

REQUEST FOR PROPOSAL FOR CONSULTING SERVICES

This is national competitive bidding document.
Please read the section –"Guide lines and scope of
works thoroughly". For clarification,if any, please
contact the following address.

tilak.limbu@aepc.gov.np

**Alternative Energy Promotion Centre (AEPC)
Renewable Energy for Rural Livelihood (RERL)**

REQUEST FOR PROPOSAL FOR CONSULTING SERVICES

Title of Consulting Services

Conducting Detailed Feasibility Study (DFS) of Sanni Gad Mini Hydro Project , Kalikot

Project Name : Renewable Energy for Rural Livelihood (RERL)

Office Name :Alternative Energy Promotion Centre (AEPC)

Office Address :Khumaltar Height, Lalitpur, Nepal

Financing Agency: RERL

Date of RFP Issue: 18 April 2018

Deadline for Submission of RFP: 2 May 2018

Date.....

Dear Sir/Madam

Subject: Conducting Detailed Feasibility Study (DFS) of Sanni Gad Mini Hydro Project, Kalikot

Please study the evaluation criteria and provide the relevant information

To enable you to submit a proposal, attached are:

- i. Instruction to OfferorAnnex I
- ii. General Terms and Conditions of the ContractAnnex II
- iii. Proposal Submission FormAnnex III
- iv. Financial Proposal Submission Form.....Annex IV
- v. Terms of Reference (TOR).....Annex V

Your offer comprising of both a technical proposal and a financial proposal, in a separate sealed envelopes, should reach the following address no later than **2 May 2018**

The National Programme Manager
Renewable Energy for Rural Livelihood (RERL)
Khumaltar Height, Lalitpur, Nepal
Phone: 01 5539390, 5539391, Fax: 01 5542397
Website: <http://www.aepc.gov.np/rerl/>
Email : rerl@aepc.gov.np

If you required additional information, we are ready to provide information, but any delay in providing such information will not be considered a reason for extending the submission date of your proposal.

Yours sincerely,

Mr. Satish Gautam
National Programme Manager(NPM)

A.Introduction

1. General

The purpose of this RFP is to invite technical and financial proposals from the potential consulting firms who have skill, knowledge and expertise for "**Conducting Detailed Feasibility Study (DFS) of Sanni Gad Mini Hydro Project, Kalikot**".

2. Cost of Proposal

The offeror shall bear all costs incurred during submitting the proposal. The offeror shall bear all costs associated with the preparation and submission of the proposal. RERL will in no case be responsible or liable for those costs, regardless, of the conduct or outcome of the evaluation of this proposal.

B. Solicitation Documents

3. Contents of solicitation documents

Proposals must offer services for total requirement. The Offeror is expected to examine all corresponding instructions; forms, terms and specifications contained in the solicitation Documents. Failure to comply with these documents will be at the offeror's risk and may affect the evaluation of the Proposal.

4. Clarification of solicitation documents

The offerors requiring any clarification of the Solicitation Documents can forward their queries in the following email address

Email: tilak.limbu@aepc.gov.np

5. Amendment of solicitation documents

At any time prior to the deadline for submission of proposals, the RERL may, for any reason, whether at its own initiative or in response to a clarification requested by a shortlisted Offeror, modify the Solicitation Documents by amendment.

All offerors that have received the Solicitation Documents will be notified in writing of all amendments to the Solicitation Documents. In order to afford prospective Offerors reasonable time in which to take the amendments into account in preparing their offers, RERL will notify in time.

C. Preparation of Proposals

6. Applying for providing services

The Offerors need to read the RFP including the ToR and prepare proposal accordingly. The proposal must address all the requirements of the proposal including required documents.

7. Language of the proposal

The proposal prepared by the Offeror and all correspondence and documents relating to the proposal exchanged by the Offeror and the RERL shall be written in the English language.

8. Documents comprising the proposal

The proposal shall comprise the following **mandatory documents**:

- a. Proposal submission form
- b. Organizational Profile/Brochure—describing the nature of business, field of experience, licenses, certification and accreditations
- c. Valid registration and renewal certificate
- d. VAT certificate
- e. Tax Clearance Certificate of 2073/74
- f. Track records of Human resource- with list of similar services relevant to objective and scope of works included in this RFP.
- g. CVs of proposed human resources signed by concern individual
- h. The proposal must provide clear methodology to meet the activities proposed for completing this task

9. Proposal form

The Offeror shall structure the operational and technical part of its proposal as follows:

i. Proposed methodology

This section should demonstrate the Offeror's responsiveness to the specification by identifying the specific components proposed, addressing, the requirements, as specified, point by point, providing a detailed description of the essential performance characteristics proposed warranty; and demonstrating how the proposed methodology meets or exceeds the specifications. **This section should explain clearly how the required information as mentioned in the scope of work in the attached ToR will be collected and analyzed.**

Pricing information shall be separated and only contained in the appropriate Price Schedules.

It is mandatory that the Offeror's Proposal numbering system corresponds with the numbering system used in the body of this RFP. All the references to descriptive material and brochures should be included in the appropriate response paragraph, though material/documents themselves may be provided as annexes to the Proposal/response.

