



## **TERMS OF REFERENCE**

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**Consultancy to undertake the Engineering Feasibility studies and the Environmental and Social Impact Assessment Studies for the development of the Batoka Gorge Hydro Electric Scheme (BGHES) Additional Transmission Lines**

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## 1. Background

The Zambezi River Authority (The Authority), a bilateral organisation owned by the Republics of Zambia and Zimbabwe and mandated to operate, monitor and maintain the Kariba Dam Complex as well as exploit the full potential of the shared portion of Zambezi River located along the common border between the two Countries is undertaking the development of the Batoka Gorge Hydro Electric Scheme (BGHES), 47 Km downstream of the Victoria Falls, along the Zambezi River.

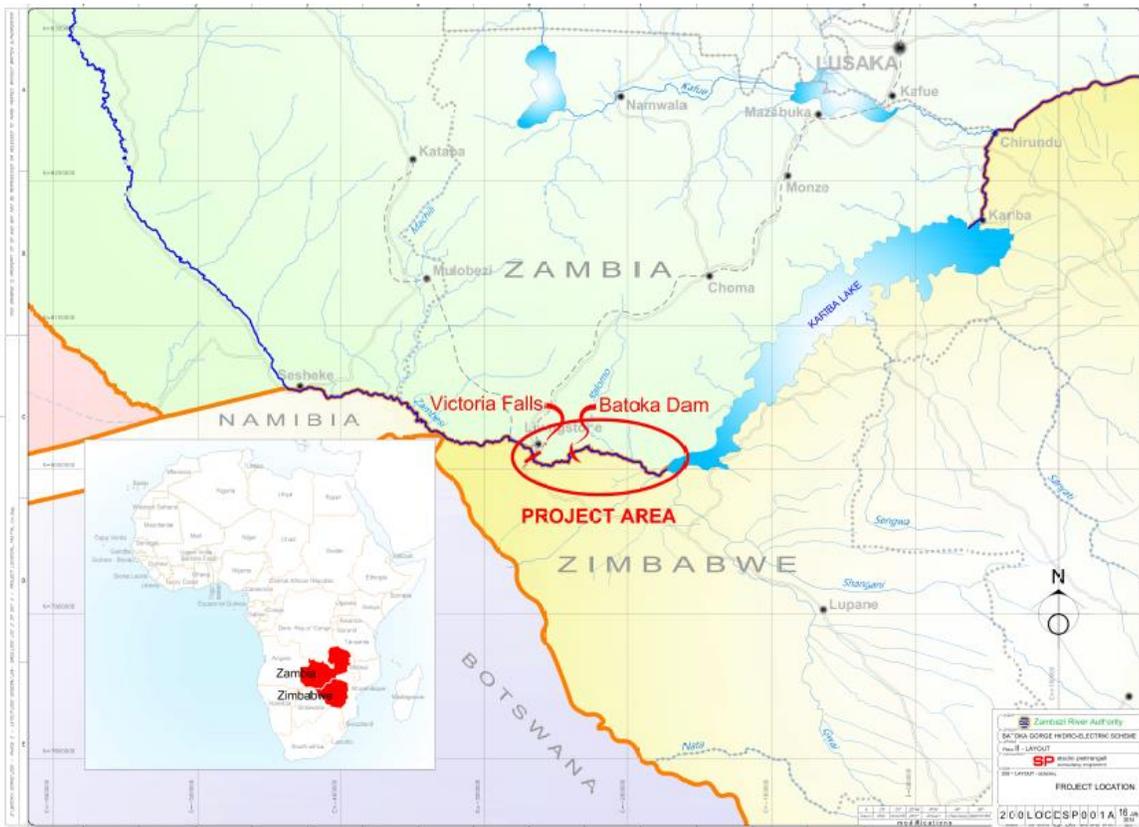


Fig 1: BGHES location

### 1.1 Scope of works:

The scope of works for the development of BGHES includes the following:

- A 181m high, Roller Compacted Concrete gravity arch dam with a crest length of 720m;
- Radial gated central crest spillway;
- Two surface power plants, one on either side of the river bank, each with a capacity of 1,200MW, giving a combined capacity of 2,400MW;
- 6 x 200MW Francis turbines in each powerhouse;
- Four water intakes delivering water through 4 tunnels (each approximately 1km in

- length) to the two surface power plants downstream of the dam;
- f. Diversion tunnel
- g. Switchyards for both power plants
- h. Access and permanent roads
- i. Construction of the staff villages/ townships with social amenities and office complex for the Authority and Power utilities on Batoka North and Batoka South.
- j. Transmission lines connecting the Project to the grid in Zambia and in Zimbabwe:
  - o BGHES to Mukuni substation (2 x 330kV x 22km,) in Zambia;
  - o BGHES to Muzuma in Choma (1 x 330kV x 151km) in Zambia;
  - o Muzuma to Nambala substation (2x 330kV, 230km) in Zambia;
  - o Batoka North and Batoka South Interconnector (2 x 400kV);
  - o BGHES to Hwange (2 x 400kV x 70km) in Zimbabwe;
  - o BGHES to Chakari (2 x 400/330kV x 400km) in Zimbabwe

The General layout of the Scheme is presented in figure 2 below.

