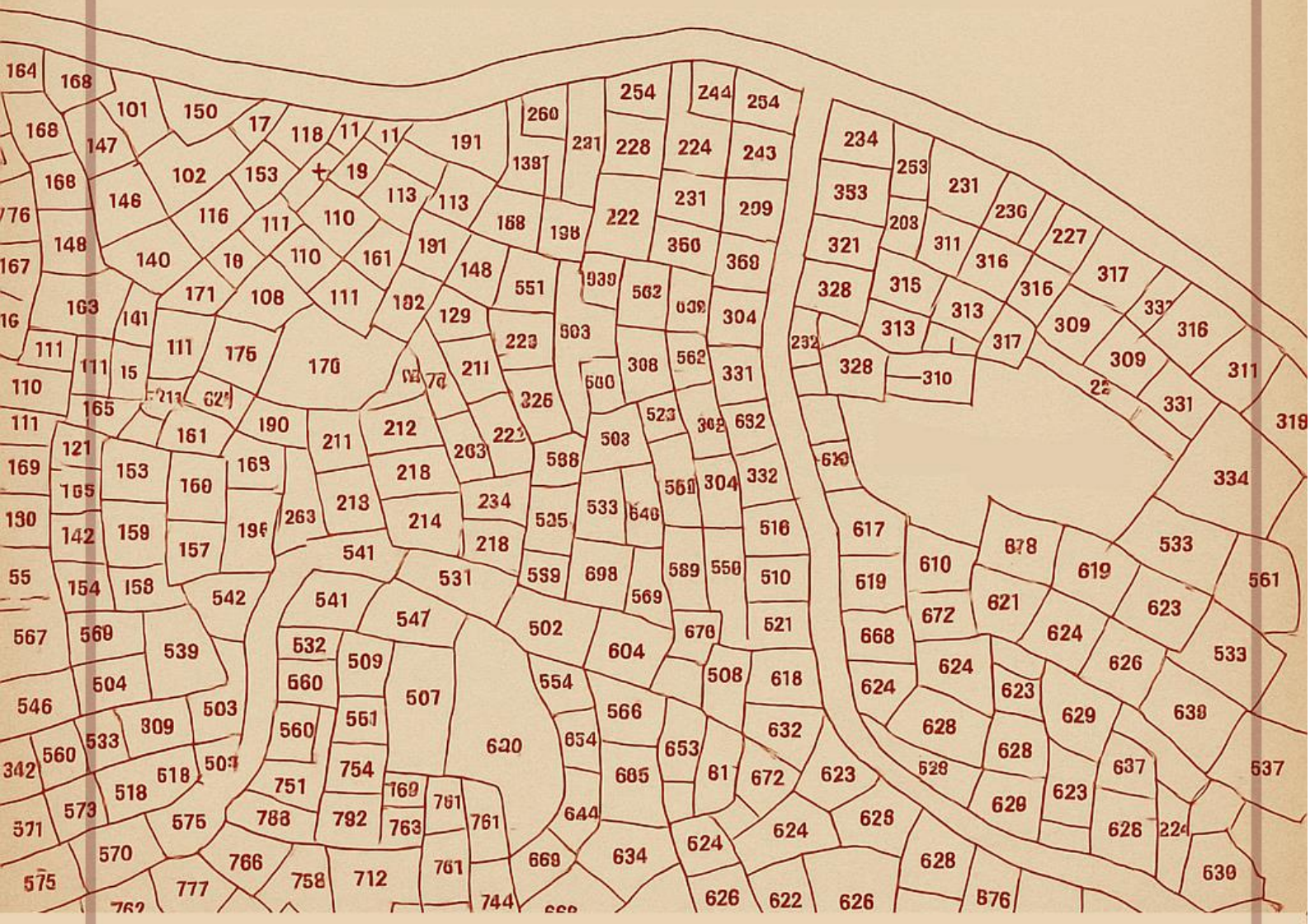
REPORT
on
Mouza Map Collection, Scanning, Digitizing and Base Map Preparation



CLIENT

Preparation of Development Plan for Mehrpur Zilla (MZDP)

URBAN DEVELOPMENT DIRECTORATE (UDD)

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URBAN DEVELOPMENT DIRECTORATE (UDD)
GOVERNMENT OF THE PEOPLE'S REPUBLIC OF BANGLADESH

REPORT

On

Mouza Map Collection, Scanning, Digitizing and Base Map Preparation under Preparation of Development Plan for Meherpur Zilla Project.

Submitted to
Ahmed Akhtaruzzaman
Senior Planner & Project Director
"Preparation of Development Plan for Meherpur Zilla Project."
Urban Development Directorate (UDD)

Submitted by

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JUNE 2025

EXECUTIVE SUMMARY

The "Preparation of Development Plan for Meherpur Zilla" is a strategic initiative led by the Urban Development Directorate (UDD) under the Ministry of Housing and Public Works, Government of Bangladesh. The objective is to create a comprehensive planning framework encompassing Structure Plans, Urban Area Plans, and Rural Area Plans to guide the sustainable development of Meherpur District. A fundamental prerequisite for this effort is the development of an accurate and up-to-date base map derived from Mouza maps and geo-spatial data.

This report presents the process and outcomes of the Base Map Preparation, which forms the spatial backbone of the entire planning initiative. The work included the collection of RS (Revisional Settlement) Mouza maps, high-resolution scanning, digitization, geo-referencing using Ground Control Points (GCPs), and integration with 3D spatial features derived from UAV surveys. The base map covers all three upazilas of Meherpur District—Meherpur Sadar, Mujibnagar, and Gangni—comprising a total of 199 Mouzas and 504 Mouza sheets.

The scope of work was executed in alignment with the Terms of Reference (ToR) and included:

- Collection and preservation of Mouza sheets from DLRS and DC offices
- On-screen digitization of point, line, and polygon features using ArcGIS
- RTK GPS-based GCP surveys and benchmark establishment for sub-meter geo-referencing
- Edge-matching and integration of Mouza sheets across unions and upazilas
- Extraction of 3D features to enhance spatial representation of land use and infrastructure
- Design and population of a structured GIS geodatabase with attribute fields
- Preparation of large-format (A0) base map layouts for planning use

The resulting geo-referenced base map serves as a comprehensive, spatially-accurate planning tool that integrates historical land data with modern geospatial technology. It supports the identification of land use patterns, physical features, infrastructure networks, and environmental resources—forming the foundation for evidence-based decision-making in future urban and rural planning.

This initiative not only strengthens the spatial data infrastructure of Meherpur Zilla but also sets a precedent for scalable, GIS-integrated planning across other districts in Bangladesh.

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Introduction

Chapter 1: Introduction

1.1 Background

The **"Preparation of Development Plan for Meherpur Zilla"** project is a great initiative undertaken by the Urban Development Directorate (UDD), Ministry of Housing and Public Works, Government of the People's Republic of Bangladesh. The primary aim of this project is to prepare a comprehensive development plan for Meherpur District, which includes the formulation of a **Structure Plan**, **Urban Area Plan**, and **Rural Area Plan** at various levels such as Pourashava (municipality), Union, and Growth Center.

As part of the planning process, detailed spatial data, including physical features, land use, and topographic information, is required to ensure that the development plan is based on accurate, up-to-date, and reliable information. A fundamental component of this process is the collection, scanning, digitization, and integration of **Mouza maps**. These maps serve as essential references for demarcating boundaries, understanding land ownership, and identifying features critical for planning purposes.

To achieve this, the consultant firm has been contracted to assist in the preparation of the physical feature, land use, and topographic survey. This includes the digitization of the Mouza maps and their integration with other survey data to create a comprehensive Geographic Information System (GIS) database. This GIS database will not only support the development of various planning documents but also serve as a valuable resource for future urban and rural development efforts in Meherpur District.

The task of **Base Map Preparation** forms a significant part of this process. It involves the collection, scanning, digitization, and integration of data from Mouza maps, followed by the creation of a base map, which will act as a foundation for all future planning and analysis activities. This report details the steps involved in base map preparation, including the collection and digitization of Mouza maps, 3D feature extraction, and the integration of various data layers to produce an accurate and reliable base map that will support the development planning process.

This report is also aligned with the Terms of Reference (ToR) provided by UDD, which outlines the requirements and expectations for the completion of the map preparation and GIS integration tasks. The base map and associated data are essential for identifying key features such as land use, infrastructure, natural resources, and topography, all of which will be used to guide sustainable development and urbanization strategies in Meherpur District.

In summary, this report provides a comprehensive overview of the **Mouza map collection**, **scanning**, **digitization**, and **GIS integration** process that will lead to the successful preparation of a base map for the **Meherpur Zilla Development Plan**. The final product will contribute significantly to the decision-making process by providing accurate, reliable, and accessible spatial data.

1.2 Objective of the Report

The primary objective of this report is to document the processes, methodologies, and outcomes associated with the **Base Map Preparation** for the "Preparation of Development Plan for Meherpur Zilla" project. This report outlines the systematic approach taken by the consultant team to collect, digitize, geo-reference, and integrate Mouza maps and 3D spatial data into a unified geodatabase that will support evidence-based planning and decision-making.

Specific objectives of this report include:

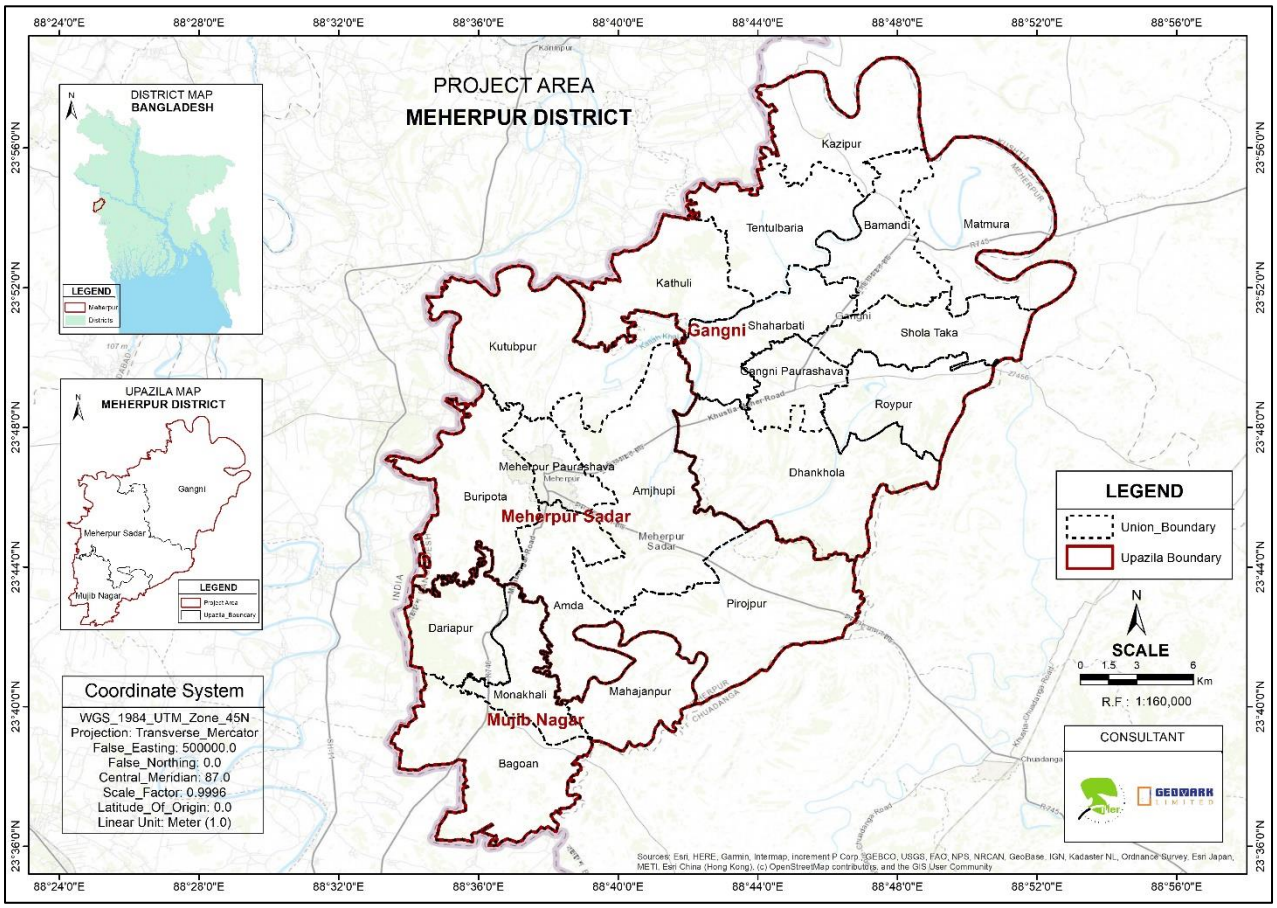
1. To present a detailed account of Mouza map collection, scanning, and digitization.
2. To describe the process of geo-referencing Mouza maps using Ground Control Points (GCPs).
3. To compile and present the integrated base map.

