EXECUTIVE 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 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 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 ESIA on the preferred route option that was selected following an analysis of alternatives that considered technical, social and environmental constraints.

The ESIA is divided in eight main chapters, including the introduction, review of the applicable institutional and legal framework, Project description, analysis of alternatives, baseline environmental and social conditions, potential environmental and social impact assessments, stakeholder consultation activities, and finally, references.

OVERALL APPROACH TO THE ASSESSMENT

The overall approach to the assignment was to collect information on the applicable regulatory and institutional framework, engage in stakeholder consultations, and collected baseline environmental and social conditions early in the assessment process. The information collected in this preliminary stage of project development allowed for an analysis of alternative project designs to be conducted, aiming to optimize Project design on technical, economic, environmental, and social terms. The project description was prepared afterwards.
Complementary stakeholder consultations and baseline information collection continued over the course of the assignment. The sum of information collected was then analyzed considering the Project description and the applicable regulatory and institutional framework, in order to conduct the environmental and social impact assessment. Mitigation measures were then identified, and residual impacts determined. An ESMP capturing mitigation measures and monitoring requirements was then completed.

The current ESIA/ESMP provides an update of the 2017 draft, revised to reflect the 2019 route refinement and further 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.).

**REGULATORY AND INSTITUTIONAL FRAMEWORK**

An analysis of the applicable policy and legal framework was conducted, as well as an institutional framework analysis. The Project notably triggers certain World Bank operational policies. OP4.01 (Environmental Assessment), OP4.04 (Natural Habitats), OP4.11 (Physical Cultural Resources), OP4.12 (Involuntary Resettlement), OP4.36 (Forests), and World Bank Policy on Access to Information (2010), and the ESIA and ESMP were prepared accordingly. OP 4.10 (Indigenous Peoples) is not triggered due to the absence of indigenous groups in the Project area.

**PROJECT DESCRIPTION**

Global Project location is illustrated on the Map below.

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.
ANALYSIS OF ALTERNATIVES

Various Project design alternatives were proposed over the course of the pre-feasibility and feasibility study development.

The “no project” option was analyzed and deemed undesirable, considering that it involves that the significant challenges currently experienced in the Project area would not be alleviated, and socioeconomic benefits and economic gains anticipated from the Project would not be realised.

Several 2 km-wide line corridor options were proposed by the FS Consultant for three segments of the Project: 3 options between the border and Kasama, 3 options between Kasama and Mpika, and finally 4 options between Mpika and Pensulo.

WSP analyzed these line corridor options using a comparative approach based on technical, environmental and social criteria. Following analysis, WSP recommended option 2 for the border-Kasama segment, corridor 4B for the Kasama-Mpika segment, and corridor 8 for the Mpika-Pensulo segment, as those options are the ones that raise the least environmental and social issues.

A local optimization of this overall line route was then carried out, to avoid the most sensitive elements, such as schools, churches, etc., and reduce the need to construct new access roads.

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

The outcome of this process is the Project description which is provided above.

BASELINE ENVIRONMENTAL AND SOCIAL CONDITIONS

Baseline conditions for the physical environment, the biological environment and the human environment were described to inform the impact assessment exercise and allow proper monitoring. To understand baseline conditions, field surveys have been completed and in-depth analyses of the Project area in the physical, biophysical, and social environments have been conducted.

The activities undertaken to characterize baseline conditions include:

- reviewing available data and literature, including studies completed for other projects that may be relevant;
- interpreting aerial photography to understand land use, habitat conditions, and to identify points of interest for future site investigations;
- site investigating to better understand existing environmental conditions and possible Project interactions. The site investigations are focused on terrestrial and aquatic habitat quality, soil conditions, and quality, current land use, perceived socioeconomic conditions, and water use demand;
- interviewing and focused discussions with local stakeholders and community leaders.

The physical environment baseline conditions were described for climate, geology, topography, soils, and water resources. Zambia has a tropical climate modified by altitude and latitude, resulting in subtropical climate rather than a tropical one for most of the year. Most of the Project area lies between 1,100 m and 1,650 m. The highest parts of the Project area occur as a belt stretching from the northern end of Nakonde Town to the northern part of Kasama, parallel with Tazara and along the Mpika-Isoka Ridge.

The biological environment baseline conditions were generally described to provide context, with specific information provided for habitat types and flora, birds, terrestrial mammals, bats, herpetofauna, and fish.

The study area is in the broad Miombo Woodland Ecoregion, which is composed of several habitat types comprising mainly tropical and subtropical grasslands, savannahs, and scrublands. Miombo woodlands are home to many large mammals including giraffes, rhinos, lions, and the largest population of elephants in Africa.
The study area is mainly located at medium elevation (1,000 - 1,500 masl), in the Central Zambezian Miombo woodlands ecoregion, which is listed on the Global 200 Ecoregions identified by WWF as priorities for conservation to protect world biodiversity, due to its species richness and concentration of large mammals. Although much of the Miombo woodland ecoregions are sparsely populated, there are only a few areas that have not been affected by human activity. Deforestation is one of the most widespread threats as woodlands are being cleared for fuelwood, charcoal, and building materials as well as for agricultural land. Slash and burn agriculture is widespread.

Poaching and illegal hunting are common throughout the ecoregion. Elephant and rhino poaching have been extremely severe throughout the ecoregion. Most areas outside parks and reserves have relatively little wildlife left. Some sparse natural vegetation patches are still present in protected areas (national park, game management areas, forest reserves, etc.) or as areas of international ecological importance (Ramsar sites or Important Bird Areas).

The human environment baseline conditions provided a description of the local administration, population, land tenure, regional economy, socioeconomic factors, gender and gender-based violence, archaeological and cultural resources, social infrastructure, and landscape. The Project crosses 7 districts and several wards, the smallest administrative unit. Zambia and the three provinces affected by the Project have high fertility rates and population growth. The most common language of the Project area is Bemba. Agriculture is the main activity and source of livelihood for most of the Zambian households. The most prevalent agricultural practice is chitemene, or slash-and-burn.

In 2010 the literacy rate in Zambia was 70.2%. There is an evident contrast between rural and urban household average incomes. Urban households’ average income was more than twice the income of rural households. Most Zambians continue to live in poverty.

Life expectancy in Zambia is higher for females than males and higher in rural areas than urban areas. Sickness or disease accounts for 75% of the reported causes of death, followed by “other causes” and accidents. Malaria is the most prevalent reported disease. The National Aids Council indicated a 1.3% drop in HIV prevalence from 2001 to 2007.

In rural Zambia, women’s ability to participate in decisions within households is influenced by several factors, such as their education level, their own income generation capabilities and income contribution to the household, as well as by her age. Women’s lack of access and control to education, markets, and public life make them financially dependent and limit their control of resources and ability to make independent decisions.

Women in rural areas spend more than two hours per day collecting firewood. Most Zambian girls are culturally expected to do more household chores than their brothers who go to school. Gender-based violence is a growing concern, which can be made worse by many projects.

IMPACT ASSESSMENT

Impact identification was carried out through the knowledge of activities involved and experience of the ESIA experts on similar projects. Identification of potential impacts is performed by identifying interactions between the Project’s potential impact sources and the environmental and social components in the Project area, with guidance from stakeholder consultation results. Potential impact sources (i.e., Project activities or components) were identified and described for each Project phase (pre-construction, construction, operation and decommissioning). Environmental and social components are elements of the physical, biological, and human environments that are likely to be affected by one or more sources of impact.

Potential impacts are identified using an “impact identification matrix” that links environmental and social components and sources of impacts at each Project phase. The importance of potential impacts identified by these means is then assessed.

Impact assessment consists of determining the importance of potential impacts on physical, biological, and human environments at each stage of the Project. Impacts are either positive or negative. A positive impact is considered to represent an improvement on the baseline conditions of the affected environmental or social component as a result of the Project, while a negative impact is considered to contribute to its deterioration.
Residual impacts (i.e., post-mitigation) were evaluated according to three main criteria: intensity, extent, and duration. Impact intensity indicates the degree of disturbance observed on an environmental or social component affected by the Project and is measured as high, medium, or low. Impact extent refers to the extent of the area or the proportion of the population affected by the Project. It is qualified as regional, local, or limited. Impact duration refers to the period during which changes in the environment are likely to occur. It is qualified as long, medium, or short. Finally, importance of each impact is determined based on the correlation between its intensity, extent, and duration. Compliance with existing laws, standards, conventions, and treaties were considered.

