BEFORE THE HON'BLE NATIONAL GREEN TRIBUNAL, PRINCIPLE BENCH, NEW DELHI

ORIGINAL APPLICATION NO.433/2022

IN THE MATTER OF:-

PATESWARI PRASAD SINGH --- APPLICANT

VERSUS

STATE OF U.P. & ORS. ---- RESPONDENTS

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1.	Letter Received from Survey of India regarding the cost, Method And time for demarcation and providing contour map of Suwawan River	

Dt. 01/08/24

Filed Through

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भारत सरकार
GOVT. OF INDIA

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पत्र सं0 त- 3668 /39-C-ED(Court Case) दिनांक: 19 /07/2024

सेवा में,

अपर महासर्वेक्षक,
उत्तरी क्षेत्र, भारतीय सर्वेक्षण विभाग,
चण्डीगढ़।

विषय : **मा. राष्ट्रीय हरित अधिकरण, नई दिल्ली में विचाराधीन वाद सं. 433/2022 पाटेश्वरी प्रसाद सिंह बनाम उ.प्र. राज्य व अन्य में पारित आदेश के अनुपालन में जनपद बलरामपुर में सुवांव नदी के फ्लड प्लेन जोन के निर्धारण के संबंध में।**

संदर्भ : अधिसाशी अभियन्ता, सरयू ड्रेनेज खण्ड-2, बलरामपुर कार्यालय का पत्रांक-574/स. ड्रे.ख.-2/एन.जी.टी दिनांकित 05.06.2024.

महोदय,

उपरोक्त विषयांकित संदर्भित पत्र के अन्तर्गत अधिसाशी अभियन्ता, सरयू ड्रेनेज खण्ड-2, बलरामपुर द्वारा सुवांव नदी के फ्लड प्लेन जोन का निर्धारण हेतु 01 मी. कन्टूर इंटरवल का मैप उपलब्ध करवाने का अनुरोध किया है जिसके लिए उनके द्वारा टोपोशीटों मे क्षेत्र को चिन्हित किया गया है। यह क्षेत्र 200 वर्ग कि.मी. है।

उक्त क्षेत्र का Lidar द्वारा सर्वेक्षण कर वांछित का 01 मीटर इंटरवल कन्टूर का मानचित्र बनाया जा सकता है। जिसके सर्वेक्षण के अनुमानित व्यय का विस्तृत विवरण तथा Cost Estimate निम्न प्रकार है।

Cost Estimate

Activity	Rate per Sq km.	Area in Sq km.	Amount in Rs.
Field Data Acquisition through LIDAR Sensor & High Resolution optical camera mounted on Aircraft	20,000	200	₹ 40,00,000.00
Feature Extraction (Supply of GIS ready Vector data & Supply of one Hard copy Map)	6000	200	₹ 12,00,000.00
Total			₹ 52,00,000.00
GD-overhead charge @ 25%			₹ 13,00,000.00
Grand Total			₹ 65,00,000.00

(Rupees Sixty Five Lakh Only)

उपरोक्त अनुमानित व्यय आकलन आपकी स्वीकृति हेतु प्रेषित है।

संलग्नकः सर्वेक्षण कार्य का विस्तृत प्रोजेक्ट प्रस्ताव

19/7/24
(रविन्द्र मीना)
अधीक्षण सर्वेक्षक,
कृते निदेशक

प्रतिलिपि: अधिसाशी अभियन्ता, सरयू ड्रेनेज खण्ड-2, बलरामपुर को सूचनार्थ प्रेषित।

19.07.24.
(पवन कुमार द्विवेदी/PAWAN KUMAR DWIVEDI)
अधिकारी सर्वेक्षक/Officer Surveyor
उ.प्र. भू.स्था. निदेशालय/U. P. G. D.
भारतीय सर्वेक्षण विभाग, लखनऊ

SURVEY OF INDIA

DEPARTMENT OF SCIENCE & TECHNOLOGY

PROPOSAL FOR AERIAL SURVEY USING LIDAR SENSOR AND OPTICAL CAMERA AS PAYLOAD AND DIGITIZATION OF TOPOGRAPHICAL FEATURES IN THE ORTHO RECTIFIED IMAGE