Information which the Offeror considers proprietary, if any, should be clearly marked "proprietary" next to the relevant part of the text and it will then be treated as such accordingly.

ii. Summary Sheet

The Offeror is required to prepare a summary sheet (Table 1) with information related to design of mini/small hydropower projects.

Table 1 Summary sheet

SN	Name of the program/project	Contract agency	Duration	Amount of contract

iii. Qualification of the Service Provider

As per attached ToR

iv. Human Resource Requirement

As per the attached ToR

10. Proposal prices

The Offeror shall indicate on an appropriate Price Schedules, the price of a service it proposes to supply under the contract. The VAT should be included in the offer, if applicable. The tax will be deducted at source as per prevailing tax rule of the government.

11. Proposal currencies

All prices shall be quoted in the Nepalese Rupees (NRs)

12. Period of validity of proposals

Proposals shall remain valid for One Hundred And twenty (120) days after the date of the Proposal submission prescribed by the RERL, pursuant to the deadline clause. A Proposal valid for a shorter period may be rejected by RERL on the grounds that it is non-responsive.

In exceptional circumstances, the RERL may solicit the Offeror's consent to an extension of the period of validity. The request and the responses there to shall be made in writing. An Offeror granting the request will not be required or permitted to modify its proposal.

13. Format and signing of Proposals

The Offeror shall prepare the Proposal. The Proposal shall be in typed or written in indelible ink and shall be signed by the Offeror or a person or persons duly authorized to bind the Offeror to the contract. The latter authorization shall be indicated by written power-of-attorney accompanying the proposal.

The Proposal shall contain no interlineation, erasures, or overwriting except, as necessary to correct errors made by the Offeror, in which case such corrections shall be initialed by the person or persons signing the proposal.

14. Estimated Completion Date

The desired delivery date for completion of this task is **3 months**.

15. Payment

The RERL shall effect payments to the Contractor/Offeror after acceptance by the RERL of the invoices submitted by the Contractor/Offeror. The payments will be made in installment basis based on deliverables.

The payments shall be made in two parts as shown below

(i)	20% of the total cost of detailed feasibility study	Upon signing contract
(i)	30% of the total cost of detailed feasibility study	Upon submission of draft report
(ii)	50% of the total cost after submission of detailed Feasibility study final report	Approval from concerned Authority

D. Submission of Proposals

16. Sealing and marking of Proposals

The Offeror shall seal (lahachhap) the proposal in one outer and two inner envelopes, as detailed below.

- (i) The outer envelope shall be

Addressed to:

The National Project Manager
Renewable Energy for Rural Livelihood (RERL)
Khumaltar Height, Lalitpur, Nepal
Phone: 01 5539390, 5539391, Fax: 01 5542397
Website: <http://www.aepc.gov.np/rerl/>
Email: rerl@aepc.gov.np

And,

Marked with:

"Conducting Detailed Feasibility Study (DFS) of Lower Sanni Gad Mini Hydro Project, Kalikot "

- (ii) Both inner envelopes shall indicate the name and address of the Offeror. The first inner envelope shall contain the information specified in clause 8 (Proposal Form) above. The second inner envelope shall include the price schedule and price schedule of individual Offeror duly identified as such.

NOTE, if the inner envelopes are not sealed and marked as per the instructions in this clause, the RERL will not assume responsibility for the Proposal's misplacement or premature opening.

17. Deadline for the submission of Proposals

Proposals must be received by the RERL at the address specified under clause *Sealing and Marking of Proposals* no later than **17:00 hrs, 2, May 2018.**

RERL may, at its own discretion extend this deadline for the submission of Proposals by amending the solicitation documents in accordance with clause *Amendments of Solicitation Documents*, in which case all right and obligations of the RERL and Offerors previously subject to the deadline will thereafter be subject to the deadline as extended.

18. Late Proposals

Any Proposals received by RERL after the deadline for the submission of Proposals, pursuant to clause *Deadline for the submission of Proposals*, will be rejected.

19. Modification and withdrawal of the Proposals

The Offeror may withdraw its proposal after the Proposal's submission, provided that written notice of the withdrawal is received by the RERL prior to the deadline prescribed for the submission of the Proposals.

The Offeror's withdrawal notice shall be prepared, sealed, marked, and dispatched in accordance with the provisions of the Clause *Deadline for Submission of Proposals*. The withdrawal notice may also be sent by telex or fax but followed by a signed confirmation copy.

No proposal may be modified subsequent to the deadline for the submission of the Proposals.

No Proposal may be withdrawn in the interval between the deadline for submission of proposals and the expiration of the period of the Proposal validity specified by the Offeror on the Proposals Submission Form.

E. Opening and evaluation of the Proposals

20. Opening of proposals

The RERL will open the Proposals in the presence of AEPC and UNDP representatives at RERL office.

21. Clarification of the proposals

To assist in the evaluation and comparison of Proposals, the Purchaser may at its discretion, ask the Offeror for clarification of its Proposal. The request for clarification and the response shall be written form and no change in price or substance of the Proposals shall be sought, offered or permitted.

