduct. All the workers on site should have access to and fully understand the Code of Conduct.

The Contractor shall also conform to the cultural norms and traditions of the local people in order to work in harmony with the local people. The Construction Supervisor shall ensure that disputes between the contractor and the workers as well as among the workers are quickly and amicably resolved to ensure that work is not disrupted. A good code of conduct can save the Employer and the Contractor from unnecessary litigations and loss of man-hours.

3.2 Institutional and Legal Framework

ZESCO carries the ultimate responsibility for ensuring that the Project and all supporting infrastructure are designed, constructed and operated in conformance with Zambian legislative requirements, IFC Performance Standards and General EHS Guidelines and industry best practice. Wherever available, Zambian standards will be adapted to the project, which will be supplemented by international standards and guidance as necessary.

In addition to the adopted policy, legislation, guidelines and standards, ZESCO will be responsible for the implementation of appropriate environmental and social mitigation measures throughout the construction and operations stages of the project that will be documented in and activated through the PESMP.

Listed below are some of the institutions and Government offices that may be contacted whenever necessary to ensure successful implementation of the ESMP:

- Ministry of Mines, Energy and Water Development
- Department of Energy
- The Energy Regulation Board
- Mine Safety Department
- Ministry of Tourism and Arts
- Zambia Wildlife Authority
- National Heritage Conservation Commission
- Ministry of Lands Natural Resources and Environmental Protection
- Lands Department
- Forestry Department
- Zambia Environmental Management Agency
- Ministry of Labour and Social Security
- Department of Occupational Health and Safety
- Local Government and Housing
- District Councils – Solwezi, Mufumbwe, Kabompo, Lukulu, Zambezi and Chavuma
- District Commissioners – Solwezi, Mufumbwe, Kabompo, Lukulu, Zambezi and Chavuma
- Area Members of Parliament
- Area Councillors
- Ministry of Education, Science and Vocational Training
- Ministry of Health
- Ministry of Works, Transport and Communication
- Roads Department
- Traditional authorities (Chiefs and Headmen)

The Contractor shall comply with the provisions under the following legislation with respect to the Works under the Project:

- (i) Environmental Management Act No12 of 2011 and its subsidiary legislations;
- (ii) Natural Resources Conservation Act cap 315;
- (iii) Zambia Wildlife Act No.12 of 1998
- (iv) National heritage Conservation Act No 23 of 1989
- (v) The Water Act;
- (vi) The Lands Act;

- (vii) The Forest Act No 7 of 1999;
- (viii) The Fisheries Act
- (ix) The Energy Regulation Act;
- (x) The Electricity Act No 15
- (xi) Town and Country Planning Act Cap 283;
- (xii) Local Government Act;
- (xiii) Mining and Explosives Regulations;
- (xiv) The Factories Act Cap 441 and Cap 443; and
- (xv) Any local and International legislation and procedures that may be applicable to the Project

3.4 General Guidelines for Construction Works

The Contractor shall conduct his activities so as to cause the least possible disturbance to existing natural amenities, and to comply with all relevant statutory and local government regulations.

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

The Contractor shall not establish or undertake any activities that, in the opinion of the ECO or Site Manager, are likely to affect the quality of work. Where required, the ECO or the Site Manager may direct the Contractor or their Site Agent to refrain from such activities:

- No work shall be carried outside the defined area of the works without the prior written approval from the Site Manager;
- To minimise air and noise pollution, construction team shall use only machinery in good condition, which shall be properly maintained. To further abate air pollution, gravel roads shall be watered.
- The Chief Engineer and the Site Manager, in collaboration with the Contractor, shall document accidents at the construction site;
- The Contractor shall ensure that the construction sites within the project area are maintained in neat and tidy conditions at all times; and
- The Contractor, in consultation with ZESCO's Site Manager, shall employ as many locals (as unskilled labour) as possible for the execution of the works.

3.5 Temporary Works

The following specific environmental guidelines shall be observed and implemented to ensure environmental protection in areas of activity, access roads and storage areas:

- Use of existing facilities such as access roads shall be improved;
- Temporary storage areas shall be located within the designated site of the project area as may be directed by Site Manager;
- Work-sites shall be kept clean and tidy;

- Fuel and lubricants shall be stored in above ground storage facilities at a designated workshop site;
- Sumps surrounded by low bunds and floored with impermeable material shall be constructed around the transformers;
- Oil changes in machinery and equipment, including vehicles, shall take place at the Workshop unless in case of a major vehicle breakdown; and
- Stored top-soil shall be restored in places where top soil is removed.