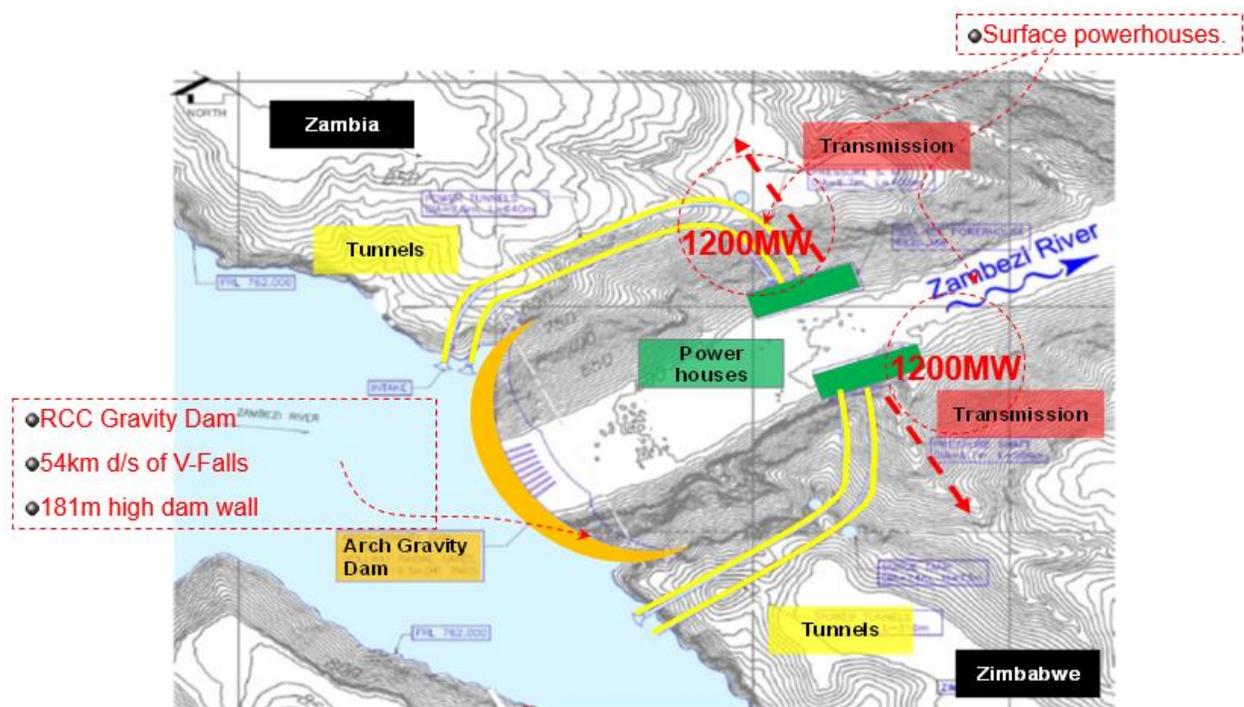


Figure 2: BGHES project features

In addition to the above transmission lines and following the optimization of the BGHES design, the following Transmission lines will be constructed:

### 1.1.1 Batoka North

The evacuation of power from Batoka North Hydro Power Station will involve construction of 330 kV twin Moose (or equivalent) transmission lines as stated below. The proposed lines take the assumption that 02 x 330kV planned transmission lines between Mukuni and Muzuma Substations; and 02 x 330kV planned transmission lines between Muzuma and Kafue West Substations to be funded by JICA have been effected.

- a) 01 x 230 km long double circuit line between Muzuma and Nambala Substations. This line is required for firm (N-1) power transmission capacity to major load centers such as Lusaka city, and mining industries located in the Copperbelt Province.

The works shall involve Construction of line bays at all the line terminal substations except for the Batoka North switchyard which shall be done as part of the Power Station Project. The details of these works are as follows: -

#### a) Mukuni Substation

- i. Installation of 02 x 330kV line bays, double busbar arrangement in the space provided comprising;
  - (a) Power equipment (Disconnectors, Earth switches, Circuit Breakers, Current Transformers, Voltage Transformers, Surge Arresters, etc.)
  - (b) Associated steel structures and civil works
  - (c) Associated secondary equipment (Protection, Metering, Control and Telecommunications).

#### b) Muzuma Substation

- i. Extending the 330kV switchyard and busbars to accommodate two (02) new line bays;
- ii. Installation of the 02 x 330kV line bays, double busbar arrangement, each comprising;
  - ❖ Power equipment (Disconnectors, Earth switches, Circuit Breakers, Current Transformers, Voltage Transformers, Surge Arresters, etc.)
  - ❖ Associated steel structures and civil works
  - ❖ Associated secondary equipment (Protection, Metering, Control and Telecommunications).

#### c) Nambala Substation

- i. Extending of the 330kV switchyard and busbars to accommodate two (02) new line bays;
- ii. Installation of 02 x 330kV line bays, double busbar arrangement, each comprising;

- ❖ Power equipment (Disconnectors, Earth switches, Circuit Breakers, Current Transformers, Voltage Transformers, Surge Arresters, etc.)
- ❖ Associated steel structures and civil works
- ❖ Associated secondary equipment (Protection, Metering, Control and Telecommunications).

### **1.1.2 Batoka South**

400kV Transmission lines from Batoka Gorge to Chakari Substation. The actual configuration with regard to either a double circuit layout or 2 x singles circuits is to be informed by the Studio Pietrangeli (SP) Feasibility study and has to be approved by ZETDC. Batoka power shall be evacuated from Batoka 400kV substation to Chakari 400 kV substation. Hwange 400 kV Substation is under construction under Hwange 7&8 Project and Chakari will be planned, designed and constructed under the Batoka Project. The line ratings and resultant wayleave will be informed by the approved SP Feasibility study. The future Chakari 400 kV Substation should come with four strategic spare bays. The entire power evacuation should be 100% compatible with smart grid technology.

The Authority contracted Studio Pietrangeli of Italy in 2014 to undertake the updating of the Engineering Feasibility Studies for the development of the BGHES. The scope of this consultancy Contract did not include the additional Transmission lines. The consultant is expected to complete the studies by the end of the second quarter of 2019.

The Authority also contracted Environmental Resources Management of South Africa (ERM) in 2014 to undertake the ESIA Studies for the development of the BGHES. The scope of this consultancy Contract (ERM Contract) did not include the additional Transmission lines. The consultant is expected to complete the ESIA studies by the end of the Second quarter of 2019.

## **2. Engineering Consultancy Services**

### **2.1 Objective of the Consultancy**

The objective of the Engineering Consultancy Services is to develop a full bankable feasibility study, complete up to tender design and document action for the development of Batoka Gorge HES and associated additional transmission lines to evacuate the power to both countries.

### **2.2 Tasks**

The following shall constitute the main tasks of the consultancy:

#### **2.2.1 Power Plant Data and Evacuation Options**

- a) The plant Site plan, layout and topographic maps. Included shall be the Physical location of the plant in WGS 84 co-ordinate format and Google earth maps in relation to

the proposed power evacuation corridors connecting the power plant to the ZESCO/ZETDC network. Mapping of the line routes for the final selected scheme.

- b) The consultant shall establish and evaluate all possible mind mapped options for the power evacuation and a suitable double circuit cable North to South transmission interconnector capacity.
- c) The consultant shall perform detailed studies for at least three best options and recommend the best plant power evacuation option from a techno-economic evaluation.

### **2.2.2 Undertake Load Flow Study**

This study shall be done at peak and minimum demand cardinal points for the year of commissioning which is 2026 and 2030 without limiting the following aspects;

- a) To carry out a complete network constraint analysis covering load flows, stability, fault levels and reserve on the network with Batoka connected and establish effective constraint clearance measures where possible and constraint management measures where appropriate with respect to relevant grid code compliances of the respective countries.
- b) To ascertain the effect of Batoka generation on the base case system losses in the years of study and propose the appropriate mitigation measures.
- c) Explore the dispatch ability of the plant with respect to ZESCO/ZETDC system operations and other generation facilities.
- d) Perform load flow element contingency analysis for all critical contingencies that are associated with Batoka evacuation in the Zambian and Zimbabwean grids and the regional context. Conformity to the SAPP and relevant Zambian Grid code provisions in contingency system states shall be verified through the study. The consultant shall agree with ZESCO/ZETDC on the minimum contingencies to be included in the study.
- e) Establish the ancillary services required if any on the existing ZESCO/ZETDC network to attain secure and reliable plant power evacuation

### **2.2.3 Undertake Short Circuit and Stability Studies**

The short circuit and stability studies shall first be conducted for the base case without the Plant and with the Plant. This study shall be done at peak and minimum demand cardinal points for the year of commissioning which is 2026 and 2030 without limiting the following aspects:

- a) Ascertain the dynamic/transient performance of the power plant generation equipment under various three and single-phase faults.
- b) Analyzing the Single-phase auto-reclose system performance in the project area before and after establishment of the plant.
- c) Establishing the critical fault clearance time for buses strongly connected to the power plant before and after establishment of the plant.
- d) Establishing the large power imbalance frequency and Voltage response capability of the plant and ZESCO/ZETDC system prior to and after integration of the facility (As a minimum, the studies shall consider tripping of one machine at the Plant and also the whole Plant. Loss of load in at least one major load centres shall also be investigated).
- e) Establishing the capacity of the plant to synchronize and reliably operate at ZESCO/ZETDC network existing constraints. The study shall demonstrate how “deep”

in the ZESCO/ZETDC network the plant can be synchronized under black start conditions.

- f) Establishing the effect of the new power plant on the system fault levels in relation to the existing equipment short circuit withstand capacities and recommend a mitigation if necessary including conceptual designs.
- g) Performing dynamic contingency analysis for all anticipated critical contingencies in the context of the Zambian grid and the regional network.
- h) Establishing the effect of the new power plant machine sizes on the spinning reserve margins of Zambian system in interconnected and islanded modes.
- i) Ascertaining the compliance to the relevant grid code provisions by the ZESCO/ZETDC system in dynamic simulation scenarios after the integration of the plant.

#### **2.2.4 Undertake Reactive Power Compensation Assessment and Recommendation**

If steady state or dynamic studies identify that voltage violations are introduced with the connection of the Plant, reactive power compensation equipment will be proposed so that voltages are kept within limits as defined in relevant Grid Code. The proposed equipment will be agreed with the client. The consultant shall prepare conceptual designs for such equipment at the particular substations.

#### **2.2.5 Undertake Transmission Line Mechanical and Electrical Design**

This scope will include but not limited to:

- i. Preparation of preliminary designs for the substation works to include single line diagrams and layouts for the required installations at the terminal substations
- ii. Estimation of the number of towers required for the new transmission line.
- iii. Carrying out engineering and cadastral surveys for the chosen transmission line route and preparation of suitable maps for the line route & Plan and Profile drawings, Tower earthing etc.
- iv. Assessment of any environmental condition using geological maps, determination of the soil types along the line, determination of any corrosion on the steel members of the structure which will identify aspects which will assist to establish the risk on the tower and foundation
- v. Carrying out preliminary geotechnical investigations on the line route with references to geological maps for the area and other sources of information.
- vi. Tower foundation designs Carry out technical study to optimization of the conductor to be used by simulating the use of another type of conductor which would have a higher capacity other than twin bison which is mostly used in ZESCO grid.

#### **2.2.6 Scope, Cost Estimate and Implementation Time Schedule Integration**

The consultant shall, based on the three options:

- a) Prepare the scope of works required for secure and reliable evacuation of power from the Plant into the ZESCO/ZETDC grid.
- b) Prepare a cost estimate of the power evacuation scope of works
- c) Prepare an indicative time schedule for the implementation of the scopes of works

- d) Prepare preliminary equipment layouts for proposed substations related to the scopes of works for integration.
- e) Ensure compliance to relevant provisions of the Zambian Grid Code in the power evacuation substations and Transmission lines configurations.

### **2.2.7 Deliverables**

As a minimum the Consultant shall produce at least the following reports covering the entire work done pursuant to the terms of reference:

- a) Inception Report: The consultant shall at their cost present to the client inception report at a workshop. All outstanding data and clarifications for the study shall be given to the consultant at this meeting through a data request matrix that shall be issued to the client by the consultant before the conference. The inception report shall include the salient assumptions, methodology for the studies, etc.
- b) Draft Grid Impact Study Report: The consultant shall at their cost present the draft Grid Impact Report at a workshop two week after issuance of the draft report. The consultant shall also avail all the relevant case files used in the study to enable the client to replicate the results were required. The case files shall be labelled adequately for this purpose.
- c) Final Grid Impact Study Report shall be issued after incorporating all comments from the client and stakeholders. The consultant shall issue to the client final version of the study case files and five hard copies of the study report. The consultant shall also issue a PDF version of the final study report to client.
- d) Tender documents for the development of the lines and associated substation works.

## **3. The Environmental and Social Impact Assessment**

### **3.1 Objective of the ESIA Studies**

The main objective of the ESIA Consultancy is to identify the positive and negative impacts associated with the proposed implementation of the BGHES, develop enhancement measures for the positive impacts and mitigation measures for the negative impacts and develop a detailed associated Environmental and Social Management Plan (ESMP) (including Resettlement Policy Framework and where necessary the Resettlement Action Plan) to be implemented to achieve environmental and social sustainability in the implementation of the project.

### **3.2 Needs and Justification for the ESIA study**

The aim of the ESIA study is to assess the environmental and social impacts associated with the design, construction and operation of the planned transmission lines. The ESIA will propose practical and effective mitigation measures to prevent or reduce any potential negative implications of the construction and operation of the planned transmission lines. In

addition, an Environmental and Social Management Plan will be developed to ensure best environmental and social performance. In principle, for each of the planned transmission line. The ESIA will ensure the following:

- a) Environmental and social impacts associated with the project are assessed and examined at the earliest planning stage possible.
- b) Environmental and social impacts to be investigated and examined include factors that impact the physical biological, social and economic environments (including but not limited to air, water, soils, waste, accidents, water usage, ecosystems, biota, public health, occupational health and safety. Social concerns include:
  - i. Involuntary resettlement of the population;
  - ii. Disturbance/Loss of livelihoods;
  - iii. cultural heritage;
  - iv. landscape;
  - v. gender;
  - vi. Communicable diseases, etc.
  - vii. Traffic impacts should also be assessed.
- c) In addition to the direct and immediate impacts, derivative, secondary cumulative and residual impacts will also be examined and investigated to a possible reasonable extent.
- d) Alternative proposals and/or minimization measures to prevent or reduce adverse impacts are examined to choose a better project option in terms of environmental and socio - economic considerations. In examination of measures, priority is to be given to the prevention of environmental impact, and when this is not possible, minimization and reduction of impact must be considered next. The findings of this examination should be incorporated in the plan.
- e) Examination of the environmental and social considerations will include analysis of environmental costs and benefits in quantitative terms, as much as possible, while taking into consideration economic, financial, institutional, social and technical aspects.
- f) Appropriate follow-up environmental and social management and monitoring plans will be prepared as part of the ESIA. Estimated costs of implementing such plans and financial resources to cover such costs will be determined.

The ESIA will ensure that the construction and operation of the proposed transmission lines are in compliance with relevant national, laws and ordinances as well as the World Bank and African Development Bank (AfDB) safeguard policies.

### **3.3 Tasks**

The following tasks are expected to be undertaken in order to prepare the ESIA for the proposed transmission lines and associated facilities:

- a) Conduct meetings with the Authority, ZESCO and ZESA team to understand and familiarize with the Master plans and activities related to the proposed transmission lines;
- b) Conduct visits, to all sites for the purpose of site reconnaissance and establishing updated baseline and collecting data from the local concerned authorities and all other relevant stakeholders;
- c) Review all relevant national laws and regulations including international conventions protocols and treaties relevant to the planned activities;
- d) Describe the environmental and social settings for the areas where the planned transmission lines will traverse including surrounding areas;
- e) Assess the potential positive and negative environmental and social impacts associated with the planned activities;
- f) Assess risks and hazards associated with the project activities
- g) Develop relevant enhancement and mitigation measures for identified positive and negative impacts associated with project activities
- h) Prepare a comprehensive Environmental and Social Management Plan (ESMP)
- i) Perform effective and efficient public/ stakeholder consultation throughout the ESIA process. A proper communication/ stakeholder engagement plan should be prepared and specific actions to be taken to ensure good representation and good attendance of affected communities and stakeholders in the planned Public consultation events.
- j) Develop an institutional development and capacity building plan to ensure effective and efficient implementation of the proposed environmental and social management and monitoring activities.

### **3.4 Approach**

The Consultant will to an extent possible identify and compile readily available technical data and information that would allow preparing the ESIA report with the least uncertainties. Appropriate and justified engineering/scientifically based assumptions should be made to cover any information or data gaps. The Consultant will ensure compliance with:

- a) Current environmental and social regulations and standards in Zambia and Zimbabwe;
- b) The World Bank Operational Policy 4.01 (and any latest revision) and other World Bank procedures and guidelines on conducting environmental impact assessment;
- c) The World Bank Group's Environmental, Health and Safety Guidelines (EHSGs);
- d) The AfDB Integrated Safeguard policies; and
- e) The international best practices.

### **3.5 Methodology**

This section describes the methodology for conducting the Environmental and Social Impact Assessment for the transmission lines routes including the substations where the lines will be integrated.

#### **3.5.1 Environmental and Social Impact Assessment Methodology**

##### **3.5.1.1 Detailed Methodology and Sequence of Work**

The methodology for preparing the Environmental and Social Impact Assessment will be in accordance with the Environmental Regulations and Standards of Zambia and Zimbabwe, the World Bank Operational Policies/Best Practices on environmental safeguards OP/BP 4.01 and the AfDB Integrated Safeguard policies. The Consultant shall prepare and submit his own detailed work methodology and approach to fulfil the assignment requirements given the large geographic scope covered under these TORs.

The following will be the minimum requirements of the proposed methodology

#### **A. Gain an understanding of the study project objectives and familiarize with project locations**

- i. Obtain necessary documents including maps, site plans, photographs, diagrams, and any visual and graphic aids.
- ii. Familiarize with project, including project purpose; location; components and phases; workforce and equipment; associated activities; schedule; and cost.
- iii. Gather information about pre-construction, construction, and operation plans.
- iv. Detail the elements of the project, highlighting the areas to be reserved for construction and determining the surrounding areas in terms of impacts to residential areas, industrial areas, protected areas, historical sites, etc.

#### **B. Review relevant legislative and regulatory considerations**

Outline the pertinent regulations and standards governing environmental quality, safety and health, protection of sensitive areas, protection of endangered species, siting and land use control at the international, national and local levels. The examination of the legislation should include at minimum, legislation such as the ZEMA and EMA Acts, the Public Health Acts, the Town and Country Planning Acts, Building Codes and Standards, Development Orders and Plans and the appropriate international convention/protocol/treaty where applicable. The consultant will consider the various relevant safeguard policies of the World Bank and the AfDB, particularly the policy on environmental assessment and the involuntary resettlement.

#### **C. Conduct the First Public Consultation (Scoping Session)**

A community consultation process will be initiated as early as possible. Notwithstanding that stakeholder engagement is a continuous process, the Consultant will hold at least

two stakeholder's meetings. The first public consultation meeting will be conducted before the identification of relevant impacts in order to discuss and agree on the scope of the ESIA. In coordination and consultation with the Authority, relevant governmental authorities and other stakeholders will be identified. The Consultant in coordination with the Authority and the relevant authorities will arrange and conduct scoping sessions which should be attended by the relevant authorities and stakeholders. The aim of these scoping sessions is to:

- i. Explain and reach a common understanding of the potential impacts and sensitivities of the surrounding environment, and similarities and differences between the present project and other similar projects implemented in the area and in Zambia and Zimbabwe at large.
- ii. Identify, early in the process, any environmental and social aspects, which the stakeholders raise, which may not have been included in the scope of work
- iii. Provide a basis for reviewing the issues that will be considered in the ESIA

#### **D. Identify Relevant Environmental and Social Aspects**

The Consultant will identify relevant environmental and social aspects to be discussed at the beginning of the work with a sample of concerned parties. The various impacts will be categorized as either positive or negative, and dealt with accordingly. Relevant impacts will be assessed for both the construction and operation phases of the project.

The following are anticipated to be the most relevant environmental aspects:

- i. Loss of vegetation/ habitat and erosion during installation of transmission lines, affecting drainage patterns and soil stability
- ii. Solid waste, hazardous waste, wastewater, noise, and other possible soil/water/air pollutants produced from associated facilities and activities during construction and operation
- iii. Loss of land use by occupation of land with permanent structures, creation of Right of Ways (ROW), or other barriers to humans and wildlife
- iv. Disruption of traffic and blockage of waterways and channels
- v. Fire and explosion related accidents and emergencies;

Among the most relevant social aspect to be considered are the following:

- i. Impacts on employment, housing of workers, and public health and safety issues
- ii. Displacement of people and other adverse impacts upon income or living standards due to land acquisition or other activities associated with construction and operation.
- iii. Impacts on the local market in change in demand for local services, as well as access to social infrastructure/ loss or disruption of livelihood
- iv. Loss of land use by occupation of land with permanent structures, creation of ROW's, or other barriers to humans and wildlife

- v. Impacts on archaeological sites, historical buildings, and cultural heritage (Physical Cultural resources)
- vi. Impacts caused by inducing secondary development, such as squatters, within the transmission lines ROW;
- vii. Immigration, pressure on existing social facilities
- viii. Fire and explosion related accidents and emergencies;

The above points will be explained and discussed with relevant authorities and stakeholders of the project including government institutions, national authorities and bodies.

## **E. Scoping**

Based on the First Consultation, the following activities will be performed:

- i. Document the issues raised during the scoping exercise. This shall provide a basis for reviewing the issues that will be considered in the ESIA
- ii. Finalize the terms of reference for this assignment by incorporating the raised issues in the scoping sessions. The terms of reference should meet the standards and requirements as prescribed by ZEMA and EMA.

