NEPAL ELECTRICITY AUTHORITY

Expression of Interest (EOI)

For

Procurement of Consulting Services

For

Detailed Engineering Design and Preparation of Tender Documents

(International Consulting Services)

Issued By:
Nepal Electricity Authority
Durbar Marg, Kathmandu

January 2024

Expression of Interest
(EOI)

Consulting Services

For

Detailed Engineering Design and Preparation of Tender Documents

International Competitive Bidding
[ICB]

Project Name : Karnali (Chisapani) Multipurpose Project
EOI : NEA/ESD/PDD/KCMP/80/81/EOI-2
Office Name : Nepal Electricity Authority
Office Address : Durbarmarg, Kathmandu
Issued on : 26 th January, 2024

Financing Agency: GoN/NEA Budget

Abbreviations

BOQ	-	Bill of Quantity
CV	-	Curriculum Vitae
DBA	-	Dam Break Analysis
DP	-	Development Partner
EA	-	Executive Agency
EOI	-	Expression of Interest
ERT	-	Electrical Resistivity Tomography
FS	-	Feasibility Study
GBR	-	Geotechnical Baseline Report
GLOF	-	Glacial Lake Outburst Flood
GoN	-	Government of Nepal
HPC	-	Himalayan Power Consultants
IDA	-	International Development Association
INPS	-	INPS Integrated Nepal Power Syste
JV	-	Joint Venture
KCC	-	Karnali Coordinating Committee
KCMP	-	Karnali (Chisapani) Multipurpose project.
LiDAR	-	Light Detection and Ranging
MAM	-	Micro Tremor Array Measurement
MASW	-	Multichannel Analysis of Surface Waves
MCDM	-	Multi-Criteria Decision Making
NEA	-	Nepal Electricity Authority
PAN	-	Permanent Account Number
PPA	-	Public Procurement Act
PPR	-	Public Procurement Regulation
SRT	-	Seismic Refraction Tomography
TOR	-	Terms of Reference
VAT	-	Value Added Tax

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A. Request for Expression of Interest

Government of Nepal
Nepal Electricity Authority

Date: 26th January, 2024

Name of Project: Karnali (Chisapani) Multipurpose Project

1. Government of Nepal (GON) and Nepal Electricity Authority (NEA) have allocated fund **toward the cost of Karnali (Chisapani) Multipurpose Project** and intends to apply a portion of this **fund** to eligible payments under the Contract for which this Expression of Interest is invited for **International Consulting Service**.
2. **Nepal Electricity Authority** now invites Expression of Interest (EOI) from eligible Consulting Firms ("Consultant") to provide the following consulting services:
   - **Detailed Engineering Design and Preparation of Tender Documents of Karnali (Chisapani) Multipurpose Project**
3. Interested eligible consultants may obtain further information and EOI document free of cost at the address **Nepal Electricity Authority, Durbarmarg, Kathmandu, Nepal** during office hours or visit e-GP system www.bolpatra.gov.np/egp or visit the website ***www.nea.org.np*** .
4. Consultants may associate with other Consultants to enhance their qualifications.
5. All the submittals from the Consultants shall be in **English language**.
6. Expressions of interest shall be delivered online through e-GP system www.bolpatra.gov.np/egp on or before 12.00 hour local time on 1st March, 2024**.** In addition to online submission, soft copy (in pendrive) and hard copy one (1) original and one (1) copies must be submitted to the address below (In person or by courier) within 15 days from the deadline of proposal submission.

   Project Development Department,
   Engineering Service Directorate,
   Nepal Electricity Authority,
   Durbarmarg, Kathmandu, Nepal.
   Email: info@nea.org.np
7. In case of any discrepancies, the online submission shall be evaluated. Submissions of hard copy shall be made in closed/sealed envelope. The envelop should be clearly marked with the title **"Expression of Interest for Procurement of Consulting Services for Detailed Engineering Design and Preparation of Tender Documents for Karnali (Chisapani) Multipurpose Project".**
8. In case the last date of obtaining and submission of the EOI documents happens to be a holiday, the next working day will be deemed as the due date but the time will be the same as stipulated. The EOI documents submitted after due date will not be considered for evaluation.
9. Only those hydropower projects which have been successfully completed (Constructed and Commissioned) within last seven years (7) years prior to the last date of submission of EOI will be considered for the evaluation. The cumulative experience of JV partners will be evaluated.
10. EOI will be assessed based on ***Qualification 30%, Experience 60%, and Capacity 10%*** of Consultant and Key Personnel. Based on evaluation of EOI, only the top 6 shortlisted firms will be invited to submit technical and financial proposal through a

Request for Proposal (RFP).

11. A consultant will be selected under **Quality and Cost-Based Selection (QCBS)** method.
12. The Client reserves the right to reject any or all of the EOIs at any stage without assigning any reason whatsoever and without incurring any liabilities to the affected applicant(s). The Client will not be responsible for any cost of expenses incurred by the firms in connection with the preparation or delivery of the EOI.

B. Instructions for submission of Expression of Interest

1. Expression of Interest may be submitted by a sole firm or a joint venture of Consultants and the maximum number of partners in JV shall be limited to three.
2. Interested Consultants must provide information indicating that they are qualified to perform the services (descriptions, organization and employee and of the firm or company, description of assignments of similar nature completed in the last 7 years and their location, experience in similar conditions, general qualifications and the key personnel to be involved in the proposed assignment).
3. This expression of interest is open to all eligible **Consulting Firm/ Company/ Organization**.
4. The assignment has been scheduled for a period of **30 months.** Expected date of commencement of the assignment is **2025/02/02**
5. A Consultant will be selected in accordance with the **ICB** method.
6. Expression of Interest should contain following information:
   (i) A covering letter addressed to the representative of the client on the official letter head of company duly signed by authorized signatory.
   (ii) Applicants shall provide the following information in the respective formats given in the EOI document:
      - EOI Form: Letter of Application (Form 1)
      - EOI Form: Applicant's Information (Form 2)
      - EOI Form: Work Experience Details (Form 3(A), 3(B) & 3(C))
      - EOI Form: Capacity Details (Form 4)
      - EOI Form: Key Experts List (form 5).
7. Applicants may submit additional information with their application but shortlisting will be based on the evaluation of information requested and included in the formats provided in the EOI document.
8. The Firms submitting EOI as JV partners, if short-listed, must submit their proposals in the same JV name while submitting Technical and Financial proposal based on RFP. The references and qualification documents submitted from their parent or subsidiary companies shall not be considered for their evaluation.
9. Consultants' work experiences shall be evidenced by duly certified (by Authorized Agency) and notarized copies of client's references with contact name, number and email addresses on the letterhead of the client's organization and shall be written in English. If the references are in other languages then English, it shall be accompanied by an accurate translation into the English language duly authenticated by notary agencies or the nationally /internationally recognized translating body / agency. Any experiences without client's/employer's reference shall not be considered for evaluation.
10. The Expression of Interest (EOI) document must be duly completed and submitted "by electronically only using the forms and instructions provided by the system" / by hand / by courier in sealed envelope". The sealed envelope shall be clearly marked as **"EOI Application for Short-listing for Consulting Services for Detailed Engineering Design and Preparation of Tender Documents of Karnali (Chisapani) Multipurpose Project**". The Envelope shall also clearly indicate the name and address of the Applicant.
11. The completed EOI document must be submitted on or before the date and address mentioned in the **"Request for Expression of Interest."** In case the submission falls on public holiday the submission can be made on the next working day. Any EOI Document received after the closing time for submission of proposals shall not be considered for evaluation.

C. Objective of Consultancy Services or Brief TOR

NEPAL ELECTRICITY AUTHORITY

Engineering Service Directorate

Project Development Department

TERMS OF REFERENCE (TOR)
For
Procurement of Consulting Services
For

Detailed Engineering Design and Preparation of Tender Document

Of

Karnali (Chisapani) Multipurpose Project

January, 2024

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Background

The Karnali (Chisapani) Multipurpose Project (KCMP) is the proposed 10,800 MW multipurpose project to be developed in the Karnali River, in the boundary among Sudurpachim Province (Kailai, Doti, Achham district), Karnali Province (Surkhet district) and Lumbini Province (Bardia district). The project includes major hydropower production and flow regulation for increased agriculture in India and Nepal with other benefits of flood control, water supply, fishery, navigation and recreational activities etc.

Feasibility Studies (FS) carried out in the past by Nippon Koei in 1966 (1800 MW was identified), Snowy Mountains Hydroelectric Authority in 1968 (3600 MW was identified), Norconsult and Electrowatt in 1976 (3600 MW was identified), Himalayan Power Consultants (HPC) consortium comprising Acres, Canada; Ebasco USA; Shawinigan, Canada; and SNC, Canada in 1989 (10,800 MW was identified).

In this background, Nepal Electricity Authority (NEA) desires to procure the services of internationally recognized Consulting Firm ("Consultant") having competent team of specialists to review and update the Feasibility Study, perform Detail Engineering Design and prepare Tender Documents of KCMP.

The Terms of Reference (TOR) attempts to outline the Consultant's tasks as detailed as possible. However, the Consultant shall note that the list of tasks and activities can by no means be considered as the complete and comprehensive description of the Consultant's duties. It is rather the Consultant's responsibility to critically verify the scope of services indicated and to include additional activities wherever deemed necessary, according to professional judgment and the knowledge of the Consultant. Accordingly, Consultant shall perform all works as necessary to fulfill the objectives of the Project. All services of the Consultant described in the following section shall be performed in close co-operation with NEA the Project Executing Agency.

Project Information

By any international comparison, KCMP is a large scale development. A detailed feasibility study conducted in 1986-89 under the loan assistance from IDA has revealed:

- 270 m high gravel fill embankment with central core dam (main dam with reservoir storage capacity of 28.2 x 10^9 m^3) with an underground powerhouse of 10,800 MW capacity (18 units of 600 MW each) will produce average energy of 20,842 GWh/yr; and
- 24 m high reregulating dam (8 km downstream of the main dam with reservoir live storage capacity of 100x 10^6 m^3) with an powerhouse of 84 MW capacity (6 units of 14 MW each) will produce energy of 621 GWh/yr from 84 MW capacity). Because of the highly variable plant output over a daily cycle, a reregulating facility is provided immediately downstream to ensure near-uniform downstream flows.

The dam is located in the Karnali river gorge, immediately upstream of the point where the river enters the Terai, The reservoir will extend up to 100 km upstream along Karnali River, and provide sufficient live storage to substantially regulate the river flow.

According to the FS, the dominant purpose is hydroelectric generation for export to Northern India. Power will be delivered into the Northern India grid by 5 x 765-kV transmission lines

and the power plant has been planned as a peaking facility for the Northern India system, capable of operating at about 20% plant factor for firm energy production and at about 25% for average energy production. In the present context, the project will be developed as a regional project. South Asian countries will be the major market for the generated electricity.

The project will also provide considerable flow regulation, allowing increased irrigated agriculture production in both Nepal and India. Other minor benefits of the project include flood control, water supply, fishery, navigation and recreational activities.

The salient features of the project according to FS 1989 are as follow:

Table 1: Salient Features of the Project (FS 1989)

Hydrologic Characteristics	
Drainage area of basin	43,679 km^2
Long-term average flow	1389 m^3/s
Average dry season flow (November-May)	451 m^2/s
Average wet season flow (June-October)	2690 m^3/s
Average annual basin precipitation	1247 mm
Highest recorded flood	21,700 m^3/s (September 11, 1983)
Design Floods	
Probable maximum flood (PMF)	63,000 m^3/s
1 – in – 10,000 yr	32,900 m^3/s
1 – in – 1,000 yr.	26,600 m^3/s
1 – in – 100 yr.	20, 600 m^3/s
Sediment average load	260 x 10^6 t/yr
Equivalent specific yield	6000 t/km^2
Reservoir Characteristics	
Full supply level (FSL)	415 m
Minimum operating level (MOL)	355 m
Drawdown	60 m
Surface area at FSL	339 km^2
Length of main arm	100 km
Reservoir volume at FSL	28.2 x 10^9 m^3
Reservoir volume at MOL	12.0 x 10^9 m^3
Live storage	16.2 x 10^9 m^3
Equivalent to	37% of average annual runoff

Loss of live storage due to sedimentation, after 75 years	30%
Dam Characteristics	
Type	Gravel-fill embankment with central core
Crest elevation	445 m
Crest width	15 m
Dam width at FSL	140 m
Crest length	745 m
Lowest foundation elevation	175 m
Maximum height of dam	270 m
Embankment slopes	2.25:1 (upstream), 1.9:1 (downstream)
Volume of dam	45 x 10^6 m^3
Spillway	
Type	Ungated chute with flip bucket and plunge Pool
Crest width	60 m
Chute length	860 m
Width of flip bucket	100 m
Invert elevation of flip bucket	220 m
Bottom elevation of plunge pool	140 m
PMF design discharge	19,218 m^3/s
Maximum velocity at flip bucket	57.0 m/s
River Diversion Facilities	
Location	Right bank
Upstream cofferdam crest elevation	205 m
Dam crest elevation (Stage 2)	287 m
Number of tunnels	2
Diameter of tunnels	15 m
Length of tunnels	2,400 m each
Maximum design discharge	9,270 m^3s
Equivalent flood (Stage 2)	1:1,000 yrs
Upstream water elevation	286 m
Maximum flow velocity	27 m/s

Diversion tunnels also provided for Bangar	
Outlet Facilities	
Low level for riparian release during reservoir filling	In one diversion tunnel, up to 1,000 m^3/s at 160 m head
Emergency irrigation	Left bank tunnel, 1,000 m^3/s
Sediment flushing (initial provision only)	Into diversion tunnels, 5,000 m^3/s total
Intake Structure	
Location	South wall of Bangar Khola valley
Type	Bell mouthed intake with gate shaft
Number of intakes	6
Invert level	322 m
Power Tunnels	
Type	Circular Concrete-line tunnel
Number of tunnels	6
Diameter	15 m
Length	390 – 880 m (4,100 m total)
Vertical drop shafts	
Number of shafts	6
Diameter	14 m
Length	140 m each
Penstocks	
Type	Steel-lined
Number of penstocks	18
Diameter	7.2 m
Length	16 – 230 m (3,300 m total)
Valve type	Butterfly valve, 7.2 m diameter
Powerhouse and Equipment	
Type	Underground cavern
Dimensions	Length 705 m, width 27.7 m, height 50 m (height from drainage gallery to crown)
Number of units	18
Turbine type	Vertical shaft, Francis turbine (620 MW)

