



गोविन्द बल्लभ पन्त राष्ट्रीय हिमालयी पर्यावरण संस्थान
G.B. Pant National Institute of Himalayan Environment (NIHE)
कोसी-कटारमल, अल्मोड़ा – 263 643, उत्तराखण्ड
Kosi-Katarmal, Almora - 263 643, Uttarakhand

Tender No. GBPI/2026-27/2992

Date: 21.07.2026

LIMITED TENDER ENQUIRY

Engagement of Third-Party Consulting Firm for Remote Sensing, GIS-Based Data Preparation, Mapping and Generation of Spatial Data for Three Study Watersheds
(Under SARRA Supported One District–One River Project)

1. Notice Inviting Tender

Sealed bids are invited under the Two-Bid System (Technical & Financial) from technically competent consulting firms for preparation of Remote Sensing and GIS based spatial datasets for Jataganga (Almora), Purvi Ramganga (Pithoragarh) and Garud Ganga (Bageshwar) watersheds.

2. Background

The Centre for Land & Water Resource Management (CLWRM), NIHE is implementing a 12-week rapid assessment project titled 'Prioritizing Sub-Watersheds and Recharge Interventions for Evidence-Based River Rejuvenation Planning under the One District–One River Programme of SARRA' supported by SARRA, Watershed Directorate, Government of Uttarakhand. The project requires development of a comprehensive geospatial database to support watershed prioritization and groundwater recharge planning. Considering the specialized nature of work and time-bound schedule, a technically competent third-party consulting firm is proposed to be engaged.

3. Tender Information

Particular	Details
Tender Type	Limited Tender Enquiry (Rule 162, GFR 2017)
Estimated Value	Not exceeding ₹10,00,000 (Inclusive of GST)
Bid System	Two Bid System (Technical & Financial)
Last Date	04/08/2026 (05:00 PM)
Completion Period	15 days from award of work
Bid Validity	60 Days
Performance Security	3% of contract value

4. Scope of Work

- Watershed boundary & base maps
- Drainage network & stream ordering
- LULC mapping (2015, 2020 & 2025)
- Soil maps

- Spectral indices (NDVI, NDWI, NDBI, SAVI, BSI, etc.)
- Demographic database
- Lineament mapping
- Terrain & morphometric layers
- Soil erosion mapping
- Geological, geomorphological & lithological layers
- Rainfall & temperature spatial layers
- Metadata, GIS database and final technical report

Kindly refer Annexure-I for detailed Terms of Reference.

5. Technical Specifications

Outputs in UTM WGS 1984 Zone 44N; Raster, Vector (Shapefile/GeoPackage), GeoTIFF, PDF maps, metadata, attribute tables and publication-quality layouts.

Kindly refer Annexure-I for detailed Technical Specifications.

6. Eligibility Criteria

Experience, turnover, Team Leader qualification, statutory registrations, non-blacklisting, conflict of interest and confidentiality requirements as specified in the qualifying criteria.

Kindly refer Annexure-II for detailed Eligibility Criteria.

7. Deliverables

Complete GIS database, thematic maps, raster/vector layers, metadata, statistics, accuracy assessment and final technical report.

Kindly refer Annexure-I for detailed Deliverables.

8. Evaluation

Technical evaluation followed by opening of Financial Bid of technically qualified bidders.

Kindly refer Annexure-II for detailed Evaluation.

9. Payment Terms

40% on 50% progress; 40% on completion; 20% after final approval.

Kindly refer Annexure-I for detailed Payment Terms.

10. General Conditions

Confidentiality, data ownership, liquidated damages, arbitration, force majeure, termination, compliance with GFR 2017 and NIHE procurement conditions.

Kindly refer Annexure-I for detailed General Conditions.

Details of Work and Terms of Reference

For Third-Party Consulting Firm for Remote Sensing, GIS-Based Data Preparation, Mapping, and Generation of Spatial Data for Three Study Watersheds

1. Subject:

Engagement of a third-party consulting firm for preparation of watershed-level GIS, remote sensing, thematic, demographic, hydro-meteorological, geological, and related spatial layers for Jataganga (Almora), Purvi Ramganga (Pithoragarh), and Garud Ganga (Bageshwar) watersheds under the SARRA-supported One District–One River project.

