

Draft Terms of Reference (ToR) -2.3 for

Consultancy to install, Collect and Supply Data from Gauge-Discharge Sites in Bagmati-Adhwara Basin

1. BACKGROUND

Bihar is India's most flood-prone State, with 76 per cent of the population in the north living under the recurring threat of flood devastation. Recurrent floods are devastating to Bihar's economy and undermine poverty alleviation efforts. There is a need to develop a long-term flood management strategy for Bihar based on analysis and stakeholder inputs that builds upon the wisdom of the substantial documentation that currently exists on the problem. The Flood Management Improvement Support (FMIS) Centre developed under two previous DfID-financed grants, aims to generate and disseminate timely and customized information to move from disaster response to improved disaster preparedness and to effectively support flood control and management in the flood-prone areas of the State. The FMIS Centre under a previous consultancy has developed a flood forecasting model (using a proprietary software) and inundation mapping tools from Dheng bridge to Hayaghat for the B-A basin. It is now proposed to update and consolidate this model, and extend to Dumri (confluence of Bagmati with Kosi) to cover the entire basin. It is also proposed to develop a model with Public Domain / License free Software to compare, and if appropriate, enable scaling up to other basins in the State. Both modeling consultancies are constrained by inadequate stage/discharge measurements downstream of Hayaghat to Dumri (confluence point with Kosi river). A Real-Time Data Acquisition System (RTDAS) of automatic rain gauges and river gauges with real-time telemetry is planned to augment data availability in the basin, but may be realized only later. This consultancy addresses the installation and operation of stage/discharge sites below Hayaghat, and collection and supply of discharge data during the flood season of 2016 to further the flood modeling activity.

2. OBJECTIVES

The objective is to select and install stage/discharge gauge sites, collect stage/discharge data during the consultancy⁷ period at specified frequency, and supply such data at specified interval and at end-of-season for use in flood modeling.

3. SCOPE

The flood forecast modeling and inundation mapping would cover the entire B-A basin, while forecasting and inundation mapping would be along the main stem of Bagmati river. To extend modeling below Hayaghat, stage/discharge sites would be selected in the three important tributaries (Western Channel, Kamala-Balan, and Kosi offshoot channel) and other sites as agreed with WRD, established and hydrometry data collected and supplied to FMIS Centre. The establishment of site would include survey of cross-section at each site, establishing

precise location and datum and description, and setting up graduated staff/s for manual observation or sensors with AWLRs/DWLRs. The consultant would make necessary logistic arrangements to maintain the sites during one flood season, position observers to measure/collect stage data, make discharge measurements through ADCPs or current meters, develop rating curve, convert stage data to discharge , and supply the data every week. The specifications for water level and discharge measurements shall follow Hydrology Project implemented by Ministry of Water Resources and may be revised as needed based on agreement with WRD.

4. Tasks and Deliverables

Task 1

Select sites below Hayaghat to measure river water level/discharge data during a flood season 2016 (15-June to 15-Oct) consistent with modeling requirement, and conduct field visits to finalize the sites.

Output

Inception Report covering Task 1 findings and proposed site details including location map, establishment, data collection and reporting arrangements.

Task 2 (by month 2)

2.1 Establish site including establishing precise location with Latitude & Longitude, datum and description, and setting up graduated staff/s for manual observation or sensors with AWLRs/DWLRs. The most-cost-effective solution would be selected. This will also include Bank to Bank cross-sectional survey across the river at 100 m up-stream, centre line of the site and 100 m down-stream of the centre line both pre-monsoon and post monsoon. The cross-section point should be located to enable at least 15 points across the river ensuring that no abrupt change in profile is missed.

2.2 Make necessary logistic arrangements to maintain the sites during one flood season, and to measure/collect stage data

Outputs

Report on establishment of sites, measurement protocols including setting-up rating curve, and logistic arrangements by month 2. Bank to bank River cross-section both pre-monsoon, post-monsoon at up-stream line, centre line and down-stream line.

Task 3 (during flood season 2016 : 15-June to 15-Oct)

Conduct discharge measurements through ADCPs or current meters, develop rating curve, observe stage data, convert stage data to discharge, and supply the stage-discharge data every week.

Outputs

Weekly report on measured data in Excel format till end of flood season
Final report on data collection

5. Reporting and Review

All reports should be submitted in hardcopy (10 copies) and soft copy (5) of each report in word format in DVD/ CD media.

The following reports will be reviewed and approved within 2 weeks after submission, by a Standing Review Committee constituted by WRD.

1. Inception Report.
2. Report on establishment of sites, measurement protocols including setting up of rating curve for each site, bank to bank cross-section of sites and logistic arrangements.
3. Final report on data collection

Reporting Schedule

- Inception Report will be submitted within one month after effective contract
- Report on establishment of sites and measurement protocols including setting up of rating curve for each site, bank to bank cross-section of each site and logistic arrangements within two months.
- Final report on data collection by end of flood season

Review Committee

SL No.	Designation	Position in Review Committee
1	Chief Engineer, Planning & Monitoring Patna	Chairman
2	Chief Engineer Muzaffarpur / Samastipur	Member
3	Superintending Engineer, Monitoring Circle -1, Patna	Member
4	Superintending Engineer, Flood	Member

	Monitoring Circle	
5	Joint Director, FMISC, WRD, Patna,	Member
6	Deputy Director-1, FMISC, WRD, Patna,	(i) Member Secretary
(ii) 7	Executive Engineer, Flood Control & Monitoring Division-1, Patna	Member
8	E-in-C (Retd.), WRD, GOB, Flood Management Specialist –cum- Project Advisor, FMIS	Member
9	Director, GFCC (Retd.), Embankment Specialist, FMIS	Member
(iii)10	Chief Engineer (Retd.), WRD, GOB	(iv)Member

6. DATA, SERVICES AND FACILITIES TO BE PROVIDED BY THE CLIENT

- Information on current hydrologic network and additional needs
- Facilitate access to State WRD offices in the basin for network implementation and data collection

7. RESPONSIBILITIES OF THE CONSULTANT

- Establish hydrologic network, and collect river water level and discharge data as per agreed protocol and supply data
- Conduct field visits as required for site selection and arranging logistics

8. KEY STAFF

The key staff to be provided by the consultant are shown below. However, the consultants are free to propose their own team composition suitable for the project duration of the consultancy for development of flood model.

Discipline of the Consultant	Qualification and Experience	Suggested Man-Months
Project Team Leader	Basic degree in Hydrology, Hydraulic and / or Water Resources (or allied field) engineering,; experience in network design, establishment and data collection -10 years working experience in	6

	flood / water resources modeling / GIS use for modeling. -Extensive knowledge of hydrological and hydrodynamic modeling tools used in flood forecasting	
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Observers for data collection and site maintenance and data entry operators for data entry in Excel form may be deployed as per need.

9. Financial Proposal

The consultant would quote cost of setting up, operating, and data collection for one station, which will be used for calculating the overall cost when the number of temporary sites is agreed with WRD.

10. PAYMENT SCHEDULE

- 20 percent mobilization advance against bank guarantee
- 15 percent after acceptance of Inception Report.
- 15 percent after acceptance of Report on establishment of sites and measurement protocols within two months.
- 25 percent after receipt of hydrologic data for first two months and certification by FMIS Centre, WRD
- 25 percent after acceptance of Final Report

11. Duration of consultancy

Six months after effective date of contract which will be signing of contract.