Generator type	Totally enclosed vertical shaft, synchronous
Transformers	54 x 214 MVA 18/400 kV, single phase 27 x 428 MVA 400/765 kV, single phase (autotransformers)
Powerhouse cranes	Two 720-t heavy duty cranes
Power Plant Head and Flow	
Minimum net head at MOL	145 m
Maximum net head FSL	208 m
Rated net head	165 m
Maximum power discharge at MOL	7,110 m^3/s, 18 units running
Maximum power discharge at FSL	4,900 m^3/s, 15 units running
Normal tail-water level	203 m
Tailrace Tunnels	
Type	Horseshoe-shaped tunnel with gates
Number of tunnels	6
Dimensions	15 m wide, 18 m high
Length	165 -270 m (1,215 m total)
Reregulating Facilities	
Type	Low embankment dam and reservoir
Location	8 km downstream from main dam
Length	6 km
Maximum dam height	24 m
Dam volume	6 x 10^6 m^3 + 3 x 10^6 m^3 for blanket
Reservoir level	200 m FSL
Drawdown	7 m
Live storage	100 x 10^6 m^3
Spillway	Gated 21 bays x 15 m wide with stilling basin, 19,218 m^3/s design discharge
Power Plant	6 x 14 MW bulb turbines at 13.5 m head
Transmission Line	
Type	5 circuits of 765 kV
	1 Circuit of 220 kV
Main Power Plant Capacity	
Target firm capacity factor	20%

Firm capacity	9,000 MW (18 x 500 MW at MOL)
Installed capacity	10,800 MW (18 x 600 MW)
Firm Energy	15,007 GWh/yr
Average energy	20,842 GWh/yr
Reregulating Power Plant	
Average energy (typical)	621 GWh/yr
Irrigation in Nepal (Gross command area)	238,700 ha
Irrigation in India (Gross command area)	3, 200, 000 ha
Socio-environmental Impact	
Total submerged land	339 km^2 at FSL (+15 km^2 for reregulating)
Implementation Schedule	
Construction	9 years
Installation and commissioning	4 years
Capital Cost, Excluding Financing Cost	Million USD 4,890 (1988 dollars)
Capital Cost/KW, Excluding Financing Cost	USD 453 USD (1988 dollars)

Location & Access

The project is located is located in the junction among Sudurpachim Province (Kailai, Doti and Achham district), Karnali Province (Surkhet district) and Lumbini Province (Bardia district). about 600 km west of Kathmandu. The Royal Bardia Wild life Reserve adjoins the project area on the left bank of the river. The site is accessible through East-West highway running across the length of the country in southern plains. Nepalganj is the nearest urban center and has an airport with daily flights from Kathmandu.

Previous Studies

The project was initially conceptualized in 1960. Nippon Koei Co Ltd (NK) of Japan had conducted Feasibility Study between December 1962 and February 1966. According to the study, the project could be developed as run-of-the-river with installed capacity of 1,800 MW with a concrete gravity – arch dam of 200 m height at the Chisapani Gorge and surface powerhouse at the base of the dam, and provision for future underground power plants on both banks of the river. Its installed capacity was optimized according to the limited projected power market in Northern India only.

The studies and recommendations of NK were reviewed by the Snowy Mountains Hydroelectric Authority (SMHA) of Australia in 1968 and was recommended peaking project with capacity 3,600 MW with embankment dam of similar height of 200 m at downstream of the proposed site by NK.

In 1976, the Nepal government hired JV of two firms, Norconsult from Norway and Electrowatt from Switzerland, to review both the recommendations from NK and SMHA and resolve the differences. The recommendation by the JV of two firms concurred with the recommendations by SMHA and suggested the installed capacity of 3600 MW with embankment dam of same height 200 m.

Even though the project was conceptualized long ago, there has been little progress towards its execution as a lot of money and expertise will be required.

The last detailed feasibility study of the project was initiated in 1986 and completed in 1989, under the loan assistance from IDA and the local costs provided by GON with the consulting services of Himalayan Power Consultants (HPC), a joint venture of three Canadian consulting companies (Acres. SNC and Shawinigan/Lavalin) and Ebasco of the United States. The study has determined the capacity at 10,800 MW. Karnali Coordinating Committee (KCC) established in 1983, has representation from both countries and is generally responsible for review and coordination of technical activities associated with execution of the study.

The salient feature of the project recommended by the study is presented in table 1.

Objectives

The objective of the consulting service is to review the previous FS conducted by Himalayan Power Consultants, identify the gaps in the study, conduct additional/required filed investigation and engineering studies, update FS, prepare the Detail Engineering Design and Drawings, and prepare complete Tender Documents to meet NEA, GON and leading multilateral financing agencies requirements for construction for KCMP.

Scope of Services

The scope of consulting services shall be but not limited to:

Task 1 Inception report on the assignment
Task 2 Field investigation and data collection for Engineering Studies
Task 3 Hydrological, meteorological and sedimentological studies, etc.
Task 4 Project benefits /impacts
Task 5 Reservoir simulation
Task 6 Power evacuation study
Task 7 Finalization of design concept and engineering studies
Task 8 Regional power market studies
Task 9 Economic and financial analysis
Task 10 Project risk assessment
Task 11 Updated Feasibility Study and Detailed Engineering Design and Drawing
Task 12 Quantity estimation and cost estimation
Task 13 Construction planning and scheduling
Task 14 Preparation of Complete Tender Documents, Specification and Tender Drawings
Task 15 Analysis of institutional arrangement for project implementation

All the interactive data shall be the Client Property and the Consultant shall provide all the data, working file along with the reports to the Client.
The Consultant shall review the feasibility study report conducted by HPC consortium in 1989 and update the data/information provided in Feasibility study 1989. The Consultant shall

incorporate all the recommendation suggested from the Feasibility Study of 1989 and other studies.

The detailed scope of services is as follows:

Task 1: Inception Report

The Consultant shall, immediately upon initiation of the inception assignment, begin collection of all relevant reports, data and maps and conduct field visit. NEA will provide available studies/reports (other data collection) and in particular FS and other available information/data. However Consultant will be responsible to collect relevant data required for the study.

The Consultant shall review the available report and present scenarios of the project area. In the project review, all information/data of the project/project area should be subjected to critical analysis and scrutiny in order to establish a realistic understanding of the type and scope of additional information/data required for subsequent analysis/design. The Consultant shall:

- Identify key areas, which will require additional field work or demand major efforts in data collection/ investigation;
- Review relevant documents, considering possible influence of currently planned and existing projects at the upstream and downstream of the KCMP; and
- Establish methods and procedures for further studies.

The Consultant shall undertake the field reconnaissance covering all project components in order to familiarize them with project area according to the schedule already submitted by the Consultant as part of the proposal

The Inception Report shall summarize the results of the review of existing data/ reports, summarize the results of the field reconnaissance, discuss the key data/information gaps requiring additional field work/investigation, data collection, data verification, and describe the approaches and methodology that the Consultant intends to follow in carrying out various activities to complete the assignment. The Inception Report shall also include the updated methodology and work plan for the studies, detailed schedule for each task, detailed field investigation plan, manning schedule of each personnel for effective mobilization.

The Consultant shall make a presentation of the Inception Report to the Client.

Task 2: Field Investigation and Data Collection for Engineering Studies

The Consultant shall review the complete site investigation data (topographic mapping, geological and geotechnical investigations, hydrology and sedimentation, irrigation survey and flooding survey) from FS, identify gaps and update the data with the following filed investigations to update the FS as well as for Detailed Engineering Study, but not limited:

a) Topographical Survey

The Consultant shall review the topographic maps of previous studies.

Airborne Light Detection and Ranging (LiDAR) Survey shall be conducted for topographical study. LiDAR Survey includes the LiDAR data acquisition with establishment of ground control point, aerial photography and primary data processing to create orthophoto map production and topographical features digitization from 1:5000 orthophoto map (@5 sq.km/sheet). It includes the Intermediate processing data (control points, DEM, point cloud with classification, DSM etc), production of ortho photographs and mapping of project components (not limited to headworks, powerhouse, reregulating dam and powerhouse, reservoir area, route survey along the transmission line including ROW.

The output of Lidar survey shall be delivered in local coordinate system adopted by Department of Survey, Nepal. The accuracy LiDAR survey shall be in accordance with the requirement of the concerned departments of Nepal.

Succeeding the LiDAR, The Consultant shall perform, among others, the following activities:

- Update/Prepare Detailed mapping of the project sites including area of reservoir, dam site, foundation area, powerhouse area, surge tank area, and diversion tunnel areas in scale of 1:500 and 1m contour interval;
- Detail mapping of the tunnel alignment strip in scale of 1:5,000 and 5m contour interval;
- Additional topographic ground survey of project area, if is not covered by LiDAR, following the establishment of datum points for survey control network within the project area;
- Cross section survey (Bathymetric) at an interval not more than 200m of the entire stretch of reservoir and its upstream covering 5 km from the upper point of the reservoir and downstream covering about 10 km from the powerhouse; and
- Detail mapping of project road alignment, camp facilities, spoil disposal area, quarry site, transmission line route alignment etc. in 1:5000 scale with 5m contour.

The Consultant shall prepare/update a Topographic Survey and Mapping Report analyzing and synthesis LiDAR survey. The report shall describe the activities undertaken including all necessary basic data and records relating to the topographic surveys to allow the reference points and mapping to be used with confidence during the future stages of the project.

b) Hydrological, meteorological and sedimentological investigation

The Consultant shall perform, inter alia, the following activities, but not limited to:

- Acquire all the data related to stream flow and other hydro-meteorological data (river discharge, precipitation, temperature, relative humidity, evaporation, solar radiation, wind speed etc.) from the gauging and climatic stations in the catchment area of KCMP
- Assess the adequacy of available data, identify gaps, if any
- Conduct supplementary hydro-meteorological and sedimentological monitoring (e.g., precipitation, river flow, sediment concentration and loads, humidity, evaporation etc.), hydrology and sedimentation during the study period to refine them;
- Establish the gauging station and automatic water level recorder and carry out continuous measurement throughout the study period;

- As a part of sediment investigation, study and monitoring, the consultant shall:
  - Acquire the available suspended and bed load sediment data/information on Karnali river ;
  - Study catchment characteristics;
  - Establish and conduct sediment sampling and analysis program of suspended and bed load sediments. At least 2 sets of samples per day shall be collected at dam site for rainy seasons (4 months) and one set of samples per week shall be collected for the remaining period in a year for, but limited to, concentration analysis, particle size distribution and mineralogical (petrography) analysis. For the purpose of this clause, a “set of samples” shall be defined as a number of individual samples collected by depth-integrating sample or better, or not less than three verticals (mid channel and at two quarter points) across the river so as to have a good representation of the mean sediment concentration of the river at the time of sampling;
  - Develop a rating curve of suspended sediment load of the river;
  - Estimate the bed load contribution to the total sediment load by means of site measurements or other means appropriate;
  - Carry out reservoir sedimentation studies in reservoir including propagation of delta formation and its consequences in storage and water quality followed by physical and 3D numerical modeling;
  - Estimate the possible ranges of sediment load to the power stations and recommend suitable value for design; and
  - Carryout the water quality analysis.
- Collect necessary data on climate change to examine its potential impact on the project; and
- Investigation on possibility of aggravated erosion in the catchment area of the proposed dam and reservoir due to change in land use pattern, road and other infrastructure construction in the catchment which may result in rapid sedimentation in the reservoir. The consultant shall make a comprehensive investigation of the problems with a view to propose measures to reduce the long term sedimentation.

c) Geological, Geotechnical, and Construction Material Investigation

The consultant shall review the geotechnical, geological and geophysical investigation carried out in the previous studies, identify data gaps (if any) and conduct necessary investigations to update the FS and relevant investigations required for Detailed Engineering Study. The Consultant shall perform, inter alia, the following activities, not limited to:

- Identify the active and non-active geological structures like thrust, fault at the project site to review and update the regional geological study and geological setup at the project area and its surrounding. The Consultant shall also review the seismic hazard and landslide hazard condition around the project area based on regional geological study;

- Prepare engineering geological mapping based on the topographic maps at 1:200 scale of the dam site, spillways, intake, power facilities including power tunnel, powerhouse, transformer yard, tailrace, etc;
- Prepare the engineering geological mapping based on topographic maps at 1: 5,000 scale of the reservoir for assessment of slope stability, and water leakage;
- Review the available geological and geotechnical report carried out in the previous study of the project area. Conduct core drilling at different structure of the project, as necessary;
- Conduct in-situ tests and other required tests at the locations deemed necessary by the Consultant, for the detailed engineering design;
- Review Electrical Resistivity Tomography (ERT) carried out in the previous study for assessment of depth of overburden and rock quality in the project area along with SRT (Seismic Refraction), MAM (Micro Tremor Array Measurement) and MASW and conduct additional study of ERT and SRT required for the Detailed Engineering Study;
- Prepare the geological model (plan and adequate sections) of dam and other structures, if necessary, showing soil cover, bedrock profile with foliation/bedding, dip angle, joints, pale channels, water table, faults/shear zones etc.;
- Review and check the test adits and its geological loggings and related investigations. The Consultant shall determine the required test adit for the study and propose the locations and lengths of the test adits at different site accordingly. All new adits should be carefully logged. It is the Consultant's responsibility to excavate the test adits after receiving the approval of the Client;
- Geological mapping, core drilling, and necessary testing including initial ground stress measurement including "hydro fracturing" for an investigation for underground power house, block shear, plate bearing and other required test shall be performed in the test adits;
- Review and conduct geological and geotechnical investigations performed at the borrow areas and quarry areas for construction materials such as sand, aggregates, filter materials, etc. The Consultant shall assess and make fair estimate of volume of each material from each of the borrow areas available for use during construction;
- Necessary in-situ and laboratory tests in the drill holes and core samples including but not limited to permeability test, lugeon test, UCS of core sample, point load test, Dynamic Cone Penetration Test (DCPT) and SPT in overburden and all other necessary test as deemed necessary;
- Investigation related to availability and suitability of construction materials including but not limited to confirmation of previously identified and identification of new borrow areas for construction materials for dam construction (e.g., clay for the core, material for filter and rock fill, etc.), concrete aggregates, and determination of their physical, chemical properties, physical strength, etc. The Consultant shall be responsible for sampling and conducting test on construction materials, assess and make fair estimate of quantity of each material from each of the borrow areas available; and

- Landslide and deep-seated gravitational slope deformation inventory maps shall be prepared by use of modern technique such as Remote Sensing & GIS technology, drone, LiDAR technology, etc.

d) Seismological Investigation

The reservoir created by the high dam of the KCMP, will be a major structure located in the region, with the potential for extreme event of earthquakes. The safety of all aspects of the design, under such conditions, is of paramount importance and must be fully investigated. The Consultant shall conduct the following studies, but not limited to

- Detailed Investigation of fault structures in the project area and its surrounding;
- Assessment of magnitudes and locations of past earthquake events. The program should include determination of fault plane and focal depth for some of the larger events near the dam site, headrace tunnel alignment, powerhouse site, within and in the vicinity of project area. Information available from Department of Mines, Government of Nepal and any other reliable sources may be used for this purpose. Information and the data of recent earthquakes need to be used for this purpose; and
- The Consultant shall recommend the requirement of the seismic network in the project area and provide the design and technical specification to integrate with the national seismic network to the Client.

e) Glacier Lake Outburst Flood (GLOF)

Detail investigation on existence and possibility on development of glacial lakes which may prove to be a considerable risk for the project. The activities to be carried out by the consultant shall include but not limited to the followings:

- Identify and locate the existing and lakes of potential Glacier Lake Outburst Flood (GLOF) in the Karnali Chisapani Basin; and
- Collect the historical GLOF data.

f) Irrigation Requirement

The Consultant shall perform and update, inter alia, the following activities, but not limited to:

- Irrigated areas planned and operated by Government of Nepal in possible command area;
- Irrigated areas planned and operated by Government of neighboring countries in possible command area;
- Crop types, crop intensities and yields; and
- Monetary value of crops.

g) Flooding survey

The Consultant shall perform and update, inter alia, the following activities, but not limited to:

- Identification of flood plain area;
- Records maintained by Government of Nepal and neighboring countries;
- Discussion with local inhabitants of the area affected by flood and establish maximum **water level; and**
- Assessment of loss (human, livestock, houses, buildings, crops etc.) on each flood event.