2. Background:

GBPNIHE is implementing a 12-week rapid assessment project titled “*Prioritizing Sub-Watersheds and Recharge Interventions for Evidence-Based River Rejuvenation Planning under the ‘One District–One River’ Programme of SARRA in Jataganga, Purvi Ramganga and Garud Ganga of Kumaun Himalaya, Uttarakhand.*” The project is supported by SARRA, Watershed Directorate, Government of Uttarakhand.

For evidence-based river rejuvenation planning and groundwater recharge potential mapping, a comprehensive spatial data is required for the three study watersheds, namely:

- Jataganga watershed, Almora
- Purvi Ramganga watershed, Pithoragarh
- Garud Ganga watershed, Bageshwar

In this context, a technically competent third-party consulting firm is proposed to be engaged to prepare, procure, process, analyze, and submit the required GIS- and remote sensing-based spatial layers, maps, data, and associated reports as per GBPNIHE specifications.

3. Objective of the Assignment:

The objective of the assignment is to prepare and provide standardized, georeferenced, watershed-level spatial datasets and thematic maps for the three study watersheds to support hydrological assessment, sub-watershed prioritization, groundwater recharge potential assessment, springs inventory, and planning of river rejuvenation interventions.

4. Details of Work / Scope of Work:

The consulting firm shall undertake the following works for all three study watersheds:

4.1 Watershed Boundary and Base Layers: The firm shall prepare and provide:

- Watershed boundary for each of the three study watersheds.
- Georeferenced Survey of India toposheets/Open Series Maps covering the study watersheds.
- Watershed-wise base maps showing major settlements, drainage, road network, administrative boundaries, and other relevant reference features.

4.2 Drainage Map:

- The firm shall prepare drainage maps for all three watersheds using Survey of India toposheets/Open Series Maps at 1:50,000 scale.

- The drainage layer shall be properly digitized, georeferenced, corrected, and clipped to the respective watershed boundary.

4.3 Drainage Network and Stream Ordering:

- The firm shall prepare a complete drainage network following Strahler's stream ordering method.
- For each watershed, the firm shall provide:
 - Number of streams by stream order.
 - Total length of streams by stream order.
 - Watershed-wise drainage network map.
- Attribute table containing stream order, stream length, and related hydrological attributes.

4.4 Land Use/Land Cover Maps:

- The firm shall prepare Land Use/Land Cover maps for the years 2015, 2020, and 2025 for all three study watersheds using Resourcesat-2/LISS-IV satellite data or equivalent appropriate datasets.
- The spatial resolution of the LULC outputs should be close to 5 m, as far as technically feasible and consistent across all three time periods.
- The LULC classification shall include the following classes: Dense forest, Moderately dense forest, Open forest/scrub, Agriculture/cropland, Fallow land, Built-up, Barren/rocky land, Water bodies, Plantation/orchards, Degraded land, Sand/river bar
- For each year and each watershed, the firm shall provide: (i) Classified LULC raster, (ii) LULC vector/shapefile, and (iii) Area statistics for each LULC class.
- Change matrix/comparative summary for 2015–2020, 2020–2025, and 2015–2025, wherever applicable.
- Map layouts in printable format.

4.5 Soil Map:

- The firm shall procure and prepare soil maps from ICAR-NBSS&LUP at 1:50,000 scale for all three study watersheds.
- The firm shall ensure that watershed-level soil layers are appropriately extracted/clipped from the district-level soil maps and provided with complete attribute information.

4.6 Derived Spectral Indices:

- The firm shall prepare the following spectral index layers for all three watersheds:
 - BSI – Bare Soil Index
 - EBBI – Enhanced Built-Up and Bareness Index
 - IBI – Index-Based Built-up Index
 - MNDWI – Modified Normalized Difference Water Index
 - NDVI – Normalized Difference Vegetation Index
 - NDWI – Normalized Difference Water Index
 - NDBI – Normalized Difference Built-up Index
 - NDSI – Normalized Difference Snow Index
 - SAVI – Soil-Adjusted Vegetation Index
- The outputs shall include raster layers, map layouts, and brief interpretation/statistical summaries for each watershed.