1.3 The project location

Meherpur is a district in southwest Bangladesh that lies in the northwest of Khulna Division. Its borders are to the east and west, respectively, with the districts of Chuadanga and Kushtia in Bangladesh and the Indian state of West Bengal. Meherpur was a Nadia district subdivision prior to independence. The district is 716.08 square kilometers (276.48 square miles) in size. Meherpur Sadar Upazila, Mujibnagar Upazila, and Gangni Upazila are the three upazilas that make up Meherpur district. Meherpur, which is home to more than 0.7 million people, is a significant hub for trade and agriculture in the area. The district headquarters is located in the town of Meherpur, which is also the largest town in the district.

Meherpur's historical significance and rich cultural legacy are well-known. There are numerous historic sites and ruins in the area. The yearly Baruni Mela, which is conducted in honor of the Hindu god Shiva, is one of Meherpur's most colorful and bright celebrations.

Meherpur's economy is based mostly on agriculture, with a sizable section of people working in farming and associated fields. Rice, wheat, and jute are just a few of the crops that may be produced in the area because of its rich soil and temperate temperature. The non-agricultural sector has grown significantly in the region in recent years, as evidenced by the opening of a number of small and medium-sized businesses. With a profusion of picturesque lakes and rivers, verdant forests, and undulating hills, Meherpur is renowned for its natural beauty. Numerous wildlife sanctuaries, such as the Kanaighat Wildlife Sanctuary, which is home to a wide variety of species, are located in the district.



Map 1-1: Project Area Map


Scope of Work

Chapter 2: Scope of Work

2.1 Scope of Work

The scope of work for this report encompasses all tasks related to the preparation of a high-quality, geo-referenced base map for the “Preparation of Development Plan for Meherpur Zilla” project. This base map will serve as a foundation for urban and rural planning components, and integrates both traditional Mouza maps and modern geospatial data. The consultant's responsibilities under this scope are aligned with the Terms of Reference (ToR) provided by the Urban Development Directorate (UDD), Ministry of Housing and Public Works.

The specific components within the scope of work are outlined as follows:

1. Mouza Map Collection and Processing
    - Collection of available Mouza sheets from DLRS and DC Offices.
    - High-resolution scanning using drum scanners to ensure rotation and alignment integrity.
    - Digital preservation and submission of scanned images to the Project Director (PD).
2. Digitization of Mouza Maps
    - On-screen digitization using ArcGIS to convert physical Mouza features into vector GIS data.
    - Development of three separate manuscripts:
        - Point Features (e.g., benchmarks, boundary pillars)
        - Polygon Features (e.g., water bodies, structures, land parcels)
        - Line Features (e.g., roads, canals, boundaries)
    - Quality control measures including edit plot checking, projection accuracy, and error correction.
3. Geo-referencing and Ground Control Point (GCP) Survey
    - Conducting GCP surveys using RTK GPS to ensure spatial accuracy (<1 meter error).
    - Selection and establishment of GCPs and permanent benchmarks jointly with UDD.
    - Geo-referencing of scanned Mouza maps using BTM (Everest 1830) projection system.
4. Map Integration and Mosaic Preparation
    - Joining and edge-matching of geo-referenced Mouza sheets at Union, Upazila, and District level.
    - Superimposing digitized Mouza maps with UAV-derived 3D features.
5. 3D Feature Extraction Statistics
    - Data extraction statistics of 3D (x, y, z) vector features including roads, structures, water bodies, embankments, and control structures.
    - Conversion of extracted data into GIS-ready format.
6. Attribute Data Structure and Geodatabase Development
    - Finalization of feature classification and attribute fields.
    - Design and creation of a structured GIS geodatabase.
    - Population of plot-wise and feature-wise spatial attribute data.
7. Map Layout and Printing
    - Preparation of standard map layouts in consultation with the PD, including title blocks, legends, scales, and grids.
    - Map printing in A0 size with finalized features and symbology.
8. Data Compilation and Submission
    - Compilation and submission of all outputs in both hard copy and soft copy format:
        - Digitized Mouza maps with georeferenced data

- 3D physical features in GIS layers
- Attribute database and metadata documentation
- Base map prints and editable digital files

This scope ensures that the base map is not only a spatially accurate and feature-rich product but also compatible with planning tools and processes to be used throughout the Meherpur Zilla Development Plan project.


Methodology

Chapter 3: Mouza Map Collection, Scanning, Digitization, Editing and Base Map Preparation

3.1 Mouza Map

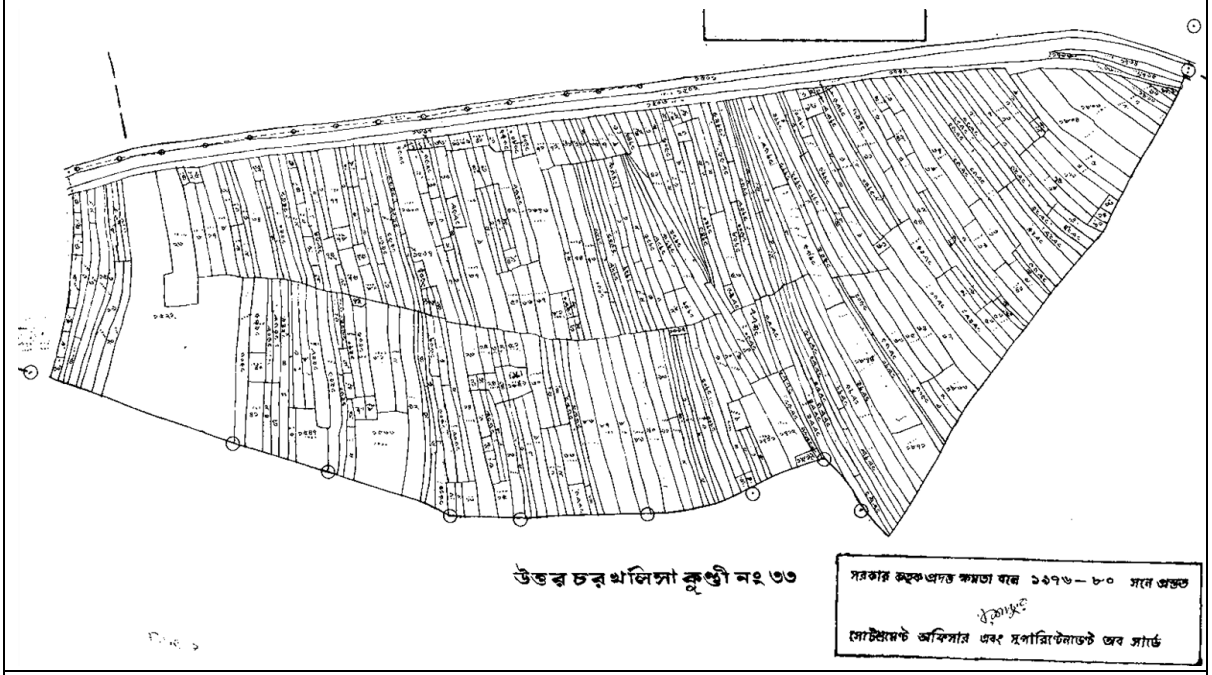
A mouza is a type of administrative district, corresponding to a specific land area within which there may be one or more settlements. Mouza maps provide detailed information about the boundaries of various areas, including their length, area, direction, and other specifics. Today, mouza maps are also known as cadastral maps. The following table describes the components of a mouza map.

Mouza maps in Bangladesh are classified based on the survey types conducted at different times. Each survey serves a specific purpose and reflects the legal and administrative status of the land during that period. Below is a detailed classification of the key mouza map types:

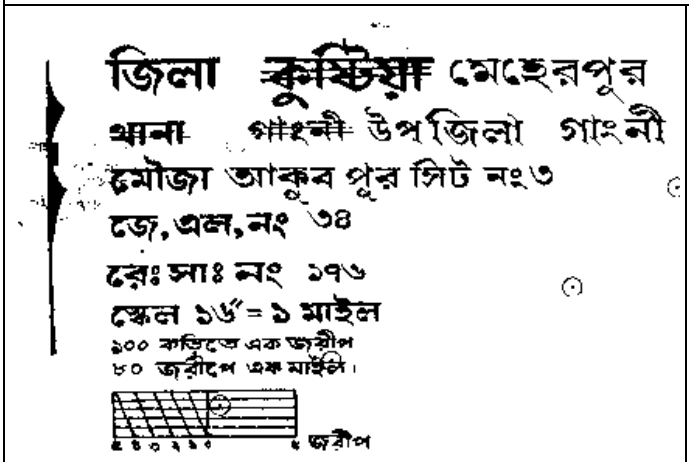
Table 3-1: Mouza Map Classification

Sl No.	Map name	Purpose	Key Features
1	CS Maps (Cadastral Survey)	Conducted during the British colonial period (late 19th and early 20th century) to establish land ownership, boundaries, and revenue records.	ovides detailed information on land parcels, ownership, and boundaries. cognized as the first comprehensive land survey in Bengal. ludes plot numbers (dag) and mouza boundaries.
2	SA Maps (State Acquisition Survey)	Conducted during the post-independence period to document land acquisition and redistribution under state control.	Reflects land parcels acquired by the government from zamindars (landlords) after the abolition of the zamindari system. Focuses on ownership, khas land, and redistribution records. Used to settle disputes related to land acquisition and state ownership.
3	RS Maps (Revisional Survey)	Conducted after the CS survey to update and revise land records, reflecting changes in ownership and land use.	Updates land parcel details, ownership changes, and boundary adjustments. Includes corrections and additions to the original CS maps. Aimed to address discrepancies in CS records.
4	BS Maps (Bangladesh Survey)	Conducted post-independence to modernize land records and incorporate changes in ownership, use, and administrative boundaries.	Incorporates contemporary land use patterns and ownership records. Includes digital mapping and GIS integration for easier accessibility and updates. Aims to provide the most current and accurate land records.