### **3.6 Analysis of Alternatives**

The environmental and social assessment should also include an analysis of alternatives (route alignment, design, raw materials and technology) that would examine different alternatives with the objectives of minimizing environmental, health, safety and social impacts of the project. The analysis would focus on the following:

- i. Summarizing and referencing the alternatives in a manner consistent with national and international guidance
- ii. Analysing the benefits and impacts expected from the project and other technical and economic alternatives including the "Do-Nothing" alternative
- iii. Evaluating the social and environmental analysis of each alternative
- iv. Propose preferred alternatives by comparing alternatives, and justify the rationale for preferring the proposed alternatives

### **3.7 Data Collection and Review**

General information about the project site and/or transmission lines routing and surrounding areas will be provided in map form at appropriate scale (1: 50 000 or 1: 100, 000), including:

- i. Provide appropriate image of proposed alignment, general layout of facilities at project related sites
- ii. layout of the existing transmission lines network and other utility services network;

- iii. project area maps at appropriate scales to illustrate general siting of project related development sites and surrounding areas likely to be environmentally and socially affected
- iv. topographic contours, as available, as well as locations of surface waters, roads, railways, town centres, parks and reserves, and political boundaries
- v. maps to illustrate existing land use, including industrial, residential, commercial and institutional development, agricultural, etc
- vi. pre-construction activities

Specific data will be compiled on the characteristics of the project area in terms of its sensitivity to adverse and beneficial environmental impacts. Historical and secondary source data will be collected, when possible, and validated with field observations. The consultant will conduct the necessary baseline surveys to collect data on the following points:

**a) Physical Environmental Data:**

- i. Geology (e.g. stratigraphy and structure, seismic history if any of the areas)
- ii. Topography (e.g. drainage patterns around the transmission lines construction areas, view-shed around facilities)
- iii. Soils (e.g. bearing capacity of soil, agriculture value, soil cover in residue disposal)
- iv. Climate and meteorology
- v. air quality
- vi. water quality
- vii. Surface water quality
- viii. Surface water hydrology
- ix. Receiving water quality (other major pollution sources in the area, if any)
- x. Ground water table condition of the study area
- xi. Ambient noise (note contribution from major sources if any)
- xii. Significant sources of pollution in the area and prospect for their mitigation
- xiii. Existing traffic patterns, types of roads, etc

**b) Biological Environmental Data**

- i. Flora and fauna, including rare or endangered species in areas adjacent to project-related development sites
- ii. Sensitive habitats; including wetlands, parks or reserves, significant wild lands, forests within or in the corridor of project-related development areas.
- iii. Species of commercial importance in areas affected by the project.

**c) Socio-Economic Data**

- i. Culturally Valuable Sites
- ii. Geography, administrative districts, etc.
- iii. Basic Demographic characteristics (population, age structure, birth rate, death rate, rate of natural increase, handicapped, etc.)

- iv. Living Conditions (household size and density, access to electricity, source of potable water, sanitation, etc)
- v. Human Development Profile (education, work status, economic wellbeing, etc.)
- vi. Undertake a socio-economic assessment/survey with a representative group of households with a focus on lower-income groups to assess the affordability of the residents to connect to the network and identify alternatives for subsidy support.

Subsequent to gathering of data, the environmental and social issues will be assessed in terms of the environmental and social risks and benefits associated with the project.

### **3.8 Analysis - Environmental and Social Assessment**

The consultant will assess the potential impacts of the project during construction and operation phases. The Consultant will perform the below tasks to identify and concisely present the significant environmental and social impacts:

- i. Explain and justify the methods used to predict potential impacts of the project on the environment, and on interactions among the project components
- ii. Nominate and classify issues that are potentially important in the assessment of impacts and for decision-making in relation to the project
- iii. Identify potential impacts in the construction and operation phase by conducting an impact analysis on the physical, biological, land-use and socio-economic environments, and the interactions among them.
- iv. Evaluate the impact significance of the project components and activities on the environment and society
- v. Establish that criteria on which the assessment of the impacts will be based
- vi. Develop a matrix as a means to present assessment of the impacts graphically, and specify and discuss positive or negative impacts, direct or indirect impacts, reversible or irreversible impacts, short-term and long-term, residual and cumulative avoidable impacts on the environment and society

### **3.9 Develop an Environmental and Social Management Plan**

After the evaluation of impacts, the consultant will establish strategies and measures to reduce or eliminate potentially negative outcomes and or enhance positive ones. This includes avoiding as far as possible, any adverse impacts due to proposed usage of the corridor and utilising of existing environmental and social attributes for optimum development and employing mitigation measures for those that are unavoidable. Issues related to the project location, equipment, and surveys conducted previously will be categorized according to how critical the impact is. These strategies will be formulated in an Environmental and Social Management Plan (ESMP) This process entails:

- i. Detailing the management measures, roles, and responsibilities for implementation, supervision, and cost

- ii. Indicating parameters to be monitored, their location, frequency of monitoring, roles and responsibilities and cost
- iii. Assessing the ability of the implementing agencies to implement the proposed environmental management and monitoring plan
- iv. Developing the institutional arrangement and capacity building programs necessary to ensure successful implementation

