



Government of Nepal
Ministry of Energy
Department of Electricity Development
Anamnagar, Kathmandu

Expression of Interest (EOI)

For

Detail Engineering Design of Lower Hongu
Khola Small Hydropower Project (23.5 MW),
Solukhumbu District
Job No. 2071/72-19

Budget Head: 308012-4

March, 2015



Government of Nepal
Ministry of Energy
Department of Electricity Development
Anamnagar

Invitation for Expression of Interest (EOI) for Consultancy Services

(Date of First Publication 2071-12-5)

1. As per the program for fiscal year 2071/72, the Government of Nepal (GoN) intends to conduct the following jobs as indicated in the table below using funds allocated by GoN. Hence, Department of Electricity Development (DoED) intends to prepare separate lists of competent local consulting firms for each of the Jobs indicated below. This Invitation for Expression of Interest (EOI) is made to invite applications from interested and eligible local consulting firms registered in Nepal under GoN rules & regulations and/or their joint ventures (JV) for the jobs.

Job No.	Job Title
2071/72-8	Feasibility Study and Initial Environment Examine (IEE) Study of Lower Chamelia Hydropower Project (20 MW)
2071/72-11	Detail Geo-Technical Studies Including Topographical Survey Studies of Sharda-Babai Hydropower Project (93 MW), Salyan/Dang
2071/72-16	Environmental and Social Impact Study of Karnali (Chisapani) Multipurpose Project
2071/72-17	Energy Price and Power Market Study of Karnali (Chisapani) Multipurpose Project
2071/72-18	Detailed Engineering Design of Siwa Khola Small Hydropower Project
2071/72-19	Detailed Engineering Design of Lower Hongu Khola Small Hydropower Project
2071/72-20	Detailed Engineering Design of Inkhu Khola Small Hydropower Project
2071/72-21	Detailed Engineering Design of Budhi Ganga Khola Small Hydropower Project
2071/72-22	Pre-feasibility study of Upper Jhimruk Storage Project
2071/72-23	Rehabilitation of hydrological station and installation of cable way for hydrological/sediment observation, updating & collection of hydrological/sediment data, & Hydrological Model study at Chisapani, Karnali River

2. The consulting firm can apply either singly or in JV. The number of consulting firms in a JV should not exceed three including the lead firm. In addition, same consulting firm is not allowed to enter into more than one JV for the same Job.
3. EoI documents could be obtained free of cost during office hours on all government working days within 15th day of first date of publication of this notice from Procurement Unit of DoED or can be downloaded from the website <http://www.doed.gov.np> or <http://www.moen.gov.np>. The instructions to applicants, prescribed formats, evaluation criteria, and detail information as well as the indicative Terms of Reference for the Job is provided in Annex along with EoI document.



4. Duly completed EoI documents in hard copy should be submitted for each Job separately to the address mentioned below clearly mentioning the name of the Job in sealed envelopes before 12 Noon (NST-Nepal Standard Time) within 16th day of first publication of this notice :

The Director General
Department of Electricity Development
Anamnagar, Kathmandu
Tel: 4480326, Fax: 4480257, Email: sandipdev@hotmail.com

5. If the deadline specified herein falls on a government holiday, the deadline shall be extended automatically to the next working day at the same hour.
6. Duly completed EoI documents received after the due date & time, shall be considered late, summarily rejected and returned un-opened.
7. The completed EoI documents received by the due date and within the specified time shall be opened at 14:00 (NST) on the 16th day of first date of publication of this notice in the presence of the applicants or their authorized representative who-so-ever wish to attend. Absence of the applicant or their authorized representatives, however, shall not obstruct or prevent the opening of the EoI in any way.
8. The EoI documents received from the applicants will be evaluated on the basis of the approved eligibility and evaluation criteria. The evaluation of EoI application of JV consulting firm(s) will be done in cumulative basis. Only six top ranked consulting firm obtaining at least 50 % marks in the EoI evaluation process will be shortlisted for each job and considered as qualified firms.
9. Request for Proposal (RFP) for each Job will be issued to qualified short listed firms for respective Job for the submission of Technical and Financial Proposal. The Quality and Cost Based Selection (QCBS) procedure will be used for final selection of the consulting firm.
10. DoED reserves the right to accept or reject any or all EoI applications with or without giving any reason whatsoever.
11. Further information on this EoI can be obtained from above address of DoED during office hours in all working days prior to the deadline of submission of EoI.



1. INSTRUCTIONS TO APPLICANTS

1.1 INTRODUCTION

1.1.1 Scope of Qualification

1. The Department of Electricity Development (DoED) intends to prepare lists of competent local consulting firms to conduct studies for Detail Engineering Design of Lower Hongu Khola Small Hydropower Project (23.5 MW), Solukhumbu District. This Invitation for Expression of Interest (EoI) is made to invite applications from interested and eligible local consulting firms registered in Nepal under GoN rules & regulations and/or their joint ventures separately for the job.

1.1.2 Definition of Terms

Unless otherwise specified, the following terms used in this EoI have the following meanings:

“Applicant” means a single consulting firm or their joint venture that intends to submit or submit completed EoI document as per notice and this EoI document.

“Authorized Representative” means an individual authorized by the Applicant as the duly authorized entity to legally bind the Applicant to the EoI process, is the authorized signatory to the process, and is the point of contact for DoED in connection with the process.

“Bidder” means a successful Applicant those are short listed under this EoI and submits Technical and Financial proposal in response to RFP.

“DoED” means the Department of Electricity Development

“EIA” means Environmental Impact Assessment

"EPA" means Environment Protection Act, 1997

"EPR" means Environment Protection Regulation, 1997

“GoN” means Government of Nepal

“IEE” means Initial Environmental Examination

“IT” means Income Tax

“JV” means Joint Venture

“Lead Firm” means an entity or firm that is the authorized leader of a team comprising the Lead Firm and its constituents to submit the EoI and perform the assignment.

“EoI” means Expression of Interest

“MOSTE” means Ministry of Science, Technology and Environment

“MOEn” means Ministry of Energy

“NEA” means Nepal Electricity Authority

“PRoR” means Pondage run of river

“RoR” means Run of river

“Project” means the Hydropower Project intended for study under this EoI and RFP

“RFP” means a Request for Proposal

"T/L" means Transmission Line

“TOR” means Terms of Reference

“VAT” means Value Added Tax

"DED" Detailed Engineering Design



1.1.3 Eligible Applicants

1. In order to be eligible, the consulting firms should be registered in Nepal under GoN rules & regulations and should submit valid registration certificate, VAT registration certificate and Income Tax Clearance Certificate for FY 070/71. These eligibility certificates shall be notarized by authorized entity.
2. In addition, the Applicant (consulting firms) should submit Self Declaration as per clause 40 – 2 (e) of Public Procurement Rule, 2064 mentioning their eligibility, non-conflict of interest, non receipt of any punishment while doing consulting business and litigation history (if any). In case of JV, the consultants should submit Self Declaration either separately or jointly by signing each member of JV mentioning information requested in Self Declaration.
3. In case of Joint Venture, the consulting firms shall submit Joint Venture Agreement duly signed & stamped with company seal by each member & clearly mentioning name of the lead firm, name of JV partners, role and responsibility of each member, name and signature of the authorized signatories. The authorized signatories of JV agreement should hold power of attorney from their respective firm. In any case, the firm/firms are not allowed to enter into more than one joint venture for same job.
4. In addition, in case of joint venture the total number of consulting firms including the lead firm should not exceed a maximum of three numbers in joint venture. The minimum share percentage of the lead firm should be at least 40% and that of other JV partners should be at least 20%. The lead firm should have an Average Annual Turnover of at least NRs. 30 millions on average in the best three fiscal years among last five consecutive fiscal years.
5. If the consulting firm or any member of joint venture does not meet eligibility criteria mentioned above, the consulting firm will be considered as non-eligible and will not be considered for further evaluation.

1.2 GENERAL INSTRUCTION TO CONSULTANTS

1.2.1 Clarification on EoI Documents

A prospective Applicant requiring any clarification on this EoI document may seek clarification by contacting DoED during office hours on all working days prior to the deadline for submission of the completed EoI document at the address mentioned below

Contact person

Sandip Kumar Dev

Senior Divisional Engineer

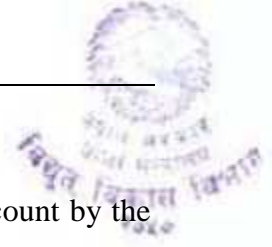
Procurement Unit

DoED, Anamnagar, Kathmandu

Tel:- 4480218, 4480276, 4496800 Ext:-3202 Fax:- 4480257

1.2.2 Amendment to EoI Documents

1. At any time prior to the deadline for the submission of the completed EoI document, DoED may amend the EoI, for any reason, whether on its own initiative or in response to a clarification requested by an Applicant.
2. All Applicants will be notified in writing about the amendments. All Applicants will be bound by the amendments. Applicants will be required to acknowledge receipt of any amendment within three business days of such receipt. Otherwise, DoED will



assume that the information contained in the amendment is taken into account by the Applicant in its Application.