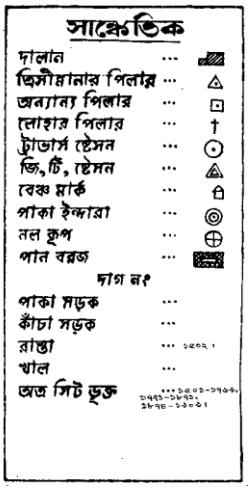
Table 3-2: Components of Mouza Map



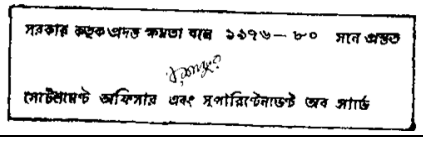
a) plots with plot number and, different symbols and names of peripheral mouza sheets



b) locational information and scale of mouza map



c) Legend and plot schedule of that the mouza sheet



d) Signature of the authority with preparation time

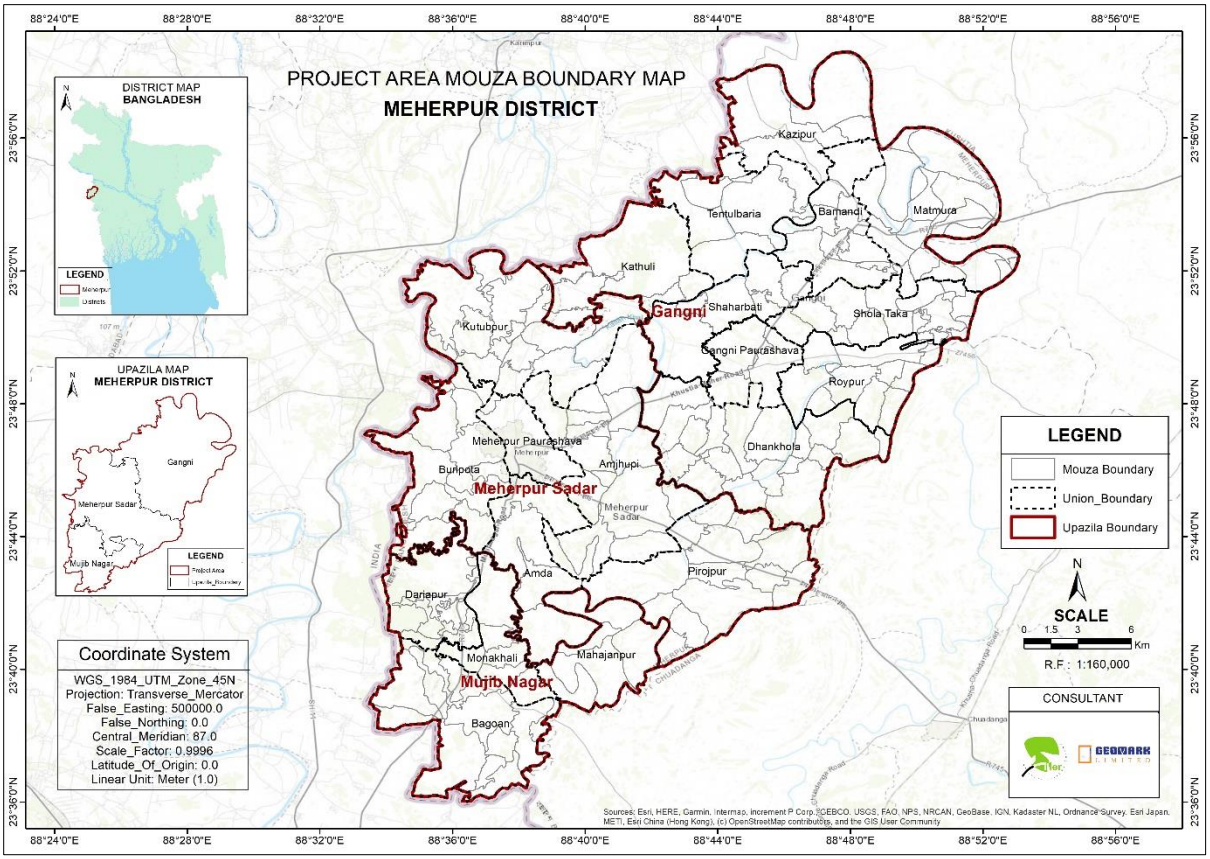
3.2 Mouza Map Collection, Scanning, Digitization

3.2.1 Mouza Map Collection

For the preparation of a comprehensive base map, RS version Mouza maps were collected, covering the entire project area of Meherpur Zilla. These maps were officially obtained from the Directorate of Land Records and Survey (DLRS). The collection process was carried out in coordination with the concerned government authorities, ensuring the authenticity and completeness of the mouza map sheets.

Table 3-3: Mouza Map Status

Upazila	Total Mouza	Total Mouza Sheet
Meherpur Sadar	66	193
Gangni	103	233
Mujibnagar	30	78



Map 3-1: Project Area Map showing Mouza Boundary

Table 3-4: Meherpur Sadar Upazila Mouza List

SL	District	Upazila	Mouza	JL	Sheet
1	Meherpur	Meherpur	Alampur	061	001
2	Meherpur	Meherpur	Alampur	061	002
3	Meherpur	Meherpur	Amdah	068	001
4	Meherpur	Meherpur	Amdah	068	002
5	Meherpur	Meherpur	Amdah	068	003
6	Meherpur	Meherpur	Amdah	068	004
7	Meherpur	Meherpur	Amdah	068	005
8	Meherpur	Meherpur	Amjhupi	079	001
9	Meherpur	Meherpur	Amjhupi	079	002
10	Meherpur	Meherpur	Amjhupi	079	003
11	Meherpur	Meherpur	Amjhupi	079	004
12	Meherpur	Meherpur	Amjhupi	079	005
13	Meherpur	Meherpur	Ashrafpur	069	001
14	Meherpur	Meherpur	Ashrafpur	069	002
15	Meherpur	Meherpur	Ashrafpur	069	003
16	Meherpur	Meherpur	Ashrafpur	069	004
17	Meherpur	Meherpur	Baliarpur	088	001
18	Meherpur	Meherpur	Baliarpur	088	002
19	Meherpur	Meherpur	Baliarpur	088	003
20	Meherpur	Meherpur	Baliarpur	088	004
21	Meherpur	Meherpur	Baliarpur	088	005
22	Meherpur	Meherpur	Bamanparachak	045	000
23	Meherpur	Meherpur	Bamanpara	067	001
24	Meherpur	Meherpur	Bamanpara	067	002
25	Meherpur	Meherpur	Bamanpara	067	003
26	Meherpur	Meherpur	Bamanpara	067	004
27	Meherpur	Meherpur	Bamanpara	067	005
28	Meherpur	Meherpur	Bamanpara	067	006
29	Meherpur	Meherpur	Bamanpara	067	007
30	Meherpur	Meherpur	Bamanpara	067	008
31	Meherpur	Meherpur	Bamanpara	067	009
32	Meherpur	Meherpur	Bamanpara	067	010
33	Meherpur	Meherpur	Bamanpara	067	011

SL	District	Upazila	Mouza	JL	Sheet
34	Meherpur	Meherpur	Bamanpara	067	012
35	Meherpur	Meherpur	Bamanpara	067	013
36	Meherpur	Meherpur	Baradi	091	001
37	Meherpur	Meherpur	Baradi	091	002
38	Meherpur	Meherpur	Baradi	091	003
39	Meherpur	Meherpur	Barakpur	048	000
40	Meherpur	Meherpur	Baribaka	018	001
41	Meherpur	Meherpur	Baribaka	018	002
42	Meherpur	Meherpur	Baribaka	018	003
43	Meherpur	Meherpur	Barshibaria	093	001
44	Meherpur	Meherpur	Barshibaria	093	002
45	Meherpur	Meherpur	Basantapur	065	001
46	Meherpur	Meherpur	Basantapur	065	002
47	Meherpur	Meherpur	Bhabanandapur	070	001
48	Meherpur	Meherpur	Bhabanandapur	070	002
49	Meherpur	Meherpur	Bhabanandapur	070	003
50	Meherpur	Meherpur	Bhabanandapur	070	004
51	Meherpur	Meherpur	Bhabanandapur	070	005
52	Meherpur	Meherpur	Bilkola	075	001
53	Meherpur	Meherpur	Bilkola	075	002
54	Meherpur	Meherpur	Bilkola	075	003
55	Meherpur	Meherpur	Buripota	017	001
56	Meherpur	Meherpur	Buripota	017	002
57	Meherpur	Meherpur	Buripota	017	003
58	Meherpur	Meherpur	Buripota	017	004
59	Meherpur	Meherpur	Chak Kutubpur	008	000
60	Meherpur	Meherpur	Chak Manoharpur	010	000
61	Meherpur	Meherpur	Chak Shubharajpur	004	000
62	Meherpur	Meherpur	Chak Ujalpur	011	001
63	Meherpur	Meherpur	Chak Ujalpur	011	002
64	Meherpur	Meherpur	Chandbil	077	001
65	Meherpur	Meherpur	Chandbil	077	002
66	Meherpur	Meherpur	Chandpur	050	001
67	Meherpur	Meherpur	Chandpur	050	002

SL	District	Upazila	Mouza	JL	Sheet
68	Meherpur	Meherpur	Chandpur	050	003
69	Meherpur	Meherpur	Chandpur	050	004
70	Meherpur	Meherpur	Chandpur	050	005
71	Meherpur	Meherpur	Chandpur	050	006
72	Meherpur	Meherpur	Chandpur	050	007
73	Meherpur	Meherpur	Chandpur	050	008
74	Meherpur	Meherpur	Chanpur	007	001
75	Meherpur	Meherpur	Chanpur	007	002
76	Meherpur	Meherpur	Dakkhin Shalika	019	001
77	Meherpur	Meherpur	Dakkhin Shalika	019	002
78	Meherpur	Meherpur	Dakkhin Shalika	019	003
79	Meherpur	Meherpur	Dhantala	060	001
80	Meherpur	Meherpur	Dhantala	060	002
81	Meherpur	Meherpur	Fatepur	012	001
82	Meherpur	Meherpur	Fatepur	012	002
83	Meherpur	Meherpur	Gopalpur	063	000
84	Meherpur	Meherpur	Govipur	016	001
85	Meherpur	Meherpur	Govipur	016	002
86	Meherpur	Meherpur	Govipur	016	003
87	Meherpur	Meherpur	Harirampur	015	001
88	Meherpur	Meherpur	Harirampur	015	002
89	Meherpur	Meherpur	Harirampur	015	003
90	Meherpur	Meherpur	Hijli	080	001
91	Meherpur	Meherpur	Hijli	080	002
92	Meherpur	Meherpur	Ichhakhali	014	000
93	Meherpur	Meherpur	Jadabpur	049	000
94	Meherpur	Meherpur	Jhaubaria	059	001
95	Meherpur	Meherpur	Jhaubaria	059	002
96	Meherpur	Meherpur	Jhaubaria	059	003
97	Meherpur	Meherpur	Juginda	092	001
98	Meherpur	Meherpur	Juginda	092	002
99	Meherpur	Meherpur	Kalachandpur	051	000
100	Meherpur	Meherpur	Kalaidanga	089	001
101	Meherpur	Meherpur	Kalaidanga	089	002

SL	District	Upazila	Mouza	JL	Sheet
102	Meherpur	Meherpur	Kaligangni	055	001
103	Meherpur	Meherpur	Kaligangni	055	002
104	Meherpur	Meherpur	Kaligangni	055	003
105	Meherpur	Meherpur	Kamdebpur	013	001
106	Meherpur	Meherpur	Kamdebpur	013	002
107	Meherpur	Meherpur	Kanthalpota	086	001
108	Meherpur	Meherpur	Kanthalpota	086	002
109	Meherpur	Meherpur	Khoksa	064	001
110	Meherpur	Meherpur	Khoksa	064	002
111	Meherpur	Meherpur	Kola	076	001
112	Meherpur	Meherpur	Kola	076	002
113	Meherpur	Meherpur	Kola	076	003
114	Meherpur	Meherpur	Kulbaria	054	001
115	Meherpur	Meherpur	Kulbaria	054	002
116	Meherpur	Meherpur	Kulbaria	054	003
117	Meherpur	Meherpur	Kutubpur	006	001
118	Meherpur	Meherpur	Kutubpur	006	002
119	Meherpur	Meherpur	Kutubpur	006	003
120	Meherpur	Meherpur	Kutubpur	006	004
121	Meherpur	Meherpur	Kutubpur	006	005
122	Meherpur	Meherpur	Manoharpur	053	001
123	Meherpur	Meherpur	Manoharpur	053	002
124	Meherpur	Meherpur	Meherpur	066	001
125	Meherpur	Meherpur	Meherpur	066	002
126	Meherpur	Meherpur	Meherpur	066	003
127	Meherpur	Meherpur	Meherpur	066	004
128	Meherpur	Meherpur	Meherpur	066	005
129	Meherpur	Meherpur	Meherpur	066	006
130	Meherpur	Meherpur	Meherpur	066	007
131	Meherpur	Meherpur	Meherpur	066	008
132	Meherpur	Meherpur	Meherpur	066	009
133	Meherpur	Meherpur	Meherpur	066	010
134	Meherpur	Meherpur	Meherpur	066	011
135	Meherpur	Meherpur	Meherpur	066	012

