

EXPRESSION OF INTEREST

For

Flood Hazard Mapping and Determination of Flood Warning and Danger Level at Flood Forecasting Stations of Narayani and East Rapti River

Consulting Firm/Joint Venture:

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Prime Consultant (in case of a JV):

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Employer:

Government of Nepal
Ministry of Population Environment
Department of Hydrology and Meteorology
Naxal, Kathmandu

February, 2017



Government of Nepal
Ministry of Population and Environment
Department of Hydrology and Meteorology

Naxal, Kathmandu

Notice No: 1/HD/DHM/073-74

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Expressions of Interest (EOI)

The Government of Nepal, Department of Hydrology and Meteorology (DHM) invites EOI (Expressions of Interest) for the purpose of short listing the qualified, eligible and experienced Companies/firms and or their joint ventures for **“Flood Hazard Mapping and Determination of Flood Warning and Danger Level at Flood Forecasting Stations of Narayani and East Rapti River”** works. The budget to this purpose has been allocated by the Government of Nepal (GON) for the fiscal year 2073/074.

Experienced, eligible and interested Consulting Firms or companies are invited to submit their EOI, either alone or in joint venture with other firms with a certified copy of Consultancy /Company Registration Certificate, VAT and Tax Clearance (2072/73)/ Tax Return Submission receipt for the last fiscal year.

EOI documents could be obtained free of cost from DHM upon request during office hour on all government working days within the 15th day of the first date of publication of this notice or can also be downloaded from the website: <http://www.dhm.gov.np>. The instruction to the consultant, prescribed format, evaluation criteria, scope of the work and duration of the study and other details of the project are mentioned in the EOI. Only lead firm may obtain EOI form mentioning the names of all members of Association/JV and submitting Association/JV agreement.

Applications for EOI must be clearly marked **“Flood Hazard Mapping and Determination of Flood Warning and Danger Level at Flood Forecasting Stations of Narayani and East Rapti River”** and shall be submitted in sealed envelopes by companies or their joint venture received by the due date and within the specified time in the presence of the applicant or their authorized representatives. Absence of any applicant (or their authorized representative), however, shall not obstruct or prevent the opening of the EOI in any way, which must be delivered to the following address within the given time below.

Last Date of EOI Submission:- 12/11/2073 & 12:00 noon

Date of EOI opening :- 12/11/2073 & 02:30 pm

Certified evidences of the client reference indicating satisfactory completion of the projects along with the cost of consulting services in NRs and date of completion of the assignment only will be counted.

In case the day of submission of the EOI falls on a public holiday, it shall then be submitted on the following working day at same hour. Only the short-listed Consulting Firms shall be invited for RFP (Request for Proposal). During the RFP process, the consulting firm/companies will be selected in accordance with quality and cost Based Selection procedure (QCBS).

DHM reserves the right to shortlist any or reject all of the Firms without assigning any reasons whatsoever. Further information or clarification can be obtained from DHM during office hours.

Procurement Unit
Department of Hydrology and Meteorology
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“Flood Hazard Mapping and Determination of Flood Warning and Danger Level at Flood Forecasting Stations of Narayani and East Rapti River”

1. INFORMATION ON THE CONSULTING FIRM

Information shall be provided in the following format. No field shall be left vacant. In case of a joint venture, the same form shall be filled by each of the JV partners separately. The form shall be submitted in the time, date and venue as mentioned in the published notice.

1. General

Name of Firm	Address	Telephone	Email	Fax	JV Percent

Out of the above list,will be the Prime Consultant.

2. Financial Capacity

Annual turnover over the last three years are as follows. The auditor’s report/tax clearance certificates are attached.

Fiscal year	Turnover (Rs)

3. Overall Experience*

Overall experiences of the firm in relevant work during last ten years are as follows (Work completion certificates are attached).

Name of Project	Project	Client	Contract amount (excluding VAT)	Year of completion	Description of work carried out

4. Specific Experience*

Experiences of the firm in related field during last ten years are as follows. Work completion certificates are attached.

Name of Project	Project	Client	Contract amount (excluding VAT)	Year of completion	Description of work carried out

** The firm/s shall produce certified evidences of the client reference indicating satisfactory completion of the mentioned projects along with the cost of consulting services in NRs and date of completion of the assignment are required for the consideration of that project for evaluation. Sublet works or assignment as a sub consultant shall not be considered for evaluation.*

5. Human Resources

Human Resources in the company

Staff Member	Details	
	Permanent/part time	Name of personals

7. Other Resources

Other relevant resources available with us are as follows. The office layout, invoice/bill of equipment/vehicle/software/computer is attached.

Resource	Unit	Total Available	Engaged by Works on Hand
Office area	m2		
Telephone lines	line		
Photocopy, Printers	set		
High capacity Computer	set		
vehicles(Four wheel Drive)	no		

Authorized signature:

Seal:

Date:

ANNEX 1: INFORMATION TO THE CONSULTING FIRM

General Information

Purpose of inviting the EOI:	The main purpose shall short-list suitable consulting firms for “Flood Hazard Mapping and Determination of Flood Warning and Danger Level at Flood Forecasting Stations of Narayani and East Rapti River” and related products so that proposals could be invited from them only. However, the client may extend the short-list to include additional relevant consulting firms which are capable of giving the desired output.
Format and Signing of Application:	Applicant intending to file an application in response to this EOI should submit an “Application together with the duly completed EOI form providing all the information required therein after signing in by Authorized Representative of Consulting Firm or company (in case of Joint Venture, Authorized Representative of Lead Firm) with Company’s seal in every page of EOI forms.
Minimum eligibility of the firm:	Registered consulting firms/company; registered at VAT office and tax clearance certificates.
Deadline for submission of EOI:	at or before 12 Noon (NST-Nepal Standard Time) within 12/11/2073
Number of copies to be submitted:	Two
Joint Venture:	A firm may apply to be short-listed alone or in joint venture with other firms. However once short-listed, JV partners are unchangeable.
Duration of completion:	Duration to complete the works will be 90 days from the signing of the contract agreement.
Information from the Client:	In due course of time, the shortlist shall be published on the Client’s notice board, at the website : www.dhm.gov.np . The client shall mail the short-list to each of the firms/JV submitting the EOI and initiate the process of RFP without waiting for the receipt from the firms that they have received the short-list.

ANNEX 2: EVALUATION CRITERIA**(I) Eligibility Criteria (Pass / Fail)**

Sr. No.	Eligibility Criteria	Requirement	Compliance	Remarks
1.	Corporate Registration	Mandatory	Yes/ NO	Pass/Fail
2.	Tax Clearance / Tax Return Submission receipt for the last fiscal year (2072/73)	Mandatory	Yes/ NO	Pass/Fail
3.	Vat Registration	Mandatory	Yes/ NO	Pass/Fail
4.	Minimum Years of Standing	The applicant or the Lead partnerof J/V applicant must have min. 5years of standing.	Yes/ NO	Pass/Fail

II) Ranking Criteria (Out of 100%)

General Experience of the firm (10 marks)	Specific Experience of the firm (60 marks) Excellent = 100%, Very Good = 80%, Good = 60%, Acceptable = 40%, not acceptable = 0	Organization Profile of the firm: in terms of clarity in role and responsibility (15 marks)	Professional competency of the firm Commitment for availability of adequate number and /or experience of professionals as required by TOR (15 marks)																		
Years of Experience in the field of Hydrology (4 marks) Number of assignments carried out in the field of hydrology during last 5 years (6 marks)	Specific Experience in hydraulic modelling for developing hazard maps and determination of danger and warning level (Number of assignments, Duration of assignment , volume of assignments in last five years will be counted)	<table border="0"> <tr> <td>Excellent</td> <td>100%</td> </tr> <tr> <td>Very good</td> <td>80%</td> </tr> <tr> <td>Good</td> <td>60%</td> </tr> <tr> <td>Acceptable</td> <td>40%</td> </tr> <tr> <td>Not Acceptable</td> <td>0%</td> </tr> </table>	Excellent	100%	Very good	80%	Good	60%	Acceptable	40%	Not Acceptable	0%	<table border="0"> <tr> <td>Excellent</td> <td>100%</td> </tr> <tr> <td>Very good</td> <td>80%</td> </tr> <tr> <td>Good</td> <td>60%</td> </tr> <tr> <td>Acceptable</td> <td>40%</td> </tr> </table> (Note: Permanent staff – 100%, hired staff-80%)	Excellent	100%	Very good	80%	Good	60%	Acceptable	40%
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NOTE: The consultant should score more than 60 percent on the overall ranking criteria as mentioned above to qualify for short listing

Project Description:

Introduction

Nepal has been frequently affected by the extreme weather events resulting in natural disasters such as floods and landslides. Nepal's fragile geological conditions, topographical extremities, climatic extremities and seismic activities coupled with population growth, poverty, illiteracy, deforestation, unscientific agricultural practices, unscientific land use changes, and developmental activities such as construction of roads, irrigation systems, hydro-powers and urbanization are making it vulnerable to several natural disasters.

Heavy rainfall in central and eastern regions of Nepal during 19-21 July, 1993 had disastrous consequences with heavy loss of life and property as well as damages to infrastructures by floods, landslides and debris flows. In 1993, 87 % of the total deaths of human life occurring in the country were resulted from floods and landslides. Within the country, more than 500,000 people of 85254 families were directly affected, 1336 people were dead and 163 injured. 25425 livestock were lost and 17113 houses were destroyed. In agriculture sector, more than 57584 ha of arable lands were damaged. 67 small and large irrigation projects along with thousands of farmer-managed irrigation schemes were seriously damaged. The estimated loss of properties was 4904 million NRs. This was the worst disaster in last 20 years.

The flood of unprecedented magnitude along with massive debris severely damaged the Bagmati Barrage and caused extensive flooding on both sides of the river upto the Indo-Nepal border affecting many villages with the biggest loss of human lives. The floods in East Rapti breached the embankment of 850 m long and washed away several villages. Hydroelectric plant of Kulekhani was also severely damaged. The main highways were gravely damaged and several bridges were washed away.

On 18 August, 2008 the breach of the left embankment of Kosi River near Kusaha village in Sunsari district of Nepal affected 4 village development committees causing more than 60000 people homeless in Nepalese side and more than 3000000 people displaced in Indian side. About 6000 hectares of agricultural land has been inundated and agricultural products worth more than US \$ 3.7 million have been damaged. Similarly, heavy rainfall in far-western Nepal during 19-20 September, 2008 has resulted devastating floods in Kanchanpur, Kailali and Bardiya districts causing widespread damage to life and properties.

About 300 peoples die and about 626 million Rupees worth of property is lost each year due to floods and landslides. It is seen that the number of lives lost due to extreme events is decreasing but at the same time the number of families affected, agricultural areas impacted and monetary damages is steadily increasing. This shows that while the exposure and even the vulnerability is increasing, the systems and institutions have been able to limit casualties but not so successful in reducing risks or preventing increasing impacts on livelihoods. Catastrophic floods could lead to outcomes that undermine development, such as crop failures, disease outbreaks, livelihood damages and losses and food insecurity.

The torrential rain has been affecting Nepal since 14 August 2014 causing massive floods and several landslides in 19 districts throughout the country. The Department of Hydrology and Meteorology record shows water level in Koshi, Narayani, Karnali, Narayani and East Rapti and Narayani and East Rapti Rivers increased above warning level during 14-16 August. In Narayani and East Rapti River in Bardiya, where the early warning system (EWS) was built on the existing gauge station, the station has been washed away by flood and no EWS worked which resulted in human deaths in addition to huge property loss.

The water overflowing the banks of these rivers caused inundation in most of village development committees (VDCs) of Siraha, Dang, Surkhet, Banke, Bardiya and Kailali districts. Of the 19 districts affected by the floods, five districts (Jajarkot, Salyan, Rukum, Rolpa and Lalitpur) have also experienced landslides.

According to the Initial Rapid Assessment (IRA) reports received from the affected districts on 20 August 2014, a total of 43,354 families (216, 770 people) have been affected, of which 13,486 families (67,430 people) are displaced. The report indicates that 105 people are confirmed dead; 153 people are still missing; and 53 people

have been injured. The numbers have been increasing day by day, and are likely to continue as some of the affected areas are challenging to access.

The floods and landslides have damaged infrastructure such as: roads connecting district headquarters to the affected VDCs; bridges; culverts; local markets; transport vehicles as well as livestock; crops and daily consumables. Highways, linking Banke to Bardia, Nepalgunj to Surkhet and Surkhet to neighboring districts, have been blocked due to landslides and floods. Furthermore, floods have swept away five suspension bridges in Surkhet which is causing daily movement for those affected even more challenging. First responders of the government and NRCS in five VDC's in turn face challenges in gaining access to these areas.

A total of 11,044 houses have been fully destroyed and 11,037 houses partially damaged in the affected districts. The communication network and electricity supply are greatly restricted due to fallen electrical and telecommunication poles. Drinking water supply systems have been disrupted in Surkhet valley while hand pumps have been contaminated in the southern plain area due to water inundation.

In July 2016 the weather system was active all over Nepal which cause major flood in Narayani and East Rapti River Basin. The cloud burst in the mountainous region of the basin resulted numerous landslides and severe floods. Fortunately the well-established early warning system for the Terai region of the basin worked very well and there was no loss of life even though hundreds of houses were inundated. The people in the Terai region got the early warning information 12 hours before the flood reach to the community. However there has been significant change in river morphology due to huge debris and sediment flow from the upstream because of landslides, bank cutting, soil erosion and scouring. The river cross section at flood forecasting stations should have been changed. In case of Devghat flood forecasting station where the warning level and danger level was established has now to be updated and Rajaiya flood forecasting station where the new warning and danger level has to be defined because of change of station due to newly constructing bridge should be updated with new rating curve first. For the purpose, new discharge measurements have to be done and cross section survey has to be carried out taking different Manning's n for the sections.

Flood forecasting and warning is an effective non-structural method of flood management. This method has been well accepted by the planners and public in flood disaster mitigation and flood plain management. Recognizing this fact, the Department of Hydrology and Meteorology (DHM) is working for the development of flood forecasting and warning system in major rivers of Nepal. Determination of danger level is prerequisite to develop such forecasting and warning system. Hence, the of the Department of Hydrology and Meteorology intends to employ local consulting firm for Generating different scenarios of flooding and preparing hazard map and determination and marking of flood warning and danger level in forecasting station of Narayani and East Rapti River.

5.2 Objectives of the Study

Major Objective:

To determine flood warning and danger level and mark it at flood forecasting station of Narayani and East Rapti River at Rajaiya and Devghat.

Specific Objective:

- The Specific objective of the project is to generate different scenarios of flooding/inundation and preparing hazard maps with reference to the water levels at Devghat and Rajaiya Station of Narayani and East Rapti.
- Identify the rainfall threshold for warning and danger level
- Estimate the flood magnitude of 2016 peak flood through direct and indirect methods

5.3 Scope of Works

The consultant shall carry out the following works during the contract period:

The work at each station should consist of the following:

- Prepare DEM for the area from high resolution data and other point elevation data available at the Department of Hydrology and Meteorology/ Department of Survey.
- Take cross-section survey at upstream boundary (Forecasting station), downstream boundary, Nepal-India border and at least 6 more sections in between where necessary (i. e. where the land is very flat, Settlement areas, river bending, infrastructures like bridges, dams etc). The cross section survey should be taken up to 5 m above the highest flood level. Take longitudinal survey along river stretches of 200 to 500 m either upstream or downstream to find out river bed (water surface) slope. All survey works should be done with respect to the grid coordinates established by the Department of Survey of Government of Nepal.
- Take the data of Levee from Department of Water Induced Disaster Management or other agencies to see the inundation with and without levee.
- Evaluate Manning's n and establish stage-discharge relationships from measured discharges and cross-section survey.
- Set up and run hydrodynamic model (e.g. HEC-RAS, MIKE 11, GeoSFM or similar) for the area and generate different scenarios of flooding and hazard map for the area for different water level at upstream boundary (forecasting station).
- Find out danger level (threshold water levels) above which there would be significant flooding and damage to life and properties downstream.
- Assess warning level (water level less than danger level but warning should be issued).
- Validate the flood warning level and danger level using field information and DHM data.
- Prepare inundation maps (1:50,000) for danger level, warning level and in the interval of every 1m above danger level upto 5m above flood marks of both the stations for the area.
- Estimate the number households affected by danger level flood and each hazard scenarios of above danger level.
- Estimate the rainfall threshold for warning and danger level for both stations of Narayani and East Rapti based on hourly precipitation data of the basin.
- Do the two set of discharge measurement during survey activities.
- Estimate the flood magnitude of 2016 peak flood in return period using direct and indirect methods
- Mark the warning level and danger level at the forecasting station with different color by erecting flood pillar.
- Take photographs of the survey work, vulnerable areas and stations showing location, staff gauges, gauge house, cable way, river bed and other features.

- Prepare and submit reports

5.4 Methodology

The Methodology shall mainly include the following:

- Cross-section and longitudinal section survey using standard practices
- Discharge measurement using Price Type Current meter or ADCP.
- Application of Hydrologic and hydrodynamic modelling incorporating water diversion, Storages, Bridges, Abatements and other major infrastructures along the section.
- Application of Geographic Information System (GIS) and AutoCAD
- Photograph, Drawing, Reporting and Presentation

5.5 Manpower

The following technical experts and assistants are envisaged for the completion of the study.

- Team Leader (Senior Hydrologist/Senior Hydraulic Engineer)
Academic qualification required: Bachelor Degree or above in civil engineering/water resources/hydrology/meteorology or equivalent
Professional Experience in relevant projects: 10 year or more
- Hydrologist

Academic qualification required: Bachelor Degree or above in civil engineering/hydrology/meteorology or equivalent

Professional Experience in hydrological and meteorological data analysis in relevant projects: 5 year or more

- GIS specialist

Academic qualification required: Bachelor Degree or above in civil engineering/water resources/hydrology/meteorology/geography or equivalent

Professional Experience in application of GIS in relevant projects: 5 year or more

- Assistant Hydrologist

Academic Qualification preferred: I. SC. /IE having relevant experience in hydrological survey/measurements.

5.6 Schedule of Implementation

The time schedule for the completion of the report is as follows:

S.N.	Description	No. of Reports to be Submitted	Due date for submission after effective date of contract agreement
1.	Inception Report	3 Copies	30 days after the date of agreement
2	Field Report	3 copies	60 days after the date of agreement
3.	Draft Report	3 Copies	75 days after the date of agreement
4.	Final Report	5 Copies with CD and 3 copies of large size hazard map for historical flood marks danger level and warning level (1:50,000)	90 days after the date of agreement

5.7 Presentation and Evaluation

All the reports as mentioned in sub-section 5.6 above have to be presented to a panel of hydrologists (Technical Evaluation Team) and other officers from DHM including from account section and invited experts. The technical evaluation team will be headed by Deputy Director General of the Hydrology Division and other members will be Senior Divisional Hydrologists and Hydrologist Engineers from the department. If necessary, external experts will also be called by DHM during presentation and evaluation meetings.

The team leader and all other experts involved in this project have to attend all 4 presentations from the consultant side.

5.7 Schedule of Payment

Schedule of Payment for this work will be as follows:

S.N.	Description	% of Contract Amount
1.	After Submission and approval of Inception Report	20%
2.	After submission and approval of field report	20%
3.	After Submission and approval of Draft Report	30%
4.	Submission and approval of Final Report	30%