1.2.3 Cost of Preparation of EoI and Liability

Applicant shall bear all costs associated with the preparation and submission of the EoI document. DoED will, in no case, be responsible or liable for these costs, or have any other liability to any Applicant, regardless of the conduct or outcome of the EoI process. DoED shall have no obligation to any Applicant to reimburse any costs incurred in preparing a response to this EoI.

1.2.4 Confidentiality of the Document

If an Applicant believes that any portion of the submittal is to be treated in confidence, he/she shall identify such information clearly in the submittal. DoED will make every effort to treat such documents in confidence as far as possible.

1.2.5 Joint Liability for Joint Venture Firms

By submitting an EoI in joint venture, the Applicant represents that, if qualified and if awarded the contract after the RFP process, the Applicant with its constituent members shall be jointly responsible to perform the obligations of such contract.

1.3 SUBMISSION OF EXPRESSION OF INTEREST (EOI)

1.3.1 Sealing and Marking

1. The Applicant shall seal the one original and one copy of the completed EoI in separate envelopes, duly marking the envelopes as “Original” and “Copy”. These envelopes shall then be sealed in an outer envelope and marked as “Expression of Interest”. The inner as well as outer envelope should clearly mention the Job number and title of consulting Job.
2. The inner and the outer envelopes shall be addressed to:
The Director General
Department of Electricity Development
Anamnagar, Kathmandu
Tel: 4480326, Fax: 4480257
3. The envelopes should also indicate the name and address of the Applicant for identification purposes.
4. The Applicant shall also submit an electronic copy of the EoI documents. However, the evaluation of the EoI document shall be done only based on the hard copy of the EoI application submitted by the applicant.

1.3.2 Deadline for Submission



1. The completed EoI document must be submitted to DoED at the address specified in Section 1.3.1 before 12:00 hr Nepal Standard Time (NST) **within 16th day from the date of first publication of this notice.**
2. The completed EoI documents received by DoED after the deadline set forth in Section 1.3.2 (1) shall be considered late and shall be summarily rejected and returned un-opened.
3. If the deadline specified herein falls on a government holiday, the deadline shall be extended automatically to the next working day at the same hour.

1.3.3 Withdrawal of EoI document

An Applicant shall not be permitted to withdraw the EoI Application that has been submitted.

1.4 PUBLIC OPENING OF SUBMITTED EOI DOCUMENT

The completed EoI documents received by the due date and within the time specified in Clause 1.3.2 (1) will be opened at 14.00 hrs NST on the 16th day of first date of publication of this notice in the presence of the applicants or their authorized representative who-so-ever wish to attend. Absence of the applicant or their authorized representative, however, shall not obstruct or prevent the opening of the EoI in any way. Applicants' each designated representative must bring a letter from the applicant stating that he/she is authorized to represent the applicants for the public opening of the EoI document. Applicants or their authorized representatives who are present at the time of opening shall sign in a register evidencing their presence.

During the opening, an authorized representative of DoED will read out the names of the applicants who have submitted the completed EoI document and then will open the submitted EoI envelopes.

1.5 PREPARATION OF THE EOI DOCUMENT

Detail procedure for preparation of EoI documents is given in section – 2.

1.6 EVALUATION PROCESS

DoED will carry out evaluation of the EoI documents based on the criteria approved by DoED. Anything not mentioned in this document regarding the EoI process shall be governed by the prevailing Public Procurement Acts and Regulations of Nepal.

The evaluation of EoI documents will be done in two stages (i) Screening of EoI Application of all firms for eligibility; and (ii) Evaluation of EoI document of eligible firms.

i) Screening of EoI Application of all firms for eligibility

The basic criteria for the eligibility of applicants are as follows:

A. Eligibility Requirement



i	Notarized Copy of Valid Registration Certificate
ii	Notarized Copy of VAT Certificate
iii	Notarized Copy of Income Tax Clearance Certificate for FY 070/71.
iv	Self Declaration as per clause 40 – 2 (e) of Public Procurement Rule, 2064 mentioning their eligibility, non-conflict of interest, non receipt of any punishment while doing consulting business (In case of JV, the consultants should submit Self Declaration either separately or jointly by signing each member of JV mentioning information requested in Self Declaration)

Note: Each member of the JV shall submit the above eligibility documents.

In addition in case of Joint Venture, following documents should be provided

i	Joint Venture Agreement between the JV Partners duly signed & stamped with company seal by each member & clearly mentioning name of the lead firm, name of JV partners, role and responsibility of each member, name and signature of the authorized signatories. (In any case, the firms are not allowed to enter into more than one joint venture for same job)
ii	Power of attorney of authorized signatories of JV agreement from their respective firm with signature & seal for each member of JV.
iii	The total number of consulting firms including the lead firm should not exceed a maximum of three numbers in joint venture
iv	The minimum share percentage of the lead firm should be at least 40% and that of other JV partners should be at least 20%.
v	Power of attorney to lead firm from JV partners
vi	The lead firm should have an Average Annual Turnover of at least NRs. 30 millions on average in the best three fiscal years among last five consecutive fiscal years.

Consulting firm or any member of joint ventures, failing to submit above basic criteria or if do not meet eligibility criteria mentioned above, the consulting firm will be considered as non-eligible and will not be considered for further evaluation.

(ii) Evaluation of EoI document of eligible firms

The basic criteria for the evaluation of EoI documents are as follows:

B. Mark allotted for EoI evaluation

SN	Description
i	Financial Capability of the Firm – 20 Marks .
ii	Specific Experience of the firm in last five years – 55 Marks
iii	Personnel proposed to be deployed for this project (Qualification and Experience) – 25 Marks



Detail Evaluation Criteria of the EoI document are as follows:

<u>S.N</u>	<u>Description</u>		<u>Marking</u>	<u>Weightage</u>
A	Financial Capability of the Firm		20	
	I	Average Annual Turn Over in million of best three years of last five consecutive fiscal years (In case of JV, the cumulative of average annual of JV will be considered)		20.00
	a	> 50	100%	
	b	40 to 50	85%	
	c	30 to < 40	70%	
	d	< 30	0%	
B	Experience of the firm:		55	
	I	General Work Experience of the firm		10.00
	a	More than 15 years of experience	100%	
	b	10 to 15 years of experience	85%	
	c	5 to less than 10 years of experience	70%	
	d	Less than 5 years of experience	0%	
	II	Work experience of the firm in Detail Engineering Design of Hydropower Projects in last 5 Years. (Project having capacity less than 5 MW will not be considered)		25.00
	a	Carried out detailed engineering design of hydropower projects with cumulative capacity of more than 25 MW	100%	
	b	Carried out detailed engineering design of hydropower projects with cumulative capacity of more than 15 MW upto 25 MW	85%	
	c	Carried out detailed engineering design of hydropower projects with cumulative capacity of ≥ 5 MW upto 15 MW	70%	
	III	Work experience of the firm in Feasibility Study/Detail Project Report (DPR) Study Hydropower Projects in last 5 Years. (Project having capacity less than 5 MW will not be considered)		15.00
	a	Carried out feasibility study/detail project report (DPR) study of hydropower projects with cumulative capacity of more than 50 MW	100%	
	b	Carried out feasibility study/detail project report (DPR) study of hydropower projects with cumulative capacity of more than 25 MW upto 50 MW	85%	



	c	Carried out feasibility study/detail project report (DPR) study of hydropower projects with cumulative capacity of ≥ 5 MW upto 25 MW	70%	
IV		Work experience of the firm in EIA or IEE Study of Project in last 5 Years. (Only one project will be considered)		5.00
	a	Experience in EIA study of hydropower project	100%	
	b	Experience in IEE study of Hydropower project	85%	
	c	Experience in IEE or EIA study of transmission line or other water resources projects.	70%	
Proposed Key Professionals of the Firm (Qualification & Experience)			<u>25</u>	
I		Qualification of the Key Personnel: Marks will be equally distributed among the list of key Personnel /Professionals		5
	i	Ph. D. / Master Degree Holders	100%	
	ii	Bachelor Degree Holders	85%	
II		Experience of the Key Professionals:		20
	a	Team Leader (Minimum 20 years of experience after graduation and should have qualification of Masters degree in relevant subject)	1*1.8 = 1.80	
	b	Hydropower Engineer, Structural Engineer and Contract /Procurement Specialist (Minimum 15 years of experience after graduation and should have qualification of Masters degree in relevant subject)	3*1.4 =4.20	
	c	Engineering Geologist, Geotechnical Engineer, Seismologist, Economist/ Financial Analyst, Environmental Engineer/ Environmentalist, Sociologist/ Anthropologist, Zoologist/Aquatic Life Expert, Botanist/ Ecologist/ Forest Expert (Minimum 10 years of experience after graduation and should have qualification of Masters degree in relevant subject)	8*1 = 8.00	
	d	Hydrologist, Hydraulic Engineer, Road Engineer, Civil Engineer/Autocad Engineer, Electrical Engineer, Mechanical Engineer and Cost Estimator (Minimum 10 years of experience after graduation and should have qualification of Bachelor degree in relevant subject)	7*0.75 = 5.25	
	e	Senior Surveyor (Minimum 10 years of experience after senior survey training and should have qualification of at least senior survey training)	1*0.75 = 0.75	
			Total Marks	100.00

Note:



- a) i. The relevant figures/numbers of the each members of joint venture shall be added together to calculate cumulative figures/numbers of the joint venture's for the purpose of evaluation.
- ii. In the event of any discrepancy between the original and the copy, the original shall govern.
- b) i. The experience of the firm should be supported with evidence/proof of experience/ completion certificates showing the project size and date of completion of the assignment. The experience of the firm without evidence/proof or experience certificate or approval letter will not be considered for evaluation.
- ii. For experience of the firm in EIA/IEE study projects, the EIA/IEE study of projects which were approved as per the prevailing Environmental Protection Act, 1997 and the Environmental Protection Rule 1997 will only be considered for evaluation. **For the evidence of EIA/IEE approval, EIA/IEE approval letter shall be submitted.**
- c) i. The Professional hired from outside or part time will be evaluated with only 80 % weightage for its marks obtained.
- ii. Employee of Government (Public) or Semi Government or Government affiliated institution's employee need to submit official no objection letter to provide consultancy services. Failure to submit no objection letter of these professionals, evaluation of such professional will not be done.
- iii. If the same key professional is proposed by two or more firms/JV (entity) for the jobs of Detail Engineering Design (four jobs) of notice dated 2071-11-..... , marks will not be given for such professional.
- iv. Similarly, same key personnel should not be proposed for more than one designation of Detail Engineering Design. If proposed so, marks will not be given for such professional.

List of Key Personnel/Professionals

<u>SN</u>	<u>Designation</u>	<u>Required No.</u>
1	Team Leader	1
2	Hydropower Engineer	1
3	Engineering Geologist	1
4	Geotechnical Engineer	1
5	Seismologist	1
6	Hydrologist	1
7	Senior Surveyor	1
8	Hydraulic Engineer	1
9	Structural Engineer	1
10	Road Engineer	1
11	Civil Engineer/Autocad Engineer	1
12	Electrical Engineer	1



13	Mechanical Engineer	1
14	Cost Estimator	1
15	Economist/Financial Analyst	1
16	Contract /Procurement Specialist	1
17	Environmental Engineer/Environmentalist	1
18	Sociologist/Anthropologist	1
19	Zoologist/Aquatic Life Expert	1
20	Botanist/Ecologist/Forest Expert	1

1.6.1 Screening of EoI Applications

In this stage, a screening of received EoI document will be done based on approved eligibility criteria. Each Consultant must 'pass' each and every criteria of eligibility. Any Consultant not complying with any one of these criteria is disqualified from further evaluation.

1.6.2 Evaluation of EoI Documents

In second stage, the EoI document of eligible firms (Consultants determined "Pass" in Stage I), will be further evaluated based on (i) Capability of Consultant, (ii) General and Specific Work Experience of the Applicant and (iii) Qualification and Experience of the Key Professional proposed for the study.

Applicants obtaining at least 50 % marks in the EoI evaluation process shall be shortlisted as per the approved EoI Document for this Job.

1.6.3 Clarification during Evaluation by DoED

1. During the evaluation, DoED may request the Applicant for necessary clarifications. The Applicant shall furnish the necessary clarifications expeditiously by post/courier/fax/e-mail or by any other means of communication to DoED at the address given in Clause - 1.2.1.
2. Failure to provide information essential clarification, or to provide timely clarifications or substantiation of the information furnished, DoED would be at liberty to declare such Applicant as non-responsive and reject his/her document.

1.6.4 Rejection of EoI Document of Applicant

1. DoED reserves the right to accept or reject any or all EoI proposals with or without giving any reason whatsoever and is not liable for any losses to Applicants due to such rejection.



2. Furnishing of false or wrong information, document or evidence by any firm or joint venture may result in rejection of the EoI document of the firm or their joint ventures. In addition in such cases, legal action shall be taken as per prevailing rules and regulations.

1.7 NOTICE OF RESULT OF EVALUATION

All applicants irrespective of the qualified or non-qualified will be notified in writing the result of evaluation of qualification in due course of time. Applicants listed in the short-listing will be considered as qualified firm and will be invited to participate in the Request for Proposal process.

1.8 INDICATIVE TOR

The information regarding the project and project area, scope of work etc are provided in Indicative ToR in Annex.



2. PREPARATION OF EOI APPLICATION

The EoI document shall be structured in accordance with the outlines given in the EoI form and must contain accurate and complete information as requested in the EoI form. **The EoI document shall have no interlineations or overwriting, except as necessary to correct errors made by the Consulting Firm itself. Any such correction must be initialed by the person authorized to sign the application and stamped with the firm's seal.**

2.1.1 Documents for EoI

The completed EoI documents to be submitted by Applicants shall comprise of the following documents:

Information Regarding Technical & Financial Capability of the Consulting Firm

Form Type	Description/Content
Form A	General Information
Form A-1	Letter of Submission
Form A-2	Joint Venture Information (Attach JV Agreement and Power of Attorney, Share Percentage)
Form A-3	Self Declaration Form
Form A-4	Eligibility Documents (Attach Registration, VAT, Income Tax Clearance,)
Form A-5	Identification of the Consulting Firm
Form A-6	Financial Capability of the Consulting Firm (Attach Audit Reports of last five consecutive fiscal years)
Form B	Relevant Work Experience of the Firm
Form B-1	Relevant Work Experience of the Firm in Detailed Engineering Design of Hydropower projects
Form B-2	Relevant Work Experience of the Firm in Feasibility studies/Detail Project Report (DPR) studies of Hydropower projects
Form B-3	Relevant Work Experience of the Firm in EIA/IEE Study of Hydropower, Transmission Line and other Water Resources Projects
Form C	Details of Key Professional Staffs to be Deployed for Study

Note: The EoI documents should be prepared and submitted in above mentioned sequence providing supporting documents with respective Form.

2.1.2 General Information



1. The Applicant shall provide a Letter of Submittal with completed forms as provided in the Format Forms A to C in the EoI document. All necessary information shall be presented to demonstrate the firm/joint venture's eligibility, capability, experience and professionals to be deployed for the study.
2. The Applicant shall enclose notarized copies of registration certificate, VAT certificate, and Tax clearance certificate. The applicants shall also enclose experience certificate or completion certificate, audit report of last five years and other relevant information.

2.1.3 Information Regarding Technical & Financial Capability of the Consulting Firm

Form A-1: Letter of Submission

The applicant shall submit with the EoI a submittal letter with name and full contact information of the authorized representative. The letter shall be signed by an authorized person of the firm or lead firm in case of joint venture and shall be stamped by the company's seal. The format of submittal letter is given in Form A-1 of the document EoI. The letter shall also include the job number and title of consulting job being applied for.

Form A-2: Joint Venture Information

In case of Joint Venture, the consultant shall submit joint venture information in Form A-2. In addition, consulting firms shall submit Joint Venture Agreement duly signed & stamped with company seal by each member & clearly mentioning name of the lead firm, name of JV partners, role and responsibility of each member, name and signature of the authorized signatories. In JV agreement the consulting firm should mention share percentage of each member of JV. The authorized signatories of JV agreement should hold power of attorney from their respective firm.

Form A-3: Self Declaration Statement of Consultant

The applicant shall submit a Self Declaration as per clause 40 – 2 (e) of Public Procurement Rule, 2064 mentioning that consultant is not ineligible to participate in this procurement process, that the Consulting Firm does not have any conflict of interest in the proposed assignment, and that the consulting Firm has not received any punishment while doing consulting business and litigation history (if any) in last five years. The self declaration letter shall be signed by an authorized person of the Consulting Firm and shall be stamped by the company's seal. The format of the self declaration letter is given in Form A-3 of this EoI document. In case of JV, each individual consultant should submit Self Declaration either separately or jointly by signing each member of JV mentioning information requested in Self Declaration.

Form A-4: Eligibility Documents

The applicant shall complete form A-4 and submit supporting documents to support the eligibility requirements(s). The supporting documents will be in the form of copies of registration certificate, VAT Certificate and Income Tax Clearance.

Form A-5: Identification of the Firm



The background information of the consulting firm shall be presented in the prescribed Form A-5.

Form A-6: Financial Capability of the Firm

The financial capability of the consulting firm shall be presented in the prescribed Form A-6 of this EoI document. The financial status of the Consulting Firm shall be supported with audited reports of last five consecutive fiscal years.

2.1.4 Relevant Work Experience of the Firm in last five years

Form B-1: Experience of the Firm in Detail Engineering of Hydropower Projects

Relevant Experience of the firms in Detail Engineering Design of hydropower projects in last 5 years shall be presented in the prescribed Form B-1. The experience of the consulting firm shall be supported with evidence/proof in the form of experience certificates/completion certificates showing the dates of completion of the assignments, capacity of the project and value of the consulting assignments. The experience of the consulting firm without evidence/proof shall not be considered for evaluation.

Form B-2: Experience of the Firm in Feasibility Study/Detail Project Report (DPR) study of Hydropower Projects

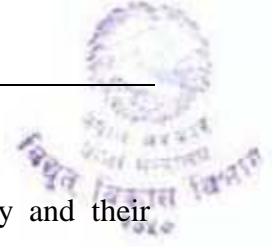
Relevant Experience of the firms in Feasibility Study/ Detail Project Report (DPR) study of hydropower projects in last 5 years shall be presented in the prescribed Form B-2. The experience of the consulting firm shall be supported with evidence/proof in the form of experience certificates/completion certificates showing the dates of completion of the assignments, capacity of the project and value of the consulting assignments. The experience of the consulting firm without evidence/proof shall not be considered for evaluation.

Form B-3: Experience of the Firm in EIA/IEE Study of Hydropower, Transmission Line and other Water Resources Projects

The relevant Experience of the firms in EIA/IEE Study of hydropower Transmission Line and other Water Resources Projects in last 5 yrs shall be presented in the prescribed Form B-3. The experience of the firm shall be supported with evidence/proof in the form of experience/ completion certificates showing the dates of completion of the assignments. The experience of the firm without evidence/proof will not be considered for evaluation. For experience of the firm in EIA/IEE study projects, the EIA/IEE study of projects which were approved as per the prevailing Environmental Protection Act, 1997 and the Environmental Protection Rule 1997 will only be considered for evaluation. **For the evidence of EIA/IEE approval, EIA/IEE approval letter shall be submitted.**

2.1.5 Details of Key Professional staff to be deployed for the Study

Form C



The details of proposed key professional staff to be deployed for the study and their experience shall be presented in prescribed Form C.

Note: The firm is requested to provide the information provided in sections 2.1.3 and 2.1.4 in electronic form (prepared in word or excel) after the opening date of the submitted EoI documents.



FORM A-1

LETTER OF SUBMISSION

[Letterhead of the Applicant, In case of Joint Venture, of the Lead Firm)

Date:

To:
The Director General
Department of Electricity Development
Anamnagar, Kathmandu,
Nepal

Sirs,

Being duly authorized to represent and act on behalf of

.....
.....
(hereinafter “the Applicant”), and having reviewed and fully understood all the information provided in EoI, the undersigned hereby apply for qualification by DOED as a consultant for the Detail Engineering Design of Lower Hongu Khola Small Hydropower Project (23.5 MW), Solukhumbu District.

1. DOED and its authorized representatives are hereby authorized to verify the statements, documents, and information submitted in connection with the submitted EoI. This Letter 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 you to verify statements and information provided in this EoI, or with regard to the resources, experience, and competence of the Applicant.
2. DOED and its authorized representatives are authorized to contact any of the signatories to this letter for any further information.
3. This application is made in the full understanding that all decisions by DOED related to this EoI are final, binding and not subject to review. DOED shall be under no obligation to inform the Applicant of the reasons for its decisions or actions.
4. The Applicant hereby provides willingness and commitment to abide by all applicable laws, regulations, and other requirements having the effect of law in the execution of this study, if selected.
5. All further communication concerning this EoI proposal should be addressed to the following person who is authorized to represent and to receive all communication on behalf of the Applicant and its constituents.



[Person & Designation]

[Company]

[Address]

[Phone, Fax, Email]

6. The undersigned declare that the statements made and the information provided in the duly completed EoI proposal are complete, true and correct in every detail.

Signed :

Name :

Designation :

For and on behalf of (Name of Applicant :
or Lead Firm in the joint venture)



FORM A-2

JOINT VENTURE INFORMATION

If the EoI is being submitted in Joint Venture, provide Joint Venture Information

SN	NAME OF FIRM	Postal Address, TEL, FAX and E-mail	NAME OF CONTACT PERSON	TELEPHONE OF CONTACT PERSON	SHARE PERCENTAGE IN JV
1.	Lead Firm:				
2.	Partner Firm:				
3.					

Note:

1. Maximum three (3) Firms can make Joint Venture.
2. In case of JV, the minimum share percentage of lead firm must be 40. Also the lead firm should hold the power of attorney.
3. Provide duly signed and stamped joint venture agreement and power of attorney of the signatories by each member in the JV.

Attachment

1. Joint Venture Agreement
2. Power of attorney of the signatory (ies) of the Applicants

Yes/No



FORM A-3

SELF DECLARATION FORM

Date:.....

To,
Director General
Department of Electricity Development
Anamnagar, Kathmandu

Sir,

We,
(name of all Consulting Firm) declare that we are legally eligible to participate in the procurement process of consulting services for the Detail Engineering Design of Lower Hongu Khola Small Hydropower Project (23.5 MW), Solukhumbu District (title of consulting service).

We also declare that we do not have any conflict of interest in the said assignment.

We hereby also declare that we have not received any punishment while doing consulting business in the last five years.

Note: (If any member of the consulting Firm is not eligible to participate in procurement process or has conflict of interest in the said assignment or has received any punishment while doing consulting business in the last five years, the same must be clearly mentioned in this form. Any history of litigation during the last five years shall also be declared here along with the relevant verdict.)

(Note: Each Consultant in JV need to submit Self Declaration document either jointly or individually with original signed and stamped with company seal together with EoI document)



FORM A-4

ELIGIBILITY DOCUMENTS

Fulfillment of Eligibility Requirements

Description	Name of Submitted documents and how these are presented in EoI	Remarks
Notarized Copy of Valid Registration Certificate (of each member of JV, in case of JV.)		
Notarized Copy of VAT Certificate (of each member of JV, in case of JV.)		
Notarized Copy of Income Tax Clearance Certificate for FY 2070/71. (of each member of JV, in case of JV.)		
Self Declaration (In case of JV, either separately or jointly by signing each member of JV)		
Joint Venture Agreement between the JV Partners duly signed & stamped with company seal by each member & clearly mentioning name of the lead firm, name of JV partners, role and responsibility of each member, name and signature of the authorized signatories		
Power of attorney of authorized signatories of JV agreement from their respective firm with signature & seal for each member of JV.		
Power of attorney to lead firm from JV partners		

The supporting documents in the form of copies of registration certificate, VAT Certificate and Tax Clearance Certificate shall be attached here:

In addition,

Description	Value	Remarks
The total number of consulting firms in joint venture		
Share percentage		
Lead firm		
JV partner firm-1		
JV partner firm-2		
The Average Annual Turnover in the best three fiscal years among last five consecutive fiscal years		
Lead firm		
JV partner firm-1		
JV partner firm-2		



FORM A-5

IDENTIFICATION OF THE CONSULTING FIRM

Full name of the Firm:
Address:

Telephone number: Fax number: E-mail: Others:	Year of Establishment: Number of Years since establishment:
Corporate Registration: Date of Registration: Registration No: Date of last renewal: Valid up to:	VAT Registration: Date of Registration: VAT Registration No:
Name and address of contact person: Name and Designation of Contact Person: Address: Telephone number (Office): Telephone number (Residence) : Mobile no: Fax: Email:	



Note: In case of the applicant being joint venture, provide similar information for each member in the joint venture separately

FORM A-6

FINANCIAL CAPABILITY OF THE CONSULTING FIRM

Full name of the Consulting Firm:

FINANCIAL STATUS

Turn Over of last five consecutive fiscal years

Description	FY	FY	FY	FY	FY
Turnover (NRs.)					

Turn Over of best three years

Description	FY	FY	FY	Average Annual
Turnover (NRs.)				

Note:

1. Provide similar information for each member in case of joint venture.
2. Submit Audited Reports of last five consecutive fiscal years



FORM B-1

RELEVANT WORK EXPERIENCE OF THE FIRM IN DETAILED ENGINEERING DESIGN OF HYDROPOWER PROJECTS (IN LAST 5 YEARS)

S. N.	NAME OF PROJECT (TYPE OF STUDY AND CAPACITY IN MW)	LOCATION/	CLIENT	VALUE OF CONTRACT	YEAR OF COMPLETION	DESCRIPTION OF RELEVANT WORK CARRIED OUT
1.						
2.						
3.						
4.						

Date:

Signature & Designation of Applicant:

Seal of the Firm



FORM B-2

(RELEVANT WORK EXPERIENCE OF THE FIRM IN FEASIBILITY STUDY/DETAIL PROJECT REPORT (DPR) STUDY OF HYDROPOWER PROJECTS (IN LAST 5 YEARS))

S. N.	NAME OF PROJECT (TYPE OF STUDY AND CAPACITY IN MW)	LOCATION/	CLIENT	VALUE OF CONTRACT	YEAR OF COMPLETION	DESCRIPTION OF RELEVANT WORK CARRIED OUT
1.						
2.						
3.						
4.						

Date:

Signature & Designation of Applicant:

Seal of the Firm



FORM B-3

RELEVANT WORK EXPERIENCE OF THE FIRM IN EIA/IEE STUDY OF HYDROPOWER, TRANSMISSION LINE AND OTHER WATER RESOURCES PROJECTS (IN LAST FIVE YEARS)

S. N.	NAME OF PROJECT (MENTION EIA/IEE STUDY, CAPACITY OF HYDROPOWER PROJECT STUDIED)	LOCATION	CLIENT	VALUE OF CONTRACT	YEAR OF COMPLETION	DESCRIPTION OF RELEVANT WORK CARRIED OUT
1.						
2.						
3.						
4.						

Date:

Signature & Designation of Applicant:

Seal of the Firm



FORM - C

DETAILS OF KEY PROFESSIONAL STAFF TO BE DEPLOYED FOR THE STUDY

S. N.	DESIGNATION	NAME	QUALIFICATION (INCLUDING UNIVERSITY & YEAR OF DEGREE OBTAINED AFTER GRADUATION)	YEARS WITH COMPANY	TOTAL YEARS OF EXPERIENCE	FULL TIME OR PART TIME
1	Team Leader					
2	Hydropower Engineer					
3	Engineering Geologist					
4	Geotechnical Engineer					
5	Seismologist					
6	Hydrologist					
7	Senior Surveyor					
8	Hydraulic Engineer					
9	Structural Engineer					
10	Road Engineer					
11	Civil Engineer/Autocad Engineer					
12	Electrical Engineer					
13	Mechanical Engineer					
14	Cost Estimator					
15	Economist/Financial Analyst					



S. N.	DESIGNATION	NAME	QUALIFICATION (INCLUDING UNIVERSITY & YEAR OF DEGREE OBTAINED AFTER GRADUATION)	YEARS WITH COMPANY	TOTAL YEARS OF EXPERIENCE	FULL TIME OR PART TIME
16	Contract /Procurement Specialist					
17	Environmental Engineer/ Environmentalist					
18	Sociologist/ Anthropologist					
19	Zoologist/Aquatic Life Expert					
20	Botanist/Ecologist/ Forest Expert					

Date:

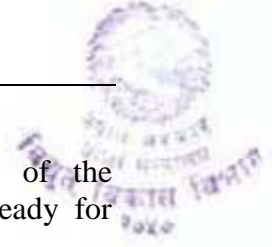
Signature & Designation of Applicant:

Seal of the Firm

The scope of Detailed Engineering Design and Project Description

The scope of consulting services for the Detail Engineering Design shall include but not necessarily limited to the followings:

- a) Collect and review of previous study reports, manuals, standards, guidelines, legislations, policies & plans, maps, drawing etc.
- b) Conduct desk study and preliminary reconnaissance survey, analyse the available data and identify data gap of previous study & recommend the further additional study needed to prepare bankable and implementable detail design report
- c) Conduct detail engineering survey and field investigation for topographical surveys, hydro-metrological surveys, sediment studies, impact study of climate change, geological, geophysical & geotechnical investigations including drilling and test adits (if any), seismicity/seismic study, construction materials survey, communication surveys, construction power survey, power evacuation survey, transmission line surveys and access road & bridge surveys as per requirement of the study for detail design and scope of work detailed in subsequent heading
- d) Compile, analyze outcome of field survey and investigation, prepare required specific maps and reports as per requirement of scope of work detailed in subsequent heading and use these maps, data & parameters for detail design
- e) Prepare and establish design criteria for the detailed design of all major project components and associated structures as per recognized best practices and applicable standards
- f) Prepare conceptual/preliminary layout & design and conduct optimization of the components & associated structures of hydropower project
- g) Conduct detail engineering design of civil structures, hydro-mechanical equipments, electro-mechanical equipments of hydropower and associated structures of optimized options
- h) Conduct detail design of the access road, project road, bridges and cross drainage structures
- i) Conduct detail design of switchyard, walkover survey of transmission line and associated substation
- j) Conduct planning & design of office complex, camp site and their required facilities such as water supply system, power supply
- k) Conduct environmental study by reviewing the approved environmental study report and verifying in field, prepare supplementary environment report
- l) Utilize the recommendation of supplementary environment report in detail design and recommendation of detail design in supplementary environment report
- m) Prepare detail drawings and tender drawings
- n) Conduct rate analysis, prepare quantity estimate & cost estimate
- o) Prepare construction plan/schedule and project implementation plan
- p) Conduct economic and financial analysis including sensitivity and risk analysis
- q) Analyze and propose appropriate contract/implementation module and institutional arrangement for project implementation.
- r) Prepare tender documents for civil structures, hydro-mechanical equipments, electro-mechanical equipments of hydropower and associated structures
- s) Prepare tender document for preparatory works (camp site, project & access road, bridge, water supply, power supply & other facilities) and transmission line and associated substation



- t) Prepare a complete, bankable and implementable detail design report of the hydropower project including associated structure considering the report ready for implementation

The detail scope of work to be covered under each specific heading of the study is provided in respective heading.

Project Description

Background

Lower Hongu Khola Small Hydropower Project (LHKSHP) is a run-of-river type project which is located in Solukhumbu District of Eastern Development Region of Nepal. The project has an installed capacity of 23.5 MW and will generate 134.35 GWh of energy annually. The project area lies on the right bank of the Hongu Khola in between Chhokham/Guarphedi and Kuwapani of Sotang and Pawai VDCs respectively. The waterway consists of about 59.4 m canal, 2593.7 m headrace tunnel, 353.5 m inclined shaft with steel penstock pipe, and 428.5 m tailrace tunnel. An underground powerhouse is located on the right bank of the Hongu Khola at Kuwapani. The generated power will be connected to a proposed substation at Lamane, 15 km south-west of the powerhouse. Moreover, about 340.0 m long adit tunnel is also proposed to make 3 headings for construction of the headrace tunnel. Surge shaft is also designed at the end of the headrace tunnel having diameter of 6.0 m and 31 m height.

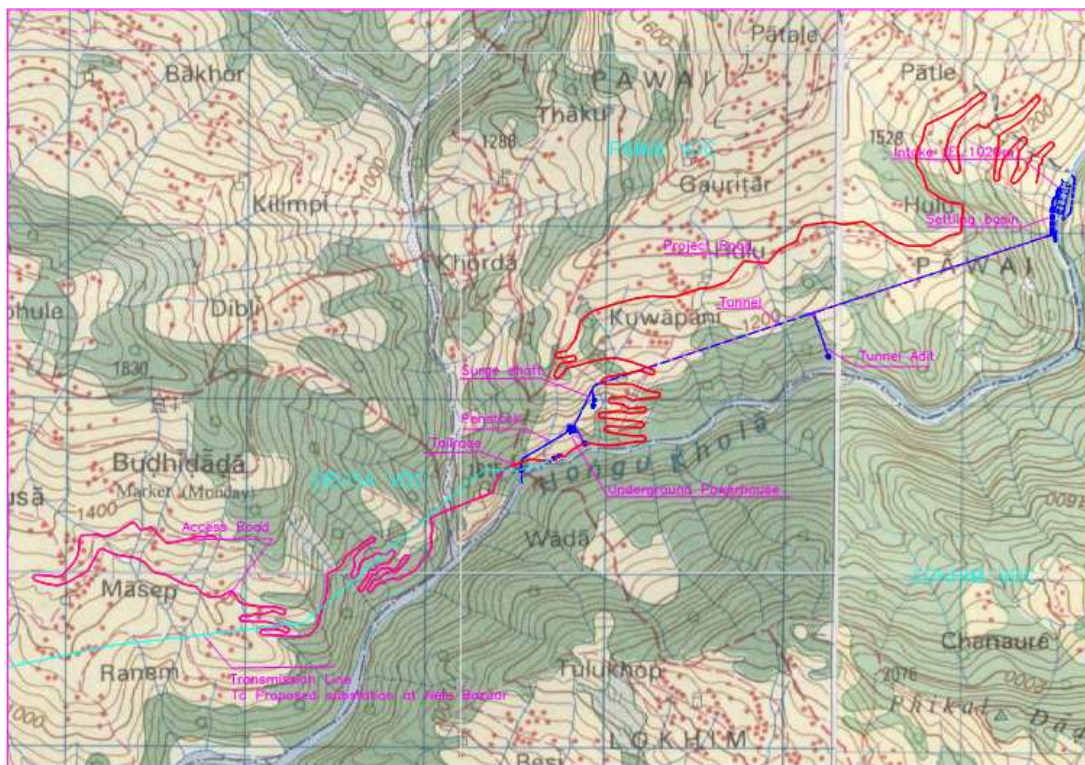
LHKSHP was first identified by ITECO Nepal P. Ltd. in February 2002, under a study "Screening and Ranking Study of 5-10 MW Small Hydropower Projects", conducted for DoED. After identification a reconnaissance level study had been performed thereon. Feasibility study of LHKSHP was completed by JV of Butwal Power Company Ltd. and Silt Consultant Pvt. Ltd for DoED in 2008.

Detail Description of Project

As per Feasibility Study Report of LHKSHP in 2008, The project is a run-of-river type in which water will be diverted from the Hongu khola at a point about 625.0 m downstream from the suspended bridge of Chhukhan / Guhar by constructing a 6.0 m high concrete weir with dressed stone lining. The weir crest level will be at 1012.0 masl. A maximum discharge of 16.2 m³/s at Q_{45.88%} probability of exceedence level will be diverted for power generation through the side intake located along the right bank of the Hongu Khola. This project utilizes a gross head of 174.1 m in between the intake at an elevation of 1012.0 masl and the tailrace at an elevation of 837.9 masl. The total length of waterways including approach canal, headrace tunnel, and penstock and tailrace tunnel will be about 3.5 km.

Project Location

LHKSHP is located in Sotang and Pawai (VDCs), at Solukhumbu District, Eastern Development Region of Nepal. The proposed project lies between $86^{\circ} 44' 00''$ E to $86^{\circ} 46' 00''$ E and $27^{\circ} 27' 00''$ N to $27^{\circ} 28' 30''$ N. (The coordinate given in feasibility study report is erroneous and shall be corrected as above). The headworks is located at Sotang VDC, between ward no 1 and 6, about 625 m downstream from the suspended bridge at Chhukham/Gwarphedi. The powerhouse is located at Kuwapani Ward no 8 of Pawai VDC. The Koshi River Basin is the largest among the three river basins of Nepal. The major tributaries of the Koshi River are Tamur, Sunkoshi, Arun, Tama Koshi, Dudhkoshi, Likhu and many other small tributaries. The Hongu Khola is one of the tributaries of the Dudhkoshi River.



Topographic map with proposed layouts

2.2 Project Accessibility

The Nele bazaar is located at south east of Salleri bazaar which is 20 km ahead. The Salleri bazaar, the headquarter of Solukhumbu district can be accessed from Kathmandu through a 551 km asphalt road. Presently, the proposed intake site is not connected by motorable road. The gravel road from Nele bazaar to Budhi danda has been constructed moderately. Power house site of the project can be accessed by constructing 12.5 km road from Budhi danda and a bridge on Dudh Koshi River. To access the Headwork site from the power house, about 11 km road need to be constructed. The project site can be reached about one hour flight from Kathmandu to Phaplu or Kagel danda, the nearest airport to the project site.



2.3 Main features of project

Type of power plant

Type: Run-of-river

Hydrology

Catchment area at intake site: 550 km²
 Long term annual average flow: 33.04 m³/s
 Average minimum flow: 5.96 m³/s
 Design flood at intake (1 in 100 Years): 626.97 m³/s

General hydraulics

Gross head: 174.1 m
 Net head: 168.78 m
 Design flow: 16.2 m³/s
 Capacity: 23.5 MW

Diversion weir

Type: Concrete weir with dress stone lining
 Length: 40 m
 Height: 6.0 m above natural bed
 Crest elevation: 1012.0 masl

Intake chamber

Type: Orifice type side intake
 Size of opening: 11.7 m wide and 1.8 m high (4 Nos. 2.92 m wide)

Gravel trap and approach canal

Gravel trap width: 12.8 m
 Gravel trap length: 12.3 m
 Coarse trash rack: 12.8 m x 3.8 m
 Regulating gate: 1.65 m x 3 m (2 Nos.)
 Box culvert: 3.3 m x 3.0 m x 10.1 m
 Approach canal: 3.3 m x 4.0 m x 59.4 m

Settling basin

No of bays: 2 nos.
 Nominal size of trapped particle: 0.2 mm
 Trap efficiency: 90%
 Inlet transition: 39.25 m
 Uniform section: 128.00 m
 Outlet transition: 13.2 m



Total depth including hopper 8.2 m

Headrace tunnel

Shape: D-shaped
 Length: 2593.70 m
 X-Section: 4.2 m wide x 4.2 m high
 Cross-sectional area: 15.75 m²
 Tunnel Audit – 1: 340m long and 3.5m dia.

Surge shaft

Type: Semi-underground
 Internal diameter: 6.0 m
 Height: 31 m
 Tunnel Audit -2: 80 m long and 3.5m dia.

Inclined shaft / Penstock

Type: Underground inclined shaft
 Diameter: 2.3 m mild steel pipe/2.9m inclined shaft
 Length: 353.5 m
 Thickness: 14 mm to 30 mm

Powerhouse

Type: Underground
 Size: 50.0 m long, 8.9 m wide and 9.0 m high
 Access tunnel: 194.0 m long and 4.2m dia.

Tailrace tunnel

Shape: D-shape
 Diameter: 3.9 m
 Length: 428.5 m
 Cross-section area: 12.04 m² (3.9 m wide x 3.5 m high)
 Slope: 1 in 1000

Turbines

Type: Francis
 Alignment: Horizontal shaft
 Rated net head: 168.78 m
 Rated discharge: 5.4 m³/s
 Turbine rated output (power on shaft): 7833 kW x 3
 Turbine efficiency: 92 %
 No of units: 3 Nos.
 Speed: 600 rpm



Tailwater level: 837.90 masl

Generators

Type: Brushless Synchronous
 Capacity: 9.8 MVA
 Voltage: 11 kV
 Power factor: 0.8
 Operating range: 0.8 (lag)- unity – 0.95 (lead)

Transmission line

Length: 16 km (from Kuwapani to Lamane)
 Voltage: 132 kV

Transformer

Type: Three phase
 Rating: 10 MVAx4 (1 Spare) vector group Ynd11
 Power factor: 0.8
 Voltage ratio: 11/132 \pm 5% in step of 1.875% Frequency
 50 Hz

Energy generation

Mean annual energy per year: 134.35 GWh
 Dry energy: 26.87 GWh
 Wet energy: 107.49 GWh

Access

Road Class: District Rural Road Class 'A' (DRRA)
 Length: (Budhidada to Headwork site) 23.52 km
 Construction Period: 3 Years

Economic Indicators (based on 2007 January price level, economical life = 50 years)

Project cost including transmission line and access road US \$ 49.066 million
 Cost per kW: US \$ 2,126
 Energy cost per kWh (after financing): US \$ 0.365
 Economic Net Present Value (NPV): US \$ 49.613 million
 Economic Internal Rate of Return (EIRR): 28.88 %
 Economic B/C ratio at discount rate of 9%: 1.63

Financial Indicators (based on 2007 January price level, economical life = 25 years)

Project cost including transmission line and access road US \$ 55.501 million
 Cost per kW: US \$ 2,400
 Energy cost per kWh (after financing): US \$ 0.413
 Financial Net present value (NPV): US \$ 19.756 million

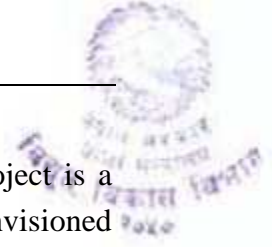


Financial Internal Rate of Return (FIRR):	18.00 %
Financial B/C ratio at discount rate of 9%:	1.199

2.4 PREVIOUS STUDY AND FINDINGS

Based on the feasibility study done in 2008 by JV of BPC Ltd. and Silt Consultant P. Ltd., the detailed field investigations like topographical mapping, geological/geotechnical investigations and hydrological data collection, layout and design works were carried out and appropriate project cost estimate was developed. Financial evaluations were also carried out to determine the viability of the project. The feasibility study found that the project is technically feasible, economically and financially viable and environmentally friendly. Based on the various studies as described in the report, following findings /conclusions can scientifically be drawn:

- On the Hongu Khola, tributary of Dudh koshi River, a low head diversion weir can be constructed to divert 16.2 m³/s of flow through 3006.6 m long waterways, (59.4 m long approach canal, 2593.70 m long headrace tunnel and 353.5 m long penstock) to the underground powerhouse built on the right bank of the Hongu Khola.
- The hydrological study shows that the Hongu Khola has relatively more flow especially during dry season as compared to the flow assumed during the previous studies. It is most likely because of the several glacier and high snow coverage of the catchment.
- The project area consists of mostly medium to high grade metamorphic rocks of the Lesser Himalayas. No major geological structure in the project area but the area is bounded by thrust fault such as Midland Thrust and Ekulade Thrust. The headworks area consists of alluvial deposit. All other components are proposed underground and mainly in rock phyllites with poor to extremely poor rock mass quality. The headrace tunnel runs parallel to the foliation plane and other are almost perpendicular to the foliation plane with fair excavation condition.
- The different discharges were used for the optimization of the plant size during this study. The plant is found to be optimum for the design discharge of 16.2 m³/s with 45.88 percentile reliability of flow. The optimum installed capacity is calculated to be 23.5 MW.
- The implementation of the project will help to enhance the socio-economic status of the local communities. The adverse impacts will be properly mitigated.
- A detailed study got carried out to figure out grid connection possibilities. Buipa at 33 kV, Khimti and Lahan Grid both at 132 kV level were the three options from the existing infrastructures. Buipa got discarded as because of its inadequacy to handle 23.5 MW of power burden. Whereas other two options (Khimti and Lahan) were discarded for the unbearable 132 kV link up TL cost. Hence, only remaining option that somehow is acceptable to the project is DoED proposed terminal point at Lamane. Assuming the proposed Lamane grid substation will come into existence before the completion of LHKSHP, Lamane has been adopted as the only possible grid connection point for the required power evacuation.



- The 23.52 km long access road of Lower Hongu Khola Small Hydropower Project is a district level road of Solukhumbu District. For LHKSH, Budhidanda has been envisioned to be the nearest road head. This road links Budhidanda village of Deusa VDC to the headworks site of Lower Hongu Khola Small Hydropower Project at Guhar village of Sotang VDC through Powerhouse and surge shaft General Information stating that the project description is based on documents etc.
- There are no settlements in the project vicinity except upper-mid hill area and therefore there are no major consumptive water use facilities. Regarding the water sharing, a healthy understanding will be made with the local communities.
- The project will have three Francis turbines with an optimum installed capacity of 3x7.83MW that generates 134.35 GWh of annual average energy.
- The power generated from the project shall be evacuated to the proposed substation at Lamane for which 15 km long 132 kV transmission line will need to be constructed.
- The project is expected to be completed at a cost of 55.501 million US dollars and within about 3 years from commencing the construction.
- The project is found economically viable and very attractive with BC ratio of 1.63 and EIRR of 28.88% for which NPV is determined as 49.613 million US\$. The cost of the project per kilowatt is determined as US\$ 2,126 after financing.
- For the adopted base case, the financial analysis also shows that the project has a B/C ratio of 1.199 (for base case), an FIRR of 18.00 % and NPV of 19.756 million US\$. The cost of the project per kilowatt is determined as US\$ 2,400 after financing.
- The sensitivity analyses shows that the project is sound financially and economically even there is minor variation in discount rate, cost and energy.
- It should be noted here that in addition to the financial benefits, the project also has many social benefits that would accrue to the communities living in the project area.

2.5 Topography study

Based on the feasibility study in 2008, the survey works was prepared for the topographical maps of the project area for sitting major project components such as headworks, headrace tunnel, surge shaft, powerhouse and tailrace. Survey works were conducted using the national grid established by Department of Survey.

The detailed topographical survey of the project area was conducted between December, 2005 and January, 2006. Permanent benchmarks and traverse points were fixed at the locations of intake, settling basin, tunnel portal, surge shaft and powerhouse sites and along the waterways alignments. The survey works have been conducted at these locations and finally connected to a third-order triangulation point on the national grid.

During the survey, a control loop over the project area was established in order to link the second and third order control point (triangulation points on national grid) established by the Department of Survey near the project site. For this purpose, control points 151 in Ratamate danda and 5901 in Bhirkharka were used. Elevations of the project area are



based on control points of third order control points established by the Department of Survey in the vicinity of the project area.

The detailed topographical survey of the project area was conducted and permanent benchmarks and traverse points were fixed at the locations of intake, settling basin, tunnel portal, surge shaft and powerhouse sites and along the waterways alignments. The survey works have been conducted at these locations and finally connected to a third-order triangulation point on the national grid and the errors were distributed accordingly. Thus previous survey works seems sufficient however consultant may propose additional survey works if found necessary.

During Feasibility study, , topographic survey mapping covering an area of approximately 200 ha were produced for headworks and powerhouse area in 1:1,000 scale with 1m contour interval and for waterways in 1:5,000 scale with 5 m contour interval has been prepared. The cross section survey is conducted at 50 m interval of H/W site with a stretch 1200m covering u/s & d/s and Powerhouse Site with a stretch 600 m in 1:2000 scale. Similarly, the topographical survey for project access road (plan and L-profile at a scale 1:10,000 and x-section at a scale 1:200 at 200m interval) has also been prepared during the feasibility study.

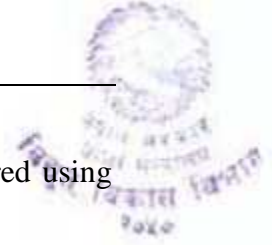
2.6 Hydrology, meteorology and sediment

Hongu Khola is an ungauged river and a river with similar catchment characteristics is not available nearby the area, to correlate the flow characteristics of this river. However, the mother catchment, the Dudhkoshi basin has long-term daily flow records, which has been used for catchment correlation. 40 years of stream flow data (from 1964 to 2003) are available for Dudhkoshi river at Rabuwa Bazaar while 30 years of stream flow data (from 1964 to 1994) for Likhu river at Sagnutar Village. After the establishment of gauging station at Hongu Khola in 2005, regular gauge reading has been recorded throughout the feasibility study period.

No established rainfall stations within Hongu Khola catchment are found. In the vicinity of Hongu catchment, DHM has four rainfall stations viz. Chialsa, Pakarnas, Aiselukhark, and Okhaldhunga. For the hydrological study, these stations were selected due to their proximity to Hongu catchment. Among them, records of rainfall from Chealsa has 27 years of rainfall records from 1971 to 1998 and Pakarnas, Aiselukhark and Okhaldhunga has 34 years of rainfall records from 1971 to 2004.

Table 1: Average annual rainfall in the catchment, mm

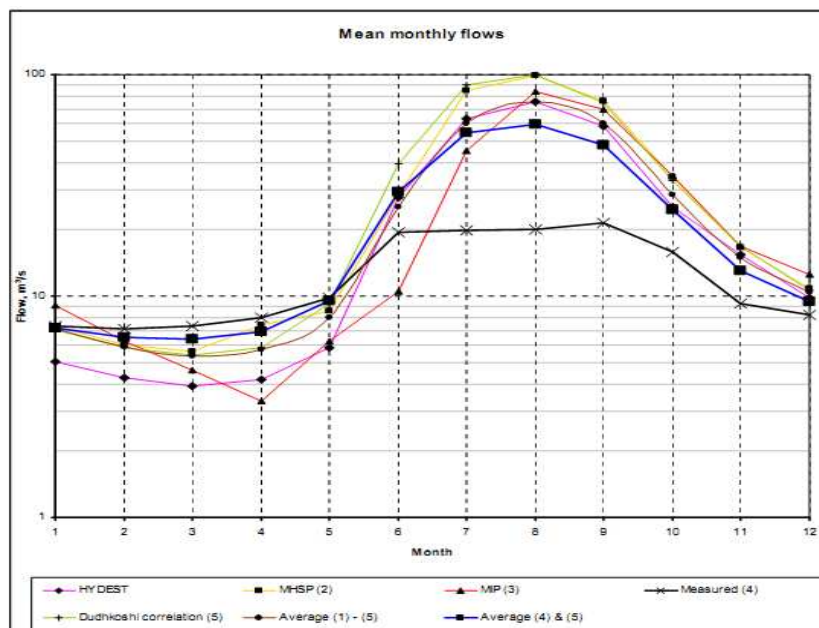
Stations	Chialsa	Pakarnas	Aiselukhark	Okhaldhunga	Arithmetic mean	Inverse Square method
Annual	1856.98	1740.05	2192.04	1738.25	1881.83	2104.39
Monsoon rainfall (Jun. – Sep.)	1554.67	1445.99	1727.54	1384.03	1528.06	1673.74
Maximum 24 hrs rainfall	80.99	67.91	112.56	95.83	89.32	75.19



In order to find the flow of the Khola at intake area, the river flow was measured using current meter and salt dilution method during site visits.

The values calculated by different methods were compared carefully. There are insufficient discharge measurements in Hongu Khola to rely fully on them, but they are useful for comparison with the other methods. Both the HYDEST and MHSP methods rely on the area of the catchment and precipitation index. However MHSP seems to give higher average flows than HYDEST. The reason behind this is that HYDEST has more details of aerial distribution than MHSP. Hence the results cannot fully be relied on MHSP. MIP derives annual hydrograph based on the single observation. For this reason, the adoption of MIP results may be unreliable. Further, it is not practical to adopt the measured flows as only shorter period of flows are available. Other flows cannot be adopted hypothetically. The results from HYDEST, flow measurements, and Dudhkoshi correlation are quite similar with each other. However, the result from Dudhkoshi seems to be quite reliable as the flows of ungauged Hongu catchment have been derived from 40 years of daily discharge of Dudhkoshi River. Therefore, mean monthly flow correlated with Dudhkoshi is adopted for further analysis.

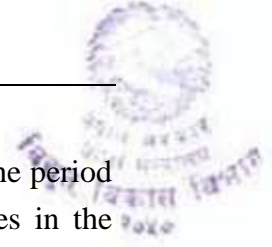
During the period of feasibility study of LHKSH, the consultant carried out the sediment study at the proposed headworks area. For this purpose, the study team collected the sediment samples from the Hongu Khola during monsoon period of 2006.



Mean monthly flow by different methods

During the period of feasibility study of LHKSH, the consultant carried out the sediment study at the proposed headworks area. For this purpose, the study team collected the sediment samples from the Hongu Khola during monsoon period of 2006.

The suspended sediment samples were collected regularly twice a day (usually 8:00 am and 5:00 pm). The sampling carried out from 13th July to 16th September, 2006 is presented in this report. The sediment load over a time period is dependent on the flow, the concentration and the duration.



Maximum and minimum concentration of suspended sediment measured during the period was found to be 2616 and 25 PPM respectively. The corresponding discharges in the Khola were 23.85 m³/s and 19.33 m³/s respectively. Usually, 10,000 ppm of the suspended concentration is taken for the design of the settling basin. From the study, it shows that average sediment concentration is significantly less than as compared to the above value. Total quartz and feldspar content in the sediment samples vary from 52 to 66%. Hence, there is high probability of wearing of turbine due to presence of high quartz and feldspar. The continuous measurement of river flow is recommended so as to obtain long term time series of flow data.

Geology

The project area consists of medium grade metamorphic rocks of the Nawakot Complex of Precambrian age. The rocks in the area fall in the Barun Phyllite Schuppe Zone. The rocks in the project area are mainly composed of phyllites with intercalated layers of quartzites. Below these rocks the crystalline rocks, augen and banded gneisses are exposed along the right bank of the Hongu Khola, lower reaches of Ratmate Danda and Baghkhori Danda. On the left bank, these rocks are observed at Wada village area opposite bank of the powerhouse location. There are no major geological structures within the study area. But the area is bounded by thrust faults mainly the Midland Thrust (MT) to the North and Ekulade Thrust to the South (Akiba et al. 1973). The Midland Thrust is at the bottom of the Midland Schuppe and lies at about 4 km north of the project area and The Ekulade Fault cuts the southern tips of crystalline schuppe and lies at about 15 km south of the project area. There are minor shear/weak zones that are mainly parallel to the foliation and about 5-10 meters thick. They will meet the tunnel alignment.

The headworks area consists of alluvial deposit. The weir and settling basin are proposed on alluvial deposits consisting of about 30% gravel, 50% sand and 20% silt mixed with sub rounded to rounded boulders. The settling basin is proposed on old alluvial deposit at dry cultivated land. There is exposed rock to the hill slope of the proposed settling basin. The attitude of foliation is 360-400/1550-1600 (dip amount/direction). Tunnel inlet portal is proposed at steep rock cliff. The attitude of foliation (Prominent discontinuity set) is N65°-75° E/ 35°-45° SE. The headrace tunnel will pass through the phyllites, quartzitic phyllites, with some intercalation of quartzites. The dip amount of foliation increases from headrace inlet portal to outlet portal. In general the attitudes of discontinuity planes are 45°/164° (Foliation) and 62°/075° and 79°/095° (Joints). The alignment is proposed almost parallel to the major discontinuity set. The quality of rock mass distribution along the headrace tunnel alignment is as presented in the Table below:

Rock mass distribution along the headrace tunnel

Rock Class	Q- value	Percentages
I Poor to Fair rock	1.0 - 4.0	10 %
II Poor rock	0.8 -1.0	31 %



III Poor to Very poor rock	0.5 - 0.8	10 %
IV Very poor rock	0.1 - 0.5	21 %
V Extremely poor rock	0.04 - 0.1	27 %
VI Exceptionally poor rock	<0.04	1%

Geophysical investigation methodology adopted here to assess subsurface geological setup is 2D ERT survey. The project area is investigated by fourteen 2D-ERT profiles at proposed suitable locations (Intake 5 nos., maximum median depth 43.95m), tunnel alignment (3 nos., maximum median depth 83.72m), Tunnel Outlet(1 no., median depth 83.72m), canal alignment (2 nos., maximum median depth 43.95m), forebay & surge tank (1 no., median depth 83.72m), penstock and power house (2 nos. maximum median depth 62.79m).

There are no major geological structures within the study area. But the area is bounded by thrust faults mainly The Midland Thrust (MT) to the North and Ekulade Thrust to the South.

The Midland Thrust is at the bottom of the Midland Schuppe and lies at about 4 km north of the project area and The Ekulade Fault cuts the southern tips of crystalline schuppe and lies at about 15 km south of the project area. There are minor shear/weak zones that are mainly parallel to the foliation and about 5-10 meters thick. They meet the tunnel alignment. Foliation and stress relief joints are well developed and prominent in the area. Other joints are non-persistence.

Seven drill holes are driven during feasibility study at major locations (Weir axis, Approach canal, settling basin, Tunnel, forebay, penstock and powerhouse). The maximum depth driven is 30 m at tunnel alignment where colluviums/bedrock is found at 19m. In other drill holes no bedrock is found up to 20m. As per the result shown in 2D ERT during feasibility study, there is no bedrock at shallow depth where the structures are planned (more than 20m). The second layer in the slope seems to contain more fine grained material, which may slide if destabilized.

2.7 Construction materials

Construction material sites are located mostly along the right bank of Hongu Khola and left bank of Dudh Koshi river. All are alluvial deposits which consist of boulder mixed sands. Most of construction materials required for the project will be procured from the domestic

producers/ suppliers. Materials such as sand, aggregates and block stones are available locally where as other materials has to be transported. The main lithology of the area is light green phyllites with intercalation of light green quartzites. The thickness of the quartzites layers in maximum is about 5 meters and occasionally up to 10 meters. So the quartzite's boulders can be obtained from the mining. But the quartzites and quartzitic



gneisses boulders deposited along the banks of the Khola, and terraces, both of just upstream and downstream of the intake area, are sufficient for works and can be extracted easily without any inverse impact in environment. The scattered boulders of quartzites are available also at powerhouse area in sufficient amount. Therefore, for coarse aggregate the quartzite and gneisses boulder scattered along the banks of the Khola within the project area can be crushed, either by hand crushing or by crushing machine, depending upon the volume of the amount required. This can be done in both headworks and powerhouse sites.

For fine aggregates, in headworks area, the Hongu Khola sand can be used. The sand deposit on the right bank of the Khola just downstream of the proposed intake location along the approach canal (Test Pit -2) and settling basin (Test Pit - 3) area can be used.

In the powerhouse area the sand deposited (alluvial terrace) along the left bank of the Dudh Koshi river at about 500 m upstream from the confluence with Hongu Khola can be used. Pits were excavated at two locations, test pit - 8 (Dudh Koshi downstream) and test pit - 9 (Dudh Koshi upstream). The estimated reserve in test pit – 8 areas is about 6000 m³ and in test pit – 9 is about 12000 m³. The sand deposited in this area is in sufficient amount and can be used for headworks area also if road is constructed. Laboratory tests show that Los Angeles Abrasion and Soundness values are good for the construction material. As the forest is in the tropical zone, high quality timbers like Sal, Salla, and also the useful tree like Chilaune are the mainly available trees. Bamboo for the project use will be obtained easily.

2.8 Road network

The Nele bazaar is located at south east of Salleri bazaar which is 20 km ahead. The Salleri bazaar, the headquarter of Solukhumbu district can be accessed from Kathmandu through a 551 km asphalt road. Presently, the proposed intake site is not connected by motorable road. The gravel road from Nele bazaar to Budhi danda has been approximately constructed. Power house site of the project can be accessed by constructing 12.5 km road from Budhi danda and a bridge on Dudh Koshi River. To access the Headwork site from the power house, about 11 km road need to be constructed. The project site can be reached about one hour flight from Kathmandu to Phaplu or Kagel danda, the nearest airport to the project site. The Nele bazaar can be accessed either via Kathmandu-Dhulikhel-Khurkot-Ghurmi- Okhaldhunga-Nele or Kathmandu- Muglin- Narayanghat - Hetaunda - Pathlaiya - Nijgadh - - Bardibas - Dhalkebar - Kamala - Katari - Okhaldhunga – Nele which are of highway standard road.

2.9 Transmission line

A detailed study got carried out to figure out grid connection possibilities. Buipa at 33 kV, Khimti and Lahan Grid both at 132 kV level were the three options from the existing



infrastructures. Buipa got discarded as because of its inadequacy to handle 23.5 MW of power burden. Whereas other two options (Khimti and Lahan) were discarded for the unbearable 132 kV link up TL cost. Hence, only remaining option that somehow is acceptable to the project is NEA proposed terminal point at Lamane. Assuming the proposed Lamane substation will come into existence before the completion of LHKSH, Lamane substation has been adopted as the only possible grid connection point for the required power evacuation.

2.10 Environmental study

The methodologies used to conduct the EIA study included (i) Desk study; (ii) Field Visit; (iii) Preparation of Scoping and ToR Documents; (iv) Baseline Survey of physical, biological, socio-economic and cultural environmental setting of the Project Area (v) Identification and Prediction of Impacts (vi) Evaluation of social and Environmental Impacts (vii) Alternative Analysis (viii) Prescribe Mitigation Measures (ix) Prepare Monitoring Plan (x) Preparation of Environmental and Social Management Plan (EMP) (xi) Public Consultation and Public Hearing (xii) EIA Report Preparation and Approval.

Based on the Implementation of the proposed Lower Hongu Khola Small Hydropower Projects expected to result in a substantial set of beneficial impacts, serving the country with much needed electricity and help to assist in reducing of current energy shortages. The Project will assist to bring about several development activities that will enhance the quality of life of local stakeholders. The total project cost is NRs 3,941 million and Financial Internal Rate of Return (IRR) of the Project is 18.00%, and B/C Ratio is 1.199. Thus, technically, financially, environment and socially the project is a very feasible and attractive project. The EIA Study has thus, recommended for implementing the proposed Project with the proper application of the proposed mitigation measures and monitoring of environmental management plan throughout all the stages of its implementation.

2.11 Others

In addition to conclusions, some recommendations are necessary to be drawn as per guidelines of some of the critical activities that should be carried out to support and as part of the detailed design processes. Hence, followings are few recommendations for further study to be conducted before construction of the project:

- The Lower Hongu Khola Small Hydropower Project (LHKSH) is recommended for implementation as it is found to be viable from the technical, economic, financial and environmental aspects.
- Lower Hongu Khola catchment is an ungauged catchment and an accurate assessment of long-term hydrology is necessary for any hydropower project. Even different methods have been used to determine the hydrology of the river with limited measurements during this study; it is highly recommended to continue calculation and updating of hydrological data. Basically the hydrological data shall be updated with regular records of gauge



heights and regular discharge measurements along with sediment sampling at the gauging station established during present study.

- Since the headworks area of the project has many big boulders, it is highly recommended to use local materials as much as possible for the construction of headworks components.
- Even financial analysis has been done as per traditional assumptions and methodology; the analysis shall be revised if the assumptions will be changed.

The Environmental Impact Assessment study will be carried out based on approved term of reference. The study will cover detail baseline information in terms of physical, biological, socio-economic and cultural environment of the project area, identify potential environmental impact, mitigation measures, monitoring and auditing with cost.