SL	District	Upazila	Mouza	JL	Sheet
136	Meherpur	Meherpur	Meherpur	066	013
137	Meherpur	Meherpur	Meherpur	066	014
138	Meherpur	Meherpur	Meherpur	066	015
139	Meherpur	Meherpur	Meherpur	066	016
140	Meherpur	Meherpur	Meherpur	066	017
141	Meherpur	Meherpur	Moyamari	078	000
142	Meherpur	Meherpur	Natun Darbeshpur	096	001
143	Meherpur	Meherpur	Natun Darbeshpur	096	002
144	Meherpur	Meherpur	Patapoka	094	000
145	Meherpur	Meherpur	Pirojpur	083	001
146	Meherpur	Meherpur	Pirojpur	083	002
147	Meherpur	Meherpur	Pirojpur	083	003
148	Meherpur	Meherpur	Pirojpur	083	004
149	Meherpur	Meherpur	Pirojpur	083	005
150	Meherpur	Meherpur	Puratan Darbeshpur	090	000
151	Meherpur	Meherpur	Radhakantapur	046	001
152	Meherpur	Meherpur	Radhakantapur	046	002
153	Meherpur	Meherpur	Radhakantapur	046	003
154	Meherpur	Meherpur	Raghunathpur	082	001
155	Meherpur	Meherpur	Raghunathpur	082	002
156	Meherpur	Meherpur	Raghunathpur	082	003
157	Meherpur	Meherpur	Rajapur	047	001
158	Meherpur	Meherpur	Rajapur	047	002
159	Meherpur	Meherpur	Ramnagar	062	000
160	Meherpur	Meherpur	Raznagar	081	001
161	Meherpur	Meherpur	Raznagar	081	002
162	Meherpur	Meherpur	Rudranagar	002	001
163	Meherpur	Meherpur	Rudranagar	002	002
164	Meherpur	Meherpur	Shibpur	009	000
165	Meherpur	Meherpur	Shoulmari	001	001
166	Meherpur	Meherpur	Shoulmari	001	002
167	Meherpur	Meherpur	Shoulmari	001	003
168	Meherpur	Meherpur	Shoulmari	001	004
169	Meherpur	Meherpur	Shoulmari	001	005

SL	District	Upazila	Mouza	JL	Sheet
170	Meherpur	Meherpur	Shoulmari	001	006
171	Meherpur	Meherpur	Shoulmari	001	007
172	Meherpur	Meherpur	Shubharajpur	005	001
173	Meherpur	Meherpur	Shubharajpur	005	002
174	Meherpur	Meherpur	Shubidpur	058	001
175	Meherpur	Meherpur	Shubidpur	058	002
176	Meherpur	Meherpur	Shubidpur	058	003
177	Meherpur	Meherpur	Shubidpur	058	004
178	Meherpur	Meherpur	Shyampur	057	001
179	Meherpur	Meherpur	Shyampur	057	002
180	Meherpur	Meherpur	Shyampur	057	003
181	Meherpur	Meherpur	Singhati	095	001
182	Meherpur	Meherpur	Singhati	095	002
183	Meherpur	Meherpur	Singhati	095	003
184	Meherpur	Mujibnagar	Sonapur	087	001
185	Meherpur	Meherpur	Sonapur	087	002
186	Meherpur	Meherpur	Terogharia	003	001
187	Meherpur	Meherpur	Terogharia	003	002
188	Meherpur	Meherpur	Tungi	084	001
189	Meherpur	Meherpur	Tungi	084	002
190	Meherpur	Meherpur	Ujalpur	052	001
191	Meherpur	Meherpur	Ujalpur	052	002
192	Meherpur	Meherpur	Uttar Salika	056	001
193	Meherpur	Meherpur	Uttar Salika	056	002

Table 3-5: Mujibnagar Upazila Mouza List

SL	District	Upazila	Mouza	JL	Sheet
1	Meherpur	Mujibnagar	Anandabas	031	001
2	Meherpur	Mujibnagar	Anandabas	031	002
3	Meherpur	Mujibnagar	Anandabas	031	003
4	Meherpur	Mujibnagar	Anandabas	031	004
5	Meherpur	Mujibnagar	Anandabas	031	005
6	Meherpur	Mujibnagar	Babupur	071	001
7	Meherpur	Mujibnagar	Babupur	071	002
8	Meherpur	Mujibnagar	Babupur	071	003

SL	District	Upazila	Mouza	JL	Sheet
9	Meherpur	Mujibnagar	Bagoan	032	001
10	Meherpur	Mujibnagar	Bagoan	032	002
11	Meherpur	Mujibnagar	Bagoan	032	003
12	Meherpur	Mujibnagar	Bagoan	032	004
13	Meherpur	Mujibnagar	Ballabhpur	039	001
14	Meherpur	Mujibnagar	Ballabhpur	039	002
15	Meherpur	Mujibnagar	Ballabhpur	039	003
16	Meherpur	Mujibnagar	Ballabhpur	039	004
17	Meherpur	Mujibnagar	Ballabhpur	039	005
18	Meherpur	Mujibnagar	Bhabanipur	040	000
19	Meherpur	Mujibnagar	Bidyadharpur	044	000
20	Meherpur	Mujibnagar	Bishwanathpur	042	000
21	Meherpur	Mujibnagar	Chak Gopinathpur	023	000
22	Meherpur	Mujibnagar	Dari Jagannathpur	033	001
23	Meherpur	Mujibnagar	Dari Jagannathpur	033	002
24	Meherpur	Mujibnagar	Dariapur	020	001
25	Meherpur	Mujibnagar	Dariapur	020	002
26	Meherpur	Mujibnagar	Dariapur	020	003
27	Meherpur	Mujibnagar	Dariapur	020	004
28	Meherpur	Mujibnagar	Dariapur	020	005
29	Meherpur	Mujibnagar	Dariapur	020	006
30	Meherpur	Mujibnagar	Dariapur	020	007
31	Meherpur	Mujibnagar	Dholmari	037	000
32	Meherpur	Mujibnagar	Gopalpur	085	001
33	Meherpur	Mujibnagar	Gopalpur	085	002
34	Meherpur	Mujibnagar	Gopalpur	085	003
35	Meherpur	Mujibnagar	Gopinathpur	024	000
36	Meherpur	Mujibnagar	Gourinagar	025	001
37	Meherpur	Mujibnagar	Gourinagar	025	002
38	Meherpur	Mujibnagar	Gourinagar	025	003
39	Meherpur	Mujibnagar	Jatarpur	074	001
40	Meherpur	Mujibnagar	Jatarpur	074	002
41	Meherpur	Mujibnagar	Jatarpur	074	003
42	Meherpur	Mujibnagar	Joypur	034	001

SL	District	Upazila	Mouza	JL	Sheet
43	Meherpur	Mujibnagar	Joypur	034	002
44	Meherpur	Mujibnagar	Joypur	034	003
45	Meherpur	Meherpur	Koyarpur	073	001
46	Meherpur	Meherpur	Koyarpur	073	002
47	Meherpur	Mujibnagar	Khanpur	021	001
48	Meherpur	Mujibnagar	Khanpur	021	002
49	Meherpur	Mujibnagar	Mahajjampur	072	001
50	Meherpur	Mujibnagar	Mahajjampur	072	002
51	Meherpur	Mujibnagar	Mahajjampur	072	003
52	Meherpur	Mujibnagar	Mahajjampur	072	004
53	Meherpur	Mujibnagar	Majhpara	030	001
54	Meherpur	Mujibnagar	Majhpara	030	002
55	Meherpur	Mujibnagar	Maniknagar	027	001
56	Meherpur	Mujibnagar	Maniknagar	027	002
57	Meherpur	Mujibnagar	Monakhali	043	001
58	Meherpur	Mujibnagar	Monakhali	043	002
59	Meherpur	Mujibnagar	Monakhali	043	003
60	Meherpur	Mujibnagar	Monakhali	043	004
61	Meherpur	Mujibnagar	Mujibnagar	028	001
62	Meherpur	Mujibnagar	Mujibnagar	028	002
63	Meherpur	Mujibnagar	Purandarpur	022	001
64	Meherpur	Mujibnagar	Purandarpur	022	002
65	Meherpur	Mujibnagar	Purandarpur	022	003
66	Meherpur	Mujibnagar	Ramnagar	026	001
67	Meherpur	Mujibnagar	Ramnagar	026	002
68	Meherpur	Mujibnagar	Rasikpur	038	001
69	Meherpur	Mujibnagar	Rasikpur	038	002
70	Meherpur	Mujibnagar	Ratanpur	036	001
71	Meherpur	Mujibnagar	Ratanpur	036	002
72	Meherpur	Mujibnagar	Ratanpur	036	003
73	Meherpur	Mujibnagar	Shibpur	041	000
74	Meherpur	Mujibnagar	Sonapur	029	001
75	Meherpur	Mujibnagar	Sonapur	029	002
76	Meherpur	Mujibnagar	Sonapur	029	003
77	Meherpur	Mujibnagar	Sonapur	029	004

SL	District	Upazila	Mouza	JL	Sheet
78	Meherpur	Mujibnagar	Taranagar	035	000

Table 3-6: Gangni Upazila Mouza List

SL	District	Upazila	Mouza	JL	Sheet
1	Meherpur	Gangni	AKUBPUR	034	001
2	Meherpur	Gangni	AKUBPUR	034	002
3	Meherpur	Gangni	AKUBPUR	034	003
4	Meherpur	Gangni	ALI NAGAR	040	000
5	Meherpur	Gangni	AMTOIL	084	000
6	Meherpur	Gangni	ARPARA	097	001
7	Meherpur	Gangni	ARPARA	097	002
8	Meherpur	Gangni	ARPARA	097	003
9	Meherpur	Gangni	AZAN	049	001
10	Meherpur	Gangni	AZAN	049	002
11	Meherpur	Gangni	AZAN	049	003
12	Meherpur	Gangni	BAGUNDA	050	001
13	Meherpur	Gangni	BAGUNDA	050	002
14	Meherpur	Gangni	BAHILAGARI	085	000
15	Meherpur	Gangni	BAMONDI	015	000
16	Meherpur	Gangni	BAOT	035	001
17	Meherpur	Gangni	BAOT	035	002
18	Meherpur	Gangni	BAROBAMUNDI	096	000
19	Meherpur	Gangni	BASHBARIA	047	001
20	Meherpur	Gangni	BASHBARIA	047	002
21	Meherpur	Gangni	BELIAGHATA	017	001
22	Meherpur	Gangni	BELIAGHATA	017	002
23	Meherpur	Gangni	BENEPUKUR	064	000
24	Meherpur	Gangni	BER ELANGI	100	000
25	Meherpur	Gangni	BETBERIA	024	001
26	Meherpur	Gangni	BETBERIA	024	002
27	Meherpur	Gangni	BETBERIA	024	003
28	Meherpur	Gangni	BETBERIA	024	004
29	Meherpur	Gangni	BETBERIA	024	005
30	Meherpur	Gangni	BHAVANIPUR	025	000