Task 3: Hydrological, Meteorological and Sedimentological studies

The Consultant shall perform and update, inter alia, the following activities, but not limited to:

a. Assess and estimation of long term flow of the Karnali River by using appropriate methods at the locations where appropriate;

b. Flow duration curves based on generated daily long term flow series;

c. Flood frequency analysis for determination of floods at different return periods and refinement of Probable Maximum Flood (PMF) in appropriate locations particularly at the dam and powerhouse sites in consideration of meteorological data and determination of the design flood for spillway and diversion during construction considering, among others, the economic aspects;

d. Assessment and estimation of sediment inflow into the planned Karnali Chisapani reservoir. The assessment shall estimate the sediment yield by using appropriate methods to determine the dead storage capacity and identify the needs of sediment management measures;

e. Perform a study of the hydraulic behavior on the Karnali River basin plain of incoming GLOFs by applying a hydraulic mathematical model;

f. Assessment and estimation of flood of different return periods including Glacier Lake Outburst Floods (GLOFs), Cloud Outburst Floods (CLOFs) and Landslide Dam Floods (LDFs) for design of dam and spillway;

g. Study of alternative sediment management options. The Consultant shall study the possibility of application of flushing, sluicing, density current venting, etc., through mathematical calculations or numerical modelling to determine the most appropriate method to be applied. Assessment of effect of dam construction on the river flow regime, particularly of downstream degradation and upstream aggradations, and recommendation for appropriate measures to minimize the adverse effects shall be presented;

h. Assessment of possible impact of climate change on hydrological characteristics by using different scenarios (without climate change, low climate change and high climate change) drawing from existing literature and data; and

i. Assessment of meteorological aspects relevant to construction phase, such as duration of the rainy season, rainfall characteristics, number and duration of rainfall events, dry interval between rainfall events, temperature etc.

Task 4: Project Benefits /Impacts Assessment

The Consultant shall review the project benefits and impacts identified in the FS and conduct all other necessary studies on additional project benefits and impacts as follows, but not limited to:

Project benefits:

a. Power Benefits: Calculate the possible electricity generation by the project.
b. Irrigation Benefits: Calculate the possible irrigable land and respective maximum water quantity withdrawn from the river, enhancement of yield from the irrigation in Nepal and neighboring countries.
c. Flood Control Benefits: Calculate the possible flood control benefits in the downstream in Nepal and neighboring countries.
d. Navigation: Analyze the possibility of navigability of river by regulating water level and possible boost of transportation and trade.
e. Recreational Benefits: Analyze the possible landscape development, infrastructure development and possible tourism development due to the project leading to job creation and simulating economic growth in the region.
f. Water Supply Benefits: Analyze the possible reliable source of freshwater for Nepal and neighboring countries, addressing existing water scarcity issues and improving living conditions.
g. Environmental Conservation: Analyze the reservoirs can become important habitats for wildlife and other possibilities of biodiversity preservation program.
h. Fishery and other Benefits: Analyze the possibility of fishery occupation both upstream and downstream.
i. Other benefits if any both upstream and downstream.

Project impact

a. Environmental Impacts: Coordinate with EIA studies team to analyze alteration of local ecosystem; disrupt fish migration, and inundation large areas of land, leading to habitat loss and biodiversity changes.
b. Socioeconomic Displacement: Coordinate with EIA studies team to analyze the result of resettlement of communities, psychological, socio-economic and cultural dislocation of people.
c. Downstream effects: Analyze the impact of altered river flow and sediment transport downstream of dams in agriculture, fisheries and ecosystem.
d. Water conflict: Analyze the possible conflicts over water allocation among Nepal and neighboring countries.
e. Water quality: Analyze the possible water pollution and health hazard downstream.
f. Other impacts if any both upstream and downstream.

Integrated planning approach shall be adopted for achieving the above mentioned sectoral project benefits and minimizing the project impact.

The Consultant shall calculate the benefits and impact in financial terms incurred by Nepal and neighboring countries which will be the basis of proposed percentage of the cost sharing by Nepal and neighboring countries.

The consultant shall also review the principle of equitable sharing of the benefits and losses in the use of international water courses among the riparian countries and propose the Mechanism in which Nepal and neighboring countries can cooperate in matters of the optimum use of water from KCMP.

The consultant shall also illustrate how Nepal and neighboring country can jointly finance the major infrastructures for the development of the project in Transboundary River.

Task-5: Reservoir Simulation

The consultant shall carry/update reservoir operation simulation studies using appropriate computer models(s) in view of acquiring maximum benefit in consideration of power, irrigation, flood control, navigation, water supply fishery and other benefits.

Task 6: Power Evacuation Study

The consultants shall carry out the grid impact study and plan for the transmission system for the evacuation of power in Nepal and neighboring countries. In particular the study shall include:

a. Load flow (internal and cross border) analysis;
b. Short circuit study;
c. Transient Stability analysis; and
d. Transmission Line Studies including substation

The Consultant shall also carry out a comprehensive study of Integrated Nepal Power System (INPS) and Cross Border Power Evacuation System to identify reinforcement needs and suggest the appropriate measures including regional transmission system in South Asia. The Consultant shall carryout power evacuation studies to determine the proper power evacuation route.

Task-7: Finalization of Design Concept and Engineering Studies

The Consultant shall prepare/update the design concept/general arrangement of the project established in the FS to determine the optimum design so as to maximize the benefits. The major activities to be performed by the consultant shall include but not limited to:

a. Integrated planning approach shall be adopted for optimizing the sectorial project benefits and minimizing the project impact as mentioned in Task4;

b. Finalize the conceptual design identifying all viable alternatives considering the maximization of the multipurpose benefits, impacts of other hydroelectric projects, input from other studies and possible hazards (geo-hazard, climate change risk etc.). Multi-criteria decision making (MCDM) tools will be adopted to finalize the best alternative;

c. Identify the possibility of pump storage project by utilizing the lower reservoir created by reregulating dam and upper reservoir created by main dam

d. Identify the possibility of hydropower generation from the discharge though irrigation outlet;

e. Carryout optimization studies including optimization of project capacity, dam height, tunnel and penstock diameter, and the number and size of the turbine units, transmission lines etc and other possible benefits

f. Perform engineering study of each component of the project.

The Consultant shall carry out hydraulic, geotechnical and structural design of main dam, reregulating dam, spillway facilities, intake, headrace tunnel, surge tank(s), powerhouse, tailrace, and other associated structures etc. The study shall also include cofferdams, diversion tunnels.

Seismic Hazard Assessment to determine Operational Basis Earthquake (OBE), Maximum Credible Earthquake(MCE) etc.

The engineering study design shall include the information collected during the field investigation. The design shall include, but not limited to, the complete design of hydraulic structures, foundation treatment and grouting, instrumentation, seepage analyses, stability analysis, deformation and stress analysis, architectural work and finishing of powerhouse and landscape development.

The designs shall conform to and be suitable for the site conditions and shall aim at achieving minimum overall cost and a minimum consumption of land, without adversely affecting safety, security, efficiency or longevity of the works or the environment.

The study shall also include electrical and mechanical equipment, substations, transmission lines to connect to the national grid and other components that are required for the proper functioning of the project. The Consultant shall carryout hydro-mechanical and electro-mechanical design to determine the type of gates, valves, turbines, and generator, substation and transmission lines. The hydro-mechanical and electro-mechanical design shall involve, among others, selection of proper electrical and mechanical systems to determine the type of gates, valves, turbine, generator, substation, and transmission line etc.

g. Identify and finalize the location of site camp for Client and contractors (civil, electromechanical, hydro-mechanical, etc.), waste disposal and establish the need for construction of access road and bridge(s) including finalization of road alignment and site relocation for bridge(s). The quantum of required construction power shall be assessed and the method of supplying temporary power shall be proposed along with cost estimation and other details;

h. Identify the nearest seaport for the import of powerhouse equipment and machineries, and the most direct mode of inland transportation (railways or road or both) taking into consideration the condition of the existing roads and bridges on the transportation route from the nearest seaport to the project site. In light of the capacity of the bridges along the transportation route, the Consultant shall recommend the maximum weight of a single consignment that can be safely transported along the identified route for the identified transportation mode, and suggest a need for improving load-bearing capacity of specific bridges especially within Nepal. The consultant shall collect the load bearing information of the bridges and the road /railway track along the identified route; and

i. Conduct a detailed site analysis and feasibility study for the river ship port and ship lift. Design the ship port layout, considering tie up facilities, cargo handling areas (if needed), and other necessary infrastructure. Develop a ship-log system that includes record-keeping, communication protocols, and safety measures.

j. Develop a detailed design and engineering plan for the upgraded irrigation system providing recommendations for modern technologies and practices to enhance efficiency

k. Prepare engineering drawings of all components of the project including hydro- and electromechanical works, camps, roads, bridges and transmission lines and substations etc.

Task 8: Regional Power Market and Associated Studies

For the evacuation of power, following activities, but not limited to the following should be conducted:

a. Review the present and projected electricity demand-supply scenario of Nepal and neighboring countries;

b. Review their existing and planned generation capacity additions in Nepal and neighboring countries; and

c. Recommend the possible regional power market for the energy produced from KCMP with respect to installed capacity and seasonal variation of energy demand of Nepal and neighboring countries.

Task-9: Economic and Financial Analysis

The consultant shall review and update the economic and financial analysis of the project conducted in the FS. The Consultants shall perform all necessary activities, following being the major activities:

a. Conduct economic analysis including economic rate of return and sensitivity analysis of the project considering regional economic benefits and opportunity cost due to project development;

b. Review the forecasted load growth and revenues and costs in relation to tariffs, cost recovery and the cost of generation from renewable/non-renewable sources of energy. Determine future sustainable tariffs to support the project;

c. Analyze the financial viability of the project including sensitivity analysis. Identify all risks for revenues and costs with sensitivity analyses, and evaluate financial internal rates of return;

d. Analyze the alternative possibilities of promoting the project, ranging from the public sector development to the public and private development approach. Simulate and evaluate optimal financial structuring and modeling in terms of profits, costs, and risks through all measures such as equity, loans, or an insurance (guarantee) mechanism from private investors and lenders, export credit agencies, multilateral development banks, and bilateral donors and other possible sources of financing; and

e. Develop financial projection models comprising financial statements and financial ratios for the standard number of years, as per international norms/practice, to assess the project and its institutional financial viability and impacts using key performance indicators.

Task 10: Project Risk Assessment

This risk assessment aims to ensure that all potential risks are identified, evaluated, and provide recommendation on management of the risk throughout the project's lifecycle, ultimately enhancing the project's chances of success and minimizing adverse impacts.

For Risk Assessment, the Consultant shall carry out the following but not limited to:

a. Risk Identification:
   - Identify potential risks across various project phases, including planning, design, construction, and operation; and
   - Categorize risks into different categories, such as technical, financial, environmental, and social etc.

b. Risk Quantification:
   - Quantify risks in terms of their probability and potential impact; and
   - Develop risk matrices to prioritize risks based on severity.

c. Risk Assessment Tools:

a. Utilize risk assessment tools and techniques such as Monte Carlo simulations; and sensitivity analysis, and decision tree analysis to model and evaluate risks.

d. Risk Mitigation Strategies:
   - Propose risk mitigation strategies for each identified risk, including avoidance, transfer, mitigation, or acceptance; and
   - Ensure that risk mitigation strategies align with legal and regulatory requirements.

e. Risk Transfer:
   - Evaluate options for risk transfer arrangements.

Task-11: Updated Feasibility Study and Detailed Engineering Design and Drawing

The Consultant shall update the FS based on the above-mentioned activities, finalizing the project configuration. The structure and format of the Updated Feasibility Study Report shall be as per the standard format responsive to the national/international financing agency's requirement.

The Consultant shall conduct detailed design and drawings of the project configuration option, finalized in the Updated Feasibility Study, incorporating the mitigation measures recommended by EIA studies.

For civil parts of project components, the consultant shall formulate prior to detail engineering design, a Design Basis Memorandum (DBM) on the basis of which, a design will be developed. It shall establish the design and functional criteria, state the assumptions, parameters, and standards applied, loading conditions, factors of safety, allowable stresses, stability criteria, and all other factors which are necessary to fully carry out the detailed design. The DBM shall describe analysis methods, database and international standards or codes and prudent practices employed.

The consultant shall carry out dynamic response profiles for accelerations and velocities applicable at different elevations for the Design Basis Earthquake (DBE) and Maximum Credible Earthquake (MCE) including likely damage to structures for each case. The Consultant shall also study on possibility of reservoir induced seismicity after the impoundment of the reservoir.

The Consultant shall conduct Dam Break Analysis (DBA) for the planned Karnali Chisapani dam to determine the possible peak flood and associated water stages in the downstream reaches in the event of dam failure. The analysis shall generate, among others, necessary data leading to recommendation of a framework for early warning system and evacuation plan.

The Consultant shall incorporate the result of DBA and corresponding Emergency Preparedness Plan and Dam Safety Assessment for finalization of detail design.

The Consultant shall check the competency of the reservoir, reservoir rim stability, and the effects due to reservoir impoundment as well as variation of water level during the reservoir operation.