1. Introduction and Background

With reference to OA no 433/2022 under consideration in National Green Tribunal, New Delhi; Honourable tribunal has asked for the marking and demarcation of flood zones of River Suwawan in Balrampur District of Uttar Pradesh to prevent the encroachment on the flood plain, stop unauthorized constructions, prevent illegal mining, stop discharge of effluents and ensure that the integrity of Rivers is maintained with its free flow. *Learned counsel appearing for State made a statement that pursuant to Tribunal's order dated 19.05.2023, demarcation of flood plain zone upto 50 mtrs distance from edge of River Suwawan on both right and left side in urban municipal limit of Balrampur and upto 100 mtrs minimum or existing natural buffer zone of River Suav outside of urban municipal limit of Balrampur has been done. It is also said that pursuant to above order, identification of encroachments by construction of houses, religious structures, schools, etc in the 50 mtr distance from the edge of left and right of River Suwawan in urban municipal limit of Balrampur city has also been completed.*

Since as per the report of the Irrigation Department, Government of Uttar Pradesh has consulted SoI and has obtained their opinion, they are of the view that, SoI which is a national reputed surveying agency be engaged for demarcation of the floods plain zone of Suwawan as per rehabilitation/rejuvenation of River Suav dated 18.10.2023.

Accordingly, they directed the Government of Uttar Pradesh to consider engaging SoI and completing the flood plain demarcation for Suwawan falling within the State within a period of one month.

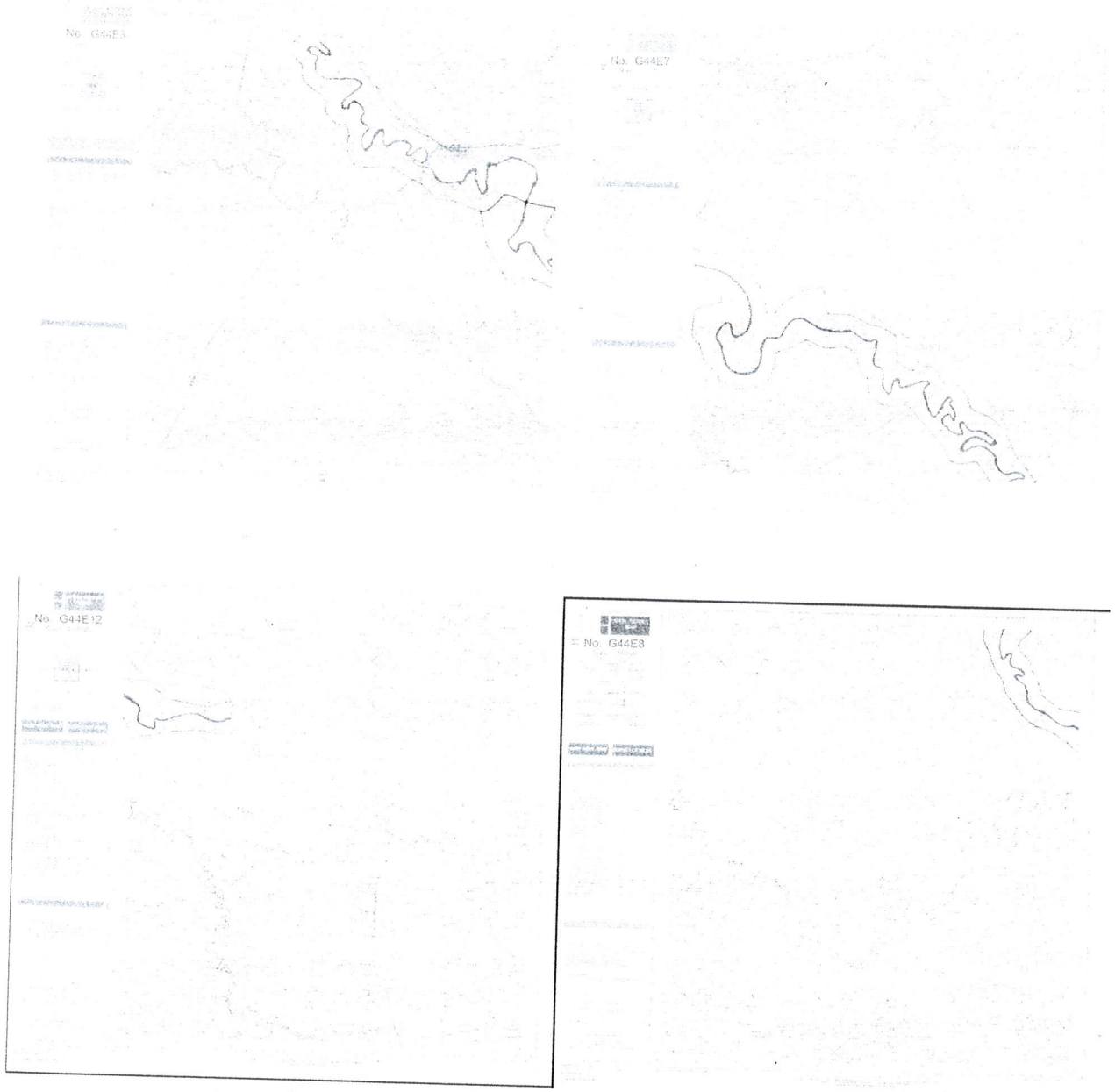
Consequently, Irrigation Department, Government of Uttar Pradesh has consulted SoI Lucknow Office for the above mentioned contour maps and SoI Lucknow office has provided toposheets of 1:50000 Scale of the flood zones of River Suwawan in Balrampur District of Uttar Pradesh.

Irrigation Department, Government of Uttar Pradesh has approached SoI Lucknow office for the fresh survey of Flood plain areas of River Suwawan in Balrampur District of Uttar Pradesh to get 1-meter interval contour map. Therein, the irrigation department has also asked to incorporate the following topographical details along with the contour map-

1-Express highway with bridge; with distance stone
2-Roads, metalled and unmetalled
3-Bridges: with piers, without piers. Causeway
4-Streams: Drain, Canal, River
5- Dams masonry or rock-filled, earthwork. Weir.
6- River dry with water channel; with island &rocks.
7-Other wet land, Temporal coast line, Harbour line 8-Embankments: Canal, river, road or rail,
9- Railways, Airways, Airport.
10-Contours with sub-features, Rocky slopes, Cliffs
11-Towns or Villages: inhabited; deserted. Fort.
12-Builtup land, Building foot print, Graveyard
13-Huts: permanent, temporary. Tower.

14-Temple. Chhatri. Church. Mosque. Idgah. Tomb. Graves 15-Boundary, interstate, Dist Boundries.
16-state: demarcated; undemarcated
17-District; subdivision, tahsil or täluk, forest
18-Bench-mark: G.T.S, geodetic; tertiary, canal

2. Project area



Area of interest of River Suwawan in Balrampur District marked in Sol Toposheet

Total area of interest of Basin of Suwawan River for carrying out fresh survey is approximately 200 Sq Km in both Balrampur and Siddharath Nagar Districts combined.

3. Methodology and Technology

2.1 Provision of Ground Control Points

Identification, Establishment, Densification & Utilisation of Ground Control Points (GCPs)

This part includes planning, observation, computation and monumentation of Ground Control Points. Existing CORS (Continuously Operating Reference Station) of Survey of India and Control points established under various mapping work shall be utilised for the project Densification of CORS network for more precise and reliable horizontal and Vertical control is proposed.

2.2 Data Acquisition using High end LIDAR sensor and High Resolution Optical Camera as payload mounted on Aircraft

This part includes Acquisition of Raw Digital data by Aerial Platform for generating Digital Elevation Model (DEM) of 0.5-meter accuracy and Digital Ortho-imagery of 20 cm GSD (Ground Sampling Distance). LIDAR survey and Digital photography of the area shall be carried out by the SOI using Aerial platform for Large Scale Mapping consisting of on-board GNSS and IMU to generate Digital elevation model (DEM) of 0.5-meter accuracy and Ortho rectified image of 0.20-meter resolution.

2.3 Pre-processing

2.3.1 This part includes Flight planning, sensor calibration, Flight execution as per plan, QA/QC for review of flight line alignment, raw data validation for completeness, avoiding data voids, strip matching, pre-processing of on-board GNSS/IMU data for trajectory file and other pre-processing steps needed for point cloud extraction/ preparing data for post-processing stage.

2.3.2 This process includes obtaining necessary clearances from Ministry of Defence and other agencies for flying over the survey area and to acquire data.

2.3.3 This part includes mobilizing all necessary equipment, software and hardware for carrying out the activity.

2.4 Post-Processing for generation of DSM, DEM and Digital Ortho-imagery

2.4.1 This part includes generating Digital Surface Model (DSM) from raw/ pre-processed data and performing necessary editing/ filtering of non- ground points (vegetation, built-up areas, bridges, elevated structures etc.) for generating bare-earth DEM of 0.5-meter accuracy.

2.4.2 This part includes performing QA/QC at various stages of project including validating horizontal and vertical accuracy as per specifications.

2.4.3 This part includes to integrate Geoid model supplied by SoI with the DEM on ellipsoidal heights for yielding DEM on MSL heights.

2.4.4 This part includes generating Ortho-imagery of 20 cm GSD.

2.5 Base Map Generation & 2D Feature Extraction

2.5.1 The ortho-rectified image, after data/image (obtained from Aerial Survey) processing, shall act as a base map from which topographical and man-made (visible) features as mentioned by irrigation dept. in the introduction section shall be extracted.

2.5.2 Administrative boundaries, revenue boundaries etc. available with SoI will be incorporated during Feature Extraction

2.5.3 **2D Feature Extraction**

2D topographical features shall be derived from Ortho-rectified using suitable GIS software. The base map shall comprise of various layers in GIS format as per the requirements of the project.

OGC compliant GIS database models shall be implemented for generation of GIS layer data structure for storing spatial & attribute data.

The features to be extracted shall be as per the deliverables/ wish list provided by the irrigation department.

2.6 Ground truthing, validation of Topographical and man-made features in maps shall be carried out by Irrigation Department.

4. Deliverables

Following shall be output of the entire project:

a) Contour map of 1-meter interval
b) Processed bare earth Digital elevation model data of 0.5-meter accuracy in GEOTIFF format
c) Digital Ortho rectified imagery of 0.2-meter GSD in GEOTIFF format
d) Deliverables also include raw data captured by various sensors and instruments
e) Processed digital surface model
f) Proper indexed map with proper sheet number incorporating all topographical features
g) Sheet wise as well as complete mosaic map of Flood plain area .
h) Spatial and non-spatial data dictionary with feature codes, feature type(line, points and polygon).
i) Feature description and symbols.
j) Seamlessly district digital database with a provision to show various layers of various topographical details/features as per wish list.
k) Hard copy maps in 1:25000/ 1:10000 scale
l) Details of the map to be generated are as follows:

(i) Scale	:	as desired
(ii) Coordinate System	:	WGS84 with UTM projection
(iii) Accuracy (minimum)	:	Horizontal - 0.2 m Vertical - 0.5 m
(iv) Format	:	Output files in Open file format (.shp) along with all the supporting files like .shx, .dbf, .prj, .xml, .sbn,.sbx).

5. Work Plan/ Roles and Responsibilities

a. Survey of India (SoI)

a) Project will be executed under close supervision of SoI.
b) Activities given in sl. 2.1 2.2 2.3 2.4 2.5 will be either outsourced or performed by SoI. The quality checking shall be under the supervision of SOI.
c) To the extent it is feasible, SoI will deploy maximum resources for these activities on priority.

6. Cost Estimate & Time Schedule

Cost Estimate

Activity	Rate per Sq km	Area in Sq Km.	Amount in Rs
Field Data Acquisition through LIDAR Sensor & High resolution optical camera mounted on Aircraft	20000	200	₹ 40,00,000.00
Feature Extraction (Supply of GIS ready Vector data & supply of one Hard copy Map)	6000	200	₹ 12,00,000.00
Total			**₹ 52,00,000.00**
GD Overhead Charge @ 25 %			₹ 13,00,000.00
Grand Total			**₹ 65,00,000.00**
			(Rupees Sixty Five Lakh only)

Detailed cost break-up for Field Data Acquisition through LIDAR Sensor & High resolution optical camera mounted on Aircraft

Sub Activity	Rate per Sq km	Area in Sq Km.	Amount in Rs
Provision of Ground control Points	1700	200	3,40,000.00
Raw data acquisition	11,400	200	22,80,000.00
Pre-processing of Raw data	1400	200	2,80,000.00
Post processing for generation of DSM, DEM and Contours	2900	200	5,80,000.00
Post processing for generation of Ortho Rectified Image	2600	200	5,20,000.00

Detailed cost break-up for Feature Extraction activity (Supply of GIS ready Vector data & supply of one Hard Copy Map)

Sub Activity	Rate per Sq km	Area in Sq Km.	Amount in Rs
Hardware/ Software cost to be deployed for Digitisation and supply of GIS ready vector data	1200	200	2,40,000
Manpower cost to be deployed for Digitisation and supply of GIS ready vector data	3400	200	6,80,000
QA/QC cost for Digitisation	1000	200	2,00,000
Printing cost	400	200	80,000

d) All mentioned above including Project planning, preparation of bid/RFP, bid processing, award of work, work execution as per contract etc. would be done under the supervision of SoI and shall adhere with the norms as laid by Government of India

b. Irrigation Department, Govt. of UP

a) Topographical features or any other features to be incorporated must be communicated well in advance

b) Activities at sl. 2.6 including activities involving ground truthing would be under taken by Irrigation department.

TIME SCHEDULE –

Time line of the Project will be as follows

ACTIVITY	DURATION	TIME-LINE
Tendering process and award of contract	2 Months	01 August – 30 September
Data acquisition and Post processing for generation of DSM, DEM, Contours and ORI	2 Months	01 October – 30 November
Feature Extraction	3-4 Months	01 November – 31January

Data acquisition will start from 01 October because weather must be clear and free of clouds for data to be acquired through aerial mode

7. WHY LIDAR SENSOR AND OPTICAL CAMERA

1) SoI is one of the central implementation agencies in National Hydrology Project (NHP) Project wherein Survey of India has been entrusted with the responsibility to generate, prepare and provide various types of Geo-spatial datasets i.e. mapping and preparing the Digital Elevation Model (DEM) of 0.5m accuracy for Major River Basin areas (plain), up to 5 km on both the sides of river. In this project data is being acquired with the help of High end LIDAR sensor and High Resolution Optical Camera as payload mounted on Aircraft.
   The objective of the NHP is assessment of water resources, flood management, reservoir operations, drought management etc
2) SoI is one of the central implementation agencies in National Mission for Clean Ganga (NMCG) Project wherein Survey of India has been entrusted with the objective to generate High Resolution DEM and GIS ready database for the part of River Ganga with Latest Technology i.e. mapping and preparing the Digital Elevation Model (DEM) of 0.5m accuracy for Ganga River Basin areas (plain), up to 10 km on both the sides of river. In this project data is being acquired with the help of High end LIDAR sensor and High Resolution Optical Camera as payload mounted on Aircraft.

Thus to fulfil the requirement of similar objective with respect to River Suwawan above proposal have been prepared. Similar approach has been used in NHP and NMCG project to get 0.5-meter accuracy DEM and 1-meter interval contour map data for the major River basin areas. Thus for getting 0.5-meter DEM and 1-meter interval contour map of Suwawan river, this technology is most suitable.

19.07.24.

(पवन कुमार द्विवेदी/PAWAN KUMAR DWIVEDI)
अधिकारी सर्वेक्षक/Officer Surveyor
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