SL	District	Upazila	Mouza	JL	Sheet
31	Meherpur	Gangni	BILLDHALA	004	001
32	Meherpur	Gangni	BILLDHALA	004	002
33	Meherpur	Gangni	BILLDHALA	004	003
34	Meherpur	Gangni	BILLDHALA	004	004
35	Meherpur	Gangni	BILLDHALA	004	005
36	Meherpur	Gangni	BILLDHALA	004	006
37	Meherpur	Gangni	BILLDHALA	004	007
38	Meherpur	Gangni	BILLDHALA	004	008
39	Meherpur	Gangni	CHAK AMTOIL	077	000
40	Meherpur	Gangni	CHAK CARAL KHALI	022	000
41	Meherpur	Gangni	CHAK ELANGI	087	000
42	Meherpur	Gangni	CHAK KOLLYANPUR	013	000
43	Meherpur	Gangni	CHAK KUNJONAGAR	081	000
44	Meherpur	Gangni	CHAK MOHABBOTPUR	037	000
45	Meherpur	Gangni	CHANDPUR	090	001
46	Meherpur	Gangni	CHANDPUR	090	002
47	Meherpur	Gangni	CHAR ABRI	073	000
48	Meherpur	Gangni	CHAR RAZ	074	000
49	Meherpur	Gangni	CHATIAN	036	001
50	Meherpur	Gangni	CHATIAN	036	002
51	Meherpur	Gangni	CHATIAN	036	003
52	Meherpur	Gangni	CHENGRA	062	001
53	Meherpur	Gangni	CHENGRA	062	002
54	Meherpur	Gangni	CHOTA BAMUNDI	093	000
55	Meherpur	Gangni	CHOUGACHA	046	001
56	Meherpur	Gangni	CHOUGACHA	046	002
57	Meherpur	Gangni	CHOUGACHA	046	003
58	Meherpur	Gangni	CHOUGACHA	046	004
59	Meherpur	Gangni	CITLA	052	001
60	Meherpur	Gangni	CITLA	052	002
61	Meherpur	Gangni	DAKHIN CHAR KHULISHAKUNDI	072	001
62	Meherpur	Gangni	DAKHIN TETULBARIA	057	000
63	Meherpur	Gangni	DAKHINCHAR KHULISHAKUNDI	072	002
64	Meherpur	Gangni	DAKKHIN GOALGRAM	030	000
65	Meherpur	Gangni	DEVIPUR	014	001

SL	District	Upazila	Mouza	JL	Sheet
66	Meherpur	Gangni	DEVIPUR	014	002
67	Meherpur	Gangni	DHANKHOLA	059	001
68	Meherpur	Gangni	DHANKHOLA	059	002
69	Meherpur	Gangni	DHANKHOLA	059	003
70	Meherpur	Gangni	DHARMOCHAKI	044	001
71	Meherpur	Gangni	DHARMOCHAKI	044	002
72	Meherpur	Gangni	DHEPA	054	001
73	Meherpur	Gangni	DHEPA	054	002
74	Meherpur	Gangni	DHEPA	054	003
75	Meherpur	Gangni	DOMRADAH	043	001
76	Meherpur	Gangni	DOMRADAH	043	002
77	Meherpur	Gangni	DULALNAGAR	091	000
78	Meherpur	Gangni	ELANGI	098	001
79	Meherpur	Gangni	ELANGI	098	002
80	Meherpur	Gangni	GANGNI	061	001
81	Meherpur	Gangni	GANGNI	061	002
82	Meherpur	Gangni	GANGNI	061	003
83	Meherpur	Gangni	GANGNI	061	004
84	Meherpur	Gangni	GARABARIA	002	001
85	Meherpur	Gangni	GARABARIA	002	002
86	Meherpur	Gangni	GARABARIA	002	003
87	Meherpur	Gangni	GARADOB	048	001
88	Meherpur	Gangni	GARADOB	048	002
89	Meherpur	Gangni	GARADOB	048	003
90	Meherpur	Gangni	GARADOB	048	004
91	Meherpur	Gangni	GOPALNAGAR	094	001
92	Meherpur	Gangni	GOPALNAGAR	094	002
93	Meherpur	Gangni	GOSHAIDUBI	020	000
94	Meherpur	Gangni	HARABHANGA	019	001
95	Meherpur	Gangni	HARABHANGA	019	002
96	Meherpur	Gangni	HARABHANGA	019	003
97	Meherpur	Gangni	HARABHANGA	019	004
98	Meherpur	Gangni	HARIADAH	095	001
99	Meherpur	Gangni	HARIADAH	095	002
100	Meherpur	Gangni	HARIADAH	095	003

SL	District	Upazila	Mouza	JL	Sheet
101	Meherpur	Gangni	HEMATPUR	089	000
102	Meherpur	Gangni	HIJOLBARIA	045	001
103	Meherpur	Gangni	HIJOLBARIA	045	002
104	Meherpur	Gangni	HIJOLBARIA	045	003
105	Meherpur	Gangni	HINDA	009	001
106	Meherpur	Gangni	HINDA	009	002
107	Meherpur	Gangni	HINDA	009	003
108	Meherpur	Gangni	HINDA	009	004
109	Meherpur	Gangni	HOGOLBARIA	032	001
110	Meherpur	Gangni	HOGOLBARIA	032	002
111	Meherpur	Gangni	HOGOLBARIA	032	003
112	Meherpur	Gangni	HOGOLBARIA	032	004
113	Meherpur	Gangni	JALSUKA	102	000
114	Meherpur	Gangni	JHORPARA	076	000
115	Meherpur	Gangni	JOGIRKHOP	065	001
116	Meherpur	Gangni	JOGIRKHOP	065	002
117	Meherpur	Gangni	JOR PUKHURIA	042	001
118	Meherpur	Gangni	JOR PUKHURIA	042	002
119	Meherpur	Gangni	JUGINDA	051	000
120	Meherpur	Gangni	KAMARKHALI	068	000
121	Meherpur	Gangni	KASHBA	103	001
122	Meherpur	Gangni	KASHBA	103	002
123	Meherpur	Gangni	KASHBA	103	003
124	Meherpur	Gangni	KASHBA	103	004
125	Meherpur	Gangni	KASTHODAH	063	001
126	Meherpur	Gangni	KASTHODAH	063	002
127	Meherpur	Gangni	Kathuli	001	001
128	Meherpur	Gangni	Kathuli	001	002
129	Meherpur	Gangni	KAZIPUR	023	001
130	Meherpur	Gangni	KAZIPUR	023	002
131	Meherpur	Gangni	KAZIPUR	023	003
132	Meherpur	Gangni	KAZIPUR	023	004
133	Meherpur	Gangni	KAZIPUR	023	005
134	Meherpur	Gangni	KAZIPUR	023	006
135	Meherpur	Gangni	KAZIPUR	023	007

SL	District	Upazila	Mouza	JL	Sheet
136	Meherpur	Gangni	KESHABNAGAR	083	000
137	Meherpur	Gangni	KOCHOIKHALI	055	001
138	Meherpur	Gangni	KOCHUIKHALI	055	002
139	Meherpur	Gangni	KODALKATI	071	001
140	Meherpur	Gangni	KODALKATI	071	002
141	Meherpur	Gangni	KODALKATI	071	003
142	Meherpur	Gangni	KOLLAYANPUR	018	001
143	Meherpur	Gangni	KOLLAYANPUR	018	002
144	Meherpur	Gangni	KOLLAYANPUR	018	003
145	Meherpur	Gangni	KORAIGACHI	092	001
146	Meherpur	Gangni	KORAIGACHI	092	002
147	Meherpur	Gangni	KORUMDI	012	001
148	Meherpur	Gangni	KORUMDI	012	002
149	Meherpur	Gangni	KORUMDI	012	003
150	Meherpur	Gangni	KORUMDI	012	004
151	Meherpur	Gangni	KORUMDI	012	005
152	Meherpur	Gangni	KORUMDI	012	006
153	Meherpur	Gangni	KULBARIA	007	000
154	Meherpur	Gangni	KUMARIDANGI	070	000
155	Meherpur	Gangni	KUNJONAGAR	079	000
156	Meherpur	Gangni	MAMUDPUR	031	001
157	Meherpur	Gangni	MAMUDPUR	031	002
158	Meherpur	Gangni	MAMUDPUR	031	003
159	Meherpur	Gangni	MAMUDPUR	031	004
160	Meherpur	Gangni	MANIKDIHIHUDA	080	000
161	Meherpur	Gangni	MANIKDIHI	082	001
162	Meherpur	Gangni	MANIKDIHI	082	002
163	Meherpur	Gangni	MANIKDIHI	082	003
164	Meherpur	Gangni	MENAPARA	078	001
165	Meherpur	Gangni	MENAPARA	078	002
166	Meherpur	Gangni	MOHABBOTPUR	038	000
167	Meherpur	Gangni	MOHISHAKHALI	058	000
168	Meherpur	Gangni	MOTMURA	027	001
169	Meherpur	Gangni	MOTMURA	027	002
170	Meherpur	Gangni	MOTMURA	027	003

SL	District	Upazila	Mouza	JL	Sheet
171	Meherpur	Gangni	MOTMURA	027	004
172	Meherpur	Gangni	MOTMURA	027	005
173	Meherpur	Gangni	MUNDA	039	001
174	Meherpur	Gangni	MUNDA	039	002
175	Meherpur	Gangni	MYLEMARI	008	000
176	Meherpur	Gangni	NISHIPUR	016	000
177	Meherpur	Gangni	NITTANANDOPUR	060	001
178	Meherpur	Gangni	NITTANANDOPUR	060	002
179	Meherpur	Gangni	NITTANANDOPUR	060	003
180	Meherpur	Gangni	NITTANANDOPUR	060	004
181	Meherpur	Gangni	NOAPARA	005	001
182	Meherpur	Gangni	NOAPARA	005	002
183	Meherpur	Gangni	PAKURIA	053	001
184	Meherpur	Gangni	PAKURIA	053	002
185	Meherpur	Gangni	PASHIM CHAR GOALGRAM	029	001
186	Meherpur	Gangni	PASHIM CHAR GOALGRAM	029	002
187	Meherpur	Gangni	PASHIM CHAR GOALGRAM	029	003
188	Meherpur	Gangni	PURBO CHAR GOALGRAM	028	000
189	Meherpur	Gangni	RAIPUR	088	001
190	Meherpur	Gangni	RAIPUR	088	002
191	Meherpur	Gangni	RAIPUR	088	003
192	Meherpur	Gangni	RAMDEBPUR	011	001
193	Meherpur	Gangni	RAMDEBPUR	011	002
194	Meherpur	Gangni	RAMNAGAR	026	001
195	Meherpur	Gangni	RAMNAGAR	026	002
196	Meherpur	Gangni	RAMNAGAR	026	003
197	Meherpur	Gangni	ROARKANDI	086	000
198	Meherpur	Gangni	SAHARBARI	006	001
199	Meherpur	Gangni	SAHARBARI	006	002
200	Meherpur	Gangni	SAHARBARI	006	003
201	Meherpur	Gangni	SAHARBARI	006	004
202	Meherpur	Gangni	SAHARBARI	006	005
203	Meherpur	Gangni	SAHARBARI	006	006
204	Meherpur	Gangni	SEWRATOLA	021	000
205	Meherpur	Gangni	SHALDAH	099	001

SL	District	Upazila	Mouza	JL	Sheet
206	Meherpur	Gangni	SHALDAH	099	002
207	Meherpur	Gangni	SHINDURKOTA	069	001
208	Meherpur	Gangni	SHINDURKOTA	069	002
209	Meherpur	Gangni	SHOLTAKA	066	001
210	Meherpur	Gangni	SHOLTAKA	066	002
211	Meherpur	Gangni	SHOLTAKA	066	003
212	Meherpur	Gangni	SOHOGOLPUR	003	001
213	Meherpur	Gangni	SOHOLGOLPUR	003	002
214	Meherpur	Gangni	SOWRABARIA	067	001
215	Meherpur	Gangni	SOWRABARIA	067	002
216	Meherpur	Gangni	SOWRABARIA	067	003
217	Meherpur	Gangni	SUNGHAT	101	001
218	Meherpur	Gangni	SUNGHAT	101	002
219	Meherpur	Gangni	SUNGHAT	101	003
220	Meherpur	Gangni	TERAIL	041	001
221	Meherpur	Gangni	TERAIL	041	002
222	Meherpur	Gangni	TERAIL	041	003
223	Meherpur	Gangni	TERAIL	041	004
224	Meherpur	Gangni	TERAIL	041	005
225	Meherpur	Gangni	TETULBARIA	010	001
226	Meherpur	Gangni	TETULBARIA	010	002
227	Meherpur	Gangni	TETULBARIA	010	003
228	Meherpur	Gangni	TETULBARIA	010	004
229	Meherpur	Gangni	UTTAR CHAR KHULISHAKUNDI	033	001
230	Meherpur	Gangni	UTTAR CHAR KHULISHAKUNDI	033	002
231	Meherpur	Gangni	VHATPARA	056	001
232	Meherpur	Gangni	VHATPARA	056	002
233	Meherpur	Gangni	VOLA DANGA	075	000

3.2.2 Mouza Map Scanning

Scanning of mouza maps was carried out using drum scanner. Flatbed scanner hasn't been used for scanning of mouza maps. Rotation and alignment were maintained during scanning of mouza maps. All scanned files in digital format has been submitted to Project Director (PD) for preservation.