4.7 Demographic Data:

- The firm shall compile demographic data for all villages falling within the three study watersheds.
- The demographic data shall include, wherever available: (i) Village name, (ii) Gram Panchayat, (iii) Block, (iv) Total population
- The demographic information shall be spatially linked with village boundary/point layers, wherever feasible.

4.8 Lineament Map:

- The firm shall prepare lineament maps at 1:10,000 scale for all three study watersheds.
- The lineament layer shall include: (i) Digitized/mapped lineaments, (ii) Lineament density layer, (iii) Length and orientation attributes, and (iv) Watershed-wise lineament maps.

4.9 Terrain and Morphometric Layers:

- The firm shall prepare the following terrain-derived layers for all three watersheds: (i) Slope, (ii) Aspect, (iii) Topographic wetness index, (iv) Proximity index, (v) Curvature, and (vi) Terrain roughness
- All terrain layers shall be prepared using appropriate DEM sources (of spatial resolution 12.5 m or less) and shall be clipped to the respective watershed boundaries.

4.10 Soil Erosion Layers:

- The firm shall prepare soil erosion-related layers at 1:50,000 scale for all three watersheds.
- The output shall include spatial soil erosion risk/erosion intensity layers, wherever applicable, along with necessary attributes, metadata, and map layouts.

4.11 Geological and Related Thematic Layers:

- The firm shall procure and prepare the following layers from Geological Survey of India, Government of India, for all three watersheds:
 - Surface lithology
 - Geomorphology
 - Geology
- The firm shall ensure that the layers are clipped to the watershed boundaries and provided with complete attribute information.

4.12 Rainfall and Air Temperature Data:

- The firm shall prepare spatial information on rainfall and air temperature using long-term datasets of at least 40 years for all three watersheds.
- The outputs shall include:
 - Long-term rainfall data.
 - Long-term air temperature data.
 - Spatial rainfall layers/maps.
 - Spatial air temperature layers/maps.
 - Watershed-wise summary statistics.
- Metadata indicating source, period, resolution, method of interpolation/downscaling, and limitations, if any.

5. Technical Specifications:

The consulting firm shall follow the technical specifications given below:

- All spatial outputs shall be provided in the projected coordinate system (UTM WGS 1984 Zone 44N).
- Outputs shall be provided in both formats, depending on the nature of data (Raster and Vector/shapefile format)
- Wherever applicable, the firm shall provide:
 - Attribute tables
 - Symbology-ready layers
 - Metadata
 - Map layouts
 - Area/length/statistical summaries
 - Processing methodology
- All raster layers shall be properly aligned, projected, and clipped to the respective watershed boundaries.
- All vector layers shall be topologically corrected and free from slivers, gaps, overlaps, and digitization errors.
- All maps shall include title, legend, scale bar, north arrow, coordinate grid, data source, projection information, and date of preparation.

6. LULC Classification Accuracy Assessment:

- For all LULC outputs, the consulting firm shall provide classification accuracy assessment, including: (i) Error/confusion matrix, (ii) Overall accuracy, (iii) Producer's accuracy, (iv) User's accuracy, (v) Kappa coefficient or equivalent standard metric, and (vi) Ground truth/validation points, wherever available
- Brief methodology for training and validation sample selection

7. Machine Learning Model Performance:

- In case machine learning algorithms such as Random Forest, Support Vector Machine, Classification and Regression Trees, or any equivalent method are used for LULC classification, the firm shall provide model performance indicators, including:
 - Training and validation approach
 - Model parameters
 - Number of training and validation samples
 - Accuracy statistics
 - Precision
 - Recall
 - F1-score
 - Any other relevant performance metric

8. Expected Deliverables:

The consulting firm shall submit the following deliverables:

- Watershed boundary layers for all three watersheds.
- Georeferenced toposheets/Open Series Maps.
- Drainage maps and stream order data.
- Stream number and stream length statistics as per Strahler's classification.
- LULC maps for 2015, 2020, and 2025.
- LULC change statistics and accuracy assessment report.
- Soil maps procured from ICAR-NBSS&LUP and clipped to watershed boundaries.
- NDVI, NDWI, NDBI, NDSI, and BSI layers.
- Village-wise demographic data.
- Lineament maps at 1:10,000 scale.
- Slope, aspect, wetness index, proximity index, curvature, and roughness layers.
- Soil erosion layers at 1:50,000 scale.
- Surface lithology, geomorphology, and geology layers from GSI.
- Long-term rainfall and air temperature spatial layers.
- Watershed-wise map layouts in PDF/JPEG/PNG format.
- Complete GIS data in raster and vector formats.
- Metadata for all datasets.
- Final technical report describing data sources, methodology, processing steps, outputs, limitations, and summary statistics.

9. Data Ownership and Confidentiality:

- All datasets, maps, processed outputs, derived products, reports, and associated documents prepared under this assignment shall be the property of the GBPNIHE/SARRA-supported project.
- The consulting firm shall not use, reproduce, publish, transfer, or share any project data, maps, or outputs with any other agency/person without prior written permission from GBPNIHE.

10. Quality Assurance:

- The consulting firm shall ensure that all outputs are technically sound, spatially accurate, properly projected, and prepared as per the specifications of GBPNIHE.
- GBPNIHE shall review the submitted outputs at different stages. The firm shall incorporate corrections, revisions, and modifications suggested by GBPNIHE without any additional financial liability.

11. Timeline:

The assignment shall be completed within 15 days. The consulting firm shall submit interim outputs on the 08th day from the date of the start of the consultancy.

12. Financial Terms and Payment Schedule:

- The fee proposed by the firm shall be examined and negotiated to ensure reasonability and consistency with prevailing market rates.
- The payment shall be made to the third-party consulting firm as per the following schedule:

Installment	Payment Percentage	Payment Condition
First installment	40%	50% work progress (Pl. see Section 4.1 to 4.5, and 4.8, 4.10, and 4.11 of Details of work)
Second installment	40%	100% work progress
Final installment	20%	After review and approval by the GBPNIHE Team

Note: For each installment release, the third-party firm must produce a valid GST bill of expenditure.

13. Completion and Acceptance:

- The assignment shall be considered complete only after submission and acceptance of all required GIS layers, raster/vector datasets, maps, metadata, statistical tables, accuracy reports, and final technical report.
- Final payment shall be released only after GBPNIHE confirms that all outputs have been submitted in the prescribed format and are technically acceptable.

A. Minimum Qualifying Criteria for the Consulting Agency:

The applicant agency shall fulfill the following minimum qualifying criteria:

1. The agency should have completed either:
 - One similar assignment costing not less than **40% of the estimated tender value**; or
 - Two similar assignments, each costing not less than **25% of the estimated tender value**, during the preceding five years.
2. The agency shall have an average annual financial turnover of at least **50% of the estimated tender value** during the last three completed financial years.
3. The proposed Team Leader shall possess a postgraduate degree in Remote Sensing and GIS, Geoinformatics, Geography, Geology, Environmental Science, Hydrology, Civil or Agricultural Engineering, Natural Resource Management, or a related field.
4. The proposed Team Leader shall have at least **three years of relevant professional experience** in Remote Sensing, GIS, watershed assessment, natural-resource mapping, or allied assignments.
5. Open-source GIS and Remote Sensing software may be used, provided that all outputs comply with the prescribed technical specifications and are submitted in standard and interoperable formats.
6. The agency shall have demonstrated experience in processing medium- or high-resolution satellite data and preparing georeferenced raster and vector datasets, attribute tables, metadata, statistical summaries, and publication-quality map layouts.
7. The agency shall possess a valid PAN, GST registration, and other statutory registrations, wherever applicable.
8. The agency shall submit a signed self-declaration confirming that it has not been blacklisted or debarred or suspended by any Central Government department, State Government department, public-sector undertaking, autonomous institution, statutory body, or multilateral agency as on the date of bid submission.
9. The agency shall disclose any actual or potential conflict of interest that may affect the impartial execution of the assignment.
10. The agency shall accept that all raw data, processed datasets, GIS layers, maps, scripts, models, reports, metadata, and associated outputs prepared under the assignment shall remain the property of GBPNIHE or the concerned project.
11. The agency shall agree not to publish, transfer, share, reproduce, or reuse any project-related data or outputs without prior written permission from GBPNIHE.