22. Preliminary examination

The Procurer will examine the Proposals to determine whether they are complete, whether any computational errors have been made, whether the documents have been properly signed, and whether the Proposals are generally in order.

Arithmetical errors will be rectified on the following basis: If there is a discrepancy between the unit price and the total price that is obtained by multiplying the unit price and quantity, the unit price errors, its proposal will be rejected. If there is a discrepancy between the words and figures the amount in words will prevail.

Prior to the detailed evaluation, the Procurer will determine the substantial responsiveness of each Proposal to the request for Proposals (RFP). For the purposes of these clauses, a substantially responsive Proposal is one which confirms to all the terms and conditions of RFP without material deviations. The producer's determination of a proposal's responsiveness is based on the contents of the proposal itself without recourse to extrinsic evidence.

23. Evaluation and comparison

Method of Selection: Quality Cost Based Selection

Total Score (100%) = Technical Evaluation (70%) + Financial Evaluation (30%)
Maximum Total Score = 1000

The Financial Proposal carries a total score of 300 points. The points for the financial proposal will be allocated as per the following formula:

$$\frac{\text{Lowest Bid Offered}^*}{\text{Bid of the Firm/Offeror}} \times 300$$

* "Lowest Bid Offered" refers to the lowest aggregate price offered by proposers scoring at least 70% points in Technical Evaluation.
 The Contract will be awarded to the (agency/Organization/Firm) Offeror scoring the highest combined scores (Technical and Financial).

Technical evaluation criteria will be as follows: **Pass marks for technical evaluation shall be 70%**

Summary of technical proposal evaluation form	Score weight	Point obtainable
Expertise of the firm submitting proposal	35%	350
Methodology, its appropriateness to the ToR, condition and timeliness of the implementation plan	35%	350
Qualification and experience of personnel	30%	300
Total		1000

Form 1: Criteria for evaluation of expertise of the firm

SN	Criteria	Obtainable points	Company/Firm				
			A	B	C	D	E
1	General experience of firm	20					
1.1	Experience less or equal to 3 year	10					

1.2	Experience more than 3 year	20					
2	Experience of firms on Hydropower	330					
2.1	Greater or equal to two DFS preparation below 1000kW	100					
2.1	Up to 2 Detailed feasibility study above 1000kW	200					
2.2	Greater than 2 detailed Feasibility Study above 1000kW	330					

Form 2 Criteria for evaluation of approach, methodology and appropriateness

SN	Criteria	Obtainable points	Company/Firm				
			A	B	C	D	E
1	Approach and methodology	200					
2	Innovative Approach for the task	100					
3	Timeline plan	50					
	Sub-total	350					

Form 3. Criteria for evaluation of proposed human resources

	Resource	Criteria	Obtainable points	Company				
				A	B	C	D	E
1	Team Leader (Hydropower Expert)-(One)	As in ToR	100					
1.1	General Experience		60					
1.2	Additional Experience		40					
2	Electrical Design Engineer-(One)	As in ToR	40					
2.1	General Experience		30					
2.2	Additional Experience		10					
3	Civil Structural Engineer (One)	As in Tor	40					
3.1	General Experience		30					
3.2	Additional Experience		10					
4	Mechanical Design Engineer –(One)	As in ToR	40					
4.1	General Experience		30					
4.2	Additional Experience		10					
5	Environment and Social safeguard Expert (one)	As in ToR	40					
6	Geologist-(One)	As in ToR	40					
		Subtotal	300					

B. Award of contract

24. Award criteria, award of contract

The RERL reserves the right to accept the proposal or reject all proposals at any time prior to award of the contract, without thereby any liability to the affected Offeror or any obligation to inform the affected Offeror or Offerors of the grounds for the Purchaser's action prior to the expiration of the period of proposal validity, the RERL will award the contract to the qualified

Offeror whose proposal after being evaluated is considered to be the most responsive to the needs of the organization and activity concerned.

25. Purchaser's right to vary requirements

The purchaser reserves the right at the time of award of the contract to vary the quantity of services and goods specified in the RFP without any change in price or other terms and conditions.

26. Signing of the conditions

After the evaluation of the proposals, **a selected Offeror will be asked to enter into contract.** Within 5 days of the receipt of the contract, the successful Offeror shall sign and date the contract and return it to the purchaser.

General Terms and Conditions of the Contract

1. Independent Relationship

Nothing contained in the contract shall be construed as establishing or creating between Government and the Organization the relationship of a master and a servant or principal and agent, it being understood that the Organization is an independent person vis-à-vis Government.

2. Organization /Expert/Consultant's General Responsibilities

- The organization shall carry out services under this contract with due diligence and efficiency and in conformity with the highest standards of professionals and ethical competence and integrity.
- The Organization shall act at all times so as to protect, and not be in conflict with the interests of Government.
- The organization shall be responsible for the professional and technical services provided by him/her in the implementation of this contract.

3. Workmen's compensation and other insurance

The organization shall make his/her own arrangements regarding insurance for the medical expenses and for an accident, death and permanent disability for the period of this contract. All costs involved will be borne by the Organization.

4. Source of Instruction

The organization shall neither seek nor accept instructions from any authority other than NPC/RERL's authorized agent in connection with the performance of services under this contract.