Accuracy and DPI management during Scanning

During scanning of the Mouza maps at least 300 dpi resolutions was maintained for appropriate resolution and maximum error 2 mm. The scanner machine is of latest technology with highest specifications.

The mouza map sheets was scanned following the scanning specifications given in the table

Table 3-7: Mouza sheet scanning specifications

Image type	Grayscale
Image format	JPG
Image Resolution	300 dpi
Image Scale	100% (1:1)

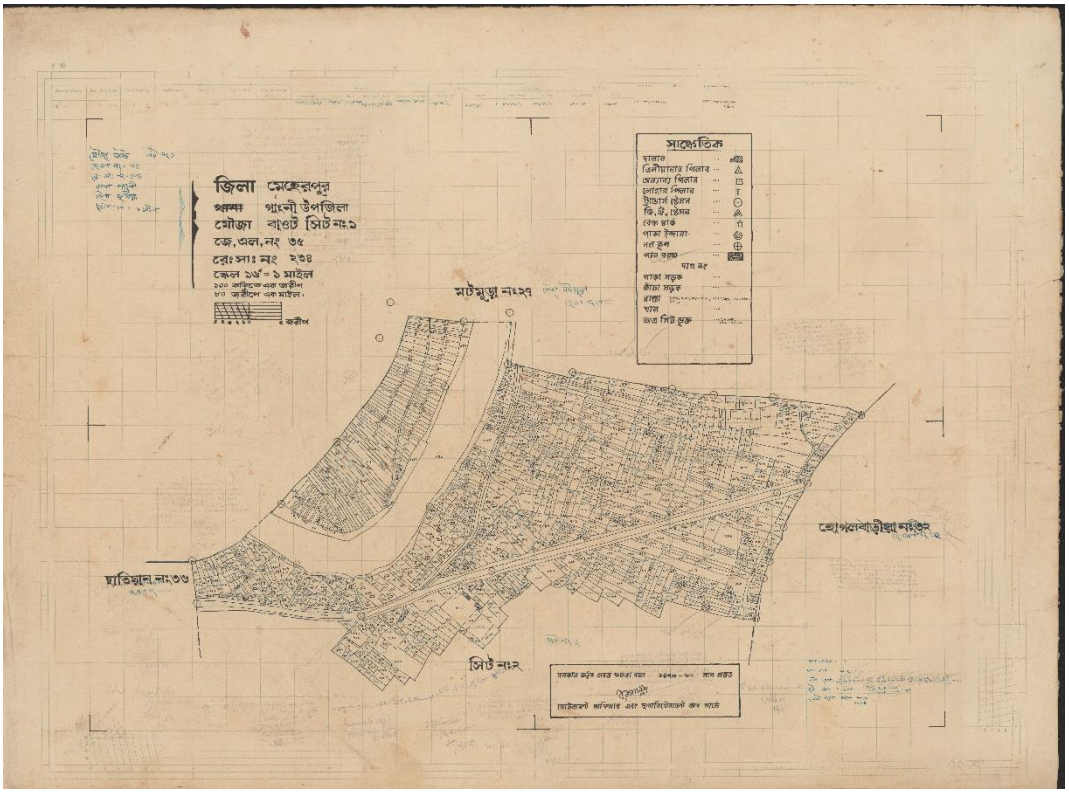


Figure 3-1: Sample of Scanned Mouza Map (Baot, JL No. 35, Sheet No. 1 of Gangni Upazila, Meherpur District, prepared in 1976-1980)

After scanning, the digital mouza sheets has been saved following the naming convention described in the Table

Table 3-8: Naming convention of Digital Mouza Sheets

District-Upazila Code						
District name	Upazila Name					District-Upazila Code
Meherpur	Gangni					MG
Nomenclature of Mouza map sheet image						
File Name	xx_xxx_xxx					
	xx					District & Upazila Code (2-digit string)
		_				An underscore as separator
			xxx			JL No. (3-digit string)
				_		An underscore as separator
					xxx	Sheet No. (3-digit string)
Example: MG_035_001 represents the image file in JPG format of Baot Mouza sheet no. 1 having JL No. 35 of Gangni Upazila, Meherpur District.						

3.2.3 Software Required

The ArcGIS software was used to digitalize mouza sheets. The ArcGIS software is designed to handle spatial data and attribute data preparation and GIS analysis. The attribute database of the mouza plots was made in GIS environment.

3.2.4 Digitizing the Mouza Maps

On screen digitization method was used for digitization of mouza maps. Arc GIS software was used for this purpose. Feature wise manuscripts was developed for digitizing the mouza maps and all features was stored as layer coverage with a separate ID or code number of respective features in the GIS database. To keep uniqueness of all features the ID or code numbers of respective features has been finalized as per suggestion and discussion with Project Director (PD). Accuracy of digitization was ensured by the Contractor.

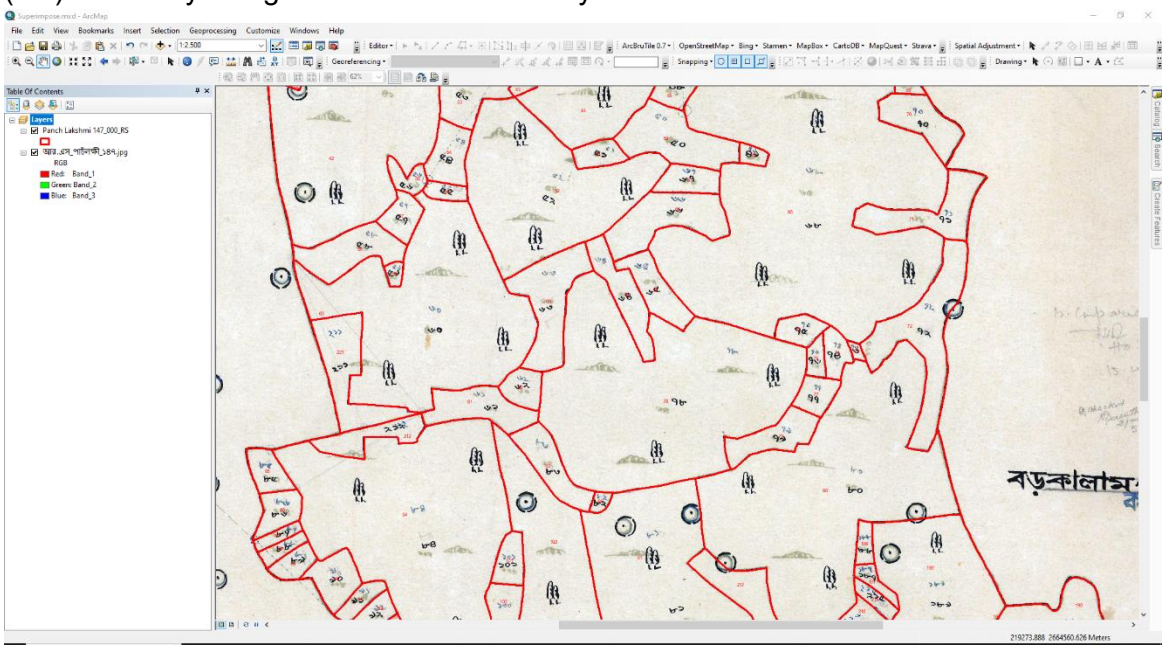


Figure 3-2: Digitizing Mouza Map in ArcMap

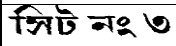
3.2.5 Preparation of Manuscript

A manuscript of a mouza map refers to the original, hand-drawn version of the map, created during the cadastral survey process. It serves as a historical document, providing detailed information about land parcels, boundaries, and other features within a mouza. Below are the key elements typically included in a mouza map manuscript.

3.2.5.1 Point Features

This manuscript contains all point features like boundary and other pillars, traverse stations, GT stations, benchmarks etc. Every point contains a numeric user ID representing feature type.

Table 3-9: Manuscript for point features

Sl. No	Feature Type		Code (ID)	Shape Type	Shape Name
1.	Boundary Pillar		41	Point	xx_xxx_xx_P (where 'P' denotes Point features)
2.	Bench Mark		42		
3.	Iron Pillar		43		
4.	Traverse Station (Old)		44		
5.	Traverse Station (New)		45		
6.	GT Station		46		
7.	Other Pillars		47		
8.	Pucca Well		51		
9.	Tube Well		52		
10.	Mosque		53		
11.	Temple		54		
12.	Adjacent Mouza/Sheet		61		
13.	Other Info		62		
14.	Demarcation Pillar		71		
15.	Settlement Pillar		72		
16.	Stone		73		
17.	Station		74		
18.	Pucca Pillar		75		
19.	CS Iron Pillar		77		
20.	Other Point Feature		88		

3.2.5.2 Polygon Features

This manuscript contains all polygon type features or closed boundary like water bodies, structure land uses, and topography. All features are closed polygon and every polygon contains a numeric user ID representing feature type.

3.2.5.3 Line Features

This manuscript contains all line type features like administrative boundaries, roads, drainage, bridge /culvert, embankment/ flood wall, sluice gate, water ways, rail ways etc.

Table 3-10: Manuscript for Line features

Sl. No	Feature Type	Code (ID)	Shape Type	Shape Name
1.	Mauza Boundary	11	Line	xx_xxx_xx_L (where 'L' denotes Line)
2.	Sheet Boundary	12	Line	
3.	Sheet Match - Line	13	Line	
4.	Plot Boundary	14	Line	
5.	Road	21	Line	
6.	Halot	22	Line	
7.	Canal	23	Line	
8.	River	24	Line	
9.	Rail Line	25	Line	
10.	Canal Within Plot	26	Line	
11.	Halot Within Plot	27	Line	
12.	Embankment	28	Line	
13.	Pond	29	Line	
14.	Municipal Boundary	30	Line	
15.	Unknown	99	Line	

3.2.6 Quality Measures during digitizing (Edit Plot Checking of Digitized Coverage)

After digitization of mouza maps edit plots was produced containing all the features in different colors to maintain the quality of the digitization of the mouza maps and ensure the proper projections while map projections were carried out. The digitized mouza maps was checked and verified by superimposing on the original mouza maps using the light table. This checking was done with the joint team of UDD and the respective personnel appointed by the contractor. By this edit plot check all possible errors (missing arcs, dislocated arcs, wrong or missing polygon labels, tic location and ID etc.) was solved and final digitized mouza maps has been prepared. After finalization of digitization of mouza maps, all data both soft and hard copy has been submitted to Project Director (PD).