4.0 IMPACT MANAGEMENT GUIDELINES

4.1 Code of Conduct and Method Statement

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

4.2 Employment

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

4.3 Air and Odour Management Plan

In accordance with the Environmental Management Act (EMA) of 2011, Air Quality and Odour Management is the responsibility of ZESCO. This responsibility includes the characterisation of baseline air quality, the management and operation of ambient monitoring networks, and the development of emission reduction strategies. The main objective of the AQMP is the protection of the environment and human health, in a sustainable (economic, social and ecological) development framework, through reasonable control measures.

Air quality management involves pollution minimisation, management and prevention, improving air quality in areas where it is poor, and maintaining it where it is good. It is in this context that ZESCO initiated the development of this Air Quality Management Plan (AQMP).

The purpose of developing an AQMP is to ensure that ZESCO meets its obligations as required by the EMA. The AQMP will initiate best practices in air quality management and ensure cost-effective and equitable reduction of emissions. This will improve air quality and reduce environmental and health risks in the project area.

The main goals of this AQMP are to:

- Achieve and sustain acceptable air quality levels in the project area;
- Minimise the negative impacts of air pollution on people's health and well-being and on the environment;
- Promote the reduction of greenhouse gases in support of climate change protection programmes; and
- Reduce the extent of ozone-depleting substances in line with national and international requirements.

The specific objective of the AQMP is to promote cleaner production processes and continuously improve best practices relating to air pollution prevention and minimisation.

Scope

The AQMP is the management and performance monitoring tool for air quality control and provides the basis for assessing air quality. The assessment of various categories of air pollutants

is included in the plan, for instance toxic and odoriferous substances and ozone-depleting substances.

This AQMP includes: Targets and projections that are linked to the best abatement measures;

- A source inventory, which is a comprehensive, accurate and current account of air pollutant emissions and associated data from specific sources over a specific time period;
- An air quality management information system containing air quality data that are compatible with acceptable modeling requirements and management information system requirements;
- The investigation of the critical implications of the AQMP for human resources, training and costs in order to develop a practical and feasible AQM system

A baseline assessment of Odour, air pollution concentrations and air quality management practices in the project area will be done, and an inventory of national and provincial requirements for AQMP development will be drawn up. The following will be taken into account:

- Operational and functional structure requirements;
- Air quality management system component requirements;
- Source identification and prioritisation;
- Implementable emission reduction measures ;
- Mechanisms for facilitating interdepartmental cooperation in the identification and implementation of emission reduction measures for certain sources; and
- Human resource development (training) requirements

The integration of technical evaluation and public issues was considered paramount in the AQMP development process to ensure that the project team did not function in isolation. The AQMP development process was divided into three components for planning and administrative purposes, namely a technical process, an advisory process and a consultation process. The technical process was the responsibility of the technical members of the project team, and comprised information syntheses, issue analyses and document drafting. The advisory process included cooperation between the project team and the Stakeholder Group. The consultation process included the dissemination of information, invitations for public participation, the organisation of discussion workshops, and the collection of comments for communication to the technical team.

Noise Pollution Control

Construction activities such as blasting, operation of plant and equipment, and heavy vehicles, though very minimal, will result in noise nuisance to residents in the project area. Suitable methods and equipment shall be used to abate noise pollution.

Main pollutants and their sources

The first step in designing an ambient air quality monitoring network is to identify the main pollutants of concern and the priority areas potentially affected by the pollutants.

4.3 Waste Management Plan

During the construction and operational phases of the power line, various waste types such as concrete, steel bars, bolts, nuts, cables, cable drums, waste oils, paper, plastics, woody vegetation and domestic waste will have adverse impacts on the environment. All waste (liquid and solid)

arising from direct or indirect project activities will have to be managed in a proper manner under the charge of the ECO and Site Manager. In order to have a well-coordinated waste management system, a Waste Management Plan will be developed.

This Waste Management Plan will specify the procedure for the management, control and disposition of items designated as waste material resulting from the project activities. The following is a list of the different categories of materials that will be generated during the project:

- a. Reusable Materials
- b. Recyclable Materials
- c. Waste/Refuse Materials

The procedures for the management, control and disposition of these items are described in subsequent sections of this plan. All contractors and subcontractors are required to identify, maintain proper control, and provide documentation for the disposition of materials described in this plan.

This Plan will be developed taking into account national legislation and international best practices. National legislation, namely the Waste Management (Licensing of Transporters of Waste and Waste Disposal Sites) Regulations, 1993 (SI No. 71 of 1993) requires that waste from all sources must be collected, gathered and treated in order to eliminate or reduce their adverse effects on health, natural resources and environmental quality.

Impacts can arise throughout the waste management supply chain and therefore generation, storage, collection/transport, reuse, recycling, recovery, treatment and disposal all require appropriate consideration. Wherever possible, wastes should be managed within the closest proximity to the site of production. The waste hierarchy approach was adopted in this waste management plan.

4.4 Ecological Management Plan

The project will have a number of impacts on the ecological system of the area. Destruction of the vegetation around the project site is one of the obvious impacts of the project. However, destruction of individuals of plant species and other herbaceous species will not have any significant impacts on their local population levels as these species are widely distributed throughout the Miombo ecoregion. Clearing of vegetation may also induce soil erosion from runoff rain water considering the amount of rain fall and the rivers in North Western Province during the rainy season. However, the impact is not expected to be severe as the riverine ecosystem is well re-vegetated and therefore will provide for soil erosion prevention.

As for the fauna, the impact of the project will vary from species to species. This is because these animals will be affected differently by the project. For example, some will be affected by noise pollution while others will be affected through habitat destruction. Generally, excessive noise affects all wild animals as they are always alert guarding against predators and enemies.

This section applies to all works that may cause risks or impacts to the ecological system, or natural resources in the project area. Possible sources of impacts include:

- Vegetation clearance;
- Pollution of water, air and soil;
- Hunting or fishing;
- Earth movements and excavations; and
- Noise.

The objective of this management plan is to prevent, minimize, or mitigate adverse impacts to natural resources and ecosystems, (including flora and fauna) that are related to project activities in the area of influence, including:

- Climate and Soils;
- Vegetation-Woodlands and grasslands dominating the vegetation

4.4.1 Vegetation Protection

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

- Vegetation clearance shall only take place within a specified area and for the purpose as defined in the project specifications;
- No trees or shrubs outside the area of works shall be felled, topped, cut or pruned, or otherwise interfered with, without the prior approval of the Project Manager or ECO;
- Soil shall not be heaped directly against trees if in so doing it can damage the stem;
- No trees within or outside the area of works shall be burned for any purpose; and
- Where the works involve clearing and ground excavation, topsoil and subsoil shall be selectively removed, to facilitate reinstatement of sites and their subsequent natural rehabilitation;

4.4.2 Protection of Fauna

The Contractor shall ensure that all work is undertaken in a manner that minimises impacts on the local fauna. Under no circumstances shall any animals if found, be handled, removed, killed or interfered with by the construction team without guidance of the ECO or the Project Manager.

4.5 Traffic Management Plan

The scope of this Transport Management Plan includes the provision for the safe movement of vehicular and pedestrian traffic, the protection of workers from passing traffic, the provision for access to properties located within the limits of the construction site, the design, construction, maintenance and removal of any necessary temporary roadways and detours, the provision of traffic controllers, the installation of temporary signs, road markings, lighting and safety barriers. It also covers maintenance of the existing road corridor, including the existing road and road shoulder that may be used for the temporary diversion of traffic, over the duration of the construction works. Sections of this Plan include the following:

- Details of traffic routes used by construction vehicles.
- The number and type of vehicles to be used in the construction of the project, and their movements to, from and within the site per day.
- Minimum requirements for vehicle maintenance to address noise and exhaust emissions.
- Speed limits to be observed along routes to and from the site.
- Behaviour requirements for vehicle drivers to and from the site and within the site.

Vehicles will be required to access the site both during the construction and operational phases of the project, affecting the existing traffic and transport conditions. The Project is not anticipated to impact upon any existing air or water-based transport systems. As such the plan will only focus on road transport system.

During the construction phase a combination of goods and materials transfer will need to be brought to site to aid development. Materials will be transported via road, primarily from Lusaka. It is not anticipated that any goods would be flown in to local airports or that employees would come to the site via aero plane.

The range of construction vehicles required across the various project sites includes:

- Bulldozers;
- Graders;
- Loaders;
- Compactors;
- Excavators;
- Fuel Tankers;
- cranes (number of sizes);
- Forklift trucks (number of sizes);
- Water tankers;
- trucks/trailers (including Heavy Goods Vehicles);

The larger heavy-construction associated vehicles are likely to be limited to use at the power plant / switching yard site. Smaller construction sites (e.g. the upgrade of the water treatment plant) are likely to require use of lighter construction vehicles (e.g. trucks, cars). The majority of these vehicles (particularly heavy construction vehicles), once present on the construction site, will be securely stored on-site until the end of the construction phase, and are unlikely to significantly impact local traffic levels.

In contrast, transport of construction goods and materials on-site and off-site (e.g. disposal of excess rock material following rock breaking) will be on-going throughout construction, as will the daily transportation of workers. Transport of goods and materials (e.g. concrete, steel, piping) is likely to be done by Heavy Goods Vehicles (HGVs).

Construction works will require daily ingress of workers to and from the construction sites. Unskilled workers employed from the surrounding local communities will be picked-up and dropped off by bus. This will require at most six bus trips per day. Semi-skilled/skilled and project management staff will reside either in town or within the proposed operational workers camps once its construction is complete. These employees will access the site via bus or car.

During operation, Project vehicles movements will be limited to:

- Daily employee access to the construction site from the proposed pick up points;
- Occasional maintenance trips to ancillary facilities

Fuel Storage and Workshop Areas

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

- Fuel dispensing areas and workshop areas for machinery shall be provided with concrete hard standing surfaces draining to oil separators, where applicable or in relation to the local and national standards;

- Drainage into watercourses from fuel storage and machinery maintenance areas shall not be permitted and where possible treated to remove oil and/or fuel; and
- Soil contaminated by fuel and oil leakage shall be removed and disposed of at an approved site and in a permitted manner or treated according to the Hazardous Waste Management Regulations, Statutory Instrument No. 125 of 2001 of the Environmental Management Act, No. 12 of 2011.

Roads and Road Transport

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

- Where designated access routes are indicated in the work program, the construction team shall use no other routes without the approval of the ECO or the Site Manager;
- Where existing gravel roads are used frequently by the project in any part of the works as access roads for transporting labour and construction materials, the project shall maintain the road by:
 - Routine maintenance; and
 - Periodically watering all gravel roads in the proximity of dwellings, where these are heavily used by construction traffic, to minimise road dust.
- Any public road, which is closed because of the Works, shall not be reopened until appropriate safety and traffic management measures have been completed, and or until the ECO confirms that it is in a suitable condition for use by the public;
- The construction team shall execute the Works in such a manner that safe access (including disabled persons access, where they existed prior to site possession) to all properties is maintained at all times. Methods of construction and programming of the Works shall be such that vehicular access to properties affected by the Works is not restricted. Normal access shall be reinstated immediately after completion of the Works ; and
- The construction team, in all instances, shall exercise utmost driving control and care.

4.6 Cultural and Archaeological Management Plan

Archaeological and Paleontological materials (artifacts) are very important as they give an insight into Zambia's ancient past. Artifacts may be in form of:

- Rock paintings or engravings
- Pottery
- Ironworks, slag or other metal-craft
- Beads, bangles or other personal adornments
- Stone implements
- Human bones
- Fossils
- Or any other thing that seems to be records of the past life.

The National Heritage Conservation Commission (NHCC) is responsible for the identification, recovery and/ preservation of both movable and immovable heritage sites and objects in

accordance with the local and International conventions that Zambia is party to on Cultural Heritage resources protection. Any artifacts that may be discovered during excavation works shall be brought to the attention of NHCC.

Archaeological and Paleontological materials (artifacts) are very important as they give an insight into Zambia's ancient past. Hence, the need to preserve them whenever and wherever they may be discovered. The artifacts may be in forms of:

- Rock paintings or engravings
- Pottery
- Ironworks, slag or other metal-craft
- Beads, bangles or other personal adornments
- Stone implements
- Human bones
- Fossils
- Or any other thing that seems to be records of the past life.

Most parts of NW Province still remain pristine with rich cultural and ethnic resources. The main tribes in the Province are the Kaonde, Lunda and Luvale. These groups of people share common cultural practices such as the celebration of seasonal feasts and initiation of young people into adulthood. Great honour and recognition is also given to their traditional leaders.

Although the province has a number of heritage sites such as the Nyambwezu Rock Shelter at Nyambwezu Falls, the Zambezi source and the Kabompo House No. J11a, they do not lie within the immediate proposed project area. However, there are graveyards and burial sites located close to villages in the project area.

4.6.1 Objectives of the Cultural Heritage Management Plan

The main objective of this Cultural Heritage Management Plan is to outline how best to document, conserve, preserve, present and manage Cultural Heritage resources, should they be found during the development of the project, to ensure the cultural heritage of North Western Province and the country as a whole present for the benefit of both present and future generations.

4.6.2 Potential Impacts of the Project on Cultural Heritage Resources

Although there were no sites with heritage resources found in the immediate project area during the studies undertaken in the past, there is still a possibility that some heritage resources could be found during project implementation. Excavation works along the proposed route and other sites in the project area may lead to the discovery and/or destruction of heritages resources that could have been buried underground over the years. This may include archaeological, prehistoric and other relic/ fossil materials including human bones, ancient settlements, stone tools, beads, potsherds, iron tools and copper implements.

Other objects of cultural importance which may be impacted upon by the project activities are the graveyards or cemeteries (burial site). Although there are no know burial sites in the immediate project area, care should be taken to ensure that burial sites are not disturbed in

anyway. Local people should be consulted as they know the locations of the current and past burial sites.

To ensure the preservation of the cultural heritage in the project area, the following guidelines shall apply during construction:

(a) In carrying out the Works, the construction team shall comply with the provisions of Zambian law on cultural and national heritage (National Heritage Conservation Commission Act);

(b) The Contractor shall ensure that key members of his staff are familiar with archaeological and paleontological materials likely to be found in the project area;

(c) Should the construction team expose any archaeological artifacts during excavation, work shall cease immediately and the Site Manager or ECO notified as soon as possible. The Site Manager shall liaise with the NHCC for advice on how to preserve or transfer the artifact. Under no circumstances shall archaeological artifacts be removed, destroyed or interfered with by the construction team.

(d) Workers should be sensitized on the need to preserve any heritage resources which they may come across in the course of their work.

An officer from the NHCC may be required to visit the project site during major excavation works to ensure the recovery of any such items that may be present in the project area.

The project site is located in a rural set-up, hence, there is need for the Contractor to respect the cultural norms, beliefs and property right of the local community.

With respect to social and cultural values, the following guidelines and rules shall apply:

(a) The construction team shall conduct their operations in a manner that will not upset the social, cultural and religious order of communities in the project area. Local traditional beliefs shall be respected;

(b) In the interest of harmony and good public relations, the Construction Supervisor in collaboration with the Site Manager and the ECO is strongly encouraged to develop rapport with local chiefs and traditional leaders through regular consultations and communications;

(c) Graveyards, cemeteries, burial sites, human remains may not be intruded upon during construction;

(d) The construction team is prohibited from entering places considered to be sacred, such as traditional shrines.

4.6.3 Chance Find Report

The project manager should then assign an official who would then, and within seven working days, prepare a Chance Find report, recording;

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

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

4.6.4 Arrival and Actions of Director of NHCC

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

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

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

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

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

4.6.5 Further Suspension of Work

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

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

4.7 Health

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

- Where practicable, the Contractor shall employ local unskilled manpower and use locally trained manpower in the immediate project area where practicable to minimise communicable diseases;
- The Contractor shall provide First Aid kits for the labour force;

- In the case of serious injuries on site, the Construction Supervisor/Site Manager shall formulate a plan to deal with such emergencies; and
- The provisions on pollution control and sanitation shall apply to maintain a healthy working environment.

The Construction Supervisor and ECO shall take measures to educate and sensitise the labour force on the risks of communicable diseases such as STIs, HIV/AIDS.

Water Supplies

The Contractor shall provide clean water for domestic usage and other activities, in consultation with the Site Manager. The local water supply system shall be used and, where possible, the Contractor shall provide alternative water supply in the community by sinking a borehole that can be used during construction and operational phases so as to avoid negatively affecting the local supply system. Where the local municipal water supply is to be used by the Contractor, permission should be obtained from the appropriate water utility.

Toilet Facilities

The Contractor's labour force shall be provided with appropriate toilet facilities within construction work area as a temporal measure. Water-borne toilets and septic tank soak-away shall be sited within the site of work and constructed with the approval of the local Civil Engineer, Site Manager or ECO.

4.8 Refuse and Waste Pollution Control

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

- Littering shall be avoided. All waste materials will be collected in bins and disposed of in designated sites within the project site in a manner acceptable to the Project Manager or ECO;
- The waste management program will be an on-going responsibility for the Contractor and the ECO;
- All hazardous wastes, materials soiled with hazardous wastes and non-biodegradable materials shall not be disposed of on site. All such waste shall be stored in an approved manner, on site, and removed at regular intervals to off-site waste disposal facilities designed to handle such hazardous waste by the local authority; and
- Soil contaminated by cement or other chemicals shall be removed and placed in approved disposal areas

5.0 MONITORING AND AUDIT FRAMEWORK

5.1 Monitoring Programme

A monitoring program will be carried out by the Environmental Coordinator under the Project Management, Environmental Officer and Safety Officers will be stationed on site throughout the implementation period of the project. A monitoring regime will begin at the earliest convenience, preferably before construction to allow a baseline to be established against which changes during construction, and on into operation, can be assessed. Some of this can be included in the ongoing activities of government agencies already active in the project area; some will be the responsibility of the contractors; and some should be carried out by ZESCO responsible for development and operation of the project or organizations appointed by them.

A schedule of environmental activities will be developed at the beginning of the project as part of the overall project implementation programme. Monitoring will ensure that the project is implemented in a safe and environmentally sound manner. Within this context the monitoring programme includes the following:

- (a) monitoring of design to ensure environmental programs described in the EIA and the EMP are included in the design and construction schedules and engineering design meet the intent of environmental objectives;
- (b) Monitoring of construction activities to ensure that construction meets specifications and environmental management plan;
- (c) Monitoring and modification to meet changes which develop over the course of the program implementation; and,
- (d) Liaison with various government agencies to ensure all requirements associated with the project initiatives and environmental mitigation measures are met.
- (e) Monitoring of disease vectors and incidence of vector-borne diseases; Health status (of communities and workforce); and
- (f) Monitoring of the implementation, and performance, of the construction management plan, employment and workforce policies, and the community support programme, and the reporting of monitoring parameters on a regular basis will also be included in the contractual arrangements with the design and build contractor, and the community support NGO.

5.2 Feedback and Audit

The monitoring programme will also establish effective feedback mechanisms so that the performance and effectiveness of the various elements of the ESMP can be evaluated, and if necessary corrective actions can be implemented.

The ZESCO ESMP Team has a clear responsibility to report at regular intervals to the PIU. For this function, it will be required to draw on the monitoring and reporting of the contractor/operator, the community supports, and the Zambia Wildlife Authority.

5.3 Corrective Actions and Disciplinary Procedures

Corrective actions and disciplinary procedures will be set out, and where possible, included in contractual agreements (i.e with the contractor, operator, and community support contractor). Without fixed disciplinary action there is a risk that environmental management measures will not be implemented.

5.3.1 Design and Build Contractor / Operator: Direct Impacts

Where the Environmental team finds that the contractor or operator has violated the environmental measures set out in their contractual agreement(s), corrective action, and *in extremis*, disciplinary action will be taken;

1. If a violation is detected during a site visit, the site manager will be notified of the verification, and the means of rectification, verbally. The Team staff will discuss with the site manager a realistic deadline for rectifying the violation.
2. If the violation is reported to the team by some other entity, the team will conduct a site visit and, similarly, issue the verbal warning and deadline.
3. The verbal warning will be confirmed in writing to the contractor within 5 working days.
4. The ESMP team will return to the site on the deadline, and if the violation is still occurring, the team will notify the contractor in writing of the continuing violation, informing them of the disciplinary action to be taken. The ESMP team will inform the in writing of the situation, and copy correspondence to the necessary authority e.g Mines and Safety department and ZESCO Steering Group.
5. If after 2 months the violation has not been rectified, the higher authorities will instigate disciplinary procedures.

5.3.2 Adherence to ESMP measures

Many of the measures in the ESMP concern actions to be taken in order to prevent environmental or social impacts, or to enhance positive impacts. In these cases, it will not be possible to monitor for ‘violations’ of the ESMP. A system of reporting and audit of the ESMP commitments is required. This will apply to: the design and build contractor; Management, and to the ESMP team itself. Each of these organisations will provide quarterly reports on the actions taken in the previous quarter to fulfill the ESMP. The ESMP Team will be able to draw on the reports it receives from the contractor etc, augmenting these reports with a report its own performance. At random intervals, the ESMP Team will be required to verify whether the actual performance of the contractor etc is honestly reflected in these progress reports. The legal inspection authorities will be required to randomly verify the actual performance of the ESMP Team. A formal annual audit of environmental and social performance will be carried out by an independent entity.

6.0 CAPACITY-BUILDING REQUIREMENTS

6.1 Recommended Additional Studies

In order to ensure adequate information during the implementation of ESMP, a number of studies will be added as necessary to ensure adequate completion and implementation of this ESMP. Additional studies will include, but will not be limited to the following:

- (a) Water quality monitoring;
- (b) Implementation and monitoring of hydrological flows periodically;
- (c) Fish and fisheries studies;
- (d) Cumulative effects assessment;
- (e) Development and implementation of a riverbank management system.

6.2 Schedule of the Activities of the ESMP

In order to implement the ESMP, a phased programme of activities has been proposed. However, the proposed outline does not exclude other appropriate activities as may be dictated by conditions during construction or as any other changes might occur or take place which may have a direct bearing on the construction works.

The phasing of environmental activities shall be as outlined in the table below:

7.0 ESMP REVIEW AND UPDATE

The Employer shall periodically review, monitor and update the ESMP, including all sub-plans to ensure they are effective at all times..

7.1 Review of the ESMP

The Employer shall review the ESMP to assess its effectiveness and relevance as follows:

- A full review shall be undertaken annually;
- Following a reportable incident, or a significant non-compliance; and
- Following an addition, up-date or change order to the ESMP, or a sub-plan.
- The review of the ESMP should consider the following:
 - Adequacy of data collection, analysis and review;
 - Reporting;
 - Non-compliances; and
 - Corrective actions implemented.

The ESMP shall also be reviewed periodically to evaluate environmental controls and procedures to make sure they are still applicable to the Works being carried out. Reviews shall be undertaken by the Environmental team as follows:

- The full ESMP shall be reviewed at least annually;
- Relevant parts of the ESMP shall be reviewed following a reportable incident;
- Relevant parts of the ESMP shall be reviewed following the receipt of an updated subplan; and
- At the request of stakeholders, including the Contractor, Supervising Engineer, ZEMA and other government regulators, financiers or the communities.

The review shall include analysis of the data collection and analysis of data, monitoring reports, incident reports, complaints/grievances and feedback from stakeholders, consultation and awareness meetings minutes and training records to evaluate the effectiveness of EMP procedures. Site visits, interviews and other auditing methods may also be used. Updates to the plan shall follow the procedure in Section 7.2.

7.2 Control and Update of the ESMP

This document will be issued as a controlled document to all relevant staff and institutions. The procedure to be followed to control the issue of the document, provide a review of its effectiveness and provide updates will be as follows:

- Issued copies by the Employer shall be numbered;
- The Employer shall initiate a review of any relevant sections following modification to the ESMP

- Environmental Approval, issue of a new approval, receipt of written requirements by ZEMA, or a change to internal procedures based on corrective actions or improvements in methodologies or analytical procedures

10.0 RECOMMENDATIONS AND CONCLUSION

Diesel generated electricity is not only costly but also not a clean form of energy. The current machines at the five diesel power stations in northwestern province are obsolete and therefore do not give the desired output. In addition to that, their capacities cannot meet the growing demands for electricity in the Province.

The Environmental Impact Assessment (EIA) for the proposed connection of NW Province to the national grid at 132kV followed the laid down EIA procedures in the Environmental Impact Assessment Regulations, Statutory Instrument No. of 1997. During this process, the various options and alternatives were considered in order to identify potential environmental impacts and recommend mitigation measures for the negative impacts as well as to enhance the positive impacts.

Routes which avoid sensitive ecological areas were selected to minimize adverse environmental impacts. In order to minimize resettlement, the line routes were selected away from the main road and away from villages. The proposed project has few adverse environmental and social impacts and appropriate mitigation measures have been recommended to address them.

To ensure implementation of the proposed mitigation, monitoring and positive impact enhancement aspects, it is recommended that environmental costs shall be included in the total project cost. Further, the actual implementation of the various environmental aspects recommended in this report will be guided by an Environmental Management Plan for the different project components and will be strictly monitored by the project developers.