The main impacts on the physical environment during construction and operation may include soil and surface water contamination, temporary air quality deterioration, and increased noise levels. Mitigation measures have been proposed to reduce impacts, including but not limited to the development and implementation of a soil and erosion management plan, using existing access roads where possible, and maintaining equipment in good working order.

The main impact on the biophysical environment will be the permanent loss of vegetation in the ROW. Other potential impacts that may occur during construction and maintenance works include potential increase in bird and bat fatalities through collisions or electrocution, as well as modification and alteration of wildlife habitats, some of which is considered natural habitat, and introduction of invasive alien species. However, mitigation measures have been proposed to reduce or compensate for negative impacts. These measures include, among others, restricting removal of vegetation and limiting activities in watercourses or wetlands to the extent possible, restoring disturbed areas as soon as possible, conducting construction activities during the dry season, and installing bird diverters on segments most likely to support bird species susceptible to collisions with transmission lines. At the time of writing the ESIA, a Biodiversity Management and Monitoring Plan (BMMP) was under development. 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.

The most significant impact on the human environment will be the relocation of houses and other assets located within the ROW. A preliminary resettlement action plan (RAP) was prepared and identified 177 households that will be directly impacted by the loss of a structure. Other impacts include the loss of arable land due to vegetation clearing in the ROW, land use restrictions in the ROW due to specific ROW management requirements, damage to crops by machinery during ROW maintenance, disturbance of traffic flow, impacts on archaeological and cultural heritage resources, and community and occupational health and safety, etc. Mitigation measures have also been proposed to reduce or compensate for these negative impacts. These measures include, notably, providing compensation measures and resettlement assistance to affected households and landowners, involving traditional Chiefs in the resettlement process, allowing crop growing and grazing in the wayleave if plantations do not exceed 2 m in height, rehabilitating damaged infrastructure after construction, and restricting travel to and from the construction sites during low traffic.

Other impacts on the human environment could arise. The Project may increase gender imbalances and particularly risks of gender-based violence, including sexual abuse and child abuse by construction workers.

Project implementation could revive old quarrels in some communities, as well as affect community health and security due to risks of increased HIV/AIDS transmission as well as child labour. Adequate mitigation measures have been proposed to reduce or compensate for those negative impacts. These measures include, notably, implementation of strict policies against sexual abuse, underage sex and child labour, implementation of a sensitization program on HIV/AIDS, as well as implementation of a grievance redress process.
The new transmission line may also lead to positive opportunities for Project Affected Persons (PAPs) and communities. One of the most important anticipated benefits to the population is increased electricity supply to communities and households. Other positive opportunities may occur in the form of temporary employment and business opportunities during the construction phase, including revenues from the sale of food and other consumable goods to workers from other parts of the country and abroad.

STAKEHOLDER CONSULTATIONS

Public consultation and stakeholder engagement activities were organized to ensure the participation of stakeholders at different stages of the ESIA and RAP processes. In total, five consultation rounds were held. Consultation round 1 aimed to inform authorities of the Project and undergoing ESIA process, identify elements that could influence the determination of corridor options and identify key concerns and expectations associated to the Project and the ESIA / RAP processes. Consultation round 2 aimed mainly at presenting the corridor options under study to collect stakeholder comments regarding the Project, as well as gathering any information of relevance for the development of environmental and social management plans. Consultation round 3 aimed to provide updates to stakeholders on the Project development process and allow stakeholders to reiterate or update their concerns. Consultations round 4 aimed to present the draft ESIA and RAP reports and collect comments on their preliminary conclusions and recommendations. Finally, a fifth round of consultations involved the completion of two separate missions aimed at providing Project design updates and collecting supplementary information regarding the biological and socioeconomic environments. General interest generated by the Project was very high. However, certain key issues raised during consultations, and considered in preparation of the ESIA and RAP, include the risk of resettlement risks, the need for jobs for community workers during construction, fair compensation, importance of engaging with traditional Chiefs and involving civic authorities, provision of urban and rural electrification, and consideration of gender issues, including gender based violence and sexual exploitation and abuse.

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.