Figure 3-3: On-Screen Checking of the Mouza Database

3.2.7 Joining of Mouza Maps and Demarcation of Study Area

Joining of mouza maps was done using ArcGIS software where surveyed GCPs used as TIC point. Afterward all Geo-referencing mouza sheets was joined and Base Map was prepared using ArcGIS. The geo-referenced mouza maps was prepared in original mouza scale. This map lay out was submitted to Project Director (PD) in hard and soft format.
Study area was demarcated by joint team, duly approved and signed by Project Director (PD) which is considered as project area. While joining mouza maps, edge matching was performed in consultation with the PD. Mouza sheet should be mosaic by mouza union, upazila and Region.

Geo-referencing and Edge-Matching Geo-referencing

This process involves geo-referencing individual sheets before any edge matching. It requires minimum three to four GCPs for geo-referencing an individual mouza sheet. This method is time consuming and costly. It is sometimes very difficult to find even one GCP on the ground for one individual sheet. Single unit mouza sheet was geo-referenced using Drone Image previously generated in this project. In this process the consultant used minimum 8 nos. of GCP (Tic) selected in ground for each of union mouza sheet.

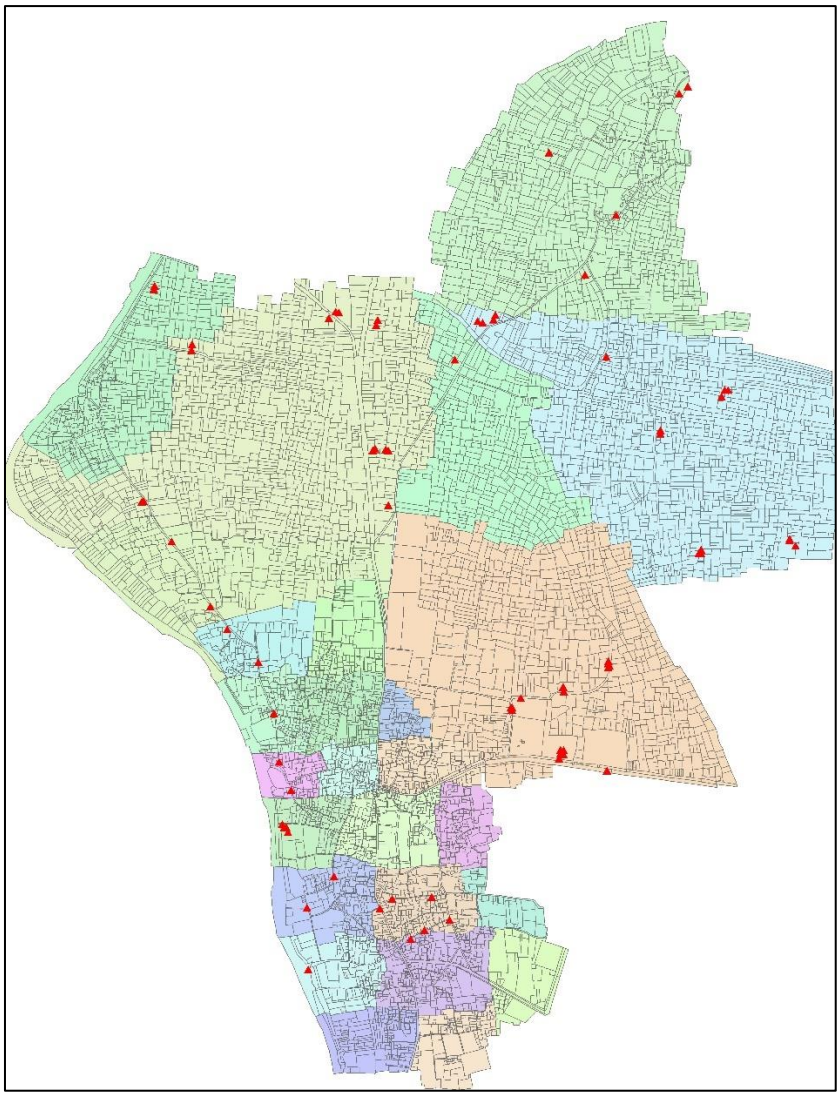
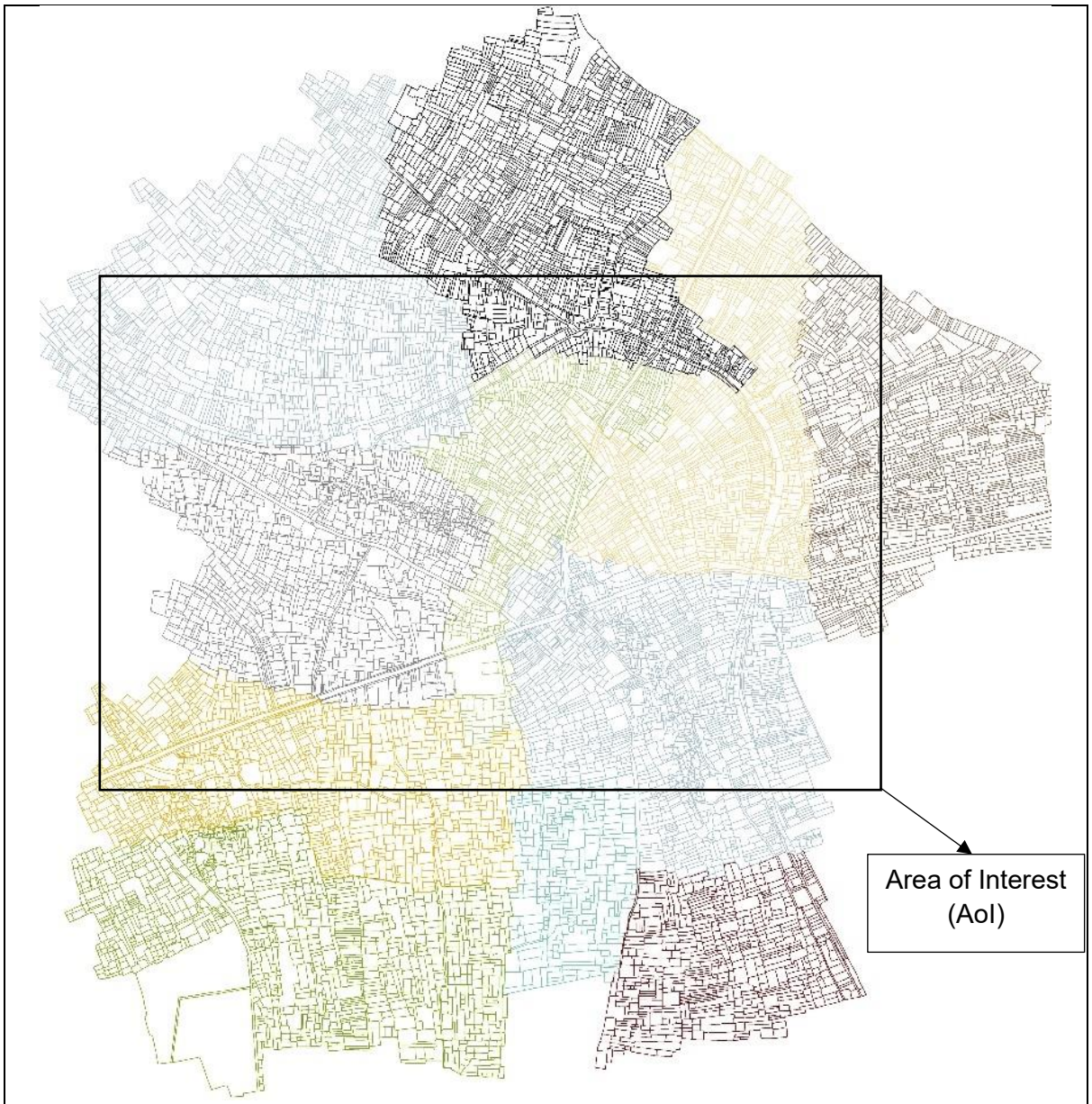


Figure 3-4: Field GCP Points Collected for Georeferencing Meherpur Paurashava Mouza

Edge-matching

After the completion of geo-referencing, a mosaic mouza map of the project area has been prepared integrating all the mouza features (points, lines, and polygons) with GCP points, in different layers. Since, traditionally, the mouza maps is prepared with bare hands; these have their own errors mostly along common boundary lines. Thus, resultant mosaic map showed, at some places, overlapping as well as gaps between boundaries of adjoining mouza maps/sheets at other places. Then topological errors of adjacent plots such as “must not overlap” and “must not have gaps” were checked. These were adjusted manually by splitting the errors in between two adjacent mouza plots.



(a) Gangni Paurashava Base Map (Georeferenced Mouza)

(b) Digitized & Georeferenced Mouza (AoI from (a))

(c) Edge Matched Mouza

Figure 3-5: Comparison of Before & After Edge-Matching

3.2.8 Preparation of GIS Map Lay Out

A standard map layout was developed with consultation of Project Director (PD). Scale, Paper size and Grid for preparation of map lay out were prepared as specified by the PD. Legend for features in the map were selected from the available symbol palettes in ArcGIS for developing a standard layout.

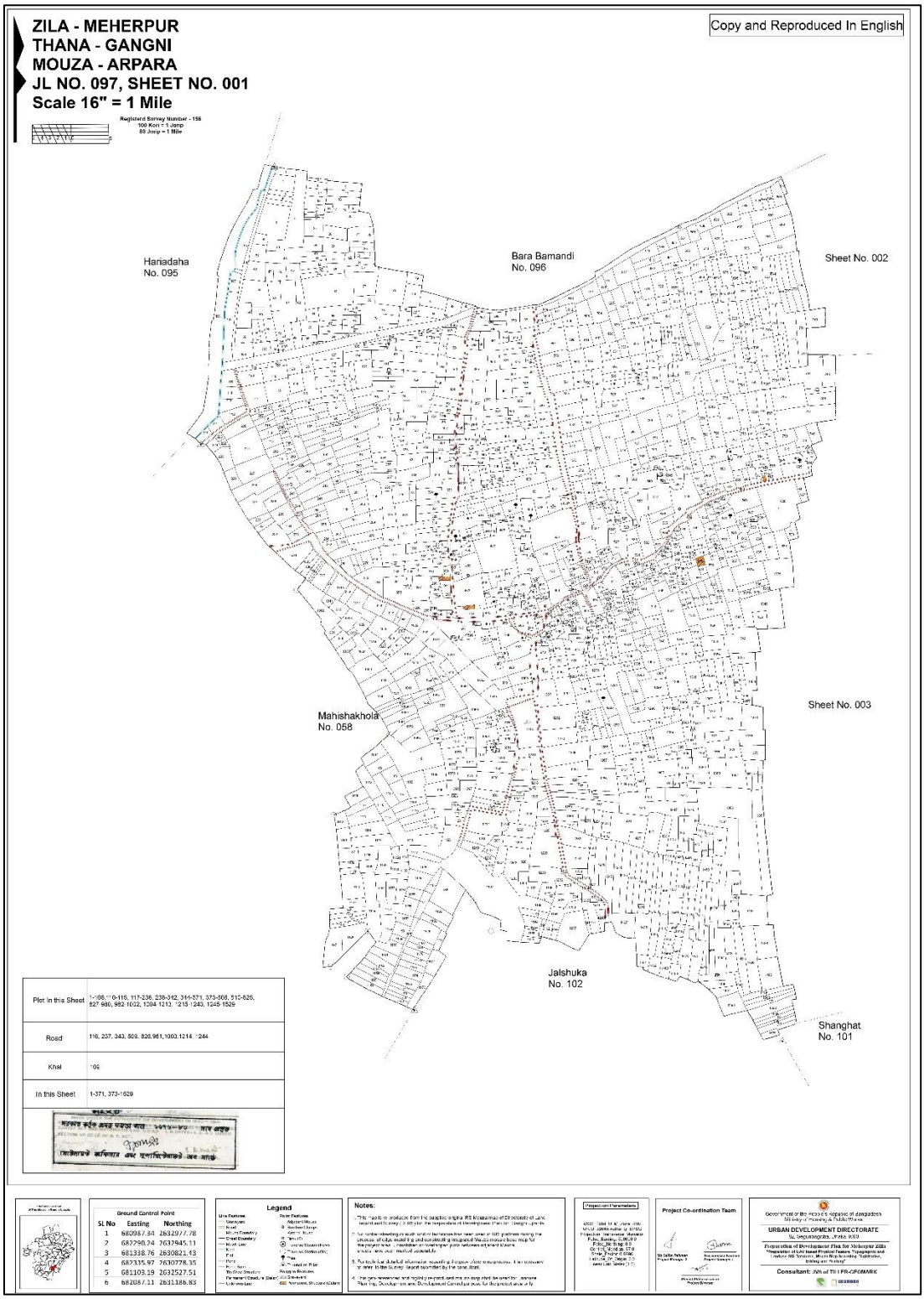


Figure 3-6: Final Layout for Printing

3.3 Field Survey

3.3.1 GPS and GIS Technique

The automation, digitization and geo-reference of planning information deserves attention to the quality, vision of the extent of future applications, flexibility for the possible user groups and openness to easy access, all of which we are lacking in our country

Now a day all the planning activities need to deal with a large amount of digital and spatial data and maps, charts and reports. The Planners also need an automated information system like Geographical Information System (GIS) capable of dealing with spatial database to make their task efficient and effective. For which a digital and geo-reference data and information are very much needed. A comprehensive GIS includes software and hardware used to capture, store, organize, manipulate, analyze and display spatially referenced information. Easy manipulation and display of information helps to facilitate the decision-making process by allowing planners to customize the maps and models produced.

3.3.2 GPS Based Advanced Survey Technique

Digitizing of existing mauza maps is time consuming with possibility of error, which can be easily converted to digital map by using scanner and processing through appropriate software with high accuracy. Spatial data collection and geo-reference digital mapping have now become very easy with satellite based advanced survey techniques using Global Positioning System (GPS) and Geographical Information System (GIS) with accuracy of centimeter level. Furthermore, the development of high-resolution images helps to determine the spatial features as well as verify the survey data more accurately.

The Global Positioning System (GPS) is worldwide all-weather radio-navigation and positioning system formed from a constellation of 24 satellites and their 5 nos. ground control & monitor stations. GPS receivers use these US Navigation Satellites for Timing and Ranging (NAVSTAR) to calculate positions accurate to matter of meters. GPS receives radio waves, modulated for positioning, transmitted by a maximum number of 24 satellites, which enables to work out the distance between satellite and observation points. By receiving radio waves from four satellites simultaneously it is possible to find out the three-dimensional co-ordinates and time (UTC) of the observation point with an accuracy level which cannot be conceived in traditional ground survey. The facility of GPS has been utilized in different kinds of ground surveys including geodetic, topographic and hydrographic survey in the recent times. Differential Global Positioning System (DGPS) is different versions of GPS technology, each with its own range of applicability and accuracy level. GPS based surveying has a number of advantages over conventional surveying methods. These are:

- Highly accurate
- Very fast
- Line of sight not required
- Digital/Computerized data storage, processing facility
- Unified 3-dimensional global co-ordinate system (x,y,z) output

GPS based survey with its computer-based data storage and processing facility on and off the field offers immense flexibility in map production under a GIS environment. To ensure precision and accuracy in survey work and to facilitate georeferenced/digital map production by GIS software and finally to complete the whole work in a rather shortened time schedule, GPS technology is the best and logical approach to be followed.

3.3.3 Differential Global Positioning System (DGPS)

To obtain precise position from a GPS receiver, we use techniques called “Differential GPS”. This involves at least two GPS receivers. One is stationary, at a known point or bench mark, we call this the “Base or Reference” receiver/unit and the other rover receiver/unit. The base unit ties all the satellite measurements into a solid local reference i.e. known point or bench mark. The Base receiver measures and records the timing errors and then transmit correction information to the other receivers those are roving around. The roving GPS receivers, possibly moving at an unknown point, calculates precise position by using the signals it receives from the satellites, and the correction information receives via radio from the Base. The correction information could be transmitted through online radio communication system or could be incorporated by off-line data processing software. Differential GPS usually gives about one-meter accuracy.

3.3.4 Real Time Kinetics (RTK) GPS

RTK is a special form of Differential GPS that gives about one hundred times greater accuracy. The GPS system uses a coded signal from which a receiver derives distance and thus position. The GPS satellite provides the equivalent of tape measure from space. The tape labeled tick marks at ~300m intervals (the C/A code), as well as unlabeled tick marks at ~20m intervals (the carrier). A GPS receiver can measure the code to one-meter (1m) precisions, and the carrier to one-centimeter (1cm) precision. A receiver that can compute the “Labels” on the carrier can then deliver centimeter position accuracy. This is what RTK does.

3.3.5 Establishment of Reference Station for DGPS Survey

Reference stations for Differential Global Positioning System (DGPS) survey were established in the project area. RTK-GPS static survey and baseline network adjustment technique was used for this purpose. SOB BMs in or around the project area was used as reference for establishment of DGPS reference stations. These reference stations were used for recording and transmitting differential correction for DGPS rover units.

3.3.6 Field Reconnaissance Survey

Field reconnaissance survey was held with Mouza map plot identified GCP in the project area. GPS survey was conducted along with the mouza maps and all the GCP points has been marked in mouza maps.

3.3.7 RTK GPS Survey

The mouza maps have no geo-coordinate, for this a GPS survey is essential. RTK GPS survey has been conducted to collect the geo-coordinates. Geo-coordinates collection points has been marked on the map.

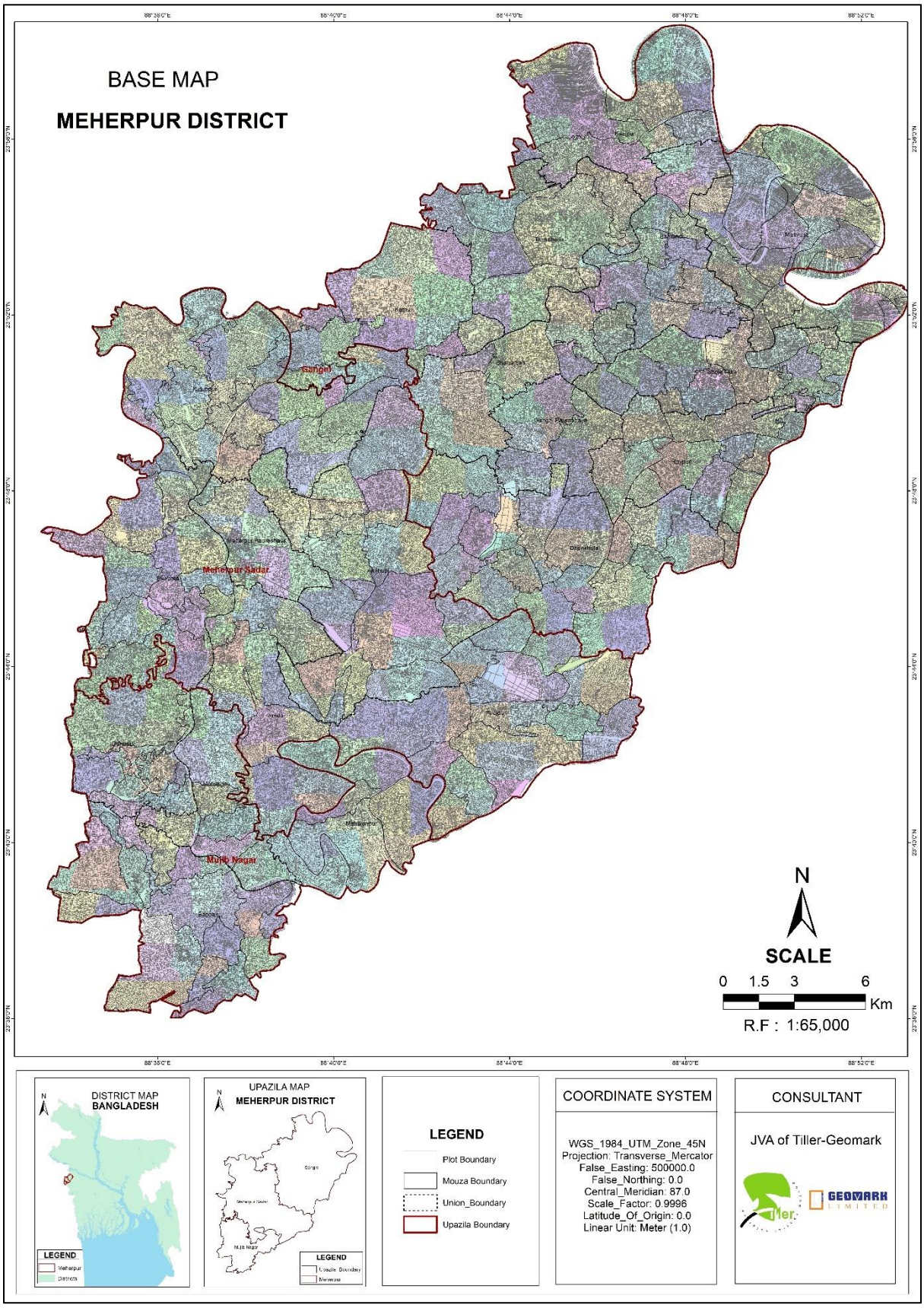
Figure 3-7: RTK-GPS Based GCP Survey


Base Map

Chapter 4: Base Map Preperation

4.1 Base Map Preparation

The base map preparation is a critical step in the development planning process, serving as a foundation for all subsequent spatial analysis and planning tasks. This component integrates high-resolution spatial data derived from UAV imagery, ground surveys, and digitized mouza maps to create accurate, geo-referenced, and attribute-rich base maps for the Meherpur District. The following map shows the base map generated from the digitized & georeferenced mouza map.



Map 4-1: Georeferenced Mouza of Project Area (Base Map)


Conclusion

Chapter 5: Conclusion

5.1 Conclusion

The preparation of the base map for the "Development Plan for Meherpur Zilla" marks a foundational step toward evidence-based and sustainable regional planning. Through the meticulous collection, scanning, digitization, and geo-referencing of RS Mouza maps, this initiative has successfully generated an accurate, spatially-integrated GIS database that will underpin all future planning efforts within the district.

The structured workflow—including high-resolution scanning, RTK GPS-based Ground Control Point (GCP) surveys, edge matching, 3D feature extraction, and integration with attribute data—ensures that the resulting base map is both spatially precise and thematically rich. This enables planners, policymakers, and stakeholders to visualize and analyze the district's existing conditions in unprecedented detail.

Furthermore, the integration of legacy land survey records with modern digital technologies ensures that both historical continuity and contemporary needs are addressed. The final outputs, including digitized Mouza sheets, a comprehensive geodatabase, and large-format map prints, provide a robust platform for strategic planning at the district, upazila, union, and growth center levels.

This base map will serve not only as a fundamental input for the Structure Plan, Urban Area Plan, and Rural Area Plan but also as a long-term asset for monitoring land use changes, planning infrastructure, managing natural resources, and supporting administrative and legal processes related to land governance.

In summary, the base map preparation has laid a strong technical foundation for the broader objectives of the Meherpur Zilla Development Plan and significantly enhances the district's capacity for spatially informed, inclusive, and resilient development.