

Ministry of Energy Water Resources and Irrigation
Department of Hydrology and Meteorology

Priority River Basins Flood Risk Management Project
Project Implementation Unit
Babarmahal, Kathmandu, Nepal

Proposal for Consulting Service

**Hydraulic Modeler
(Individual Consultant)
PRBFRMP/PIU/DHM/Hydraulic/CS-04**

**Project Implementation Unit (PIU)
DHM
June 2025**

Priority River Basins Flood Risk Management Project

INTRODUCTION

1. Priority River Basins Flood Risk Management Project jointly undertaken by the Asian Development Bank (ADB) and the Government of Nepal, focuses on enhancing community resilience in the flood-prone Terai Region. The project emphasizes six river basins: Mohana-Khutia, East Rapti, Lakhandehi, Bakraha, Mawa-Ratuwa, and West Rapti, implementing a Flood Forecasting and Early Warning System (FFEWS). The system is procured through the supplier Ms. NARI Group Corporation, China and implemented by Project Implementing Unit (PIU), PRBFRMP under Department of Hydrology and Meteorology (DHM). This system integrates real-time data from rain gauges and river stations, complemented by Hydraulic Modeler using the existing models for flood and hydraulic modelling. Extending the FFEWS to small catchments to address flashy floods, the project aims to develop an impact-based early warning system, improving the region's preparedness and response capabilities, thereby reducing the adverse effects of floods in the Terai region.

PIU-DHM with its limited strength is not in a position to develop a hydraulic model for these works and therefore intends to hire a Hydraulic Modeler to assist DHM in providing technical support for developing a model and feed into FFEWS. Hence this proposal is submitted for hiring hydraulic modeler as an individual consultant, under package CS-04.

OBJECTIVES

The main objective of this intermittent consultancy assignment is to provide comprehensive technical support to PIU, DHM for development of hydraulic model which will feed into the FFEWS.

DETAILED SCOPE OF WORK

The scope of work will include

- i) To support PIU in the development of the 1D and 2D hydraulic and hydrodynamic model in the priority river basins.
- ii) To support in deriving hazard, exposure and risk maps for project area for reduction of casualties and quick assets in the flood prone zone in the specified river basins.
- iii) To guide, derive risk thresholds for the communities with application of warning and danger level associated with impact-based forecasting using gauge to gauge and model-based forecasts.
- iv) To guide and evaluate the technical adequacy of hydraulic model developed by the supplier.
- v) To assist PIU in the examination, evaluation and validation of the model developed by the supplier.
- vi) To assist PIU in the conception of the model and providing inputs, comments and feedback to suppliers regarding same.
- vii) To monitor and shape the capacity building activities of the Supplier for DHM flood engineers and managers regarding the modelling.

DETAILED TASKS AND/OR EXPECTED OUTPUT

The main tasks related to the position shall be, but not limited to:

1. **Development Monitoring and Reporting:**
 - Report periodically the development of model and gaps in deliverables required by FFEWS TOR Section 6 of DHM.
 - Arrange frequent technical meeting with supplier and DHM for shaping the activities in appropriate direction.
 - Suggest supplier and DHM the best approach in developing reliable 1D2D hydraulic model.
2. **Model Setup Support:**
 - Assist in setting up a modeling system
3. **Supervision:**
 - Supervise the survey works by supplier during topographic survey and development of terrain database.
 - Test the performance of hydraulic model developed by the supplier.
4. **Support:**
 - Suggest the best mechanism for validation of hydraulic model on the basis of TOR of the contract.
 - Suggest the operational hydraulic model robust enough in terms of less time-consuming running algorithm to work with high resolution input data.
 - Provide guidance to the supplier regarding the integration Asset Management System (AMS) and sediment calculation in the hydraulic model part of the FFEWS system.
5. **Monitoring:**
 - Monitor the activities of modelling expert provided by the supplier to confirm the performance is in accordance with envisaged in TOR of the supplier.
 - Supervise and manage the general and on-the-job training required for DHM skill from the supplier.
 - Monitor the effectiveness of training to cope for the smooth operation of hydraulic model and accessories.

MINIMUM QUALIFICATION REQUIREMENTS:

- Master's degree in Water Resource Engineering, or Hydraulic Engineering or River Engineering or Hydrology or Hydro informatics or Hydraulic Structural Engineering related degree in Civil Engineering.
- At least 5 years of work experience in the government as a civil engineer or consultant regarding modelling in the fields of irrigation, hydrology, hydropower, bridges, roadways, urban drainage, water supply and sanitation or any other fields involving water resources.
- At least 2 projects completed.
- Should have in depth knowledge of fluvial hydraulics, hydraulic modelling software, river hydraulics, boundary conditions and related computer technologies.
- Strong communication skills in English; knowledge of Chinese language is advantageous.
- Should have a knowledge about geography of Nepal.
- Knowledge of third and fourth generation Programming languages would be an advantage.

Duty Station shall be Kathmandu.

PROPOSED CONSULTANTS

For the tasks outlined above, it is proposed to engage one Hydraulic Modeler on individual basis. The consultant shall be engaged for 5.0 months on intermittent basis staggered over a period of 15 months tentatively from July 2025 to September 2026.

KEY DELIVERABLES

- **Inception Report:**
 - Short report detailing the Expert's workplan and methodology, brief note on selected model, data requirement and data availability for model setup.
- **Technical note on data preparation, model setup and coupling:**
 - Brief note on data preparation such as DEM, land use/land cover, soil etc., model setup, development, coupling with hydrological model
- **Phase 1 Report (model runs, calibration and validations):**
 - Model development and runs, including parameter sensitivity analysis
 - Model Calibration and Validation
 - Model integration in Delft FEWS
- **Technical Note on Model Performance:**
 - Brief note on model performance after FFEWS setup, feedback and suggestion for refinement.
- **Technical Note on trainings to be conducted for DHM staff:**
 - Prepare syllabus for training (both on the job training and group training) to be provided for DHM staff.
 - Brief note documenting the trainings conducted to DHM staff, including feedback and suggestions on handouts prepared by consultant and key feedback received during the trainings.
- **Phase 2 Report:**
 - A conclusive report consolidating all received comments from DHM and ADB. This final document offers a comprehensive summary of project outcomes, summarizing valuable insights, and presenting recommendations for future initiatives.

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