The Consultant shall carryout physical hydraulic model studies of spillway and auxiliary spillway, intake, outlets and other structures, as per requirement, to finalize the design. The consultant shall carry out numerical model of spillways, intake and other structures, as necessary, in order to finalize the design.

The consultant shall prepare Geotechnical Baseline Report (GBR) as per international standards.

The detailed design including reinforcement details, where applicable, shall be conducted for all project components (e.g. dam and reservoir including spillway and other outlets, intake, water ways, surge tank, powerhouse, tailrace, roads, employer's camp landscaping etc.) according to the international practice.

The design drawings shall be prepared on the basis of detailed design and shall be adequate in coverage for use in construction work to illustrate the complexity of the work and enable estimation of concrete and excavation quantities. Typical reinforcement details shall be prepared for the structures with sufficient details to enable estimation of reinforcement quantity.

Detail Design work of Electro-Mechanical, Hydro-Mechanical, transmission line and substation design work, ship ports and ship logs, irrigation facilities shall be based on national/internationally accepted practices and shall include drawings and supporting calculations. The Electro-Mechanical design shall involve, among others, selection of proper electrical and mechanical systems and equipment, dimensioning/sizing of the equipment, etc.

Task-12: Construction Planning and Scheduling

The Consultant shall review the Construction Plan and Schedule prepared in FS, 1989 and update them considering the current practices, contractor's point of view of operation, construction methodology, contract packages, transportation of civil materials and hydro-mechanical and electro- mechanical equipment, available infrastructures etc. with the objective of optimizing the project costs, construction duration and construction risks.

The schedule shall establish start and finish and interim critical milestone dates and key dates for interfaces between different lots of civil, hydro-mechanical and electro- mechanical works as per international standards.

The Consultant shall carryout material handling studies which will aid the Contractor to efficiently quarry, store, haul, use and dispose huge amount of construction material required

for construction of the project. The result of material handling studies shall be incorporated in the construction plan, which shall be supported by network and logic diagram showing the sequence in which construction activities are to be performed, their interdependencies, constraints and the critical path of the execution of the work, and so on using standard construction planning software (e.g.: prime vera, MS project etc.)

Task-13: Quantity Estimation and Cost Estimation

The Consultant shall review the quantity estimation, unit cost and project cost established in the FS 1989 and update them with the current studies following the standard practice.

The Consultant shall prepare quantity estimate based on detailed design and drawings and prepare Bill of Quantities (BOQ). BoQ shall be prepared in accordance with recognized standard method of measurement of civil engineering works and shall provide appropriate to the level of information required.

For civil works, the unit cost for each individual item shall be composed of labour and staff costs, construction materials, plant and equipment costs, fuel and lubrication, transport, electrical power, customs duties, taxes, fees, royalties, and levies due in Nepal shall be presented separately in line with construction plan.

The cost for Hydro-mechanical and Electro-mechanical equipment (turbines, generators, substation equipment, switchgear, gates, etc.), shall be based on prevailing market prices etc. and quotation received from the manufacturer.

The cost estimates shall be prepared from a contractor's point of view using resource based costing and shall follow international standard practice.

The cost estimate needs to be based on construction methodology and planning as determined.

The Consultant shall propose and add an appropriate sum as Price and Physical Contingency for additional funding for the execution for unforeseen conditions.

The Cost Estimate shall include the cost of land acquisition and rehabilitation of the project affected people and mitigation measures proposed by EIA.

Task-14: Preparation of Complete Tender Documents, Specification and Tender Drawings

The Consultant shall recommend the type of the contract and lots of work for project implementation in consultation to the Client. The Consultant shall prepare complete Tender Documents with Tender Drawings for all Lots of works with appropriate details and specifications, detail BoQ and other necessary documents as per National/International Standard in consultation with the Client.

Task-15: Analysis of Institutional Arrangement for Project Implementation

The Consultant shall analyze the different alternative institutional setups for the implementation of the project and recommend appropriate institutional arrangement. For the recommended institutional setup, the Consultant shall propose organizational structure clearly defining the role of each position and responsibility and chain of command linking the entire organizational hierarchy. The Consultant shall also clearly identify the requirement of

resources including but not limited to capacity building measures (trainings, workshops etc.), physical infrastructures, requirement of software, equipment etc.

Team composition

The Consultant shall ensure a team of Experts experienced in design, design review, for Updated Feasibility and Detail Engineering Design and Preparation of Tender Documents of KCMP. The project team will consist of International Key and Non-key Experts and National/local Experts to accomplish the study.

It is estimated that about one hundred and fifty five (155) man-months of international experts and five hundred seven (507) man-months of national experts will be needed to complete the assigned tasks.

It is envisaged that the International Experts will be resident in Nepal for the entire duration of the services. Coordination activities only will be carried out in the home office of the Consultant with the possible exception of studies that may require specialist input that cannot be supplied from Nepal

The breakdown of the estimated inputs Man months of International Experts is given in following table

International Experts

The following table (Table 7.1) presents the International Experts for the updated feasibility study and Detail Design Study and preparation of Tender Documents.

Table 7.1: International Experts

S.N	International Experts	Man-month
A.	**Key**	
P1	Project Manager/Team Leader/ Hydropower Expert	28
P2	Dam Engineer	12.5
P3	Geologist	8.25
P4	Geotechnical Engineer	10.5
P5	Hydrologist/Sedimentology Expert	4
P6	Hydraulic Engineer	6
P7	Structural Engineer	6
P8	IWRM Expert	6
P9	Power Regulatory Expert	4.25
P10	Contract Specialist	8.25
	Sub Total A	**93.75**
B.	**Non Key**	
P11	Seismic Engineer	3
P12	Irrigation Engineer	4
P13	Cost Engineer/Quantity Surveyor	5
P14	Construction Planner	4
P15	Financial Analyst	3

S.N	International Experts	Man-month
P16	Economist	3
P17	Risk Analysist	2
P18	Hydro-Mechanical Engineer	3
P19	Electro-Mechanical Engineer	3
P20	Transmission Line and Sub-station Engineer	6
P21	GLOF Expert/ Climate Change Expert	2.25
P22	Navigation Engineer	3
P23	Pool of Expert	20
	Sub Total B	**61.25**
C.	**Grand Total**	**155**

It is estimated that about one hundred and fifty five (155) man-months of international experts.

National Experts

The expertise of the National Experts is given in the following table (Table 7.2):

Table 7.2: National Experts

SN	National Experts	Man-month
N1	Deputy Team Leader/Hydropower Expert	30
N2	Dam Expert	25
N3	Geotechnical Engineer	20
N4	Power System Engineer	12
N5	Geologist	20
N6	Water Resources Engineer	20
N7	Hydrologist	15
N8	Hydraulic Engineer	15
N9	Structural Engineer	15
N10	Irrigation Engineer	8
N11	Cost Engineer/ Quantity Surveyor	12
N12	Construction Planner	6
N13	Economist	8
N14	Risk Analysist	6
N15	Hydro- Mechanical Engineer	12
N16	Electro-Mechanical Engineer	12
N17	Transmission Line & Sub-station Engineer	15
N18	Contract Specialist	16
N19	Civil Engineers	120
N20	Electrical Engineers	60

SN	National Experts	Man-month
N21	Draft Person	60
	Total	**507**

NEA Counterpart Staff

The expertise of the NEA Counterpart Staff is given in the following table (Table 7.3):

Table 7.3: NEA Experts

S. No.	Description	Units	Quantity
	National Manpower		
1	Hydropower Engineer	Man Month	30
2	Design Engineer	Man Month	30
3	Geologist	Man Month	15
4	Geotechnical Engineer	Man Month	15
5	Hydrologist/Sedimentologist	Man Month	15
6	Electrical Engineer /Control Power System Engineer	Man Month	15
7	Mechanical Engineer /Hydromechanical Engineer	Man Month	10
8	Hydraulic Engineer	Man Month	8
9	Structural Engineer	Man Month	10
10	Transmission Line/Substation Engineer	Man Month	10
11	Survey Engineer	Man Month	10
12	Cost Engineer/ Quantity Surveyor	Man Month	10
13	Contract Engineer	Man Month	15
14	Construction Planner	Man Month	8
15	Civil Engineer	Man Month	30
	Total		**231**

NEA Engineering Company Counterpart Staff

The expertise of the NEA Engineering Company Counterpart Staff is given in the following table (Table 7.4):

Table 7.4: NEA Engineering Company Counterpart Experts

S.No.	Description	Units	Quantity
	National Manpower		
1	Hydropower Engineer	Man Month	15
2	Design Engineer	Man Month	15
3	Geologist	Man Month	8
4	Geotechnical Engineer	Man Month	8
5	Hydrologist/Sedimentologist	Man Month	8
6	Electrical Engineer /Control Power System Engineer	Man Month	8
7	Mechanical Engineer /Hydromechanical Engineer	Man Month	5

S.No.	Description	Units	Quantity
8	Hydraulic Engineer	Man Month	4
9	Structural Engineer	Man Month	5
10	Transmission Line/Substation Engineer	Man Month	5
11	Survey Engineer	Man Month	5
12	Cost Engineer/ Quantity Surveyor	Man Month	5
13	Contract Engineer	Man Month	8
14	Construction Planner	Man Month	4
15	Civil Engineer	Man Month	30
	Total		**133**

Five hundred seven (507) man-months of National Experts shall be needed to complete the assigned task. The Client may provide National Experts from NEA and NEA Engineering Company as the counterpart staff for the above stated positions. In case the Client is unable to provide the Experts from NEA and NEA Engineering Company as the counterpart staff, the Consultant shall manage on his own to complete the task without hindering the work progress.

Experience and qualification of Experts

Experience and qualification of Experts area as follows:

International Key Expert

P1. Project Manager/Team Leader/Hydropower Engineer

The team leader shall have a Master's degree or equivalent in civil/ hydropower /water resources engineering discipline and must have twenty five (25) years of professional experience and fifteen (15) years of which in planning, design, specification, tender document preparation, and construction supervision of hydropower projects.

The expert shall have previous team leader experience in detailed engineering design or construction supervision of successfully completed (constructed and commissioned) hydropower projects with capacity of not less than 500 MW. Experience shall also cover planning, design, specification, tender document preparation, construction, testing and commissioning of the hydropower project not less than 500 MW.

Experience in detailed design or construction supervision of hydropower project not less than 500 MW in Asia (other than expert's home country) as hydropower expert will be an added advantage.

The expert shall resident in Kathmandu and visit to the project site, as per requirement, for his proposed man month.

P2. Dam Engineer

The Reservoir/Dam Engineer shall have a Master's degree or equivalent in dam/hydropower /geotechnical engineering discipline and must have twenty (20) years of professional experience.

The expert shall have previous working experience as Dam Expert in Feasibility Study and Detailed Engineering Design of successfully completed (Constructed and Commissioned)

seasonal reservoir type hydropower projects with capacity not less than 500 MW involving dam with height of at least 130 m. Experience shall also cover planning, design, specification, tender document preparation, construction supervision of seasonal reservoir type hydropower projects of size of 500 MW as a dam expert. The expert shall resident in Kathmandu and visit to the project site, as per requirement, throughout his proposed man month. Experience in detailed design of embankment dam in hydropower project as dam engineer will be an added advantage of the expert.

Experience in detailed design or construction supervision of hydropower project not less than 500 MW (other than expert's home country) as dam expert will be an added advantage.

P3. Geologist

The Geologist shall have a Master's degree or equivalent in engineering geology discipline and must have twenty (20) years of professional experience.

The Geologist shall have experience of geological investigation, studies and design in Feasibility Study and Detailed Engineering Design of successfully completed (Constructed and Commissioned) seasonal reservoir type hydropower projects with capacity not less than 500 MW as a Geologist.

Experience as the Geologist in hydropower projects of the installed capacity not less than 500 MW (other than expert’s home country) will be an added advantage.

The expert shall resident in Kathmandu and visit to the project site, as per requirement, throughout his proposed man month.

P4. Geotechnical Engineer

The Geotechnical Engineer shall have a Master's degree or equivalent in geotechnical engineering or other relevant and must have twenty (20) years of professional experience.

The Expert shall have experience in geotechnical investigation and design as a Geotechnical Expert of successfully completed (Constructed and Commissioned) seasonal reservoir type hydropower projects of capacity not less than 500 MW.

Experience as the Geotechnical Engineer in Detail Design or Construction Supervision of hydropower projects of the installed capacity not less than 500 MW (other than expert’s home country) will be an added advantage.

The expert shall resident in Kathmandu and visit to the project site, as per requirement, for his proposed man month.

P5. Hydrologist/ Sedimentology Expert

The Hydrologist shall have a Master's degree or equivalent in hydrology or water resources engineering or civil engineering or sediment discipline and must have twenty (20) years of professional experience.

The Expert shall have experience in hydrological investigation and analysis of successfully completed (Constructed and Commissioned) seasonal reservoir type hydropower projects with capacity not less than 500 MW as Hydrologist. The Expert shall also have experience in sediment study including investigation, analysis and interpretation and design of reservoir

sedimentation and its management in reservoir type hydropower projects with storage capacity not less than 10 billion m^3 as a Sediment Engineer.

Experience as the Hydrologist/Sediment Expert in hydropower projects of the installed capacity not less than 500 MW (other than expert's home country) will be an added advantage.

The Expert shall resident in Kathmandu and visit to the project site, as per requirement, throughout his proposed man month.

P6. Hydraulic Engineer

The Hydraulic Engineer shall have Master's degree in civil/hydraulic engineering and have twenty (20) years of professional experience.

The expert shall have experience in hydraulic design of project components of successfully completed (Constructed and Commissioned) seasonal reservoir type hydropower projects with capacity not less than 500 MW involving dam with height of at least 130 m and spillway of discharge capacity of 10,000 m^3/sec.

Experience as the Hydraulic Expert in hydropower projects/reservoir projects of the installed capacity not less than 500 MW in Asia (other than expert's home country) will be an added advantage.

The expert shall resident in Kathmandu and visit to the project site, as per requirement, throughout his proposed man month.

P7. Structural Engineer

The Structural Engineer shall have a Master's degree or equivalent in civil/structural engineering discipline and must have preferably twenty (20) years of professional experience.

The Expert shall have previous working experience in Feasibility Study and Detailed Engineering Design/Construction Supervision of successfully completed (Constructed and Commissioned) seasonal reservoir type hydropower projects with capacity not less than 500 MW and involving dam of at least 130 m height as a structural engineer and shall have proven skills including training experience. Experience shall also cover planning, design, specification, tender document preparation, and construction supervision of reservoir projects of size 500 MW.

Experience in Detail Design/Construction Supervision as the Structural Engineer of hydropower projects of the installed capacity not less than 500 MW (other than expert's home country) will be an added advantage.

