

**Devils Gorge Hydro Electric Scheme (DGHES)**

**Draft Terms of Reference (ToRs)**

**Prefeasibility Studies for the development of the Devils’ Gorge Hydro Electric Scheme**

1. **Background**

The Zambezi River Authority (the Authority) is a bilateral organization owned by the Republics of Zambia and Zimbabwe and mandated to operate, monitor, and maintain the Kariba Dam Complex as well as develop the full hydro power potential of the shared portion of the Zambezi River, common to the Contracting States.

The proposed Devils’ Gorge Hydro-electric Scheme (HES) is located at the tail end of Kariba Dam, just downstream of the Gwayi/Zambezi Rivers Confluence.

The Devils’ Gorge HES was conceived in 1972 out of a study instituted by the predecessor of Zambezi River Authority, Central African Power Corporation. The aim of the study was to identify possible power sources which the intergovernmental institution could develop to meet the power demands of Zambia and Zimbabwe. Its recommended scheme included a 181 m high concrete arch dam, 65m of which are below the water level of the river, two underground power stations on each side of the river with a total capacity of 1240 MW for the scheme. The normal retention level of EL 595 was selected creating a reservoir of 33 billion m3.

In 1992-93 a feasibility study was commissioned by the ZRA for the Batoka Gorge Hydroelectric Scheme Feasibility Studies during which the Devils’ Gorge Scheme was looked at in greater detail and reserved as one of the potential sites for future development.

In addition, the Authority requested Tractabel France (TEF) to undertake an analysis of the Devils’ Gorge Project in 2016. No Environmental impact assessments have been conducted to date.

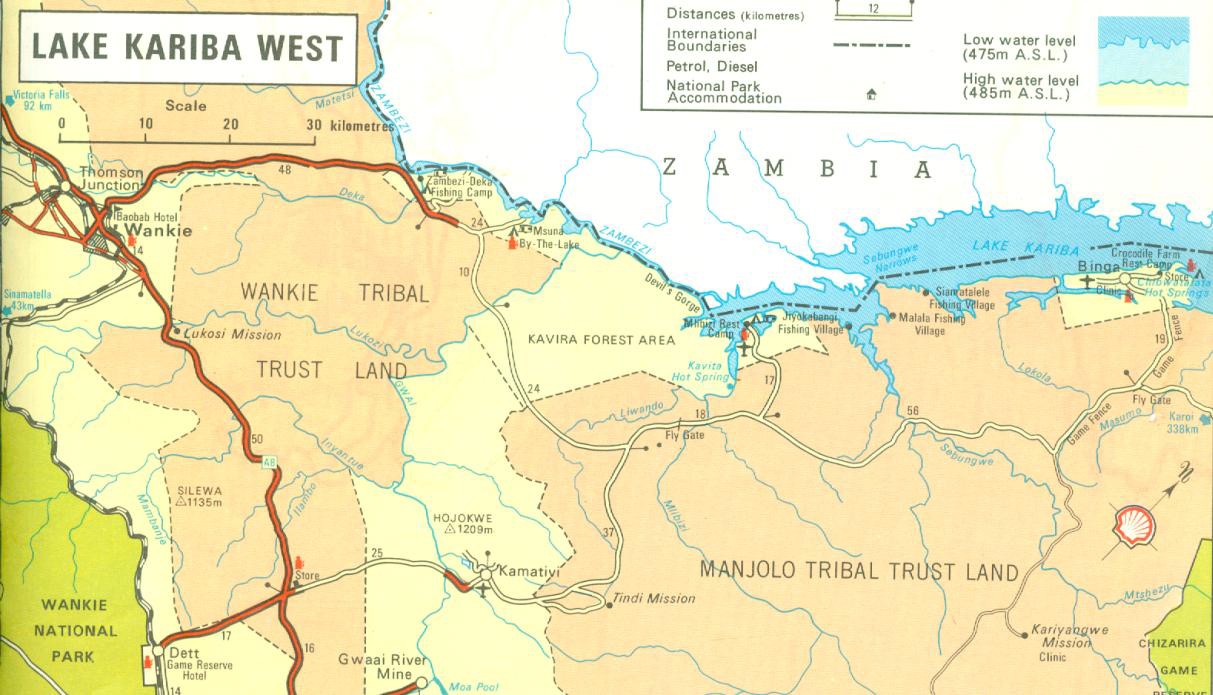


Fig 1: Location of Devils Gorge

**2.0 Consulting Engineering Services Required**

**2.1 General**

ZRA therefore seeks Consulting services from a competent firm to undertake a detailed prefeasibility assessment of the proposed DGHES. In the execution of the services, the consultant shall cooperate and liaise with ZRA, the Executing Agency (EA) of the project. The EA will supervise and monitor the consultant’s work, while the consultant will be solely responsible for the accuracy of all findings and outputs, including conclusions and recommendation. The consultant will provide the expertise and manpower required to deliver the services on time, with care and due diligence.

**3.0 Objective**

To undertake prefeasibility studies that would investigate and recommend an optimal site, around the stretch between approximately 60km downstream of the proposed Batoka Gorge site and upstream of the area of influence of Lake Kariba as shown in figure 2 below. The initially recommended site shall also be analyzed and compared with the other alternatives.

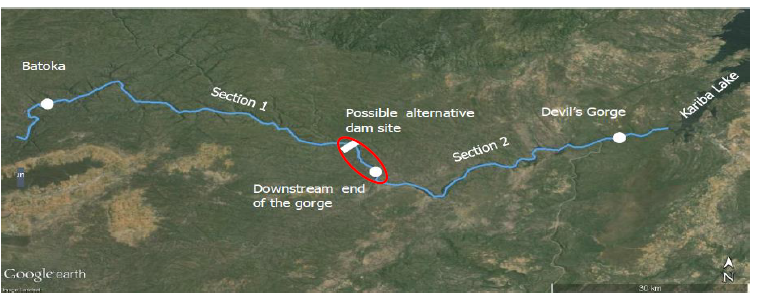


Figure 2: Proposed alternative dam site. Screening required in the marked red area

**3.1 Description of Services**

The consultant will:

1. Review all available previous documentation on the Devils Gorge HES
2. Supplement the study’s review with focused and limited field investigations and tests required to firm up the scope of the proposed works. These shall include limited geotechnical investigations.
3. Identify possible alternative optimal sites for the location of the Dam taking into account the findings of the technical, geotechnical, environmental, social and economic considerations. From the long list of alternative sites, two shall be recommended, analysed in detail and ranked based on a multi criteria to be agreed with the client.
4. Propose an optimal installed capacity, informed by technical, environment, social and economic considerations
5. Propose an optimal configuration of the scheme considering the bilateral nature of the project.
6. Prepare a detailed design report describing the scope of the proposed works, and clearly showing the design criteria adopted, assumptions made and the corresponding calculations. Confidential cost estimates of the works as well as an implementation schedule shall also be prepared and included in the report. The report shall be discussed with the executing agency.
   1. **Technology Transfer and Capacity Building**
      1. Technology and knowledge transfer is a very important aspect of his consultancy. As such the consultant is expected to lay a strong technology transfer and capacity building program of the Project Management Unit and other relevant staff of Zambezi River Authority and Utilities during the implementation of the project.
7. **Quality Assurance**

The work will be reviewed by the ZRA, National Utilities, Specialist consultants working with/for ZRA. The reports will be deemed approved after ZRA clears them in writing

1. **Scope of Work**
2. **Phase 1 – Site Screening**

**Data Collection**

As a first step in the execution of the Services, the Consultant shall hold consultations with the ZRA and shall acquaint themselves with the Zambezi River and power generation and transmission infrastructure in Zambia and Zimbabwe, as well as in the Southern Africa Power Pool (SAPP).

The Consultant shall collect and review previous documents related to development of new hydropower sites on the Zambezi River, and especially the proposed Devils Gorge HES from the Client. (See Obligations of the Authority Section 8.0 under 8.1 Documents to be provided). Additional data to be collected include:

**Topographical maps and Digital Elevation Model**

**Satellite Imagery**

**Environmental bibliographic data** – Desktop work of available data will be carried out before any field visit. For example, the collected data for the biodiversity aspects of the study will be mainly the IUCN1 Red List, the Birdlife database, and the World Database on Protected Areas (WDPA).

**Geological bibliographic data** – Most of available geological data on the Zambezi valley has already been collected in the course of Kariba and Batoka studies. All available geological mapping between Batoka and Kariba will be gathered.

**Hydrology/Meteorological/sediment data** – Most of available hydrological/meteorological and sediment data on the Zambezi valley have already been collected during Kariba and Batoka studies. No new data will be collected. The Consultant shall review available hydrological data relevant to the Devils Gorge HES. The consultant shall assess the data quality completeness, and integrity. Based on the quality assured data the consultant shall analyze river flows and compute updated historical data series of river flows at alternative project sites and calculate river flow characteristics such as average flows and duration curves. The Consultant shall review previous analyses of extreme floods in the Zambezi River and estimate updated flood magnitudes with different return periods.

**Site Visits**

The Consultant shall conduct site visits at the potential dam sites to evaluate topographical, geological, access, and other conditions. The Consultant will also identify and analyze likely social and environmental issues to emanate from development of the alternative sites. For each of Sites, a general layout will be drawn, and the main scheme features will be described with the objective to define the site investigations and field survey to be carried out at each site.

1. **Phase 2 – Site Investigations and Field Surveys**

As part of the data collection and verification exercise, the Consultant shall carry out site investigations and field surveys. These will broadly cover Bathymetric Survey and Geological Investigations.

1. **Bathymetric Survey**

The Consultant shall conduct a Bathymetric survey of the Devils Gorge HES areas covering the reservoir area proposed dam site downstream of Batoka Gorge down to Lake Kariba. The Bathymetric survey data will be used:

* to confirm dam heights volumes and surface areas suggested in previous studies.
* Make hydraulic calculations to build the rating curve at the project site.
* Evaluate the depth of the sediment deposit of the alternative sites.

1. **Geological and Geotechnical Assessment**

The geological assessment conducted in the initial stage shall be updated by detailed review of previous documents and undertaking the initial geotechnical investigation studies and extraction and analysis of core samples. Geological investigations are necessary to make a general appraisal of the geological conditions of the considered sites and to provide sufficient information to assess the potential risk of each site.

The consultant shall carry out any other assessments deemed necessary for the completeness of the assignment. Such additional, but relevant investigations shall be clearly indicated in the proposal.

1. **Phase 3. Environmental and Social Screening**

The Consultant shall undertake a study on environmental and social impact assessment and make a screening of environmental and social impacts for the proposed alternative power generation sites. An environmental and social scoping will be carried out with the aim to:

* Contribute to the site screening exercise as described in the Task 1: Site Screening
* Develop a preliminary environmental and social baseline, principally based on existing bibliographic data;
* Identify the potentially significant environmental and social risks and impacts inherent to the project.
* Provide the input for the comparative analysis of the several considered alternatives.

The study will cover all components of the dam project according to the availability of the data such as dam and power-plants sites, reservoir, access roads, works area and transmission lines. The study area will consider the zone of influence where Project impacts, direct or indirect, could be felt. The study will be carried out in close collaboration with the Engineering Team to base itself on the best level of technical information.

**Site visit and preliminary consultations**

Based on the collected data, the Consultant will identify the main areas of impact and then will conduct a site visit with the objective to investigate and evaluate these areas.

The site visit will be led by socio-environmental expert with ZRA representatives. The team will travel along the river in order to collect the information relative to the inhabited areas along the river identified by satellite imagery.

Preliminary consultations will be carried out with key stakeholders at national and local level such as the representatives of the main technical services as well as the representatives of the main impacted localities.

**Biodiversity Aspects**

In the project area, the site visit will be orientated to update, complete the documentary data collected in office and increase their veracity and allow to:

* characterize more precisely the type of habitat based on collected data,
* evaluate the recent evolution of the land,
* evaluate human pressures on the environment (habitat destruction) and species (poaching / hunting),
* collect qualitative information on biodiversity and practices among local populations,
* highlight potential sites of great interest.

No fauna and flora inventories will be carried out at this level of study.

**Socio-Economic Aspects**

In the project area, the site visit will be orientated to update, complete the documentary data collected in office and increase their veracity and allow to:

* estimate the demographic constraints,
* define the origin of settlement,
* identify the main socio-economic activities,
* evaluate the main cultural aspects,
* identify the main public infrastructure.

No census and inventory of individual assets will be carried out at this level of study.

**Analysis of the data**

**Preliminary Baseline Study**

A preliminary baseline study will be carried out to draw the main characteristics of the environmental and social context of the project area and identify the areas of focus. The study will draw on the findings and outcomes of the site visit carried out as well as the existing data.

The study will cover the aspects described in the following sub-sections.

* Legislative / regulatory framework and standards
* Definition of the study area
* Physical environment
* Biological environment
* Socio-economic environment

**Identification of the Main Socio-Environmental Impacts**

**General**

Referring to the preliminary environmental and social baseline established as part of the study, the main potential impacts of the Project will be identified. The analysis will cover impacts generated during the construction phase and the operation phase (with the reservoir operation) of the project.

**Identification of Impacts**

The socio-environmental screening will be carried out for the series of alternatives considered and will cover at least the following aspects:

* Environmental
* Social

**Evaluation of impacts**

For each considered alternative, the major impacts will be defined, evaluated, and compared in order to rank the alternatives according to their environmental and social impacts.

The identified impacts will be characterized in terms of importance to describe the consequences of the project on the environment.

The criteria to evaluate the importance of the impacts will be the duration of the impact (temporary or permanent), the extent of the impact (local, regional, or national) and the intensity of the impact (high, medium or low) taking into account the sensitivity and vulnerability of the affected component.

**Framework of Environmental and Social Management Plan**

Based on the main impacts identified, a framework of environmental and social management plan will be drawn by identification of feasible and cost-effective measures that may reduce potentially significant adverse environmental and social impacts to acceptable levels. The objective is to provide an order of magnitude of the cost to implement the environmental and social plans.

1. **Phase 4 – Engineering and Design**

**Hydrological studies**

The study will use the output of the hydrological studies carried out in the framework of the Engineering Feasibility Study of Batoka HES. It will also evaluate how the non-negligible tributaries (at least Gwayi River) between Batoka and Devil’s Gorge contribute to the inflows and to the floods at Devil’s Gorge.

**Geological studies**

Following the site investigations, analysis of the results will be performed by consultant’s geologist expert. The main objectives of this study will be to provide input data to perform the preliminary design of the alternatives and the risk assessment of each alternative. In particular, the output of the geological studies will consist of:

* Determination of the dam type suitable for the foundation
* Estimate of the foundation characteristics
* Determination of the suitability of the material for dam construction
* Definition of geological risk associated to each site

**Reservoir simulation studies**

The simulation will be carried out for each of the dam and reservoirs corresponding to the several considered alternatives. The reservoir operations will be done for varying FSL and rated discharge to determine firm and secondary energy for the various considered alternatives. The simulation will be refined during the study as the design activities progress.

**Preliminary design of the alternatives**

A preliminary design will be provided for each alternative considered in the study. It will be based on:

* The topographical maps produced from the LiDAR survey done in the framework of the Engineering Feasibility Study of Batoka HES.
* The hydrological studies
* The geological studies including observation made on site by the geologist and the output of geological investigations.

The project features governing the main costs of the project will be defined and justified:

* Dam type: this will be chosen and justified mainly based on the geological study output.
* Dam height: this will be determined based on the topographical constrains and a cost/benefit analysis using volume of the dam and energy production.
* Installed capacity: some indication will be provided with regard to the optimum range of value, and it is proposed that the installed capacity optimization will be done in a further stage of the project development. Indeed, the choice of an installed capacity/rated discharge is a complex subject, for which detailed analysis is required.

In addition, the installed capacity is not expected to be a key driver for the selection of the best option to develop the hydropower potential of the Zambezi in this area, which is the main objective of the proposed study. Therefore, for comparison and pre-feasibility design purposes, it is found reasonable to consider a fixed rated discharge for all alternatives; for instance, a rated discharge giving a plant factor of 0.4. Then, depending on the dam height, the installed capacity will be fixed.

* Dam design: it will ensure the stability of the dam for a limited number of load case scenarios.
* Spillway type, layout and size: the spillway type and layout will be adapted to the site topography, and its discharge capacity will be justified through analytical hydraulic calculations.
* Powerhouse: the number, type and size of the turbines, hence the powerhouse size, will be defined on the basis of the head and rated discharge.
* Water ways: the main costs regarding the power waterways are the steel lining, the excavation/lining of tunnels if any and the surge shaft if any. The study will then focus on these points and try to minimize these quantities with short waterways. The diameter of the waterways will be defined using a cost/benefit analysis based on the comparison of construction costs and losses of revenue due to head losses.
* River diversion system: as in all dam projects, the question of the river diversion needs a special attention because of its implication in terms of cost and time. This is particularly true for the projects in the Devil’s Gorge for which, given the high depth of water, the river diversion scheme can represent a significant portion of the project cost.
* Transmission infrastructure-the consultant shall propose the best options available to interconnect the power from DGHES to the two respective National grids. In this regard, preliminary layout and sizing of the transmission infrastructure shall be conducted.
* Access roads will be drafted with the objective to estimate their lengths.

It is estimated that the output of the preliminary design will be a set of 5 to 10 A3 drawings for each alternative.

The preliminary design will also cover the HV lines for the connection of the power plants to the High Voltage Transmission infrastructure in both countries. This will be done in consultation with ZESA and ZESCO Limited.

1. **Phase 5 – Costs and Economics**

**Cost estimate of the projects**

The cost estimate will be performed by taking into account the following items:

* Civil works,
* Electro - Mechanical equipment
* Contingencies,
* Cost of project procurement and implementation (Social and Environmental plan, engineering, works supervision, technical assistance, project management,)

**Schedule**

The Schedule for the construction and impounding of the project will be presented, for each alternative under evaluation. Only the main tasks will be highlighted (dams’ construction, reservoir filling, tunnels excavation and lining, powerhouse excavation, units erection and commissioning), with the objective to identify the critical path of the project implementation.

**Economics**

On the basis of the results of the cost estimate and of the reservoir operation studies, an economic evaluation will be performed for each considered alternative. Costs and benefits along the project life span will be estimated and the corresponding discounted cash flow will allow the calculation of the Internal Rate of Return of the projects.

A sensitivity analysis will allow to check the robustness of the conclusions.

1. **Phase 6 – Multi-Criteria Analysis**

Based on the topographical data, hydrological data, Bathymetric survey and geological conditions, environmental and social screening, the Consultant shall review the previously proposed dam sites for the Devils Gorge HES. Emphasis shall be given to confirm the optimal location of the Devils Gorge Scheme along the Zambezi River balancing Performance criteria (annual generation, firm energy, unit cost of generation, etc.), environmental and social impacts, risks and least costs.

Comparison should be made with other generation alternatives in Zambia and Zimbabwe as well as possibility of importation of electricity. The Consultant shall conduct a multi-criteria analysis based on the above. The weight to each criteria will be discussed and agreed with the Client and the consultant shall present the results in a transparent way.

Based on the review and the multi-criteria analysis the Consultant shall recommend the proposed optimal project site location for Devils Gorge HES

1. **Phase 7 - Workshop**

The options assessment report will be presented to the Client and stakeholders for discussion in a workshop chaired by the client . The purpose of this workshop is for the client ZRA to provide its comment on the study and to appropriate its conclusion in order to be able to make an informed decision regarding the selection of the alternative to be developed. Based on the feedback from the workshop the Consultant shall finalize the Pre-Feasibility Reports which will be used as input for the subsequent processes and Feasibility Studies. The costs of the workshop venue and other logistics will be borne by the client and must therefore not be presented as part of the proposal

**6.0 Reporting and Communication Requirements**

All correspondences shall be addressed to the Chief Executive. However, for day-to-day engagements, the contact person shall be the Senior Manager-Projects.

Reports will be written in concise, clear and well-edited Standard English. Where need arises, the client may require the consultant to engage the services of an editor of which the costs shall be borne by the consultant. The expected deliverables are as detailed below:

|  |  |  |
| --- | --- | --- |
| Report | Summary | Draft Submission |
| Inception Report | At the end of the data collection mission, the Consultant shall submit an Inception Report. The Report shall detail the preliminary views, approach, and work plan to be taken by the study team. It shall summarize the methodology to be used, availability of data, necessary field investigations the organization (logic diagram) and schedule of the study. | The Initial Report shall be submitted to the Client 2 weeks from commencement |
| Monthly Progress Reports | The Consultant shall prepare Monthly progress reports, which shall discuss activities undertaken during the period and progress against the program, issues and constraints that could affect the delivery of services and outputs and a program of work to be undertaken during the next period. The monthly progress reports shall be kept as brief as possible and shall be limited to highlighting progress, key issues and constraints encountered during the reporting period. | Monthly |
| Options Assessment Report | The report shall indicate all the site options considered, using the pre-agreed criteria and highlight the two recommended options for consideration by the Authority. | To be prepared and submitted 16 weeks from the date of written approval of the Inception report |
| Draft Engineering feasibility report | The draft Engineering Feasibility report shall outline the results of the field surveys. It shall report on the findings and clearly justify the recommended optimal project site and scheme to be further studied in the Feasibility study. The Draft Engineering Feasibility Report shall include a main report summarizing the results and annexes with detailed technical reports.  After feedback from the Client and other stakeholders a final report will be prepared. | Shall be delivered within eight (8) weeks after a written approval of the Options report |
| Draft ESIA screening report | The draft ESIA screening report shall summarize the results of the screening of environmental and social impacts for the proposed (alternatives) power generation sites. The ESIA report may not require approval by Environmental Regulators ZEMA/EMA but simply to aide decision making implying the reports must be acceptable to the client.  After feedback from the Client and other stakeholders a final report will be prepared. | Shall be delivered within eight (8) weeks after a written approval of the Options report |
| Final Reports | After feedback on the Draft from the Client and other stakeholders a Final Engineering Pre-Feasibility and ESIA Screening report | Will be prepared and submitted within 4 weeks from the issue of the written notice of acceptance of the Draft Pre-Feasibility Report. |

**7.0 Duration of the assignment**

The consultant shall perform the tasks above within a period thirty weeks, net of the review period which will range from 2 weeks to one month.

**8.0 Obligations of the Authority**

The Client will provide the following inputs and facilities:

**8.1 Documents**

Where available, such as:

1. 1972 Gibb, Merz and McLellan Report
2. 1993 documentation following the Batoka Gorge Hydro Electric Scheme, Feasibility Study
3. 2007 SAPP Regional Generation and Transmission Expansion Plan Study
4. 2007 IWRM Strategy for Zambezi River Basin
5. 2010 Multi-Sectoral Investment Opportunity Analysis
6. Power Master Plans in Zimbabwe and Zambia
7. Tractebel Engineering Analysis of the Devils Gorge Project 2016 Report

**8.2 Administrative Assistance**

Render all possible assistance to the Consultant in the timely acquisition and securing of such office space required for the execution of the Services. The Authority will help in obtaining the following for the Consultant's staff:

* + working permits,
  + residence visas,
  + exit, re-entry and exit visas,
  + other licensing documents, etc.

Provide assistance in facilitating and expediting customs procedures in connection with importation of equipment and materials necessary for the consultant's services and for the personal use of the consultant's staff

**9.0 Obligations of the Consultant**

1. The Consultant will mobilize a coherent, dynamic and organized professional team of experts with experience in similar assignments to undertake this assignment. The Consultant shall provide experts with the required qualifications and experience for the activities in the scope of services.
2. 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.
3. The Consultant shall co-operate and liaise with the Client, stakeholders and with the affected local Authorities.
4. The Consultant shall exercise all due skills, care and diligence in the performance of the services and will carry out all responsibilities in accordance with internationally recognised professional standards.
5. The Consultant will take into account relevant comments from the Client, all relevant Government Authorities and other agencies and shall be responsible for the accuracy of all data collected, analysis, conclusions and recommendations.
6. Adequate staff shall be provided to complete the assignment within the agreed time frame.
7. The copyright of all documents prepared by the Consultant in connection with the agreement will automatically be transferred to the Client. The Consultant may make copies of such documents but shall not use the contents thereof for any purpose unrelated to the services without prior written approval of the Client;
8. Equipment and material furnished to the Consultant by the Client or purchased by the Consultant with funds wholly supplied or reimbursed by the Client shall be the property of the Client and shall be so marked. Upon completion or termination of the services, the Consultant shall furnish to the Client inventories of the equipment and materials referred to above;

**9.1 Consultants, Experience, Qualifications and Required Expertise of Consultant's Key Personnel**

The firm and team selected to carry out this assignment should have the following minimum qualifications:

**9.1.1 Firm Experience**

* At least 10 years’ experience with internationally financed projects. Solid (more than 5 years) experience with administrative, procurement, and financial procedures of the of international financing institutions and the Government of Zambia and Zimbabwe.
* Proven track record of delivery of implementation manuals for comparative projects. The consultant should have carried out at least 3 related assignments in the last 15 years.
* Ability to form and effectively manage multi-disciplinary teams in order to draw upon the experience of specialists as needed,

**9.1.2 Key Experts**

The approximate time effort for each Key staff will be proposed by the consultant. The consultant shall prepare the proposal based on a detailed work plan, staffing, and time inputs necessary to accomplish the scope of the Terms of reference.

The consultant shall provide an appropriate mix of experts and specialists as required by the tasks in the Terms of reference. The consultant is responsible for optimization of his staff requirements after assessing the scope of work. Each of the Key Professional Personnel shall be a senior level professional with at least 10 years of experience in appropriate area of expertise and specific experience performing tasks similar to the task as assigned in the consultant’s proposed staffing plan and similar to this project. The following table shows the required Key Professional Personnel for the project.

|  |  |
| --- | --- |
| **NO.** | **Position** |
| 1 | **Team leader:** *The Team leader must possess at least a Master’s degree in Civil Engineering/Hydropower Engineering or equivalent with at least 15 years of relevant experience in undertaking Engineering feasibility studies for hydropower projects. He/She must be registered with a recognized Engineering Institution and be eligible for registration with the Engineering Institution of Zambia. He/She must have experience of working in Sub Saharan Africa or similar conditions.* |
| 2 | **Power Economist:** *The Power Economist must possess at least a Master’s Degree in Economics or related field with at least 10 years of experience in Hydro Power Generation Costs Estimation, Power Sector Economic Analysis. The Specialist should have experience in Sub Saharan Africa Region* |
| 3 | **Dam design specialist:** *The Engineer must possess at least a Master’s degree in Civil Engineering or equivalent with at least 10 years of relevant experience in preparing detailed dam designs. He/She must be registered with a recognized Engineering. Institution. . He/she is expected to prove to have been involved in at least three (3) projects of a similar nature. He/She must have experience of working in Sub Saharan Africa or similar conditions.* |
| 4 | **Hydropower plant designer -** *The Engineer must possess at least a Master’s degree in Hydropower Engineering or equivalent with at least 15 years of relevant experience in preparing detailed Hydro Power plants designs. He/She must be registered with a recognized Engineering Institution. He/she is expected to prove to have been involved in at least three (3) projects of a similar nature. He/She must have experience of working in Sub Saharan Africa or similar conditions.* |
| 5 | **Electro-Mechanical Engineer:** *The Engineer must possess at least a Master’s degree in Mechanical/Electrical Engineering or equivalent with at least 15 years of relevant experience in preparing detailed hydropower designs and installation of electro-mechanical equipment. He/She must be registered with a recognized Engineering Institution. He/she is expected to prove to have been involved in at least three (3) projects of a similar nature. He/She must have experience of working in Sub Saharan Africa or similar conditions.* |
| 6 | **Geologist/Hydrogeologist:** *The Geologist / Hydrogeologist will undertake the geological and hydro-geological assessment of the dam site, reservoir area, power station sites as well as water/power tunnels as required. He/She must have a degree in geology and shall be a Registered or Chartered Geologist with at least Fifteen (15) years of cumulative geological experience with specific experience in two (2) hydropower projects. He/She shall be fluent in English.* |
| 7 | **Transmission and Substation Engineer:** *Shall be responsible for review of all transmission and substation works. He/She shall be a Registered or Chartered Engineer with a master’s degree in electrical engineering and at least fifteen (15) years of relevant experience. As such, he/she is expected to prove to have been involved in at least three (3) projects of a similar nature (in terms of the transmission length, size (Kv) etc).* |
| 8 | **Environmental Specialist:** *The Environmental specialist must possess at least a master’s degree in Environmental Management or related field with at least 10 years of experience in environmental impact assessments of similar projects. The Specialist should have experience in Sub Saharan Africa Region* |
| 9 | **Social Specialist:** *The Social Specialist shall be responsible for Social Impact Assessment and ESMPs. He/she shall hold a relevant Masters Degree with 15 years' relevant experience in community development addressing social impact assessment, 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 is required. As such, he/she is expected to prove to have been involved in at least three (3) projects of a similar nature (The experience should be in Dams or hydropower projects. The expert should have experience in other projects too). He/she must be fluent English, and any local Languages in Zambia/Zimbabwe.* |

The consultant can propose additional non key experts to enable him carry out the scope as per the Terms of reference.