TERMS OF REFERENCE (TOR)

Consultancy Services for the Design, Development, and Operationalization of a Unified Flood Management and Hydrological Web Portal for Ethiopia

Federal Democratic Republic of Ethiopia
Ministry of Water and Energy (MoWE)

Ethiopia Flood Management Project (ET-FMP)

Date: 14 December 2025

1 Background

The Ethiopia Flood Management Project (FMP), implemented under the Ministry of Water and Energy (MoWE), aims to strengthen flood forecasting, early warning, and disaster risk management across priority river basins including Awash, Omo-Gibe, and the Rift Valley Basin.

Currently, hydrological, meteorological, and impact-based flood forecasting systems operate in a fragmented manner, with limited interoperability, inconsistent data sharing, and inadequate visualization and dissemination tools. This constrains timely decision-making and coordinated flood response at national and basin levels.

To address these challenges, MoWE intends to develop a Unified Flood Management and Hydrological Web Portal, which will serve as the national visualization, dissemination, and interoperability layer of Ethiopia's Flood Early Warning System (FEWS).

A parallel consultancy is responsible for the development of the FEWS forecasting and modeling components. This consultancy will not duplicate forecasting or modeling functions, but will interface with FEWS to visualize and disseminate outputs. Clear coordination mechanisms, data exchange protocols, and interface specifications shall be established between the two consultancies.

The Web Portal will integrate real-time and near-real-time data and visualize outputs from:

- EMI Weather Research and Forecasting (WRF) models,
- MoWE Hydrological Predictions for the Environment (HYPE) models, and
- Impact-based forecasting systems including IBFFEWS.

The system will be implemented initially in pilot basins under ET-FMP and designed for phased national expansion.

2 Objectives

2.1 Overall Objective

To design, develop, and operationalize a national Flood Management and Hydrological Web Portal that consolidates, visualizes, and disseminates hydrological and flood risk information through an interoperable, secure, and scalable platform.

2.2 Specific Objectives

- Assess institutional workflows, data products, and coordination mechanisms among MoWE, Ethiopian Meteorological Institute (EMI), Emergency and Disaster Risk Management Commission (EDRMC), and Basin Development Offices
- Develop functional and system requirements for a secure, scalable, and interoperable web portal.
- Integrate and visualize outputs from WRF, HYPE, and impact-based forecasting systems.

- Establish GIS-based dashboards and visualization tools for decision-makers and stakeholders.
- Ensure role-based access control, sustainability, and national scalability.
- Provide training, capacity building, and two-year post-deployment technical support.

Interoperability refers to the portal's ability to securely exchange data with external systems through standardized APIs and internationally recognized metadata and geospatial standards.

Integration of forecasting systems is primarily for visualization and dissemination purposes. Where different systems produce differing outputs, these shall be presented transparently, and synthesis or interpretation of information shall remain the responsibility of authorized users.

3 Scope of Services

Task 1: Inception and Institutional Assessment

- Review institutional mandates and workflows relevant specifically to data ownership, access rights, validation responsibilities, and data-sharing constraints.
- Map telemetry networks, WRF outputs, HYPE forecasts, and other relevant systems, including Basin Development Offices databases, remote sensing platforms, and disaster management information systems.
- Identify stakeholders, roles, and responsibilities for data provision, validation, and use.
- Prepare an Inception Report including methodology, coordination mechanisms with the FEWS consultancy, and a phased implementation plan.

Task 2: Needs Assessment and Functional Design

- Conduct consultations with MoWE, EMI, EDRMC, basin offices, and other stakeholders.
- Assess existing practices for data collection, processing, visualization, and dissemination.
- Identify gaps and define functional requirements.
- Prepare Functional Requirement Specification (FRS) and System Requirement Specification (SRS) documents covering dashboards, visualization layers, QA/QC mechanisms, metadata profiles, user roles, access controls, data download options, and audit trails.

Task 3: Data Integration Framework

- Design a real-time and near-real-time data ingestion framework, including hourly, daily, and event-based ingestion as applicable.
- Integrate outputs from WRF, HYPE, and impact-based forecasting systems.
- Define interoperability standards, including RESTful APIs, ISO 19115/19139 metadata standards, and OGC services (WMS, WFS, and WCS).
- Draft and recommend inter-agency data-sharing agreements and data governance mechanisms. Formal endorsement of such agreements shall remain the responsibility of the concerned institutions.
- Assess the data readiness of existing systems and recommend technical solutions where interoperability constraints exist.