B. Documents to be Submitted with the Technical Bid:

The applicant agency shall submit the following documents:

1. Certificate of incorporation, registration, partnership deed, LLP registration, society registration, or equivalent legal document.
2. Copies of PAN, GST registration, and other applicable statutory registrations.

3. Audited financial statements or a Chartered Accountant's certificate showing year-wise turnover for the last three completed financial years.
4. Copies of relevant work orders, contracts, completion certificates, or satisfactory performance certificates.
5. Details of at least one or two similar assignments (complying with A.1) completed during the preceding five years.
6. Signed CVs of the proposed Team Leader and other key technical experts.
7. A signed undertaking confirming the availability of the proposed personnel for the assignment.
8. A list of available GIS, Remote Sensing, image-processing, cartographic, and computing facilities.
9. A signed conflict-of-interest declaration.
10. A signed confidentiality and data-ownership undertaking.
11. A signed undertaking confirming acceptance of all technical specifications, deliverables, timelines, revision requirements, and conditions specified in the ToR.

C. Consortium and Subcontracting:

1. The assignment should preferably be awarded to a single technically competent agency.
2. Consortium or joint-venture bidding is not allowed.
3. Subcontracting of specialized activities is not permitted.
4. The selected agency shall remain fully responsible for the accuracy, quality, confidentiality, coordination, and timely submission of all outputs, irrespective of any approved subcontracting arrangement.
5. Core GIS analysis, quality assurance, data integration, and preparation of final deliverables shall not be entirely subcontracted.

D. Technical Responsiveness:

1. Only agencies satisfying all mandatory eligibility criteria shall be considered for detailed technical evaluation.
2. The financial bids of only those agencies obtaining the prescribed minimum qualifying criteria shall be opened.
3. Submission of incomplete, unverifiable, misleading, or materially inconsistent credentials may result in rejection of the bid.

ANNEXURE-III

Experience Details

Client	Name of Work	Contract Value	Completion Date	Proof

ANNEXURE-IV

Annual Turnover

Financial Year	Turnover (₹)
2023-24	
2024-25	
2025-26	

Certified by Chartered Accountant (Signature & Seal)

ANNEXURE-V

Team Leader & Key Experts

Name	Qualification	Experience	Role
			Team Leader
			Expert
			Expert

ANNEXURE-VI

Infrastructure Details

GIS Software Available:

☐ ArcGIS ☐ QGIS ☐ ERDAS ☐ ENVI ☐ SNAP ☐ GRASS GIS ☐ Others

Equipment	Quantity
Workstations	
Server	
GPS	
Drone (if available)	

ANNEXURE-VII

Declaration of Non-Blacklisting

We certify that our organization has not been blacklisted/debarred by any Central/State Government Department, PSU or Autonomous Body.

Authorized Signatory

Seal

ANNEXURE-VIII

Conflict of Interest Declaration

We declare that there is no actual or potential conflict of interest in this assignment.

Authorized Signatory

Seal

ANNEXURE-IX

Confidentiality & Data Ownership Undertaking

All datasets, maps, GIS layers, reports and outputs prepared under this assignment shall remain the exclusive property of NIHE. No information shall be shared without prior written approval.

Authorized Signatory

Seal

ANNEXURE-X

Financial Bid Format (in separate envelope)

Description	Amount (₹)
Professional Consultancy Charges	
GST	
Total	

Grand Total: