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REQUEST FOR EXPRESSION OF INTEREST
(CONSULTING SERVICES– CONSULTING FIRM SELECTION)

Uttarakhand Disaster Recovery Project (UDRP)
Credit No.5313 - IN
Reference: GPN dated 21/9/2013

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Assignment Title: <u>SELECTION OF FIRM FOR IMPLEMENTATION OF INTEGRATED GEOSPATIAL PLATFORM, DATABASE, AND APPLICATIONS FOR DISASTER RISK MANAGEMENT IN UTTARAKHAND</u>

Reference No.: IN-PIU-CBDRM-26477-CS-QCBS   **Date: 27/09/2017**

The Government of India has received financing from the World Bank towards the cost of Uttarakhand Disaster Recovery Project (UDRP) in Uttarakhand, India and Project Implementation Unit for Technical Assistance on Capacity Building on Disaster Risk Management (PIU-TA-CBDRM), the implementing agency for Disaster Risk Management component, intends to apply part of the proceeds for consulting services.

Through this consulting service the PIU intends to engage a Consulting Firm for **IMPLEMENTATION OF INTEGRATED GEOSPATIAL PLATFORM, DATABASE, AND APPLICATIONS FOR DISASTER RISK MANAGEMENT IN UTTARAKHAND.** The goal of this effort is to rapidly implement a collaborative geospatial platform; integrate real-time and baseline data into the platform; and deploy applications on the platform to support the emergency operation centers (EOC) and decision makers involved in disaster management in the state of Uttarakhand.

The geospatial platform will be managed and operated by the Uttarakhand State Disaster Management Authority (USDMA) and District-Level Disaster Management Authorities (DDMA). The use of the platform will extend to various other agencies, including:

- State Disaster Response Force (SDRF)
- Public Works Department
- Irrigation Department
- Forest Department
- Police Department
- Tourism Department

The platform would enable coordination and collaboration among these agencies in effective deployment of resources, manpower, and expertise for mitigation, response, and recovery from different geophysical, hydromet, and man-made disasters in Uttarakhand.
The contract duration shall be 12 months from the effective date. Draft Terms of References for the consultancy are given as **Annexure-A.**

PIU-TA-CBDRM invites eligible Consulting firms ("Consultants") to indicate their interest in providing the Services. Interested Consultants should provide information demonstrating that they have the required qualifications and relevant experience to perform the Services.

The short listing criteria are:

GENERAL EXPERIENCE

- The consulting firm should have an overall experience of **minimum 10 years**.
- The consulting firm should have experience of **World Bank/ ADB or any other multi lateral funding agencies** for **minimum 2 completed projects**.

TECHNICAL EXPERIENCE

- The consulting firm should have successful track record of designing, developing and operation GIS systems for Disaster Management of minimum **three similar completed assignments in India or abroad in past five years**.
- The consulting firm should have proven expertise of working with hydro meteorological data and forecasting models of minimum **two similar completed assignments**.

FINANCIAL CAPABILITY

- The consulting firm should have completed **at least 2 projects (costing not less than INR 1.85 Crores Each) in the field of GIS system for Disaster Management/ hydro meteorological data and forecasting models** (supporting documents to be attached).
- The consulting firm should have an Average Annual Turnover of **minimum INR 7.5 Crores** certified by CA **in the last three FY** in the format provided in Annexure-I.

MANAGEMENT COMPETENCY

- The consulting firm should have Quality certification like **ISO** etc. (supporting documents to be attached)
- The consulting firm should have staff capacity to provide onsite operation and maintenance support at Dehradun for all components of the geospatial platform, database, and applications

NOTE: The consulting firms should prepare their EOIs clearly highlighting the points above with relevant and sufficient supporting documents only. The criteria mentioned above are the minimum criteria. Any consulting firm with more experience than the criteria stipulated above will secure more marks in the respective criteria.

Supporting document shall include:

Criteria	Supporting Document
Company's General Experience	Registration Certificate
Company's Specific/ Technical Experience	End User Certificate
Company's Turnover	Audited Balance Sheets/ Turnover certificate certified by CA in Annexure-I
Financial Capability	End User Certificate showing the cost

Expressions of interest (EOI) must include the following:

- Introductory letter on letter head (with complete contact details – name of contact person, mailing address, telephone, fax, email etc) explaining how the firm is best to deliver the task.
- Organization profile.
- Last three years audited annual report and three years financial statement.
- Short note along with photographs on the similar projects implemented by the Consultancy Firm pertaining to the short listing criteria.
- The EOI should contain sufficient supporting document to substantiate the claim of the Consultant towards their qualification as per the short listing criteria.

The attention of interested Consultants is drawn to paragraph 1.9 of the World Bank's Guidelines: Selection and Employment of Consultants [under IBRD Loans and IDA Credits & Grants] by World Bank Borrowers January 2011 ("Consultant Guidelines"), setting forth the World Bank's policy on conflict of interest.

Consultancy Firm may associate with other consultants in the form of a joint venture or a sub-consultancy to enhance their qualifications. Such association should be clearly stated in the EOI. Selection will be based on "**Quality and Cost Based Selection Procedures**".

Further information can be obtained at the address below during office hours between 1000 hours to 1700 hours.

Expression of Interest must be delivered in a document form (hard copy or electronic-pdf) at the address or mail id given below (in person, by post or by email) latest by **1700 hours on 27/10/2017**

Program Manager
Project Implementation Unit TA & CBDRM,
Uttarakhand Disaster Recovery Project (UDRP),
Plot No. 29, SIIDCUL Building, IIE (IT PARK),
Sahastradhara Road, Dehradun, Uttarakhand,
Pin Code-248001, Tel/Fax: +91-135-2708358
E-mail piu.wb.drm@gmail.com
Website: www.ukdisasterrecovery.in

STRUCTURED QUESTIONNAIRE FOR DESIGN CONSULTANT
(TO BE SUBMITTED ALONG WITH EOI)

General Particulars of CONSULTANT

Name of the CONSULTANT	
Registered Address	
Phone No:	
Email id:	
Name of the Contact Person for this EOI	
Phone no. of the Contact person for this EOI	
Email id of the Contact person for this EOI	
Branch offices if any	
Date of CONSULTANT establishment	
Number of full time partners Fellow Associate	
Number of full time qualified staff	
Number of other staff who are semi qualified/unqualified	

Financial Particulars of the CONSULTANT

Financial Year	Turnover from Consultancy	Turnover from other Activities	Total Turnover	Average Annual Turnover
2014– 2015				
2015- 2016				
2016– 2017				

"Turnover" would mean the professional fee earned excluding GST and travelling, if billed separately.

Partners Brief Profile

Name of Partner/ M.No.	Age	Associate/ Fellow	Years of post-qualification experience	Qualification	Years of experience as signing partner	Name of Clients handled	Number of years associated with the DESIGN CONSULTANT (post qualification)

Full Time Qualified Staff Brief Profile

Name of Staff/M. No.	Age	Years of experience	Qualification	Number of Years associated with the CONSULTANT (post qualification)	Brief nature of work done

Other Staff Brief Profile

Name of Staff	Age	Years of Experience	Qualifications	Number of Years Associated with the firm	Assignments where the staff has worked with year

Relevant assignments – Last five years

Name of Project /Agency Audited	(1) Funded by Multilateral / Bilateral funding agency;[(2) Agencies implementing government projects (other than above); Or (3) Public sector undertakings in the same sector Please specify 1, 2, 3	Client Name	Nature of Work	Year of Work Done	Partner	project Expenditure	Professonal fees

SELECTION OF FIRM FOR IMPLEMENTATION OF INTEGRATED GEOSPATIAL PLATFORM, DATABASE, AND APPLICATIONS FOR DISASTER RISK MANAGEMENT IN UTTARAKHAND

Uttarakhand Disaster Recovery Project (UDRP)

1. Background

The State of Uttarakhand and several parts of the higher reaches of Himalayas received extremely heavy rainfall during the period June 15 to 17, 2013. The resulting flash flood and landslides caused heavy loss of lives and damage to infrastructure and property.

Following the request of the Government of India, the World Bank is financing the Uttarakhand Disaster Recovery Project (UDRP), which has six components including Technical Assistance and Capacity Building for Disaster Risk Management.

One of the subcomponents focuses on establishment of systems for disaster risk management and risk-informed development planning, with specific focus on enhancing hazard monitoring and early warning, preparedness, response, and recovery planning.

2. Vision

The goal of this effort is to rapidly implement a collaborative geospatial platform; integrate real-time and baseline data into the platform; and deploy applications on the platform to support the emergency operation centers (EOC) and decision makers involved in disaster management in the state of Uttarakhand.