The Expert shall resident in Kathmandu and visit to the project site, as per requirement, throughout his proposed man month.

P8. Integrated Water Resource Management (IWRM) Expert

IWRM expert shall have preferably Master's degree or equivalent in water resources engineering/ hydrology/civil or related discipline and must have preferably twenty (20) years of professional experience.

The expert shall have previous experience of working for Integrated Water Resource Management (IWRM) for carrying out Feasibility Studies or Detailed Engineering Design of successfully completed (Constructed and Commissioned) multipurpose type hydropower projects with installed capacity not less than 500 MW. He shall have the experience of the interconnectedness of water resources, environmental, social, and economic factors to ensure that water is managed efficiently and equitably.

Experience as the IWRM expert in Feasibility Study or Detail Design of hydropower projects of the installed capacity not less than 500 MW (other than expert's home country) will be an added advantage.

The expert shall resident in Kathmandu and visit to the project site, as per requirement, for his proposed man month.

P9. Power Regulatory Expert

The Expert shall preferably have a Master's degree or equivalent in electrical engineering/ power system planning/international water law/water resources/hydropower or related discipline and must have at least twenty (20) years of professional experience.

The Expert shall have experience in power market studies and power system planning, evacuation studies, load forecasting, electricity pricing, and various aspects of regional power trade, technical issues related to systems interconnection, system control, and regulations of successfully completed (Constructed and Commissioned) hydropower projects of the installed capacity not less than 500 MW.

Experience as the Power System Engineer in Feasibility Study or Detail Design of hydropower projects of the installed capacity not less than 500 MW (other than expert's home country) will be an added advantage.

The expert shall resident in Kathmandu and visit to the project site, as per requirement, throughout his proposed man month.

P10. Contract Specialist

The Contract Specialist shall preferably have a Master's degree or equivalent in Construction Management/Law/Engineering or other relevant discipline and must have preferably twenty (20) years of professional experience.

The Expert shall have experience in the preparation of bidding documents of successfully completed (Constructed and Commissioned) multipurpose type hydropower projects with capacity not less than 500 MW as contract specialist. Experience shall also cover tender document preparation, negotiation, and arbitration of reservoir projects of size not less than 500 MW.

Experience as the Contract Specialist in bidding documents preparation of hydropower projects of the installed capacity not less than 500 MW (other than expert's home country) will be an added advantage.

. The expert shall resident in Kathmandu and visit to the project site, as per requirement, throughout his proposed man month.

International Non Key Expert

P11. Seismic Engineer

The Seismic Engineer shall have preferably Master's degree or equivalent in engineering/social science/geology/soil science other relevant discipline and must have preferably fifteen (15) years of professional experience.

The Engineer shall have experience of seismological investigation, studies and design in as part of detailed engineering design of successfully completed (Constructed and Commissioned) seasonal reservoir type hydropower projects with capacity not less than 500 MW as a Seismic Engineer/Expert.

Experience in seismological investigation and studies of hydropower project (other than expert's home country) as Seismic Engineer/ Expert will be an added advantage of the expert.

It is expected that the expert will be resident in Kathmandu and visit to the project site as per requirement, throughout his proposed man month.

P12. Irrigation Engineer

The Irrigation Engineer shall preferably have a Master's degree or equivalent in Irrigation Engineering or Water resources engineering and must have preferably fifteen (15) years of professional experience.

The Engineer shall have previous working experience in feasibility study and detailed engineering design of irrigation project with command area not less than 100,000 ha of successfully completed (Constructed and Commissioned) irrigation projects as a irrigation engineer and shall have proven skills including training experience. Experience shall also cover planning, design, specification, tender document preparation, construction supervision of irrigation projects.

Experience in Feasibility Study/Detail Design/Construction Supervision as the Irrigation Engineer of hydropower projects/seasonal reservoir projects of the installed capacity not less than 500 MW (other than expert's home country) will be an added advantage. The Engineer shall have experience in possible irrigation command area, crop yield, flow required for irrigation etc. and ultimately irrigation benefits, detailed design and engineering plan for the upgraded irrigation system providing recommendations for modern technologies and practices to enhance efficiency

The engineer shall resident in Kathmandu and visit to the project site (Nepal and neighboring countries), as per requirement, throughout his proposed man month.

P13. Cost Engineer/Quantity Surveyor

The Cost Engineer/Quantity Surveyor shall preferably have a Master's degree or equivalent in civil/mechanical engineering or other relevant discipline and must have preferably fifteen (15) years of professional experience.

The Engineer shall have previous experience as cost engineer/estimator of successfully completed (Constructed and Commissioned) seasonal reservoir type hydropower projects with capacity not less than 500 MW as cost engineer/estimator and shall have proven skills including training experience.

Experience shall also cover quantity/cost estimation and tender document preparation of seasonal reservoir projects of installed capacity not less than 500 MW.

It is expected that the expert will be resident in Kathmandu with frequent visit to the project site as per requirement, throughout his proposed man month.

P14. Construction Planner

The Construction Planner shall preferably have a Master's degree or equivalent in civil engineering or construction management or other engineering discipline and must have preferably fifteen (15) years of professional experience.

The Expert shall have experience in preparation of construction plan and schedule of successfully completed (Constructed and Commissioned) seasonal reservoir type hydropower projects having capacity not less than 500 MW as construction planner. It is expected that the expert will be resident in Kathmandu with frequent visit to the project site as per requirement, throughout his proposed man month.

P15. Financial Analysist

The Financial Analyst shall have preferably Master's degree or equivalent in finance or business administration or engineering economics or other relevant discipline and must have preferably fifteen (15) years of professional experience.

The Expert shall have experience in financial analysis of successfully completed (Constructed and Commissioned) seasonal reservoir type hydropower projects with capacity not less than 500 MW as financial specialist. Experience in the financial analysis of hydropower project (other than expert's home country) as financial analyst will be an added advantage of the expert. It is expected that the expert will be resident in Kathmandu with frequent visit to the project site as per requirement, throughout his proposed man month.

P16. Economist

The Economist shall preferably have a Master's degree or equivalent in economics or finance or business administration or other equivalent relevant discipline and must have preferably fifteen (15) years of professional experience.

The Expert shall also have experience in economic analysis of successfully completed (Constructed and Commissioned) seasonal reservoir type hydropower projects with capacity not less than 500 MW, irrigation project of agricultural land of about 1,00,000 ha and multipurpose project having at least 4 purposes as Economist.

The Expert shall conduct economic analysis of the project considering it as a multipurpose project and its benefits/impacts both upstream/downstream. The Expert shall resident in Kathmandu and visit to the project site (Nepal and neighboring countries), as per requirement, throughout his proposed man month.

P17. Risk Analysist

The Risk Analysist shall preferably have Master’s degree in civil engineering/water resource engineering or related equivalent and must have preferably fifteen (15) years of professional experience. The professional shall be well experienced with risk analysis of the multipurpose /reservoir project.

The Expert shall identify assess, quantify the risk and recommend the risk mitigation strategies. He shall coordinate with the stakeholders for the completion of the assignments. The expert shall resident in Kathmandu with frequent visit to the project site (Nepal and neighboring countries) as required.

P18. Hydro-mechanical Engineer

The Hydro-mechanical Engineer shall preferably have a Master's degree or equivalent in mechanical engineering or other related discipline and must have preferably fifteen (15)years of professional experience.

The Expert shall have experience in the preparation of hydro-mechanical design specifications of hydro-mechanical components of successfully completed (Constructed and Commissioned) seasonal reservoir type hydropower projects with capacity not less than 500 MW as mechanical/hydro- mechanical engineer and shall have proven skills including training experience. The engineer shall resident in Kathmandu and visit to the project site, as per requirement, throughout his proposed man month.

P19. Electro-mechanical Engineer

The Electro-mechanical Engineer shall preferably have a Master's degree or equivalent in electrical/power system engineering discipline and must have preferably fifteen (15) years of professional experience.

The expert shall have experience in the preparation of powerhouse electrical equipment design specifications, conditions of contract at the detailed engineering study of successfully completed (Constructed and Commissioned) seasonal reservoir type hydropower projects with capacity not less than 500 MW as an electro-mechanical engineer.

The engineer shall resident in Kathmandu and visit to the project site, as per requirement, throughout his proposed man month.

P20. Transmission Line and Sub Station Engineer

The Transmission Line and Sub Station studies shall have preferably Master's degree or equivalent in high voltage/electrical engineering discipline and must have preferably fifteen (15) years of professional experience.

The expert shall have experience in design/construction supervision/specification and tender document preparation of transmission lines and substations of 400 kV or above voltage class as transmission line & substation engineer.

Experience in design of Transmission Line and substation of 400 KV in Asia (other than expert’s home country) will be an added advantage. The engineer shall resident in Kathmandu and visit to the project site, as per requirement, throughout his proposed man month.

P21. GLOF/Climate Change Expert

The GLOF Expert shall preferably have a Master's degree or equivalent in civil engineering /natural science/hydrology or other relevant discipline and must have preferably fifteen (15) years of professional experience.

The expert shall have experience in the study and analysis of GLOF and in the study of climate change of successfully completed (Constructed and Commissioned) seasonal reservoir type hydropower projects of installed capacity not less than 500 MW as GLOF/climate change expert. The expert shall have experience in hydrological and meteorological studies including GLOF and climate change for hydropower projects in the hindu kush region as hydrologist or GLOF expert.

The expert shall resident in Kathmandu and visit to the project site (Nepal and neighboring countries), as per requirement, throughout his proposed man month.

P22. Navigation engineer

The Navigation Engineer shall preferably have a Master's degree or equivalent in marine/navigation engineering or related discipline and must have preferably fifteen (15) years of professional experience.

The expert shall have experience in the design and preparation of specifications of navigation facilities at the detailed engineering study of successfully completed (Constructed and Commissioned) multipurpose type hydropower projects having navigation facilities with capacity not less than 500 MW as navigation engineer.

The engineer shall resident in Kathmandu and visit to the project site, as per requirement, throughout his proposed man month.

P23. Pool of Experts

The Consultant shall propose experts in different fields deemed necessary to complete the assignments. These experts shall preferably have a Master's degree or equivalent in relevant field and must have preferably fifteen (15) years of professional experience.

National Experts

The minimum qualification and minimum professional years of experience shall be as follows:

S. N.	National Experts	Minimum Qualification	Minimum professional years of experience in relevant field
N1	Deputy Team Leader/Hydropower Expert	Master's degree in any discipline of civil engineering	20
N2	Dam Engineer	Master's degree in any discipline of civil engineering	15
N3	Geotechnical Engineer	Master's degree in geotechnical engineering	15
N4	Power System Engineer	Master's degree in any discipline of electrical engineering	15
N5	Geologist	Master's degree in geology	15
N6	Water Resources Engineer	Master's degree in Water Resource Engineering	15
N7	Hydrologist	Master's degree in any discipline of civil engineering/ water resource/	15

S. N.	National Experts	Minimum Qualification	Minimum professional years of experience in relevant field
		hydrology	
N8	Hydraulic Engineer	Master's degree in hydropower /water resource engineering / hydraulic	15
N9	Structural Engineer	Master's degree in structural engineering	15
N10	Irrigation Engineer	Master's degree in any discipline of civil engineering / water resource/ Irrigation	15
N11	Cost Engineer/ Quantity Surveyor	Bachelor's in civil engineering	15
N12	Construction Planner	Bachelor's in civil engineering	15
N13	Economist	Master's degree in economics	15
N14	Risk Analysist	Master's in civil engineering preferably master's degree in any discipline of civil engineering	15
N15	Hydro- Mechanical Engineer	Master's mechanical engineering	15
N16	Electro-Mechanical Engineer	Master's degree in mechanical engineering	15
N17	Transmission Line & Sub-station Engineer	Master's in civil /electrical engineering	15
N18	Contract Specialist	Master's degree in any discipline of civil engineering	15
N19	Civil Engineers	Bachelor's in civil engineering	
N20	Electrical Engineers	Bachelor's in electrical engineering	
N21	Draft Person		

Reporting Requirements and Time Schedule for Deliverables

Reporting Requirements

The reports to be prepared and submitted by the Consultant in compliance with this Terms of Reference fall under the categories of management reports, technical reports, and combined reports. Each report shall be complete with an Executive Summary and shall include maps, drawings, data collected and/or used in the analysis. The consultant shall submit the electronic versions in addition to the hard copies of the reports in number as mentioned in the following section. The electronic versions of these reports shall include the complete documents including all data, analysis, design calculations (working sheets), autocad files, shape files, projection files, kmz files etc. The consultant shall discuss their interim findings at review meetings with project management team on regular basis.

(I) Management Reports

The Management Reports shall comprise quarterly progress reports and monthly progress reports concerning physical progress/status of works, expenditures, etc. in formats acceptable to the Client covering all the activities of the consultant during the period and shall be submitted within two weeks after completion of each quarter and within one week after completion of each month. The Management Reports shall contain summary of the progress of the different activities achieved in the particular period and shall also include the plan and program for the subsequent period. All communications from the Client to the consultant and by the Consultant to Client shall be in writing. Minutes of all meetings will be recorded and signed by both the parties, in token of having arrived at decisions taken in each meeting.

(II) Technical Reports

These shall comprise a series of Reports covering the main technical studies, investigation, issues, etc., related to the project. Each report shall be complete with an Executive Summary and shall include maps, drawings figures and diagrams as necessary. The reports shall include Annexes providing the basic data used in the analysis.

(III) Inception Report

The Inception Report shall present details of the assignment and reporting requirement stated in Task-1

(IV) Topographical Survey and Mapping Report

The Consultant shall prepare, among others, a Topographic Survey and Mapping Report stated in Task-2 (a).

(V) Geotechnical Studies and Investigations Report

The Consultant shall provide separate report(s) or a comprehensive report on geological investigations, geological mapping, refraction survey and ERT, SRT , MASW etc. The results of geotechnical studies and investigations shall cover in situ and lab tests, tests on construction materials, soil tests specified in the TOR and all findings, test reports, calculations, and conclusions organized in the form of a Geotechnical Report.

(VI) Geotechnical Baseline Report

The results of geotechnical studies and investigations and all findings, test reports, calculations, and conclusions shall be organized in the form of a Geotechnical Report and summarized in the various project reports. The results, data and interpretations uncovered from the geotechnical studies and site investigations and the corresponding interpretations and recommendations shall be presented in such a manner that it can be used as a stand-alone document for further development of the projects. The baseline statements shall be in quantitative terms that can be measured and verified during construction. The principal aim of the Geotechnical Baseline Report is to establish an understanding of the subsurface site conditions, referred to as a baseline, which can form the basis of contractual conditions in construction contracts. GBR should be in line with the requirements of FIDIC Emerald book.

(VII) Hydrology and Sedimentation Report

The Hydrology and Sedimentation Report shall describe the hydrological activities required in the TOR. The report shall also present the analysis of the hydrological data and present

results and conclusions regarding magnitude and variability of flows and flood estimates. The report shall also provide a detailed description of estimates of sediment load, extent of sediment deposition anticipated in reservoirs and potential for mitigating measures by reservoir flushing.

(VIII) Water Resources Management Report

The Water Resources Management Report shall present analysis/synthesis/interpretation of the data to be used in construction of dam and regulation of the flow at the downstream water resources projects including irrigation use in neighboring country and Nepal. Besides, details of the estimated energy output for the various options considered shall also be presented in the report.

(IX) Power System Analysis Report

The Power Market, Power System and Power Evacuation Study Report shall describe the power market in the participating countries, shall present the results of the power system studies and power evacuation studies. The report shall cover, among others, preparation of long-term electricity demand forecast for the regional countries ,a review of the existing and planned transmission and generation plans in the study countries, electricity prices studies, contribution of power generated from KCMP to meet the electricity demands, and in the provision of ancillary services. The Consultant then shall prepare the scope of transmission network requirements (both green-field and reinforcement) to evacuate the power from the KCMP backed up by a detailed analysis (technical and financial) of alternative options such as asynchronous links, or HVDC.

The study shall also summarize the findings of the study on willingness and affordability of consumers to pay for the power from the project and any challenges that might be posed to the project viability due to the deployment of the latest renewable energy technologies for power generation as an alternative source for electric energy within the region. The focus of the findings shall be the evaluation of alternatives emerging from the solar and wind energy, the prices of which are coming down at an accelerated pace, thereby having the potential to challenge the viability of the project.

(X) Interim Design report

The Interim Design Report shall include the findings of project layout and optimization, hydraulic design, hydro-mechanical design, electro-mechanical design and electrical design. It shall include the design works completed within the reporting period.

(XI) Draft Final Updated Feasibility Report

Draft Final Updated Feasibility Report shall include the complete feasibility study reports of the projects including design, optimization, drawings, quantity and cost estimates, construction planning, power evacuation plan, economic and financial analyses and other details as mentioned in the scope of work. The Updated Feasibility report shall be in detail covering investigation, alternative analysis, conceptual design, economic and financial analysis and so on. The draft report shall include as separate volume(s) the drawings, Updated Feasibility level design calculations, geotechnical and geological analysis and design, hydrologic and sedimentological analysis and design, seismic analysis and design, construction material survey, power system analysis, electro- mechanical design, hydro-

mechanical design, transmission line and substation design, effect of flow regulation and dam construction in upstream and downstream reaches, and so on.

The Consultant has to present the findings contained in the Draft Final Updated Feasibility Report to Client or any independent Consultant authorized by the Client. The suggestions and comments provided at the presentation will also be duly incorporated by the Consultants in the final reports.

(XII) Updated Feasibility Report (Final)

The Updated Feasibility Report (Final) shall be prepared incorporating comments, suggestions from Client or any independent Consultant authorized by the Client. It shall also incorporate the recommendations made in the approved EIA Report. This Final Report will, therefore, be the consolidated report based on both the Feasibility Study and EIA. The Consultant shall submit electronic version of the complete report on compact disk in addition to the hard copies of the reports in requisite number as mentioned above. The electronic version of the report shall include the complete report and drawings including the complete data in appropriate formats compatible with mainstream software, working copies (Excel, autocad, shp files, kmz files and working copies of softwares),.

(XIII) Design Basis Memorandum

The Consultant shall submit Design Basis Memorandum report for the project. The report shall include the design and functional criteria, and include the layout and design concepts of all project facilities/ components; state the assumptions, parameters, and standards applied, loading conditions, factors of safety, allowable stresses, stability criteria, and all other factors which are necessary to fully carry out the detailed design.

(XIV) Updated Financial Analysis Report

The Updated financial report shall be prepared based on the detailed design studies of the project and will have to be submitted.

(XV) *Draft Final Detailed Design Report*

Draft Final Detailed Design Report shall include, not limited to, the following:

- Main Report
- Executive Summary
- Hydrology Report
- Sediment Report
- GLOF Report
- Topographical Report
- Geological Report
- Seismic Hazard Analasis
- Dam Design

- Dam Break Analysis
- Energy Production Report
- Hydraulic Structural Design
- Quantity and Cost Estimate
- Construction Schedules
- Economic and Fianancial Analysis
- Transmission Line Report
- Road Design Report
- Structural Design Report
- Water Resource Management Report
- Drawings
- Design Criteria Report

Time Schedule for Deliverables

The reports to be prepared and submitted in compliance with this Terms of Reference fall under three categories: (1) Management Reports, (2) Technical Reports. The time schedule for deliverables after the commencement the commencement of services is presented in the following table.

Table: Schedule for Deliverables

S. N.	Report	Report Type	No. of Copies	Submission Date End of Month
1	Inception Report	Technical	6	2
2	Topographical Survey and Mapping Report	Technical	4	6
3	Geological and Geotechnical Report	Technical	4	12
4	Hydrology and Sedimentation Study Report	Technical	4	12
5	Interim design report including Project optimization report	Technical	6	10
6	Upgraded Feasibility Study Report (Draft)	Technical	6	15
7	Water Resources Management Report	Technical	4	18
8	Power System Analysis Report	Technical	4	18
9	Geotechnical Baseline Report	Technical	6	18
10	Cost Estimation Report	Technical	4	18

11	Economic and Financial Analysis Report	Technical	4	18
12	Upgraded Feasibility Study Report (Draft Final)	Technical	4	18
13	Upgraded Feasibility Study Report (Final)	Technical	12	20
14	Physical Model Test Report	Technical	6	24
15	Design Criteria Report	Technical	6	24
16	Draft Final Detailed Design report	Technical	6	24
17	Final Detailed Design report	Technical	12	27
18	Draft Final Tender Document	Technical	6	28
19	Final Tender Documents	Technical	12	30
21	Monthly Progress Reports	Management	3	
22	Quarterly Progress Reports	Management	3	

Duration of Services

The estimated time for completion of the complete assignment is about thirty (30) months. Out of the total 30 months, it has been estimated that twenty-eight (28) months will be utilized in inception, review and validation of field investigation and feasibility study, draft detail engineering design and preparation of tender documents and remaining two (2) months for finalization of detailed engineering design report and tender documents of the project after incorporating all the comments provided from Panel of Expert (POE) and the Client.

Training and Capacity Building

One of the basic objectives of the consulting services is transfer of technology in the field of hydropower planning, design and development to the Client engineers particularly in storage type of projects. This will be achieved by involving the Client engineers in various activities of the project implementation during the execution of detailed engineering design in Nepal as well as in the home office of the Consultant.

During the Inception phase of the contract, the Consultant shall perform a skill assessments and develop a training program for NEA staff. All international/national experts will be expected to work closely with NEA personnel and shall ensure that NEA personnel will achieve higher skill level as a result of involvement in the project.

The Consultant shall arrange training/workshops session/ observation tour and meeting in its home office for Client engineers for 280 man days in total. NEA's senior engineers will visit the Consultant's home office for necessary meetings, observation and study on similar hydropower projects (both states of under construction and in operation) to gain the valuable experience and familiarity with the working and procedures of Consultant's Design office particularly with regard to the detail design review and study tour to actual hydropower projects.

In addition to above mentioned, the Consultant shall arrange workshop sessions in its home office for engineers in following disciplines.

- Reservoir Simulation
- Project planning and design

- Hydraulic and structural design of hydropower projects
- Transient analysis
- Power transmission system
- Project management and contract administration for engineers
- Administration and Finance training for 3 persons

Client's Input

Data and Reports

The Client will provide all available data and reports to facilitate preparation of the Proposals to the short-listed Consultants.

- Feasibility Study Report of Karnali Chisapani Multipurpose Project – 1989 along with annexes,
- Assistance to facilitate site visit if required by shortlisted consultant with prior notice to the Client.

Administrative support for Consultant Team

If required by local regulations, the Client will provide Consultant with necessary support letters for obtaining visas/working visa for Consultant staff and other personnel permits. The cost and timing of obtaining the above is entirely Consultant responsibility. All the international staff working for the project should obtain/apply for the working visa from the concern authority.

Other Facilities and Support Services

All other facilities and logistic supports such as office space, vehicles, computers, photocopy machines, fax machines, furniture, office equipment, etc. shall be managed by the Consultant for its own purpose. The costs of all the facilities required by the Consultant to carry out the assignment shall be included in the Consultant's proposal. After the completion of the assignment, the above facilities except rented ones shall be handed over to the Client.

D. Evaluation of Consultant's EOI Application

Consultant's EOI application which meets the eligibility criteria will be ranked on the basis of the Ranking Criteria.

1. EVALUATION PROCEDURE FOR SCREENING OF CONSULTANTS

The list will be prepared of those consulting firms which have submitted EoI within the scheduled time in response to the notice of EoI for consulting services published by NEA. The general notes in the evaluation procedures are as follows:

i) Qualification and experience of the consulting firm associated as sub-consultancy or in association will not be considered for evaluation for shortlisting;

ii) The experience of the Consultants (single entity or as JV partners) carried out in association or sub -consultancy will not be evaluated;

iii) The references and the qualification documents submitted from their parent or subsidiary companies as applicable shall not be considered for their evaluation;

iv) Consultants work experiences shall be evidenced by duly certified (by authorized agency) copies of client's references with contact addresses on the letter head of the client's organization and shall be written in English. If the references are in other languages, it shall be accompanied by accurate translation into the English language duly authenticated by notary agency or nationally/internationally recognized translating agency.

The evaluation for short listing will be carried out in following three steps.

STEP I : PRELIMINARY SCREENING OF CONSULTANTS

In this step, a preliminary screening of the received EoI proposals will be carried out. The Consultants will be evaluated on 'Pass' or 'Fail' basis. Each Consultant must 'pass' each and every threshold criterion mentioned below. Any Consultant not complying with any of the specified threshold criteria (A, B, C and D) shall be disqualified and shall not be considered for further evaluation.

A. General Threshold Criteria

(i) EOI proposal shall be duly received within the last date and time of submission as mentioned in the notice of EOI;

(ii) Following documents shall be submitted along with the EOI proposal;
- Certificates of incorporation or Registration
- financial statement or document to support annual turnover of preceding three consecutive fiscal years
- Company Profile

(iii) At the time of submission of EOI proposal, Consultants must not be black listed by Multi-lateral Financial Institutions, Public Procurement Monitoring Office (PPMO) of Nepal, Government of Nepal (GoN) and Nepal Electricity Authority (NEA);

(iv) Consultants (single entity or each partner of JV) must have been legally registered for at least ten (10) years prior to the deadline date for submission of EOI.

B. Technical Threshold Criteria

Evaluation under these criteria will be based on the experience of the Consultants on the study of the hydropower projects, which are constructed and commissioned only. Ongoing and planned projects will not be considered for the evaluation. All of the criteria listed below could be fulfilled by one single or separate project/s. Only those projects completed in the last seven (7) years preceding from the last date of submission of EOI will be considered for evaluation.

(i) Consultants must have the experience of completion of Detailed Engineering Design of at least one (1) storage type hydroelectric projects (HEP), installed capacity not less than 500 MW ;

(ii) Consultants must have the experience of completion of Detailed Engineering Design of at least one (1) hydroelectric project having dam height not less than one hundred thirty meters, 130 m;

(iii) Consultants must have the experience of completion of Detailed Engineering Design of at least one (1) hydroelectric project consisting of underground cavern of width not less than sixteen (16) meters;

(iv) Consultants must have the experience of Preparation of Tender Documents of at least one (1) storage type hydroelectric project having installed capacity not less than 500 MW.

C. Threshold Criteria for Joint Venture Firms

(i) The lead partner of the Joint Venture firm must be the international firm with at least 40% share and each of the other JV partners must have at least 25 % of the share;

(ii) Each partner of JV shall meet the above criteria A (ii), (iii) and (iv);

(iii) Each partner of JV firm shall meet at least one of the criteria mentioned in B (i), (ii) and (iii) above;

(iv) The cumulative experience of the JV partners shall meet all the Criteria mentioned in B above;

(v) Joint Venture firms shall submit the Joint Venture Agreement or MoU of JV agreement or intendant JV agreement along with their EoI proposal clearly indicating the tasks assigned to each JV member and the identification of the lead JV member;

(vi) An Applicant must not submit more than one (1) EOI proposal as either a single entity or as a partner in JV.

D. Management competency of Consultant:

(i) Standard policies, procedures, and practices to assure quality interaction with clients and outputs including ISO registration;

(ii) Complaint handling mechanism concerning performance of experts or quality of the reports and internal controls to address and resolve complaints;

(iii) Strategy to improve quality of firm/association's performance for the assignment;

(iv) Firm/association's standard policies, procedures and practices for professional development and services;

STEP II: DETAILED EVALUATION OF CONSULTANTS

The Consultants determined ''Pass'' in the Step I, are further evaluated in the Step II. The cumulative Technical Competency of Consultant, Geographical Experiences of the Consultant, Qualification of Key Experts and Financial Capacity of the Consultant shall be considered in the evaluation. A scoring system is adopted to rank these firms in order of merit based on the criteria mentioned below. The maximum overall score that any Consultants can obtain is set at 1,000 points, which are distributed as follows:

Criteria 1:	Qualification of Key Experts	: 300 points
Criteria 2:	Experience of Consultant	: 600 points
Criteria 3:	Financial Capacity of the Consultant	: 100 points

STEP III: SHORT-LISTING OF CONSULTANTS

The Consultants or JV firms scoring less than 600 points out of total points of 1000 in detailed evaluation and 60% points in **Criteria-2. Experience of the Consultant** will not be qualified for short listing.

a) Rank the firms in order of merit according to the points secured by them;

b) Select the top six Consultants as short-listed firms, to which RFP will be addressed.

c) In case of JV, origin of Lead firms shall be considered for the Evaluation.

In case of tie of total scored marks between firms during evaluation, the firm with a greater number of project's experience on **the Sub Criteria 1.2.1 Detailed Engineering Design of Hydroelectric Projects having dam height not less than one hundred thirty-meter, 130 m**, will be prioritized.

E. EOI Forms & Formats

Form 1. Letter of Application

Form 2. Applicant's information

Form 3.Experience *(General, Specific and Geographical)*

Form 4. Capacity

Form 5. Qualification of Key Experts

1. Letter of Application

(Letterhead paper of the Applicant or partner responsible for a joint venture, including full postal address, telephone no., fax and email address)

Date: .....

To,

Full Name of Client: _____

Full Address of Client: _____

Telephone No.: _____

Fax No.: _____

Email Address: _____

Sir/Madam,

1. Being duly authorized to represent and act on behalf of (hereinafter "the Applicant"), and having reviewed and fully understood all the short-listing information provided, the undersigned hereby apply to be short-listed by ***[Insert name** of Client)* as Consultant for ***{Insert brief description** of Work/Services}*.

2. Attached to this letter are photocopies of original documents defining:

    a) the Applicant's legal status;

    b) the principal place of business;

3. ***[Insert name of Client]*** and its authorized representatives are hereby authorized to verify the statements, documents, and information submitted in connection with this application. This Letter of Application will also serve as authorization to any individual or authorized representative of any institution referred to in the supporting information, to provide such information deemed necessary and requested by yourselves to verify statements and information provided in this application, or with regard to the resources, experience, and competence of the Applicant.

4. ***[Insert name** of Client)* and its authorized representatives are authorized to contact any of the signatories to this letter for any further information.[1]

5. All further communication concerning this Application should be addressed to the following person,

    [Person]

    [Company]

    [Address]

[1] Applications by joint ventures should provide on a separate sheet, relevant information for each party to the Application.

[Phone, Fax, Email]

6. We declare that, we have no conflict of interest in the proposed procurement proceedings and we have not been punished for an offense relating to the concerned profession or business and our Company/firm has not been declared ineligible.

7. We further confirm that, if any of our experts is engaged to prepare the TOR for any ensuing assignment resulting from our work product under this assignment, our firm, JV member or sub-consultant, and the expert(s) will be disqualified from short-listing and participation in the assignment.

8. The undersigned declares that the statements made and the information provided in the duly completed application are complete, true and correct in every detail.

Signed :

Name :

For and on behalf of (name of Applicant or partner of a joint venture):

2. Applicant's Information Form

(In case of joint venture of two or more firms to be filled separately for each constituent member)

1. Name of Firm/Company:

2. Type of Constitution (*Partnership/ Pvt. Ltd/Public Ltd/ Public Sector/ NGO)*

3. Date of Registration / Commencement of Business *(Please specify):*

4. Country of Registration:

5. Registered Office/Place of Business:

6. Telephone No; Fax No; E-Mail Address

7. Name of Authorized Contact Person / Designation/ Address/Telephone:

8. Name of Authorized Local Agent /Address/Telephone:

9. Consultant's Organization:

10. Total number of staff:

11. Number of regular professional staff:

(Provide Company Profile with description of the background and organization of the Consultant and, if applicable, for each joint venture partner for this assignment.)

3. Experience

3(A). General Work Experience

(Details of assignments undertaken. Each consultant or member of a JV must fill in this form.)

S. N.	Name of assignment	Location	Value of Contract	Year Completed	Client	Description of work carried out
1.						
2.						
3.						
4.						
5.						
6.						
7.						

1. <u>Criteria-1:Experience of Consultant (600)</u>

1.1 General Experience of Consultant (200)

1.1.1 Detailed Engineering Design of Hydroelectric Projects having Installed Capacity not less than 500 MW.

☐Three or more projects ☐Two projects ☐ One project ☐ None

Project Details for above Experience:

S. No	Name of the project	Installed Capacity(MW)	Completed or Commissioned Year
1			
2			
3			

1.1.2 Detailed Engineering Design of Multipurpose Seasonal Reservoir type

Hydroelectric Projects having Installed Capacity not less than 500 MW.

☐Three or more projects ☐Two projects ☐ One project ☐ None

Project Details for above Experience:

S. No	Name of the project	Installed Capacity(MW)	Type of Project	Completed or Commissioned Year
1				
2				
3				
4				

3(B). Specific Experience

Details of similar assignments undertaken in the previous seven years
(In case of joint venture of two or more firms to be filled separately for each constituent member)

Assignment name:	Approx. value of the contract (in current NRs; US$ or Euro)[2]:
Country: Location within country:	Duration of assignment (months):
Name of Client:	Total No. of person-months of the assignment:
Address:	Approx. value of the services provided by your firm under the contract (in current NRs; US$ or Euro):
Start date (month/year): Completion date (month/year):	No. of professional man-months provided by the joint venture partners or the Sub-Consultants:
Name of joint venture partner or sub-Consultants, if any:	Narrative description of Project:

[2] Consultant should state value in the currency as mentioned in the contract

Description of actual services provided in the assignment: **Note: Provide highlight on similar services provided by the consultant as required by the EOI assignment.**

Firm's Name: _____

1.2. Specific Experience of Consultant (375 Points)

1.2.1 Detailed Engineering Design of Hydroelectric Projects having dam height not less than one hundred thirty-meter, 130 m.

☐Three or more projects ☐Two projects ☐ One project ☐ None

Project Details for above Experience:

S. No	Name of the project	Installed Capacity(MW)	Height of Dam(m)	Completed or Commissioned Year
1				
2				
3				
4				

1.2.2 Detailed Engineering Design of Tunnel of diameter nine (9) meter.

☐Three or more projects ☐Two projects ☐ One project ☐ None

Project Details for above Experience

S. No	Name of the project	Tunnel Diameter (m)	Completed or Commissioned Year
1			
2			
3			
4			

1.2.3 Detailed Engineering Design of Hydroelectric Projects having Underground Cavern of width not less than 16.0 meters.

☐Three or more projects ☐Two projects ☐ One project ☐ None

Project Details for above Experience

S. No	Name of the project	Type of Powerhouse	Width of Cavern	Completed or Commissioned

				Year
1				
2				
3				

1.2.4 Preparation of Tender Documents of Hydroelectric Projects funded by the multinational development agencies having Installed Capacity not less than 500 MW.

☐Three or more projects ☐Two projects ☐ One project ☐ None

Project Details for above Experience

S. No	Name of the project	Installed Capacity(MW)	Funding Agency	Completed or Commissioned Year
1				
2				
3				
4				

1.2.5 Construction Supervision of Hydroelectric Projects having Installed Capacity not less than 500 MW.

☐Three or more projects ☐Two projects ☐ One project ☐ None

Project Details for above Experience:

S. No	Name of the project	Installed Capacity(MW)	Completed or Commissioned Year
1			
2			
3			

3(C). Geographic Experience

Experience of working in similar geographic region or country

(In case of joint venture of two or more firms to be filled separately for each constituent member)

No	***Name of the Project***	***Location (Country/ Region)***	***Execution Year and Duration***

1.			
2.			
3.			
4.			
5.			
6.			
7.			

1.3 Geographical Experiences of Consultant (25 Points)

Evaluation under this criterion is based on the experience of Consultants in Detailed Engineering Design of hydroelectric projects, completed within the last seven (7) years proceeding from the last date of submission of EoI in the Asian Region. The cumulative experience of the JV partners shall be evaluated. The following is the breakdown of this particular criterion:

1.3.1 Detailed Engineering Design of Hydroelectric Projects with installed capacity not less than 500 MW in the Asian Region.

☐Three or more projects ☐Two projects ☐ One project ☐ None

Project Details for above Experience

S. No	Name of the project	Installed Capacity(MW)	Region / country	Completed or Commissioned Year
1				
2				
3				

4. Capacity

4(A). Financial Capacity

(In case of joint venture of two or more firms to be filled separately for each constituent member)

Annual Turnover	
Year	**Amount Currency**

- **Average Annual Turnover of Best of 3 Fiscal Year Of Last 7 Fiscal Years**

(Note: Supporting documents for Average Turnover should be submitted for the above.)

Criteria 3: Financial Capacity of the Consultant: 100 points

Evaluation under this criterion is based on the financial capacity of the Consultant (Average Annual Turnover (AAT) of Best of 3 Fiscal Year of Last 7 Fiscal Years in consulting business) from the last date of submission of EOI.

Note: For the purpose of determining the equivalent amount of the required amount of the required average annual turnover shall be provided in freely convertible currency. The exchange rate (Selling exchange rate) published by Nepal Rastra Bank prevailing on the last date of submission of EOI document shall be applied.

4(B). Infrastructure/equipment related to the proposed assignment[3]

No	Infrastructure/equipment Required	Requirements Description
1.	**NA**	**NA**
2.		
3.		
4.		
5.		

[3] *Delete this table if infrastructure/equipment for the proposed assignment is not required.*

5. Key Experts (Include details of Key Experts only)

(In case of joint venture of two or more firms to be filled separately for each constituent member)

SN	Name	Position	Highest Qualification	Work Experience (in year)	Specific Work Experience (in year)	Nationality
1						
2						
3						
4						
5						

(Please insert more rows as necessary)

Criteria-2: Qualification of Key Experts (300 Points)

P1. Project Manager/ Team Leader

Name of Professional:

A) Academic Qualifications:

S.N	Academic Degree	Graduation Years	Faculty	Program
1	Bachelor			
2	Masters			

B) Work Experience of Key Expert proposed

Years of Professional Experiences:……

I) As a Team Leader/ Project Manager

Professional experience in Detailed Engineering Design or Construction Supervision of successfully completed (Constructed and Commissioned) hydropower projects with capacity not less than 500 MW as Team Leader.

☐ Three or more projects ☐ Two projects ☐ One project ☐ None

Project Details for above Experience

S. No	Name of the project	Installed Capacity(MW)	Country	Position Held	No. of man month in the project	Project Commissioned Year (AD)
1						
2						
3						
4						

II) As a Hydropower Engineer

Professional experience in Feasibility Studies of successfully completed (Constructed and Commissioned) seasonal reservoir type hydropower project with installed capacity not less than 500 MW as Hydropower Expert.

☐ Three or more projects ☐ Two projects ☐ One project ☐ None

Project Details for above Experience

S. No	Name of the project	Installed Capacity(MW)	Country	Position Held	No. of man month in the project	Project Commissioned Year (AD)
1						
2						
3						
4						

Professional experience Detailed Engineering Design of successfully completed (Constructed and Commissioned) seasonal reservoir type hydropower projects with installed capacity not less than 500 as Hydropower Expert.

☐ Three or more projects ☐Two projects ☐ One project ☐ None

Project Details for above Experience

S. No	Name of the project	Installed Capacity (MW)	Country	Position Held	No. of man month in the project	Project Commissioned Year (AD)
1						
2						
3						
4						

Team leader must be full-time employee of the Consultant for the last **3 years**.

C) Regional Experience (Outside Home Country) within Asian Countries:

Regional experience in Detailed Engineering Design or Construction Supervision of at least one successfully completed (Constructed and Commissioned) hydropower project with capacity not less than 500 MW as Hydropower Expert

☐ Three or more projects ☐Two projects ☐ One project ☐ None

Project Details for above Experience

S. No	Name of the project	Installed Capacity(MW)	Country	Position Held	No. of man month in the project	Project Commissioned Year (AD)
1						
2						
3						

I, the undersigned, certify that to the best of my knowledge and belief, these data correctly describe me, my qualifications, and my experience.

_____Date: _____
[Signature of staff member and authorized representative of the consultant]Day/Month/Year

Full name of staff member:_____

Full name of authorized representative: _____

P2. Dam Engineer

Name of Professional:

A) Academic Qualifications:

S.N	Academic Degree	Graduation Years	Faculty	Program
1	Bachelor			
2	Masters			

B) Work Experience of Key Expert proposed

Years of Professional Experiences:……

Professional experience in Feasibility Studies of successfully completed (Constructed and Commissioned) seasonal reservoir type hydropower projects with dam height of at least 130 m as dam expert

☐ Three or more projects ☐Two projects ☐ One project ☐ None

Project Details for above Experience

S. No	Name of the project	Dam height (m)	Country	Position Held	No. of man month in the project	Project Commissioned Year (AD)
1						
2						
3						

Professional experience in Detailed Engineering Design of successfully completed (Constructed and Commissioned) seasonal reservoir type hydropower projects with dam height of at least 130 m as dam expert

☐ Three or more projects ☐Two projects ☐ One project ☐ None

Project Details for above Experience

S. No	Name of the project	Dam Height(m)	Country	Position Held	No. of man month in the project	Project Commissioned Year (AD)
1						
2						
3						

C) Regional Experience (Outside Home Country):

Regional experience in Detailed Engineering Design/ Construction Supervision of at least one successfully completed (Constructed and Commissioned) hydropower project with

capacity not less than 500 MW as Dam Expert.

☐ Three or more projects ☐Two projects ☐ One project ☐ None

Project Details for above Experience

S. No	Name of the project	Installed Capacity(MW)	Country	Position Held	No. of man month in the project	Project Commissioned Year (AD)
1						
2						
3						
4						

I, the undersigned, certify that to the best of my knowledge and belief, these data correctly describe me, my qualifications, and my experience.

_____Date: _____
[Signature of staff member and authorized representative of the consultant]Day/Month/Year

Full name of staff member:_____

Full name of authorized representative: _____

P3. Geologist

Name of Professional:

A) Academic Qualifications:

S.N	Academic Degree	Graduation Years	Faculty	Program
1	Bachelor			
2	Masters			

B) Work Experience of Key Expert proposed

Years of Professional Experiences:……

Professional experience in Feasibility Studies of successfully completed (Constructed and Commissioned) seasonal reservoir type hydropower projects with installed capacity not less than 500 MW, as geologist

☐ Three or more projects ☐Two projects ☐ One project ☐ None

Project Details for above Experience

S. No	Name of the project	Installed Capacity(MW)	Country	Position Held	No. of man month in the project	Project Commissioned Year (AD)
1						
2						
3						

Professional experience in Detailed Engineering Design of successfully completed (Constructed and Commissioned) seasonal reservoir type hydropower projects with installed capacity not less than 500 MW, as geologist

☐ Three or more projects ☐Two projects ☐ One project ☐ None

Project Details for above Experience

S. No	Name of the project	Installed Capacity(MW)	Country	Position Held	No. of man month in the project	Project Commissioned Year (AD)
1						
2						
3						

C) Regional Experience (Outside Home Country):

Regional experience in geological studies or design of at least one successfully completed (Constructed and Commissioned) hydropower project with capacity not less than 500 MW as geologist

☐ Three or more projects ☐ Two projects ☐ One project ☐ None

Project Details for above Experience

S. No	Name of the project	Installed Capacity(MW)	Country	Position Held	No. of man month in the project	Project Commissioned Year (AD)
1						
2						
3						
4						

I, the undersigned, certify that to the best of my knowledge and belief, these data correctly describe me, my qualifications, and my experience.

_____Date: _____
[Signature of staff member and authorized representative of the consultant]Day/Month/Year

Full name of staff member:_____

Full name of authorized representative: _____

P4. Geotechnical Expert

Name of Professional:

A) Academic Qualifications:

S.N	Academic Degree	Graduation Years	Faculty	Program
1	Bachelor			
2	Masters			

B) Work Experience of Key Expert proposed

Years of Professional Experiences:……

Professional experience in Feasibility Studies of successfully completed (Constructed and Commissioned) seasonal reservoir type hydropower projects with installed capacity not less than 500 MW, as Geotechnical expert

☐ Three or more projects ☐ Two projects ☐ One project ☐ None

Project Details for above Experience

S. No	Name of the project	Installed Capacity(MW)	Country	Position Held	No. of man month in the project	Project Commissioned Year (AD)
1						
2						
3						
4						

Professional experience in Detailed Engineering Design of successfully completed (Constructed and Commissioned) seasonal reservoir type hydropower projects with installed capacity not less than 500 MW, as Geotechnical expert

☐ Three or more projects ☐Two projects ☐ One project ☐ None

Project Details for above Experience

S. No	Name of the project	Installed Capacity(MW)	Country	Position Held	No. of man month in the project	Project Commissioned Year (AD)
1						

2						
3						

C) Regional Experience (Outside Home Country):

Regional experience in Detail Engineering Design or Construction Supervision of at least one successfully completed (Constructed and Commissioned) hydropower project with capacity not less than 500 MW as Geotechnical expert

☐ Three or more projects ☐Two projects ☐ One project ☐ None

Project Details for above Experience

S. No	Name of the project	Installed Capacity(MW)	Country	Position Held	No. of man month in the project	Project Commissioned Year (AD)
1						
2						
3						
4						

I, the undersigned, certify that to the best of my knowledge and belief, these data correctly describe me, my qualifications, and my experience.

_____Date: _____

[Signature of staff member and authorized representative of the consultant]Day/Month/Year

Full name of staff member:_____

Full name of authorized representative: _____

P5. Hydrologist/Sedimentology Expert

Name of Professional:

A) Academic Qualifications:

S.N	Academic Degree	Graduation Years	Faculty	Program
1	Bachelor			
2	Masters			

B) Work Experience of Key Expert proposed

Years of Professional Experiences:……

Professional experience in Feasibility Studies of successfully completed (Constructed and Commissioned) seasonal reservoir type hydropower projects with installed capacity not less than 500 MW, as Hydrologist/Sedimentology Expert

☐ Three or more projects ☐ Two projects ☐ One project ☐ None

Project Details for above Experience

S. No	Name of the project	Installed Capacity(MW)	Country	Position Held	No. of man month in the project	Project Commissioned Year (AD)
1						
2						
3						
4						

Professional experience in Detailed Engineering Design of successfully completed (Constructed and Commissioned) seasonal reservoir type hydropower projects with installed capacity not less than 500 MW, as Hydrologist/Sedimentology Expert

☐ Three or more projects ☐Two projects ☐ One project ☐ None

Project Details for above Experience

S. No	Name of the project	Installed Capacity(MW)	Country	Position Held	No. of man month in the project	Project Commissioned Year (AD)
1						
2						

3						

C) Regional Experience (Outside Home Country):

Regional experience in Detail Engineering Design or Construction Supervision of at least one successfully completed (Constructed and Commissioned) hydropower project with capacity not less than 500 MW as Hydrologist/Sedimentology Expert

☐ Three or more projects ☐Two projects ☐ One project ☐ None

Project Details for above Experience

S. No	Name of the project	Installed Capacity(MW)	Country	Position Held	No. of man month in the project	Project Commissioned Year (AD)
1						
2						
3						
4						

I, the undersigned, certify that to the best of my knowledge and belief, these data correctly describe me, my qualifications, and my experience.

_____Date: _____
[Signature of staff member and authorized representative of the consultant]Day/Month/Year

Full name of staff member:_____

Full name of authorized representative: _____

P6. Hydraulic Engineer

Name of Professional:

A) Academic Qualifications:

S.N	Academic Degree	Graduation Years	Faculty	Program
1	Bachelor			
2	Masters			

B) Work Experience of Key Expert proposed

Years of Professional Experiences:……

Professional experience in hydraulic design of project components of successfully completed (Constructed and Commissioned) seasonal reservoir type hydropower projects with capacity not less than 500 MW involving dam with height of at least 130 m and spillway of discharge capacity of 10,000 m^3/sec.

☐ Three or more projects ☐ Two projects ☐ One project ☐ None

Project Details for above Experience

S. N	Name of the project	Installed Capacity (MW)	Dam ht (m)	Spillway discharge capacity	Country	Position Held	No. of man month in the project	Project Commissioned Year (AD)
1								
2								
3								
4								

C) Regional Experience (Outside Home Country):

Regional experience in Detail Engineering Design or Construction Supervision of at least one successfully completed (Constructed and Commissioned) hydropower project with capacity not less than 500 MW as Hydraulic Expert

☐ Three or more projects ☐ Two projects ☐ One project ☐ None

Project Details for above Experience

S. No	Name of the project	Installed Capacity(MW)	Country	Position Held	No. of man month in the project	Project Commissioned Year (AD)
1						

2						
3						
4						

I, the undersigned, certify that to the best of my knowledge and belief, these data correctly describe me, my qualifications, and my experience.

_____Date: _____
[Signature of staff member and authorized representative of the consultant]Day/Month/Year

Full name of staff member:_____

Full name of authorized representative: _____

P7. Structure Engineer

Name of Professional:

A) Academic Qualifications:

S.N	Academic Degree	Graduation Years	Faculty	Program
1	Bachelor			
2	Masters			

B) Work Experience of Key Expert proposed

Years of Professional Experiences:……

Professional experience in feasibility study/detailed engineering design/construction supervision of successfully completed (Constructed and Commissioned) seasonal reservoir type hydropower projects with capacity not less than 500 MW and involving dam of at least 130 m height as a Structural Engineer.

☐ Three or more projects ☐ Two projects ☐ One project ☐ None

Project Details for above Experience

S. No	Name of the project	Installed Capacity(MW)	Dam height (m)	Country	Position Held	No. of man month in the project	Project Commissioned Year (AD)
1							
2							
3							
4							

C) Regional Experience (Outside Home Country):

Regional experience in Detail Engineering Design or Construction Supervision of at least one successfully completed (Constructed and Commissioned) hydropower project with capacity not less than 500 MW as Structure Engineer.

☐ Three or more projects ☐Two projects ☐ One project ☐ None

Project Details for above Experience

S. No	Name of the project	Installed Capacity(MW)	Country	Position Held	No. of man month in the project	Project Commissioned Year (AD)
1						

2						
3						
4						

I, the undersigned, certify that to the best of my knowledge and belief, these data correctly describe me, my qualifications, and my experience.

_____Date: _____
[Signature of staff member and authorized representative of the consultant]Day/Month/Year

Full name of staff member:_____

Full name of authorized representative: _____

P8. IWRM Expert

Name of Professional:

A) Academic Qualifications:

S.N	Academic Degree	Graduation Years	Faculty	Program
1	Bachelor			
2	Masters			

B) Work Experience of Key Expert proposed

Years of Professional Experiences:……

Professional experiences in feasibility study/detailed engineering design of successfully completed (Constructed and Commissioned) multipurpose type hydropower projects with capacity not less than 500 MW as IWRM Expert.

☐ Three or more projects ☐ Two projects ☐ One project ☐ None

Project Details for above Experience

S. No	Name of the project	Installed Capacity(MW)	Country	Position Held	No. of man month in the project	Project Commissioned Year (AD)
1						
2						
3						
4						

C) Regional Experience (Outside Home Country):

Regional experience in feasibility study/detailed engineering design of at least one successfully completed (Constructed and Commissioned) hydropower project with capacity not less than 500 MW as IWRM Expert

☐ Three or more projects ☐Two projects ☐ One project ☐ None

Project Details for above Experience

S. No	Name of the project	Installed Capacity(MW)	Country	Position Held	No. of man month in the project	Project Commissioned Year (AD)
1						
2						

3						
4						

I, the undersigned, certify that to the best of my knowledge and belief, these data correctly describe me, my qualifications, and my experience.

_____Date: _____
[Signature of staff member and authorized representative of the consultant]Day/Month/Year

Full name of staff member:_____

Full name of authorized representative: _____

P9. Power Regulatory Expert

Name of Professional:

A) Academic Qualifications:

S.N	Academic Degree	Graduation Years	Faculty	Program
1	Bachelor			
2	Masters			

B) Work Experience of Key Expert proposed

Years of Professional Experiences:……

Professional experience in power market studies and power system planning, evacuation studies, load forecasting, electricity pricing, and various aspects of regional power trade, technical issues related to systems interconnection, system control, and regulations in at least one successfully completed (Constructed and Commissioned) hydropower project with capacity not less than 500 MW as Power Regulatory Expert.

☐ Three or more projects ☐ Two projects ☐ One project ☐ None

Project Details for above Experience

S. No	Name of the project	Country	Installed Capacity(MW)	Position Held	No. of man month in the project	Project Commissioned Year (AD)
1						
2						
3						
4						

C) Regional Experience (Outside Home Country):

Regional experience in feasibility study/detailed engineering design of at least one successfully completed (Constructed and Commissioned) hydropower project with capacity not less than 500 MW as Power System Engineer

☐ Three or more projects ☐Two projects ☐ One project ☐ None

Project Details for above Experience

S. No	Name of the project	Installed Capacity(MW)	Country	Position Held	No. of man month in the project	Project Commissioned Year (AD)
1						
2						

3						
4						

I, the undersigned, certify that to the best of my knowledge and belief, these data correctly describe me, my qualifications, and my experience.

_____Date: _____
[Signature of staff member and authorized representative of the consultant]Day/Month/Year

Full name of staff member:_____

Full name of authorized representative: _____

P10. Contract Specialist

Name of Professional:

A) Academic Qualifications:

S.N	Academic Degree	Graduation Years	Faculty	Program
1	Bachelor			
2	Masters			

B) Work Experience of Key Expert proposed

Years of Professional Experiences:……

Professional experience in bidding document preparation of successfully completed (Constructed and Commissioned) multipurpose type hydropower projects with capacity not less than 500 MW as contract specialist

☐ Three or more projects ☐Two projects ☐ One project ☐ None

Project Details for above Experience

S. No	Name of the project	Country	Type of Project (m)	Installed Capacity (MW)	Position Held	No. of man month in the project	Project Commissioned Year (AD)
1							
2							
3							
4							

C) Regional Experience (Outside Home Country):

Regional experience in bidding document preparation of successfully completed (Constructed and Commissioned) hydropower projects with capacity not less than 500 MW as contract specialist.

☐ Three or more projects ☐Two projects ☐ One project ☐ None

Project Details for above Experience

S. No	Name of the project	Installed Capacity(MW)	Country	Position Held	No. of man month in the project	Project Commissioned Year (AD)
1						
2						

3						
4						

I, the undersigned, certify that to the best of my knowledge and belief, these data correctly describe me, my qualifications, and my experience.

_____Date: _____
[Signature of staff member and authorized representative of the consultant]Day/Month/Year

Full name of staff member:_____

Full name of authorized representative: _____

N1. Deputy Team leader/ Hydropower Expert (Local)

Name of Professional:

A) Academic Qualifications:

S.N	Academic Degree	Graduation Years	Faculty	Program
1	Bachelor			
2	Masters			

B) Work Experience of Key Expert proposed

Years of Professional Experiences:……

Professional experience in Feasibility Studies of successfully completed (Constructed and Commissioned) hydropower projects with installed capacity not less than 20 MW as hydropower expert shall

☐ Three or more projects ☐ Two projects ☐ One project ☐ None

Project Details for above Experience

S. No	Name of the project	Country	Position Held	No. of man month in the project	Project Commissioned Year (AD)
1					
2					
3					

Professional experience in Detailed Engineering Design of successfully completed (Constructed and Commissioned) hydropower projects as hydropower expert with installed capacity not less than 20 MW as hydropower expert

☐ Three or more projects ☐ Two projects ☐ One project ☐ None

Project Details for above Experience

S. No	Name of the project	Country	Position Held	No. of man month in the project	Project Commissioned Year (AD)
1					
2					
3					

I, the undersigned, certify that to the best of my knowledge and belief, these data correctly describe me, my qualifications, and my experience.

_____Date: _____
[Signature of staff member and authorized representative of the consultant]Day/Month/Year

Full name of staff member:_____

Full name of authorized representative: _____

CURRICULUM VITAE (CV)

Position Title and No.	{e.g., K-1, TEAM LEADER}
Name of Firm	Insert name of firm proposing the expert
Name of Expert:	{Insert full name}
Date of Birth:	{day/month/year}
Citizenship	

Education: {List college/university or other specialized education, giving names of educational institutions, dates attended, degree(s)/diploma(s) obtained}

_____

_____

Employment record relevant to the assignment: {Starting with present position, list in reverse order. Please provide dates, name of employing organization, titles of positions held,type of employment (full time, part time, contractual),types of activities performed and location of the assignment, and contact information of previous clients and employing organization(s) who can be contacted for references. Past employment that is not relevant to the assignment does not need to be included.}

Period	**Employing organization and your title/position. Contact information for references**	**Country**	**Summary of activities performed relevant to the Assignment**
[e.g., May 2005-present]	[e.g., Ministry of ……, advisor/consultant to… For references: Tel……/e-mail……; Mr. Bb, deputy minister]		

Membership in Professional Associations and Publications:

_____

Language Skills (indicate only languages in which you can work): _____

_____

Adequacy for the Assignment:

Detailed Tasks Assigned on Consultant's Team of Experts:	**Reference to Prior Work/Assignments that Best Illustrates Capability to Handle the Assigned Tasks**
{List all deliverables/tasks as in TECH- 5 in which the Expert will be involved)	

Expert's contact information: (E-mail…… phone……)

Certification:

I, the undersigned, certify to the best of my knowledge and belief that

(i) This CV correctly describes my qualifications and experience
(ii) I am not a current employee of the GoN (Applicable to National Expert)
(iii) In the absence of medical incapacity, I will undertake this assignment for the duration and in terms of the inputs specified for me in Form TECH 6 provided team mobilization takes place within the validity of this proposal.
(iv) I was not part of the team who wrote the terms of reference for this consulting services assignment
(v) I am not currently debarred by a multilateral development bank (In case of DP funded project]
(vi) I certify that I have been informed by the firm that it is including my CV in the Proposal for the {name of project and contract}. I confirm that I will be available to carry out the assignment for which my CV has been submitted in accordance with the implementation arrangements and schedule set out in the Proposal.
(vii) I declare that Corruption Case is not filed against me.

I understand that any willful misstatement described herein may lead to my disqualification or dismissal, if engaged.

_____ Date: _____
[Signature of expert] Day/Month/Year

_____ Date: _____
[Signature of authorized representative of the firm] Day/Month/Year

Full name of authorized representative:

_____