### **3.10 Stakeholder Engagement and Stakeholder Engagement Plans**

- a) A detailed stakeholder analysis should be undertaken by the consultant with a view to develop a broad and detailed stakeholder engagement plan covering the preparatory studies phase as well as construction and operational phases of the project.
- b) The developed Stakeholder Engagement Plan is a critical output on the part of the consultant which the Authority will continue to utilise even during the construction and operational stage of the project and beyond.
- c) The consultant shall document information on public participation, stakeholder engagement and consultation undertaken about the project consistent with the requirements of the Environmental Protection Laws of Zambia and Zimbabwe and the World Bank Safeguard Policies.
- d) The ESIA consultant must develop an engagement plan that demonstrates (through a thorough stakeholder mapping analysis) the approach to the engagement of stakeholders over the life of the project.
- e) The Consultant shall work with the client to implement the stakeholder engagement plan components that cover the period from the preparatory studies stage up to the conclusion of the environmental regulatory approval processes in Zambia and Zimbabwe.
- f) Stakeholders to be engaged should include but not limited to the following;
  - ❖ Government Ministries and local authorities
  - ❖ National and local civil society and Non-Government organizations including but not limited to environmental, women groups among others.
  - ❖ Local communities and affected peoples including women groups of the project area;
  - ❖ Ethnic organizations;
  - ❖ Users of land etc. within a specific area that may not be members of the local community;
  - ❖ Expert advisory groups;
  - ❖ Private sector;
  - ❖ Media;
  - ❖ Non-Governmental Organizations

- ❖ Multi-lateral development agencies/banks and other funders of overseas development aid; and
  - ❖ Any other interested and affected parties as may have been identified in previous stakeholder engagements.
  - ❖ The power utilities
- g) The stakeholder engagement plan developed should demonstrate how stakeholder engagement will be an all-inclusive consultative process and will be a continuous process throughout the life of the project and what level of corporate responsibility and transparency will occur as part of the ongoing process during pre-construction, construction, operation, and decommissioning/project closure and/or rehabilitation.
- h) The consultant should also develop detailed **Community Outreach Programs**. The Stakeholder Engagement and Community Outreach Plans developed by the consultant should also build on the lessons learnt from the Authority's implementation of the Zambezi Valley Development Fund (ZVDF).

### **3.11 Conduct the Second Public Consultation Meetings to Involve the Stakeholders of the Project in the ESIA**

- i. Select appropriate venue for public consultation meeting
- ii. Manage logistics of the meetings, including participants and thorough documentation of the event.
- iii. In addition to making a public announcement, invite stakeholders of the project, and potential interested parties including those relating to alignment of the transmission lines, address the same in the environmental assessment and provide opinion on project design wherever relevant. Invited stakeholders should have balanced representation of women, NGOs, local community groups, youth and other vulnerable groups (e.g. handicapped, elders.... etc.)
- iv. Provide attendees with a summary of the project and briefing on the impacts and analyses developed in non-technical English language.
- v. Document stakeholders' concerns and issues raised. The consultant will document all the consultations including the issues raised and actions planned/taken and justifications for no action wherever relevant.
- vi. Assess the public's perception to the proposed project.
- vii. Document the means by which the public engagement was used in the identification of the issues, and how it affected the project.

The final version of the ESIA report will incorporate the comments raised in the second public consultation meeting. The final report will discuss how the public concerns that are raised during different stages of consultations have been considered and addressed in the project.

### **3.12 Grievance Redress Mechanism for the BGHES**

The consultant shall develop a grievance redress mechanism (GRM) for the project, which will provide a transparent and accessible means for project affected persons and communities to register complaints and issues they may have as a result of project activities, during both construction and operations phases. The GRM description should include principles, a description of the process, including who oversees, it, how grievances are registered and addressed, and what recourse exists for appeal or escalation to a higher authority. The GRM should seek to resolve any issues at the closest level to the affected parties, with an avenue for appeals to higher authorities. Entering the judicial and legal system is seen as the last recourse if all other solutions have been exhausted. A grievance log book will be kept for each contractor and construction site, to ensure any construction-phase issues, including harmful or negative contractor employee interactions with local communities are acted on and resolved quickly. The GRM for the ESIA shall input into the RAP, grievance redress mechanism. As such the consultant is expected to work hand in hand with the current ESIA consultant undertaking the RAP.

### **3.13 Payment for specialised Environmental Sample Analysis**

The Consultant shall be responsible for payment of any specialized studies that will pertain to detailed assessment of environment and social impacts as required by ZEMA/EMA.

### **3.14 Submit a Draft ESIA Report for Review**

Based on the results of the public consultation, the consultant will finalize the draft ESIA report and submit it to the Client for review.

### **3.15 Submit Final ESIA Report**

Based on the comments received from the Authority, the Consultant will perform the following tasks:

- i. Revise the Draft ESIA report in accordance with comments and concerns received
- ii. Finalize the ESIA report and present the final ESIA report to the Authority
- iii. Submit the Final Report to the Client for public disclosure

The reports shall be subject to review and comment by ZEMA and EMA

### **3.16 Deliverables**

The following reports reflect the main outputs expected from the study:

- i. Inception Report (including the work methodology, approach, detailed work plan and results of the scoping phase)
- ii. Draft Environmental and Social Impact Assessment (ESIA) Report
- iii. Draft Environmental and Social Management Plan (ESMP) Report
- iv. Draft Resettlement Action Plan (in case of Displacements)
- v. Final Environmental and Social Impact Assessment (ESIA) Report

- vi. Final Environmental and Social Management Plan (ESMP) Report
- vii. Final Resettlement Action Plan (in case of Displacements)

Each report mentioned above will be submitted both as a digital copy and 10 hard copies in English language except for the final ESIA report which will be submitted both as a digital copy and 20 hard copies in English language

#### **4. Duration**

The consultancy is expected to take 5 months.

#### **5. Obligations of the Client**

##### **5.1 Data and Reports**

The Authority will assist with the following data and reports where available:

- i. Provide available copies of previous study reports and other relevant documents;
- ii. Facilitate consultation with relevant stakeholders (Ministries / Departments and other institutions and communities)
- iii. The current PSS/E SAPP case file that shall be subject to validation by the consultant.
- iv. Relevant Substations Single line and general arrangement drawings in PDF.
- v. Relevant Substations Primary equipment rating data.
- vi. Proposed non-dispatchable Power plants in the years of study.
- vii. The ZESCO/ZETDC and IPPs Generation and Transmission Expansion plans and the load forecast for the two study horizons.

##### **5.2 Liaison**

The Client will provide liaison through its Program Management Unit (PMU) and will ensure that the Consultant has access to all available information required for timely execution of the assignment.

#### **6. Obligations of the Consultant**

The Consultant is expected to be fully self-sufficient in all respects for undertaking the assignment including accommodation, office space, equipment and supplies, communication and transportation.

#### **7. Consultants Qualifications and Required Expertise**

The Authority intends to engage a consultancy firm with experience in engineering designs and undertaking ESIA studies for Transmission lines of similar nature and complexity as the BGHES. The Consultant shall provide a team of competent experts with extensive experience from similar transmission lines, substations, or related infrastructure projects.

**7.1 Project Manager:** The team leader shall be responsible for the overall supervision and coordination of the project and shall be the principal contact person between the

Consultant and the Client. The Project Manager shall be a Registered or Chartered Electrical Engineer, preferably with relevant postgraduate training. He/she must have at least Fifteen (15) years of cumulative experience related to Transmission construction management. The Project Manager must have had, in the last ten (10) years, specific experience in managing consultancy teams working on feasibility studies, detailed engineering design for hydropower structures, Transmission lines, and construction management in at least two hydropower projects of similar size and complexity. He/She must be fluent in English. The Team Leader will be full time for the duration of the project, except for normal annual leave.

**7.2 Electro-Mechanical Engineer:** The Electro-Mechanical Engineer will be responsible for the designing of all electro-mechanical components and design reviews and supervision for the project. He/She shall be a Registered or Chartered Engineer with at least Ten (10) years of relevant experience. He/She shall be fluent in English.

**7.3 Transmission and Substations Engineer:** shall be responsible for design and review of all transmission and substation works. He/she shall have a minimum of a master's degree in electrical engineering and a minimum of 10 years' experience in design and implementation of similar works.

**7.4 Structural Engineer:** The Structural Engineer will design and review the design of all concrete and structural steelwork elements of the lines. He/She shall be a Registered or Chartered Civil or Structural Engineer with at least Fifteen (15) years of relevant experience relating to transmission lines structure design. He/she shall be fluent in English.

#### **7.5 Civil Engineer**

A professional engineer with at least 15 years of experience in the reconnaissance, siting, general layout design and output optimization of transmission lines and substations. The Engineer shall be a key member of the consultancy team and shall play a key role in informing the planning and execution of the feasibility study and as such is expected to prove to have been involved in at least 3 (three) projects of a similar nature.

**7.6 Social Specialist:** The Social Specialist shall be responsible for assessment of social impacts. He/she shall hold a University Degree with 10 years' relevant experience in community development addressing resettlement issues and social impact assessment, including preparation of Resettlement Action Plans, and stakeholder consultation associated with new infrastructure projects. He/she must also have work experience in Southern Africa and be fully cognizant of the gender-related issues, including the application of World bank OP 4.12. Experience in health impact assessment would be an advantage. He/she must be fluent English, and preferably any local Languages in

Zambia/Zimbabwe.

### **7.7 Gender specialist**

For a gender baseline study with a Minimum of 10 years' experience of progressive professional experience in gender analysis and programming especially in infrastructure projects implementation, a Minimum of a master's degree in gender studies, development, or a relative discipline and Demonstrated experience working on projects promoting women's empowerment with Extensive field-based experience, preferably in Zambia and Zimbabwe

### **7.8 Ecologist**

Ecologist with at least a Masters Degree in Ecology, or equivalent discipline, and at least 10 years relevant experience in ecological management or related field and mitigation plan preparation. Expertise in identifying plant or animal species of conservation or management interest in the project area will be an advantage.

### **7.9 Ornithologist**

For fauna baseline issues with a master's degree in Zoology or equivalent and 10 years post relevant experience.

**Nb. The consultant is expected to propose additional Non-Key specialists to support the key specialists. These should be of relevant post qualification experience and possess requisite education qualification. Indicatively, the following are the expected Non key staff:**

- Surveyor
- Environmental experts
- Social specialists
- Environmental Health and Safety

## **8. Consultancy firm's associations**

The Applicant can be a single Consultancy firm or as a group of firms (the "**Joint Venture**"), coming together to undertake the consultancy services. However, no applicant applying individually or as a member of a Joint Venture, as the case may be, can be member of another Applicant. The term Applicant used herein would apply to both a single Firm and a Joint Venture.

## **9. Coordination**

The consultant shall liaise with the Authority's BGHES project team (or any other Consultant delegated by the Authority to coordinate the project activities) and the other consultants undertaking the preparatory studies for the implementation of the BGHES with the aim of avoiding gaps/overlaps. This will include meetings with these consultants where necessary, provision of input information and/or reviewing recommendations from the outputs from these consultants.