The geospatial platform will be managed and operated by the Uttarakhand State Disaster Management Authority (USDMA) and District-Level Disaster Management Authorities (DDMA). The use of the platform will extend to various other agencies, including:

- State Disaster Response Force (SDRF)
- Public Works Department
- Irrigation Department
- Forest Department
- Police Department
- Tourism Department

The platform would enable coordination and collaboration among these agencies in effective deployment of resources, manpower, and expertise for mitigation, response, and recovery from different geophysical, hydromet, and man-made disasters in Uttarakhand.

3. Objectives
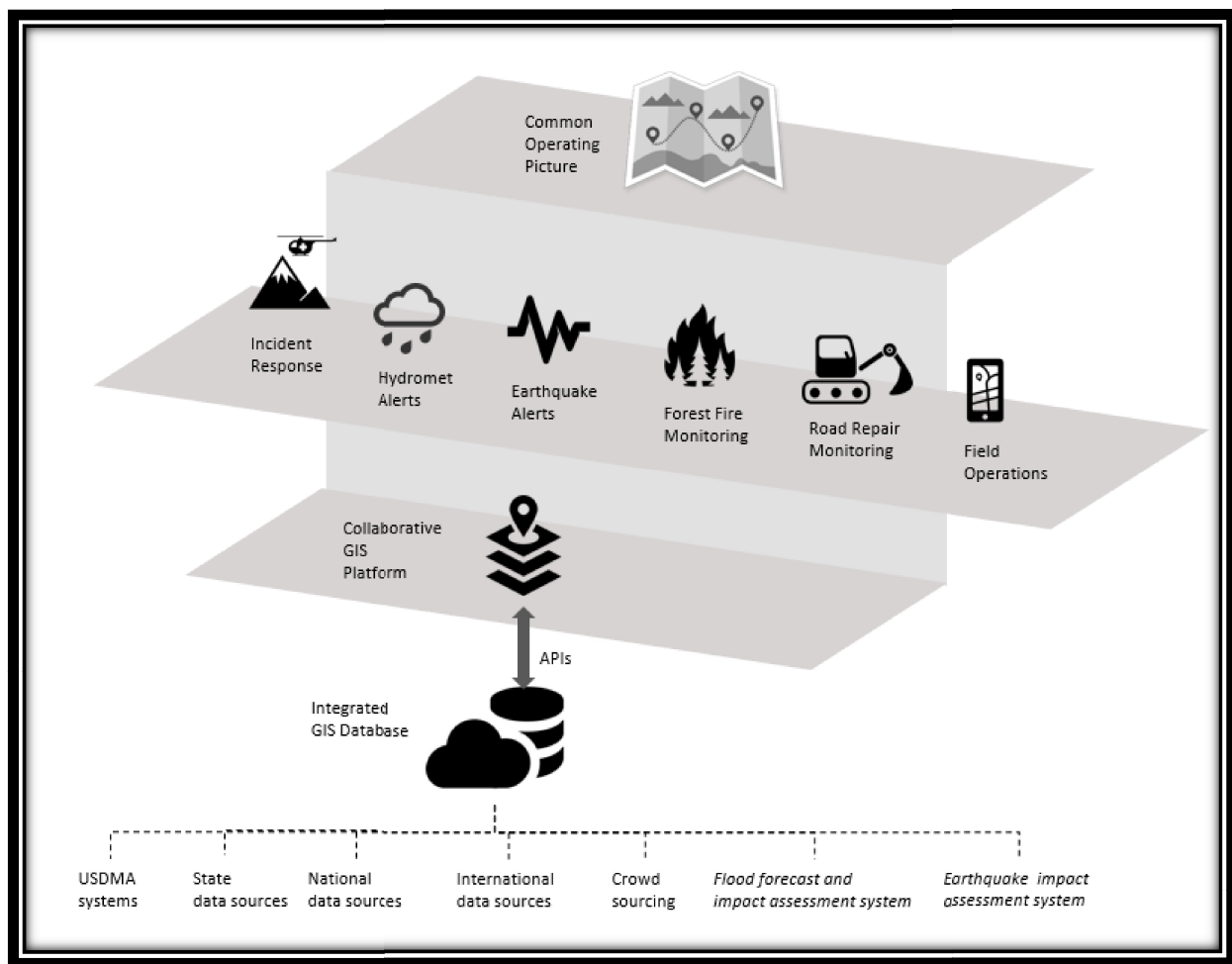
The objectives of the selected firm will be to:

- Implement a single, secure, and scalable geospatial platform operated by the USDMA - accessible across locations, devices, agencies, and applications for reporting, monitoring, and responding to disasters in Uttarakhand.

- Extract and standardize geospatial data and models from existing systems at USDMA and other Uttarakhand govt. agencies and make them available through into the consolidated geospatial database.

- Connect real-time data sources from state, central, and international sources into the geospatial platform, which can be continuously updated and augmented by USDMA.

- Deploy device-independent geospatial applications for EOCs, govt. agencies, decision makers, and field staff to help them monitor, report, analyzes, and respond to emergencies and disasters in the state. These include applications for:

- ○ Hydromet alerts
- ○ Earthquake alerts
- ○ Incident response
- ○ Forest fire monitoring
- ○ Road repair monitoring
- ○ Field operations
- ○ Common operating picture

- Create configurable GIS services and interfaces for quick deployment of visualization, modelling, analytics, and application development as required by the USDMA and other associate agencies.

- Train and certify USDMA and other govt. staff for ongoing operation, administration, development, and management of the geospatial platform and applications.

4. Requirements

4.1 Implementation of geospatial platform

The vendor will be responsible for the end-to-end development and deployment of the geospatial platform - including its database, technical architecture, deployment, development, testing, and delivery.

4.1.1. Platform requirements

- The geospatial platform is expected to be a COTS product ready to be deployed rapidly. It should provide integrated base maps, imagery, vector, digital elevation, terrain, and topographic data.
- The platform should enable users to integrate data and services to create maps and applications, and visualize these in 2D/3D perspectives and analyze as required.
- The platform should be deployable on dedicated servers and cloud.The platform should be accessible by USDMA with and without the access to internet.
- The platform should be able to be integrating with standard hazard and risk models for flood, rainfall, earthquake, landslides, drought, wind, man-made disasters and others.
- The platform should provide device-independent and configurable web and mobile apps. These apps needs to be spatially intelligent and should also work offline.
- The platform should provide simple interfaces to integrate: open data (especially from Open Street Maps), live feeds, telemetry data, GPS data, remote-sensing imagery, social media, video feeds, sensors networks, MIS, ERP, RDBMS, etc.
- Platform should provide a collaborative environment for data and content publishing, sharing and management.
- The platform should be able to process and store big data and real-time data feeds, and offer built in tools for pattern analysis and spatial insights.
- Platform should provide integrated user management with secured access to data and contents. It should also include multi-tier integrated security.

- The platform should include tools for: advanced search and query, geocoding, geofencing, geofencing, data updates from field, situational awareness, spatio-temporal analysis, trend analysis, density analysis, location analytics, multivariate analysis, visibility analysis, and volumetric analysis.
- The platform must provide services for real-time and accurate routing, traffic status, location allocation, and other routing analysis - which must work for Uttarakhand

4.1.2 Deliverables

- Requirement analysis and detailed implementation plan
- Hardware and software requirements
- Solution architecture and technical architecture
- Database physical design, infrastructure design, and disaster recovery plan
- Installation and configuration of the platform, database, and its components
- Setup and configuration of data servers / data center, as needed
- User set up, and end-user testing of platform at state and district levels

4.2 Development of geospatial database

The vendor will be responsible for the end-to-end development of the consolidated geospatial database that extracts and standardizes baseline, real-time, and historic data makes them available through APIs for development of maps, dashboards, and applications.

4.2.1 Database requirements

- The database should support high-availability of data in both online and offline scenarios.
- The database should be scalable and extensible, in order to accommodate newer spatial / non-spatial data as it becomes available
- The database should support include a simple admin interface to upload new data, connect to data from online sources, and manage metadata.
- The database should enable data extraction through various means, including web services, direct downloads, APIs, and others.
- For real-time data collection, the firm will need to develop appropriate ETL tools so that the latest data can be pulled in an automated fashion.
- The data requirements are given below, additional sources may be added at the time of implementation in consultation with USDMA.

4.2.2 Deliverables

- Requirement analysis and conceptual design of the database
- Design of data model and logical design of the database
- Deployment and setup of the RDBMS database
- Deployment and setup of the hardware for the associated data center
- Development of administrative interface enabling users to upload new data, connect to data from online sources, manage and update metadata
- Development and integration of data services and APIs
- Integration of APIs and data services with analytical modules and applications
- Definition of the business continuity plan (BCP) for the database/data services
- Setup of the backup and recovery mechanisms per the BCP
- Detailed technical documentation of the database for system administrators
- Development of ETL (Extract, Transform, Load) tools for datasets, as required
- Extraction, transformation, standardization, and integration of datasets into the database. The vendor should extract and integrate all available data from the following into the geospatial database for platform launch:
  UDRP systems

- *Uttarakhand Disaster Risk Assessment*
  - Input datasets (spatial and temporal) for hazard assessment
  - Exposure, capacity, and vulnerability datasets
  - Hazard layers for earthquake, floods, landslides, flash floods, and industrial hazards
  - Probabilistic and deterministic risk analysis for earthquake, floods, landslides, flash floods, and industrial hazards
  - "Digital Risk Database" of all spatial and non-spatial data from the assessment

- *Uttarakhand River Morphological Analysis*
  - GIS layers for land use, forest area, roads, railways, lakes, major wetlands, basins, river, streams, areas of sedimentation deposits, landslides, high elevation points, vulnerable areas and settlements with history of floods
  - Cross sectional data for vulnerable points in river basins
  - Output raster of digital elevation model (DEM)
  - Rain-runoff modelling outputs, including snowmelt
  - 1-D Hydrodynamic modelling output including dam break simulation with GLOF (Glacial Lake Outburst Flood)
  - 2D Morphological Modelling Outputs
  - Inundation Modelling Outputs
  - "Uttarakhand River Morphological Information System (URMIS)" GIS database

- *UDRP Management Information System*
  - Major road, rail, rivers, and administrative boundaries

- Search and rescue equipment availability, requirement, and maps
- Location and status of reconstruction work including bridges, roads, public buildings, water supply, helipads
- Data visualization and reporting tools for monitoring and evaluation

- *Disaster Mitigation and Management Center Database*
  - Critical infrastructure: Healthcare, police, road, civic aviation, civic supplies, buildings
  - Seismic vulnerability assessment
  - Landslide hazard assessment
  - Flood inundation mapping for Tehri and Pipalkoti dams

- *Real-time Forecast and Impact Assessment System for Flash Floods and Floods (Upcoming)*

- *Earthquake Impact Assessment System (upcoming)*

  Real-time data
- Real-time gauge, discharge, reservoir, meteorological, and other data from:
  - Irrigation Department
  - Central Water Commission (CWC)
  - Water Resources Information System (WRIS)
  - CWC Flood Forecast System
  - Tehri Hydro Development Corporation (THDC)

- Real-time rainfall and spatial analysis from:
  - IMD Automated Weather Stations
  - IMD Customized Rainfall Information System (CRIS)
  - NASA GPM and TRMM
  - India WRIS

- Weather Forecasts
  - IMD bulletins
  - IMD City Weather Forecast
  - IMD Mountain Weather Bulletin
  - IMD Chardham Special Forecast
  - Global Flood Monitoring System (GFMS)
  - Private Weather APIs

- Road closure and machine deployment status
  - PWD Uttarakhand

- Baseline and active forest fire data from:
  - NASA Fire Information for Resource Management System
  - BHUVAN Uttarakhand Forest System
  - Forest Department Control Room

- Uttarakhand Fire Report Management System
- Forest Fires Alert System (Forest Survey of India)
- Forest Survey of India

- Real-time earthquake and shakemap data from:
  - USGS Earthquake Hazards Program
  - IMD (National Center for Seismology)
  - IIT Roorkee Earthquake Early Warning System

- Remote Sensing Imagery
  - Uttarakhand Space Application Center
  - NRSC
  - NASA EOSDIS
  - Digital Globe
  - IIRS

Baseline data
- Digital elevation model data
- LIDAR data
- Hydrological features
- Health infrastructure
- Multi-hazard zonation
- Historical disasters
- Landslide inventory
- Administrative boundaries
- Cadastral Boundaries
- Other boundaries – Forest, Police
- Road network
- Railways network
- Helipads
- Building footprints
- Landuse / Landcover
- Critical Infrastructure
- Relief and rescue infrastructure
- Search and rescue Equipment
- Utility network
- Telecom network

Monitoring data
- Incident reports from SEOC and DEOCs
- Disaster Helpline and Whatsapp
- Social Media
- Drone and UAV data
- CCTV data
- Traffic and routing data - including Google Maps Directions API
- Public transit data
- GPS tracker data

4.3 Development of Geospatial Applications

The consulting firm is expected to leverage the geospatial database to develop applications based on the requirements of the following user groups:

- SDMA and govt. decision makers
- State and district EOCs
- SDRF and other field staff
- Coordinating govt. departments:
  - Forest Department
  - Public Works Department
  - Irrigation Department
  - Tourism Department

The firm will be responsible for end-to-end development and deployment of the following applications and associated workflows for the user groups:
- Hydromet alerts
- Earthquake alerts
- Forest fire monitoring
- Road repair monitoring
- Incident response
- Field operations
- Common operating picture

4.3.1 Application requirements

4.3.1.1 Hydromet alerts

These dashboards will extract, geo-tag, and display real-time hydromet data for Uttarakhand, including:

- Real-time rainfall data from IMD and NASA GPM
- Daily and Weekly cumulative rainfall and spatial rainfall analysis from IMD
- Present and forecasted water level data from CWC
- Reservoir level and discharge data from THDC and irrigation department
- Flood warnings from IMD, CWC, and GFMS
- Current weather and forecasted weather from IMD
- Flash flood and flood forecasts and alerts generated by the *Real-time Forecast and Impact Assessment System for Flash Floods and Floods*

Additionally, when specified thresholds are met these should display geo-tagged alerts and send email / SMS alerts to SEOC staff. Here are some alert examples:

- When real-time rainfall exceeds IMD defined intensity threshold for 'heavy rainfall'
- When 'heavy' rainfall and higher is predicted by IMD
- When 'heavy' rainfall (and higher) predicted areas are flood / landslide prone
- When cumulative rainfall is above threshold for flood / landslide prone areas

- When real-time water level at a station exceeds CWC defined "Warning" level
- When flood warnings or forecasts are generated by the *Real-time Forecast and Impact Assessment System for Flash Floods and Floods*
- When flood warnings are raised by CWC / IMD / GFMS

The firm is expected to work with SDMA to define further alert requirements and appropriate base map needs.

4.3.1.2 Earthquake Alerts

This dashboard will geo-tag, and display real-time earthquake data for Uttarakhand, including data from:

- USGS Earthquake Hazards Program
- IMD (National Center for Seismology)
- IIT Roorkee Earthquake Early Warning System

When an earthquake is detected by any of these sources, the dashboard should:
- Display geo-tagged alerts on the map and send alerts to SEOC staff
- Display associated intensity / shake map
- Automatically generate buffer zones around the earthquake epicenter

The firm is expected to work with SDMA to define the alert / buffer requirements and appropriate base map needs.

4.3.1.3 Forest Fire Monitoring

This shared application can be used EOCs / Forest Department's Control Rooms to track and manage forest fire incidents. This application should:

- Display active fire and potential hotspots based on real-time data from:
    - NASA Fire Information for Resource Management System
    - Uttarakhand Fire Report Management System
    - Forest Fires Alert System (Forest Survey of India)

- Provide:
    - Appropriate base maps (vegetation, topography, vulnerable areas etc)
    - Spatial and temporal patterns of wildfire data in Uttarakhand
    - Latest remote sensing images from MODIS/BHUVAN

- Enable users to:
    - Create and track geo-tagged forest fire incident reports
    - Add status of crew stations, control rooms, watchtowers
    - Add forest fire modelling output to map displays

The firm is expected to work with SDMA to define further requirements and appropriate base map needs.

4.3.1.4 Incident Response

This shared application can be used by EOCs, SDRF, and Police staff for coordination and response to disaster and emergency incidents. The application should include tools to:

- Log and geo-tag incident reports received from various sources, including:
  - Helpline
  - Whatsapp
  - E-mail
  - SMS
  - Social media
- Identify potentially impacted population and infrastructure around an incident
- Identify emergency shelters and evacuation zones for the incident area
- Log and track resource requests to respond to an incident
- Monitor resource availability and response to resource requests
- Track movement of vehicles and response teams
- Monitor and track incident response progress
- Add features representing temporary relief infrastructure including:
  - Staging area
  - Helibase
  - Command post
  - Helipads
  - Relief camps
  - Field hospitals
  - Alternative routes
- Create, share, and print operational views for decision makers

4.3.1.5 Road Repair Monitoring

This shared application can be used by the EOCs and PWD to track and manage road damage and repairs:

- Log and track road damage, road blockages, and closures
- Log and track status of road repairs and associated machine deployments
- Log and track district-wise deployment of machinery for disaster management
- Log and track deployment of machinery along specific locations and road stretches for Char Dham Yatra route maintenance
- Display landslide prone zones, landslide alerts, and incident reports
- Display accident prone zones, patterns, and latest road accident reports

4.3.1.6 Field Operations

This cross-platform mobile application should offer critical features and tools to users in the field to send and receive essential information. The application should:

- Enable users to log, geotag, and track incidents from the field
- Enable users to log, geotag, and track damage reports from the field

- Enable users to log, geotag, and resource requests from the field
- Notify users of their task assignments, and allow user to update their status
- Notify users of latest geo-tagged disaster forecasts and alerts
- Identify location and status of nearby disaster response facilities
- Identify nearby evacuation points and routes
- Store and share the GIS track of the user for particular periods
- Enable user to stream the device's current GPS location

4.3.1.7 Common Operating Picture

This will be a central application for decision makers at USDMA and other government agencies for situational awareness, logistics planning, and operational response to disaster and emergencies in Uttarakhand. This application should:

- Provide real-time display of current disaster alerts and forecasts
- Provide real-time display of incident reports and status of response
- Provide summary of impacted areas, population, infrastructure for an incident
- Display current location and status field teams, resources, and critical infrastructure
- Display critical updates from social media and other crowdsourced information
- Display hazard vulnerability of specific areas or populations for planning purposes
- Assess optimal locations for setup of temporary structures, such as relief camps
- Assist in planning of logistical operations and management of resource requests
- Run routing and resource analysis for impacted areas to plan rescue and relief efforts
- Enable users to view and maintain contact details and locations of personnel
- Provide focused workflows for govt. departments to contribute latest information
- Automatically update status of mobilized resources, stocks and other inventories
- Enable user to issue orders to specific personnel / team with digital signature
- Enable users to assign tasks to specific personnel / teams with digital signature
- Generate map based briefings and reports - for online and print use

4.3.2 Deliverables

- Detailed requirement, task, and process analysis in consultation with user groups
- Data gap analysis, and recommendation to fill data gaps as needed
- Technical architecture and user-experience design based on the analysis
- Definition of workflows and processes for each user group for application use
- Development and deployment of all end-user applications mentioned above:
  - Hydromet alerts
  - Earthquake alerts
  - Forest fire monitoring
  - Road repair monitoring
  - Incident response
  - Field operations
  - Common operating picture

- Testing of applications in online/offline scenarios across devices
- User acceptance testing and Quality Assurance
- Detailed user documentation for end users
- Detailed operation manual for system administration

4.4 Capacity Building

It is mandatory for the consulting firm to transfer the knowledge to the identified USDMA staff and officers with respect to the operation and maintenance of the geospatial platform, database, and applications.

4.4.1 Deliverables

- **Training Plan:** Prepare detailed training and capacity building plan for end users, administrators, and govt. agencies. The training plan based on assessment of skill-gap analysis of USDMA/SEOC/DEOC staff. The training's objectives should be to enable to use, operate, maintain, and update the geospatial platform, database, and applications.
- **On the job training:** Selected USDMA staff with technical skills will be nominated to work with the consultancy team throughout the development to receive on-the job training. These staff should be trained and certified in administration, operation, and updates to the of the geospatial platform, database, and applications.
- **Training modules and training delivery:** Develop curriculum and courseware for variety of training modes like web based video libraries, self-learning, instructor led training etc. Consultant should also list out the mode and associated infrastructure needs for successfully delivering the trainings. The vendor will also deliver the training, The number of participant in these trainings can be expected to be 25-30 including USDMA staff , SEOC/DEOC staff, and staff from other govt. Agencies.
- **Manuals:** Develop operations manuals including implementation and rollout plan, user manuals, training manuals and aids, etc. This will also include comprehensive process guidelines for rollout by administrators and third party implementers.

5. Knowledge Transfer

- It is mandatory for the consulting firm to transfer the knowledge to the identified USDMA staff and officers with respect to the operation and maintenance of the geospatial platform, database, and applications.
- All source code and artefacts produced as part of this assignment should be provided to USDMA - which would have the right to re-deploy these as needed.
- The USDMA shall have exclusive rights over all IP products and database generated under this consultancy assignment.

6. Timeline

The duration of this consultancy is 12 months. Here is the suggested timeline:

Component	Deliverables	Period in Months (from the effective date)
Geospatial platform	**Refer section 4.1.2**	2 months
Geospatial database	**Refer section 4.2.2**	6 months
Geospatial applications	**Refer section 4.3.2**	10 months
Capacity Building	**Refer section 4.4.1**	12 months

7. Technical Requirements

- Interoperability of data is a critical need for the platform - data formats and models should follow established international standards such as OGC standards for geo-data, allowing other developers to connect to data sources
- The geospatial platform used must allow easy integration with Open Street Map and enable Satellite-Based Emergency Mapping
- The platform should enable offline use at Dehradun and the District Level Disaster Management Authorities in case of loss of internet connectivity
- The consulting firm should recommend hardware sizing and configuration, networking specifications taking into account the number of concurrent users, desired response time, database sizes etc. This includes definition of back end servers, data storage/volumes, network equipment, connectivity, and physical security requirements.
- The consulting firm should define the hosting needs along with connectivity options for high availability of the system and networking and bandwidth requirements.
- Since this platform will support critical, emergency services - the consulting firm should define the Business Continuity Planning requirements and constraints to ensure constant availability of the platform.
- Software development activities should be conducted following industry best practices in secure code development as outlined in the OWASP Secure Coding Practices.
- Consulting firm should provide for quality assurance and security testing of deliverables including providing evidence thereof to USDMA providing opportunity and dedicated environment for USDMA to complete their own QA & security testing as desired prior to acceptance of delivery.

8. Usability Considerations

- As disaster and risk management are high-stress situations with large volumes of information adding to the cognitive load of the disaster managers/responders who

need to make quick decisions – the user experience design for the user-facing applications should be carefully considered for effectiveness in real crisis situation.
- The design of the platform should consider the support for Hindi to ensure its usability - especially for users in the field

9. Services and Facilities to be provided by USDMA

The following support will be extended by the USDMA to achieve outcomes of the assignment:

- Appropriate production hardware for setup and deployment of system
- Facilitation of data collection from government agencies in timely manner
- Appropriate open source software for setup and deployment of the production system. If the development cannot be done in open source environment than firm should provide lifetime licenses with upgrading facility to run the geospatial platform.
- Coordination with other government agencies for sourcing datasets, and provide access to existing systems and datasets available within USDMA
- Availability of key staff/project team for discussions when needed and organize workshops to facilitate structured consultations.
- Facilitation of interaction and exchange of information with key stakeholders and ensuring linkages with other DRM components of the project as well as Government of Uttarakhand initiatives
- Office facilities, telephone, internet, computers, etc for installation and commissioning geospatial platform, database, and applications.
- Hardware and space for the Data Center based on specifications provided by the consulting firm.

10. Vendor Requirements

- The consulting firm should have successful track record of designing, developing and operation GIS systems for Disaster Management of minimum three similar completed assignments in India or abroad in past five years.
- The consulting firm should have proven expertise of working with hydro meteorological data and forecasting models of minimum two similar completed assignments
- Vendors should include tentative bill of material for their proposed technical solution in their response to the RFP.
- The consulting firm should have staff capacity to provide onsite operation and maintenance support at Dehradun for all components of the geospatial platform, database, and applications
- The key staffs to be provided by the consulting for design and development are shown below.

Position	Man months	Qualifications
Team Leader	12	- M.Tech/MCA/MBA from a premier institute. 10 + years of experience in planning, designing, and managing GIS applications for situational awareness and real-time data monitoring - Extensive knowledge of tools and methodologies used for flood / earthquake / landslide prediction and impact assessment - Experience in leading and managing application development projects - Demonstrable experience working on disaster risk reduction related projects in India
GIS Expert	12	- Advanced degree in GIS/Geology/IT or related disciplines 3+ years of experience in design and development of GIS datasets and systems - Demonstrable experience of working with satellite data - Direct experience in development of hydrological applications and emergency operations applications
Database Expert (2 Nos.)	12	- Advanced degree in computer science / computer engineering or related disciplines 5+ years of experience in database design and development - with a focus on disaster management related databases - Demonstrable experience in API development and management - Experience in integrating real-time data with decision support systems
Application Developer (2 Nos.)	12	- Advanced degree in computer science / computer engineering or related disciplines 5+ years of experience in developing GIS based decision support applications - for desktop and mobile devices - Demonstrated experience in developing and managing Application Programming Interfaces
User Experience Designer	4	- Advanced degree or certification in User Experience Design / Usability and related disciplines 3+ years of experience in research and User Interface design for GIS based applications

		● Demonstrable experience in planning and conducting participatory design sessions ● Demonstrable experience in designing mobile applications
Training and Documentation Expert	4	● MBA or advanced degree in knowledge Management. ● 5+ years of experience in designing, developing and delivering training for GIS databases and applications ● Experience in using rapid e-learning tools to develop learning modules ● Demonstrated capability in developing technical documentation for complex technical products ● Capacity to deliver classroom training in English and Hindi