5. Prohibition on conflicting activities

The Organization shall ensure that he/she will not directly/indirectly engage in any activity that would conflict with those of RERL in respect of this evaluation.

6. Officials no to benefit

The Organization warrants that no RERL has been or will be admitted by him/her to any direct/indirect benefit arising from this contract or award thereof.

7. Assignment

The Organization shall not assign, transfer, pledge or make other disposition of this contract or any other parts thereof rights, claims or obligations under this contract, without prior written approval of RERL.

8. Records, Accounts, Information and Audit

- The organization shall maintain accurate and systematic records and accounts in respect of the services to be performed under this contract.
- The Organization shall furnish, compile or make available at all times to RERL any records or information, oral or written, which RERL may reasonably request for in respect of the services to be performed under this contract.
- The Organization shall allow RERL or its authorized agents to inspect and audit all such records or information upon reasonable notice.

9. Language

Unless otherwise specified in this contract, english language shall be used by the Organization in all written communications to RERL with respect to the services rendered and with respect to all documents procured or prepared pertaining to such services.

10. Equipment of property

Equipment or property furnished to the organization with funds supplied or reimbursed by the RERL or its agent shall be the property of the RERL and such equipment shall be returned to the duly authorized official of RERL upon completion of the services, conclusion of this contract or upon completion of the services, conclusion of this contract or upon termination thereof or when no longer required by the Organization. Such equipment or property when returned to RERL shall be in the same conditions as when delivered to the Organization, subject to the normal wear and tear. The organization shall in any event, be liable to RERL for the loss of or damage to such equipment or property through his/her fault or negligence.

11. Confidential Nature of Documents

All maps, drawings, photographs, mosaics and plans.

12. Amendments

The terms and conditions of this contract may be amended only in writing signed by both parties to this contract or their duly authorized representatives.

13. Obligation to Inform RERL of change in condition

The organization shall promptly and fully notify RERL in writing of any conditions, which interferes, or threatens to interfere, with successful carrying out of the services under this contract. Such notice shall not however relieve the Organization of his/her obligations to continue to provide services under this contract. Upon receipt of such notice, RERL shall take such action as in its sole discretion it considers to be appropriate or necessary under the circumstances.

14. Taxation

The Organization shall be liable for any tax levied on the remuneration and allowances paid as per this contract. Income tax on the remuneration and allowances paid to the organization will be deducted at source.

Proposal Submission Form (Company Letter Head)

The National Programme Manager
Renewable Energy for Rural Livelihood (RERL)
Khumaltar Height, Lalitpur, Nepal
Phone: 01 5539390, 5539391, Fax: 01 5542397
Website: <http://www.aepc.gov.np/rerl/>
Email: rerl@aepc.gov.np

Dear Sir,

Having examined the Solicitation Documents, the receipt of which is hereby duly acknowledged, we, the undersigned, offer to provide services to conduct evaluation of the "**Conducting Detailed Feasibility Study (DFS) of Sanni Gad Mini Hydro Project, Kalikot**" for the sum as may be ascertained in accordance with the Price Schedule attached herewith and made part of this proposal.

We undertake, if our proposal is accepted, commence and complete delivery of all services specified in the contract within the time frame stipulated.

We agree to abide by this Proposal for a period of 120 days from the date fixed for opening of Proposals in the invitation for proposal, and it shall remain binding upon us and may be accepted at any time before the expiration of that period.

We understand that you are not bound to accept any proposal –whole or part –you may receive.

Dated this day/Month of year

Signature
Name
Position
Stamp

Duly authorized to sign Proposal for and on behalf of

Annex IV

Financial Proposal Submission Form

PRICE SCHEDULE

The Consulting Firm/Contractor is asked to prepare the Price Schedule alongwith the cost breakdown (as provided in this annex IV below) in separate envelop. All prices/rates quoted must be inclusive of all taxes. The Price Schedule must provide a detailed cost breakdown. Provide separate figure for each functional grouping or category. The format shown on the following pages should be used in preparing the Price Schedule. The format includes specific expenditures, which may or may not be required or applicable but are indicated to serve as the examples. Therefore, it should be considered as broad guidelines for Price Schedule (s).

Cost Breakdown by Cost Component

Financial Proposal

Detailed Feasibility Study

S.N.	Particulars	Unit	Quantity	Rate	Total Amount(NRs)
1.0	Secondary data collection				
	Gauge and precipitation data from Department of Hydrology and Meterology	LS	1		
	Geological map and topographical map	LS	1		
2.0	Field Work				
	Field visits by Design team/ Engineers	LS	1		
	Detail Topographical Survey	LS	1		
	Detail Transmission and distribution survey	LS	1		
	Gauge Installation	Nos	1		
	Discharge Measurement	Nos	1		
3.0	Design and report preparation				
	Hydrological analysis	Nos	1		
	Geological study & Investigation (Surface Only)	Nos	1		
	Design of project components	Nos	1		
	Project layout and optimization	Nos	1		
	BoQ and Costing	Nos	1		

	Financial analysis	Nos	1		
	Electromechanical Designs	Nos	1		
	Hydro mechanical design	Nos	1		
	Drawing preparation	Nos	1		
	Report preparation and Printing	Nos	1		
4.0	Equipment Rentals	LS	1		
5.0	Base cost(1+2+3+4)				
6.0	VAT (13 % of base cost)				
	Grand Total (5+6)				

Total in
words.....

Annex V: Terms of Reference For “Conducting Detailed Feasibility Study (DFS) of Sanni Gad Mini Hydro Project, Kalikot”

Introduction

Alternative Energy Promotion Centre (AEPC) is the apex government body under the ministry of science, technology and environment which was established on 1996 with the objective of promotion of Renewable Energy Technologies in Nepal. Renewable Energy for Rural Livelihood (RERL) Programme has been implementing from 1 April 2011 upon the successful completion of the Rural Energy Development Program (REDP).

The RERL intends to support National Rural and Renewable Energy Programme (NRREP) being executed by AEPC in emerging sector of RETs such as in mini hydro, mini grid and centralized solar system. Creating enabling policy environment to enhance private and public sector capacities for manufacturing and installations of electro-mechanical equipment to match the increasing demands of RE sector is also a major focus of AEPC/RERL.

One of the main focus of RERL is to promote less disseminated technologies like mini hydro in Nepal. RERL is currently providing technical support to NRREP in implementing mini hydro in different parts of Nepal. In this context, RERL has received a request from developers in Kalikot district for conduction of detailed feasibility study (DFS) of a project named Sanni gad mini hydro project in Kalikot district.

Objectives

The objective of the assignment is to prepare detailed feasibility study report (DFS) of Sanni Gad mini hydro Project.

Scope of Work

The installed capacity shall be below 1000kW.

The scope of work shall include following, but shall not necessarily be limited to the following .

Scope of work for Detailed Feasibility Study (DFS). Details of scope of works is provided in

ANNEX-V-I

Inputs from AEPC/RERL

- AEPC/RERL budget and relevant documents/materials and information
- Input from relevant AEPC/NRREP/RERL/SASEC personnel.

Human Resource Requirement

A team of technical experts are should carry out the assignment. One of the experts shall compulsorily be a team leader with the following requirements.

- a) Team Leader-1 (Hydropower Expert)-(One)

The team leader should have at least master degree in civil engineering with 10 years of experience in mini/small hydropower. The team leader will be responsible for coordinating activities pertaining to the activities mentioned in this ToR. The team leader shall be responsible for overall quality control. The team leader should also possess a strong working knowledge in mini hydro sector, quality management system. In addition, S/he should have experience of preparation of at least 3 DFS of Mini /Small Hydropower. The team leader shall be the focal point for communication between RERL and the bidder firm.

b) Electrical Expert-(One)

The expert should have bachelors in electrical engineering at least 3 years of experience or in mini/small hydro sector, design/ drawing. S/he should have through knowledge of the technical parameters, guidelines and standards of mini hydro as well as quality assurance of the sector.

c) Mechanical Expert –(One)

The expert should have bachelors in mechanical engineering at least 3 years of experience in mini/small hydro sector, design/ drawing. S/he should have through knowledge of the technical parameters, guidelines and standards of mini hydro as well as quality assurance of the sector.

d) Structural Expert-(One)

The expert should have bachelors in civil engineering and at least 3 years of experience or in civil structural design work. Experience in mini/small hydro sector, design/ drawing/ structural design is a must. S/he should have through knowledge of the technical parameters, guidelines and standards of mini hydro as well as quality assurance of the sector

e) Geologist-(One)

The expert should have Bachelors in geology with 3 years of experience in similar jobs. S/he should have experience working in hydropower project.

f) Environment and social safeguard expert-(One)

The expert should have Bachelors in relevant discipline with 3 years of experience. Experience working in hydropower project is an added advantage.

g) Assistant Engineer –(One)

Consultant/firm/organization should have a support staff for the field verification of mini/micro hydro power project with Certificate level and 3 years of experience in mini hydro survey.

h) Surveyor-(One)

Consultant/firm/organization should have a surveyor for the field verification of mini/micro hydro power project with Bachelor in civil engineering or surveying and at least 3 years of

experiences in mini hydro survey and design. S/he should have experience of conduction of survey using total station in mini and small hydro.

Qualification of Firm

- a) Must be working in the field related to mini hydropower/Large hydropower for at least 3 years.
- b) Experience in preparation of renewable energy studies/business plan preparation, preferably in mini hydropower is an additional advantage

Deliverables

The consultant will submit the following to RERL in the timeline stipulated below:

- Sanni gad mini hydro DFS draft Report : Within 2 months after signing the contract
- Sanni gad mini hydro DFS Final report : Within 3 month after signing the contract.

Time

The duration of this task shall be 3 months from the date of signing the contract agreement with AEPC/RERL.

Guidelines and Scope of WorksFor Detailed Feasibility Study

1	Topographical Survey and Mapping	
1.1	Topographical Survey	Please refer to " <u>Guidelines for Detailed Feasibility Studies of mini hydro projects, June 2014</u> " Published by AEPC. All standards and quality shall be as per Chapter-2 confirming to clauses [2.3, 2.3.2, , 2.3.4, 2.3.5] Note: Insufficient survey points and points extracted from existing topographic maps will not be accepted.RERL will verify the visit of the survey teams independently.
1.1	Mapping and Plotting	As per Chapter- 2 confirming to clauses [2.3.3 and Table 2.1]
2	Hydrological Investigation	
2.1	Hydrology	<p>a) Collect the long term historical rainfall data and climatological data pertinent to the study area.</p> <p>b) Collect the long term historical flow data and sediment data of the river under study, if available; if not, collect the data from other river with similar hydrological characteristics in the vicinity.</p> <p>c) Assess the mean monthly flows.</p> <p>d) Develop a flow duration curve.</p> <p>e) <u>Establish a Gauge station at the intake site.</u></p> <p>f) <u>Carry out discharge measurements at the intake site. Minimum of 3 sets of measurement should be carried out at a space of 2 months.</u></p> <p>g) Estimate the design floods for the structures for the return periods of 50, 100 and 200 years.</p> <p>h) Conduct flood frequency analysis for the period October to May for ascertaining diversion flood. The frequency of diversion flood should be 1 in 20 years.</p> <p>i) Carry out three cross-section surveys at the headwork site and three at the tailrace site covering the highest flood marks.</p> <p>j) Compute the peak flood discharge corresponding to the flood marks at the intake site and tailrace site.</p> <p>k) Develop rating curves for the intake site and tailrace site.</p> <p>l. Assess the potentiality of GLOF in the catchment, if any.</p>
3	Geological and Construction material	
3.1	Geological, Geophysical Study, Geotechnical Study and Mapping	<ul style="list-style-type: none"> • review available geological, geophysical and geotechnical data • carry out geological and geo-technical studies necessary for design point of view at feasibility study level study of the project • interpretation of findings of studies and synopsis of all the findings

		of geological, engineering geological, geophysical and geo-technical investigations, tests
3.2	Construction Material	Please refer to " <u>Guidelines for Detailed Feasibility Studies of mini hydro projects, June 2014</u> " Published by AEPC. All standards and quality shall be as per Chapter-2 confirming to clauses [2.5.4]
4	Selection of project configuration	<p>a) Topographical and geological conditions of the alternative sites should be studied in the field in order to select the proper locations of the following structures: Weir, Desander, Canal, Forebay, penstock and Powerhouse. The locations and types of the structures should be selected after comparison of alternatives.</p> <p>b). General layout of the project should be prepared using the topo map plotted after field survey.</p> <p>c) All comparison of alternative schemes of the project, based on the various locations of the structures, should be carried out in order to select the optimum alternative scheme. The criteria should be the maximum energy benefit at minimum cost</p>
5	Optimization Studies	
5.1	Optimization	<p>1) General Approach</p> <p>a. Selection of parameters to be optimized, identify their range and establish a series of alternatives.</p> <p>b. Carry out the conceptual design, and estimate its cost for each alternative.</p> <p>c. Estimation of benefits for each alternative.</p> <p>d. Comparison of Cost and Benefits</p> <p>2) Assumptions</p> <p>a. Price of firm energy</p> <p>b. Price of secondary energy</p> <p>c. Capacity benefit</p> <p>3) Selected Alternatives</p> <p>a. Determine number of alternatives within the range of installed capacities.</p> <p>4) Energy Production</p> <p>a. For ROR projects calculate energy production for all alternatives with following consideration:</p> <ul style="list-style-type: none"> - 80% exceedence flow and average monthly flows to be used. - Firm and Secondary energy to be calculated. <p>5) Project Layout</p> <p>a) Optimize project structures individually for the given installed capacity.</p> <p>b) As the installed capacity increases, design of weir and undersluice to be kept constant.</p> <p>c) Size of desander to be adjusted.</p> <p>e.) Surge chamber dimension and penstock dimension to be optimized for a given installed capacity.</p>

		<p>f) Powerhouse and unit sizes to be obtained from empirical formula.</p> <p>6) Cost Estimate</p> <p>a) Preliminary quantity and cost estimates should be developed for all the cases considered.</p> <p>b) Only the major items should be computed in detail, while minor items may be estimated based on curves and data of similar structures of other projects.</p> <p>c) Unit rates should be estimated based on the data of recent projects undertaken by NEA and private sector with some modifications.</p> <p>d) Electro-mechanical equipment costs should be calculated using empirical relations.</p> <p>f) Technical contingencies should be taken into account for obtaining the implementation cost of the alternative.</p> <p>7) Economic Comparison</p> <p>a) Economic comparison of the different alternatives should be carried out considering the implementation cost and operation cost with occurred benefits due to energy production for each case.</p> <p>b) The economic analysis should be carried out to determine the basic economic parameters like Net Present Value (NPV), Internal Rate of Return (IRR), Benefit Cost Ratio (B/C), etc.</p> <p>c) The case with maximum B/C ratio and rate of return should be selected for optimum installed capacity.</p> <p>8) Number of Units</p> <p>a) Minimum possible number of units should be adopted.</p> <p>b) Limitation of transport capabilities should be taken into consideration.</p>
6	Project Description and Design	
6.1	General Layout and civil structures	<p>1. General Layout: The general layout of the selected scheme of the project comprising headworks, headrace tunnel, penstock, powerhouse and tailrace should be described.</p> <p>2) Civil Structures</p> <p>i) River Diversion a. An upstream coffer dam should be designed in order to protect the working area at weir site, to divert the river flow. A downstream cofferdam should also be provided to protect the weir construction site from entering the river flow after out flow from diversion channel (tunnel). The diversion channel (tunnel) should be designed to pass the flood of 1 in 20 years return period.</p> <p>ii) Headworks</p> <p>a) Design and description of the headworks comprising weir, undersluice spillway, intake, desander, etc. should be provided.</p> <p>b) The weir should be designed to divert the river flow to the power channel through desander according to topographical and geological conditions. It should be capable of passing the maximum flood of 1 in 100 years return period. Stability analysis of the weir should be done 1 in 200 year.</p> <p>c) A under sluice structure of headworks should be designed to pass a</p>

		<p>portion of the high flood discharge. However, during the low flow season, the design discharge should be allowed to flow through the intake by closing the sluice gates.</p> <p>d) Side Intake –Head Regulator: The hydraulic design of side intake should ensure the entry of the required design flow into the headrace canal.</p> <p>e) Desilting basin: Desilting basin should be designed for continuous supply of required design flow in the power canal and continuous flushing of permissible deposited suspended sediments of size greater than 0.2 mm in diameter. An emergency automatic spillway should be provided for the desilting basin.</p> <p>iii) Power Canal /Pipe</p> <p>a) The power canal / pipe including all hydraulic and cross-drainage structures from intake to forebay/powerhouse should be designed to convey the required design flow.</p> <p>iv) Forebay</p> <p>a) The forebay basin should be designed to create pressure flow in the penstock leading to turbines. The forebay levels should be determined is such a way that it will be possible to avoid entrance of air into the penstock during maximum drop of water level at sudden opening of turbine valves.</p> <p>v) Penstock</p> <p>a) Optimum diameter of penstock pipe should be determined. The thickness of the steel pipe should be able to with stand any variable load conditions to be encountered during operation of the plant. Anchor blocks for supporting penstock pipe should also be designed at appropriate places. The bifurcation of the penstock should also be designed. Surface type or cut and cover type should be decided on the basis of the topographic and environmental considerations.</p> <p>vi) Power Station Powerhouse</p> <p>a) A brief description of power station should be provided with the types and number of equipment, and power execution facilities</p> <p>b) The dimension of the powerhouse should be planned to accommodate all electro-mechanical equipment.</p> <p>c.) The dimensions of spiral casing and the draft tube should also be determined.</p> <p>3. Stability Analysis for Hydraulic size to the civil Structures.</p>
6.2	Electromechanical Equipment	<p>i) Mechanical Equipment</p> <p>a) Selection of the type and determination of main parameters of the following essential and main mechanical equipment should be carried out: - Hydraulic Turbine; - Inlet valve; - Governor; - Lubricating system; - Pressure oil system; - Compressed air system; - Cooling system; - Control system.</p> <p>b) The description of the equipment mentioned above should be provided.</p> <p>ii) Electrical Equipment</p>

		<p>a) Following electrical equipment for the generation and evacuation of the power should be described with the determination of the main Parameters: - Generator; - Excitation system; - Switch gears; - Control panel; - Switchyard; - Transmission line</p> <p>b) A single line electrical diagram depicting the inter connection of all electrical equipment should be prepared.</p> <p>iii) Auxiliaries a. For the smooth operation of the power station, following auxiliaries should be provided: - Grease Lubricating system. - Firefighting system - Station supply - Lifting arrangement.</p>
7	Energy computation and benefit Assessment	
7.1		<p>1. Energy Computation</p> <p>a) Energy computation should be based on: - Reference hydrology (average flow) for average annual energy 80% reliable average monthly flow in the lowest flow month for firm energy. - Assumed design parameters (net head, turbine discharge, installed, consideration of compensation flow, installed capacity). b. Secondary energy is computed as average annual energy minus firm energy. Secondary energy available on monthly basis should also be presented.</p> <p>2. Benefit Assessment</p> <p>a) There are two kinds of benefits accruable capacity and energy. Energy benefit could further be splitted into firm energy and secondary energy benefits. Values for power and firm energy benefits should be based either on generation costs of other potential similar size hydropower projects in Nepal considering hydropower in the cheaper alternative than others (i.e., LRMC of hydro-generation in Nepal) or on perverting selling price to NEA under Power Purchase Agreement. For Secondary energy at the most thermal, fuel displacement value could be taken. In no case, the values for capacity benefit should exceed the value of dry season peaking capacity</p>
8	Estimation Methodology	
8.1	For Civil Works	<p><u>a) For Civil Works:</u> The cost estimates should be based on unit rates developed from prevailing labour rate, construction equipment rate and materials taking also into account the local situation and bill of quantities derived from design drawings. The cost estimate should be done by breaking down major structures into number of distinct construction activities or measurable pay items</p> <p>Due consideration should be given to local labors. The rates for locally available labors can be obtained from 'District rates' of concerned districts and can be used after appropriate adjustments. The rates of skilled labors available around project area or within Nepal can be obtained from general inquiries and references of other projects.</p> <p>The rates of construction equipment can be taken from regularly updated cost data, quotation from the suppliers/ manufacturers.</p>

The construction material to be used for construction work should be divided into

- Materials locally available
- Materials to be imported from India
- Materials to be imported from Overseas

The rates of construction materials should be derived accordingly as their source of supply. While calculating the construction materials rate, sufficient attention should also be given to mode of transportation and their corresponding costs should also be included. When access roads for the project is not built (generally for small hydropower projects) the cost of air transportation for transporting heavy equipment from nearest town to the project area should also be included.

From labor cost, material cost and equipment cost the direct cost per unit of construction activity can be calculated. The estimate should be of contractor's type and, therefore, should also include all other indirect costs such as office overhead, contractor's financing cost, insurance, bonds, profit and risk margin. A suitable percentage for contractor's expenses should be allocated. The total percentage should be used as a bid factor on direct cost. Thus calculated direct cost can be used to derive unit bid costs which in turn, be used to determine the total civil works cost.

b. For Generating Equipment: The cost estimate for generating equipment should either be based on quotations obtained from suppliers or in-house estimate using established current international prices/ relationships. The cost should include cost of control devices/ system, auxiliary etc. transportation and erection.

c. Hydraulic Steel Works: The cost of hydraulic steel works should be based on quotation of suppliers or on market price if they are locally available. Transportation cost should also be added.

d. Transformers, Switchyard and Transmission Line: The cost of transformer and switchyard could be based on capacity, while for estimate of cost of transmission line can be calculated from per km rates of transmission line. References of cost can be taken from current rates used by Nepal Electricity Authority for same type/ voltage of transmission lines taking into account different types of towers required, the conductors and types of terrains being crossed.

e. Land Acquisition and Access Road: Due attention should be given to costing of land acquisition and construction of access road as well. The length and type of access roads to be constructed or to be improved can be determined from preliminary design. Cost per km of different types of roads can be used to determine the cost of access road.

f. Camp and Other Facilities: The costs of construction camps and permanent buildings required for operation and also of construction power facilities required should be included in cost estimation. A lump sum amount for this can be allocated depending upon magnitude of

		project.
8.2	Base Cost and Total Project Cost	<p>At feasibility level, due to use of more detailed information collected and minor items included and designs concretized, level of uncertainties will decrease particularly in civil work component. Hence a maximum of 15% contingency for this item would be reasonable. Reference Contingency:</p> <p>Electro-mechanical, hydro-steel structure, and transmission line : 10% of construction work Coverage of general item and preparatory works including establishment of diesel plant : 8% of construction work Coverage for administration and engineering construction including detailed design and investigation of the project : 10% of construction work Coverage for land acquisition and compensation 1% (of the direct cost)</p>
9	Construction and Planning Schedule	
		<p>1) Transportation a. Access road to the project site should be described with various alternatives. Most economical combination of transport should be selected. b. A description of the transportation through India covering the nearest sea port and railway or road transport should be analyzed for import of plant equipment and construction material.</p> <p>2) Construction Power a. Various means of construction power supply should be studied consisting the electric power supply from NEA grid and individual diesel generating sets. Most reliable and feasible option should be selected.</p> <p>3) Construction Camps and Telecommunication a. Sites for temporary conveys for the labours, fatching and crushing plants, workshops, fuel depots and permanent camps for operators' village and site office should be selected and described. b. Power line communicant facilities should be provided for communication with load dispatch centre (LDC) of NEA. Local telecommunication network should also be extended to project site.</p> <p>4) River Diversion During Construction a. A plan for diversion of the river during construction should prepare. It will consist the construction of cofferdams and diversion channel. The sequence of the construction of diversion structures should be inter related to the construction of headworks structures like weir, spillway, intake and desander.</p> <p>5) Project Implementation Schedule a. Project implementation schedule should be prepared. It should consist all the major construction activities in sequence with inter linkage between them. Significant milestones should be indicated in the</p>

		bar chart of schedule.
10	Project Evaluation	
10.1	Financial Analysis	<p>a) In performing financial analysis, the financial internal rate of return (FIRR) and the loan reputability are examined based on financing conditions. The financial cost should include, besides economic cost, duties, taxes, price escalation and interest during construction. The benefits will comprise the revenue generation from the sales of energy. As a result of the financial analysis, the financial cash flow showing operating expenses, debt service (loan repayment), royalty and tax payments is required to be presented. All assumptions including finalizing conditions made for the analysis need to be clearly stated and FIRR determined.</p> <p>b) A brief analysis of Best available technology (BAT)</p>
10.2	Sensitivity Analysis	<p>a. Sensitivity analysis are required to be performed in general, for the following cases: - Varied discounted rates (say 8% to 14%), - Capital cost decreased/ increased by 20% - Wet season available energy gets market. - Delay in commissioning (say 1 yr., 2 yr., effect of cost and time overruns</p>

As part of deliverables, all design sheet, design calculations, drawings need to be provided as a soft copy