Task 4: Web Portal and GIS Integration

- Develop a dynamic, CMS-based (Content Management System) web portal with interactive dashboards and GIS-based visualizations.
- Map river basins, sub-basins, administrative boundaries, hydrological stations, lakes, and reservoirs.
- Implement interactive features including zoom, click-based queries, news, events, discussion forums, newsletters, and calendars.
- Ensure compatibility with MoWE, EMI, and EDRMC systems.
- Implement responsive design for desktop and mobile devices.

Task 5: System Testing, Deployment, and Domain Registration

- Conduct functional, integration, and performance testing using pilot basins.
- Deploy the system at the Ministry of Water and Energy Data Center
- Register a dedicated domain and provide hosting, database, and access credentials to MoWE.
- Validate system performance, security, and interoperability.

Task 6: Capacity Building and Knowledge Transfer

- Train at least ten (10) MoWE staff on portal use, administration, and data management.
- Prepare comprehensive user manuals, operational manuals, and technical documentation.
- Conduct experience-sharing workshops with stakeholders.

Task 7: National Rollout and Expansion Planning

- Develop a roadmap for expansion from pilot basins to national coverage.
- Ensure system scalability for future integration of drought, sediment, water quality, and climate monitoring systems.
- Prepare a national rollout plan including technical, financial, and governance considerations.

Task 8: Post-Deployment Maintenance and Support

- Provide two (2) years of technical and administrative support.
- Implement software updates, bug fixes, and performance monitoring.
- Submit periodic maintenance and performance reports.

4 Duration

- Design, development, testing, deployment: **12 months**
- Post-deployment support: **24 months**

5 Deliverables and Payment Schedule

Deliverable	Timeline	Payment (%)
Inception Report & Prototype	Week 2	10%
Needs Assessment Report	Month 2	15%
FRS & SRS + Data Protocols	Month 4	20%
Draft Web Portal	Month 6	20%
Final Web Portal, Training & Manuals	Month 12	25%
Final Consultancy Report	Month 12	10%

6 Team Composition & Qualifications

No.	Position	Qualification	Experience & Responsibilities	Person	Person-Month (PM)		Total Person-Month
					Office	Field	
1	**Project Manager**	M.Sc./Ph.D. in CS, Software Engineering, Data/Info Management	10+ years in large-scale software/ database projects; project coordination, reporting	1	8	4	12
2	**Senior Software Engineer**	M.Sc. in CS/Software Engineering	10+ years; software development, API/database integration, flood management systems	1	10	3	13
3	**Senior System Analyst**	M.Sc. in CS/IT	7+ years; hydrological data management, system design, data integration	1	7	2	9
4	**Senior Software Developer & Integrator**	M.Sc. in CS	7+ years; web portal and database integration, CMS customization	1	9	4	13
5	**Senior Hydrologist x2**	M.Sc. in Hydrology/Water Resources	10+ years. One hydrologist shall focus on data integration and forecasting outputs, and the other on validation and interpretation of multi-source hydrological information.	2	11	5	16
6	**GIS Specialist**	M.Sc. in GIS/Remote Sensing	10+ years; geospatial data integration, mapping, web-based visualization	1	7	2	9

7 Institutional Arrangements

- Lead Agency: Ministry of Water and Energy (MoWE)

Technical Partners: EMI, EDRMC, Basin Development Offices

A Steering Committee, chaired by MoWE, shall provide strategic oversight and approve major deliverables.

A Technical Committee comprising representatives from MoWE, EMI, EDRMC, and Basin Development Offices shall review technical outputs and ensure harmonization.

8 Data Ownership & Usage Rights

All data, source code, databases, manuals, and outputs produced under this consultancy shall be the exclusive property of MoWE. No material may be used or shared without written authorization from MoWE.

9 Compliance

The consultancy shall comply with:

- World Bank Procurement Regulations (2023)
- WMO FEWS guidelines
- International best practices for hydrological and flood risk information systems

10 Risk Management & Mitigation

- **Data Sharing Delays:** Mitigated through inter-agency agreements and standard APIs.
- **Interoperability Issues:** Early-stage testing with EMI WRF, MoWE HYPE, and IBFFEWS outputs.
- **Technical Failures:** Phased pilot testing and two-year post-deployment support.
- **Capacity Risks:** On-the-job training and knowledge transfer to MoWE staff.

11 Acronyms

API – Application Programming Interface
CMS – Content Management System
EDRMC – Emergency and Disaster Risk Management Commission
FEWS – Flood Early Warning System
FFEWS –Flood forecasting and Early Warning System
HYPE – Hydrological Predictions for the Environment
ISO – International Organization for Standardization
IBFFEWS- Impact Based Flood Forecasting and Early Warning System
NDC – National Data Centre
OGC – Open Geospatial Consortium
QA/QC – Quality Assurance / Quality Control
WRF – Weather Research and Forecasting Model