



Government of the People's Republic of Bangladesh

Ministry of Housing and Public Works

Urban Development Directorate

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PREPARATION OF DEVELOPMENT PLAN FOR MEHERPUR ZILLA

REPORT ON ASSIGNMENT-9

Preparation of Structure Plan and Policies
including Report elaborating all containing
Sectors and Extents

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Summary of Assignment-9

Meherpur district in Bangladesh is susceptible to riverine floods, primarily due to its location and the behavior of its trans-boundary rivers. The district is bordered by and contains tributaries of trans-boundary rivers, most notably the Mathabhanga River and the Bhairab River. Flooding in Meherpur is often triggered by heavy rainfall in the upstream catchment areas in India, particularly West Bengal, which causes a surge of water that enters Bangladesh through its western districts, including Meherpur. Flooding in Meherpur is often triggered by heavy rainfall in the upstream catchment areas in India, particularly West Bengal, which causes a surge of water that enters Bangladesh through its western districts, including Meherpur.

The spatial extent and severity of flooding in Project area were analyzed under seven return period scenarios: 1.01, 2, 5, 10 and 25 years. The results indicate a progressive increase in both inundated area and flood depth with increasing return periods. In the case of the 1.01, 2,5-year return scenario, flooding was limited primarily to some low-lying areas adjacent to water bodies and river channels. However, long term return periods scenario like 10, 25 years, floodwaters extended significantly into inland areas including depression lands, agricultural fields and settlements etc.

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Urban Planner

Preparation of Structure Plan and Policies including Report elaborating all containing Sectors and Extents

Introduction

Meherpur district in Bangladesh is susceptible to riverine floods, primarily due to its location and the behavior of its trans-boundary rivers. The district is bordered by and contains tributaries of trans-boundary rivers, most notably the Mathabhanga River and the Bhairab River. Flooding in Meherpur is often triggered by heavy rainfall in the upstream catchment areas in India, particularly West Bengal, which causes a surge of water that enters Bangladesh through its western districts, including Meherpur. Flooding in Meherpur is often triggered by heavy rainfall in the upstream catchment areas in India, particularly West Bengal, which causes a surge of water that enters Bangladesh through its western districts, including Meherpur.

Notable Flood Event (September, 2000)

The flood of September, 2000 in Meherpur and the surrounding southwestern districts was particularly devastating because the area had not experienced severe flooding for about 60 years, meaning the population and local administration were not prepared (Bangladesh - Floods OCHA Situation Report No. 4).

- Extent: Approximately 65% (about 403 sq. km. out of 620 sq. km.) of Meherpur's total area and about 50% of its population (around 250,000 people) were affected.
- Impact: The floodwaters cut off road links, damaged a significant number of earthen houses (mostly built of mud), inundated tube wells (causing concerns about arsenic contamination), and forced people to seek refuge in temporary shelters.

Water Level Analysis

There are two water level gauge station data available within the project area named Kazipur (ID: SW205) on the Mathabhanga river and Kathuli (ID: SW32) on the Bhairab River. Nearby the project area, BWDB also operates and maintains three additional stations (SW206, SW207, SW208) on the Mathabhanga River. For this study, data from two of these stations (SW206 and SW208) were collected and analyzed effectively. Table 1 and Table 2 represents the historical annual maximum and minimum water level data of the Mathabhanga and Kathuli River at different gauge station.

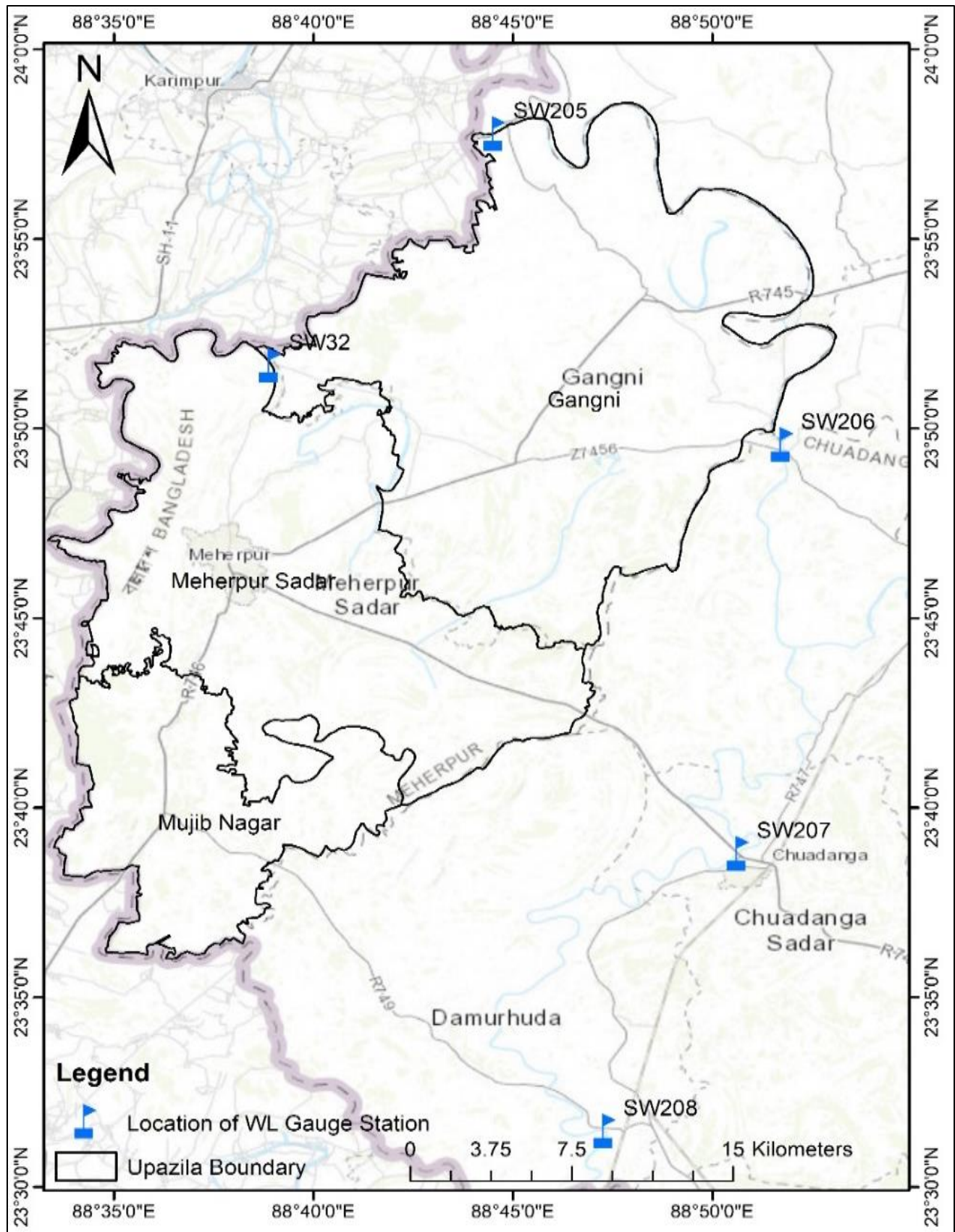


Figure 1: Location of Water Level Gauge Station

Table 1: Annual maximum and minimum water levels in the Mathabhanga River at different stations

Year	SW 205		SW 206		SW208	
	Max (m MSL)	Min (m MSL)	Max (m MSL)	Min (m MSL)	Max (m MSL)	Min (m MSL)
2003	13.34	7.76	11.23	6.13	8.00	2.50
2004	12.04	7.57	11.10	6.18	9.27	2.92
2005	13.72	7.93	10.66	6.15	9.10	3.98
2006	11.98	7.98	10.16	5.96	8.30	3.21
2007	12.78	7.99	10.79	6.12	8.27	3.24
2008	12.26	7.97	10.53	6.16	8.89	2.26
2009	11.63	7.68	9.49	6.04	6.12	2.21
2010	11.28	7.37	9.57	5.89	7.28	3.56
2011	12.58	7.47	10.85	5.60	9.50	3.51
2012	11.76	7.33	9.98	5.89	7.44	2.41
2013	12.92	7.45	11.07	5.93	7.75	3.22
2014	12.00	7.53	10.15	6.57	8.12	4.07
2015	11.44	7.71	10.15	6.64	8.02	2.51
2016	11.87	7.25	9.89	5.89	7.81	2.38
2017	11.37	7.52	9.24	5.98	6.74	3.09
2018	10.93	7.39	9.05	5.94	5.99	3.20
2019	12.16	7.44	9.74	5.92	7.69	2.33
2020	11.50	7.47	9.58	5.90	7.06	2.04
2021	11.87	7.43	10.33	5.94	7.85	2.17
2022	11.41	7.42	9.26	5.88	5.61	2.54
2023	10.43	7.25	8.35	5.59	5.60	2.21
2024	-	-	9.25	5.49	6.74	2.24

Table 2: Annual maximum and minimum water levels in the Bhairab River at Kathuli station

Year	SW32	
	Max (m MSL)	Min (m MSL)
2003	11.42	10.16
2004	11.26	9.11
2005	0.80	0.50
2008	11.84	10.19
2009	11.24	9.56
2010	10.46	9.99
2011	12.09	10.02
2012	10.54	9.81
2013	10.85	10.06
2014	10.70	9.97
2015	10.74	10.10
2016	10.55	9.72
2017	12.04	9.79
2018	10.52	9.63
2019	10.42	9.64
2020	11.24	9.55
2021	10.72	9.29

Year	SW32	
	Max (m MSL)	Min (m MSL)
2022	10.03	9.30
2023	10.41	9.03

Flood Inundation Assessment

The spatial extent and severity of flooding in Project area were analyzed under seven return period scenarios: 1.01, 2, 5, 10 and 25 years. The results indicate a progressive increase in both inundated area and flood depth with increasing return periods. In the case of the 1.01, 2,5-year return scenario, flooding was limited primarily to some low-lying areas adjacent to water bodies and river channels. However, long term return periods scenario like 10, 25 years, floodwaters extended significantly into inland areas including depression lands, agricultural fields and settlements etc.

The 1.01-year flood inundation map of the project area considering return period of 1.01-year is shown in Figure 2. The 1.01 -year return period flood is considered as very usual or normal flood for the project area which is occurred every year where major inundation area are riverbanks and some depression land with shallow depths between 0.1 to 1.6 meters. An approximately 2.238 km² of land across the project area will be inundated in 1.01 -year return period flood.

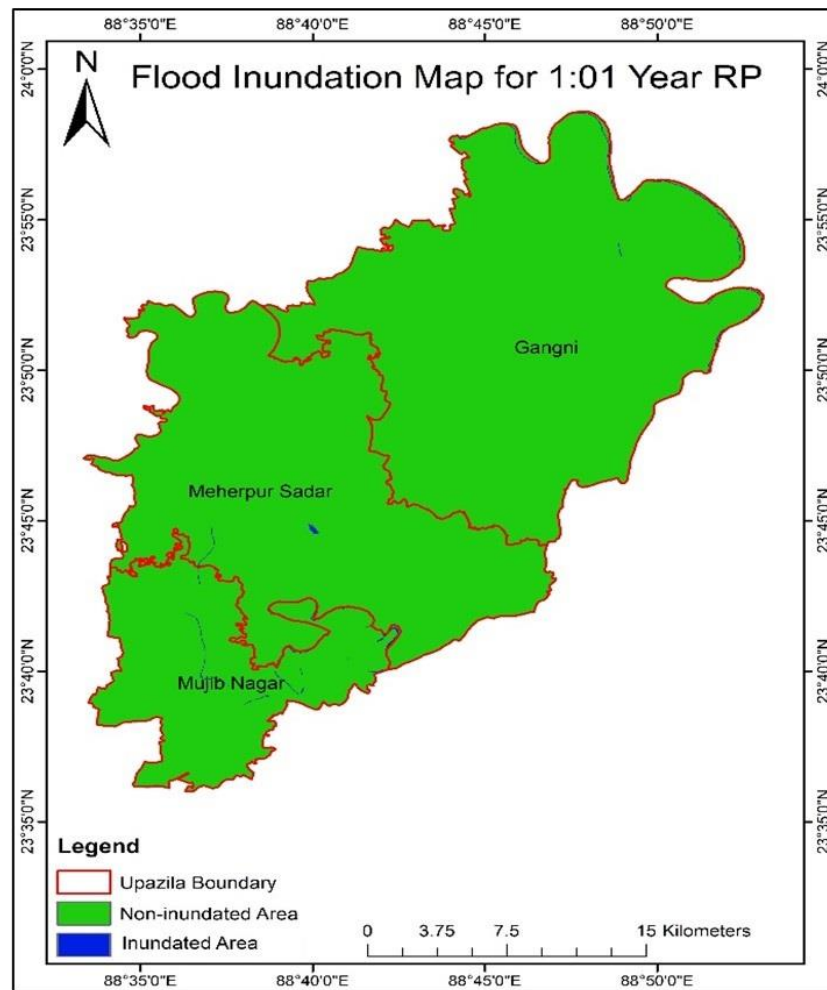


Figure 2: Flood Inundation Map over the project area for 1.01-year return period

Under the 2-year return period event, the flood extent increased significantly to around 9.70 km² which means that additional 7.46 km² of land will be inundated in comparison to 1.01-year return period. The inundation area is mainly in Meherpur Sadar and Mujibnagar Upadistrict. Water depths ranged from 0.1 to 3.4 meters. The flood inundation map under 2-year return period for the project area is shown in Figure 3.

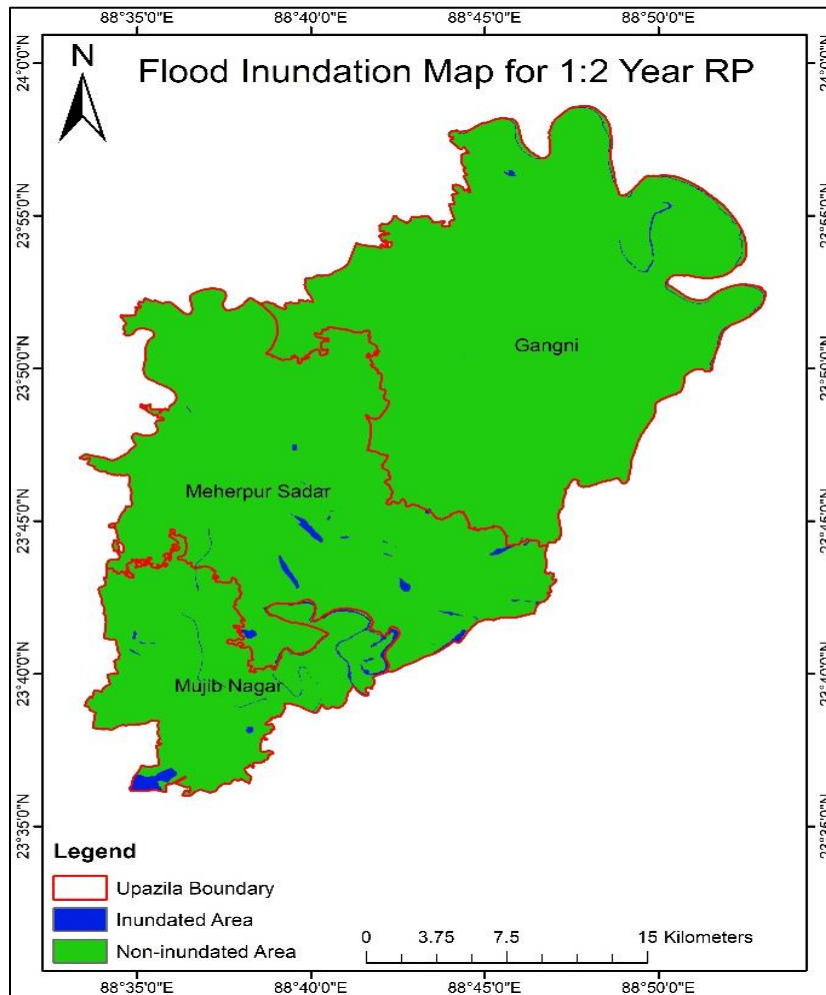


Figure 3: Flood Inundation Map over the project area for 2-year return period

A total of 15.56 km², 8.56 km² & 19.66 km² land of Meherpur Sadar, Gangi and Mujibnagar upadistrict will be inundated. The inundation area of Meherpur and Gangi Pourashava will be 0.43 km² and 0.57 km² respectively for a 10-year return period flood. The inundation depth ranged from 0.1 to 4.4 meters. The flood inundation map under 10-year return period for the project area is shown in Figure 5. The flood inundation map for Maherpur and Gangi Pourashava under 10-year return flood is presented in Figure 5.

The 5-year return period flood scenario will affect approximately 26.51 km² of the district which means that additional 16.81 km² of land will be inundated in comparison to 2-year return period. This scenario marked the extended impacts of beginning flood scenario, especially in agricultural areas of Meherpur Sadar and Mujibnagar Upadistrict. Depths ranged from 0.1 to 4 meters in many places of the project areas. The 5-year flood inundation map of the project area under 5-year return period is represented in Figure 4.

In the 10-year return period flood, the inundated area expanded to about 43.77 km². Affected regions mainly included low depression area and agriculture

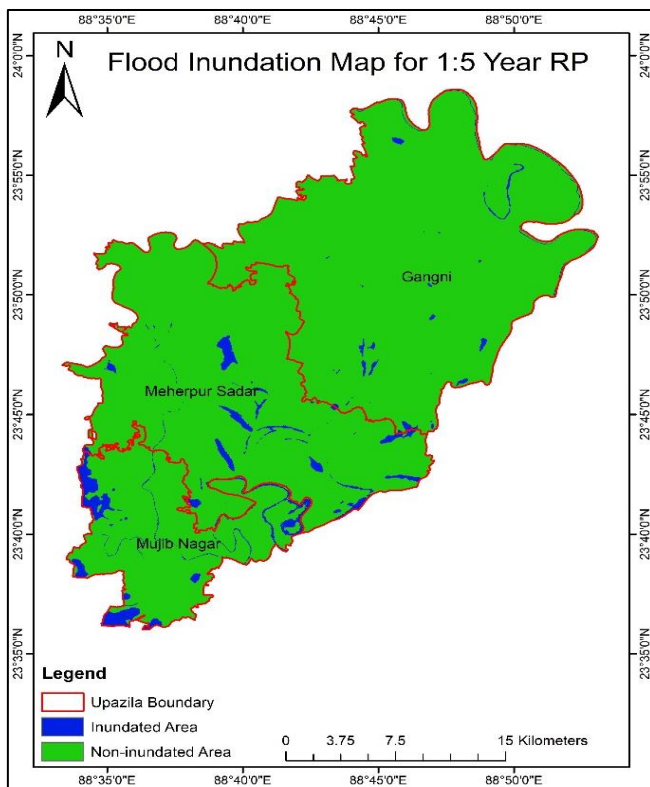


Figure 4: Flood Inundation Map over the project area for 5-year return period

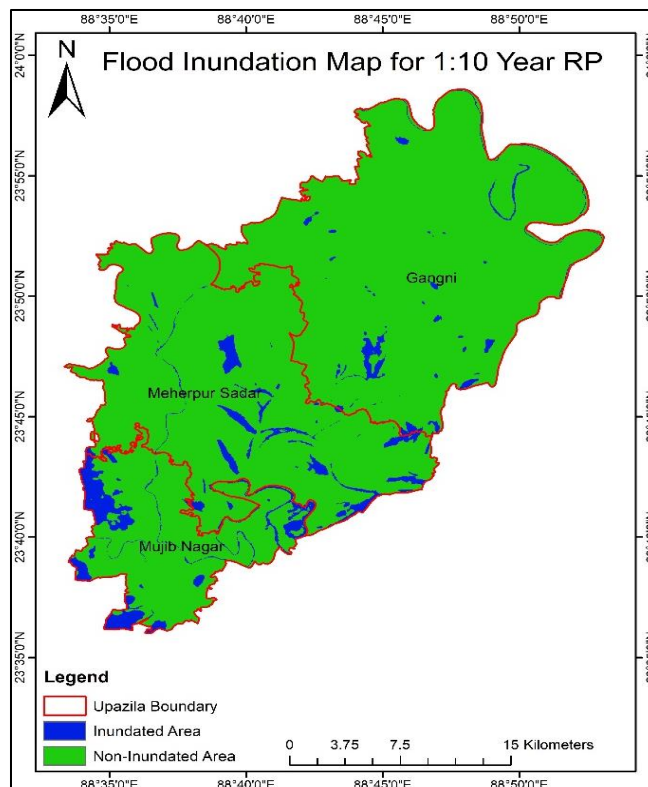


Figure 5: Flood Inundation Map over the project area for 10-year return period

The 25-year flood inundation map of the Meherpur District considering return period of 25-year is shown in Figure 2.15. The flood affected area is estimated 66.62 km² which means that additional 22.85 km² of land will be inundated in comparison to 10-year return period. Total area of 14.39 km², 21.55 km² & 26.71 km² will be inundated in Meherpur Sadar, Gangi and Mujibnagar upadistrict respectively. Moreover, Meherpur and Gangi Pourashava will be inundated 0.73 km² and 0.75 km² area respectively. Inundation reached to settlements and agricultural lands, posing serious concerns for displacement, crop failure, and damage to critical infrastructure. Depths frequently exceeded 4.7 meters in several locations near river confluences and depressions. The flood inundation map for Meherpur and Gangi Pourashava under 25-year return flood is presented in Figure 6.

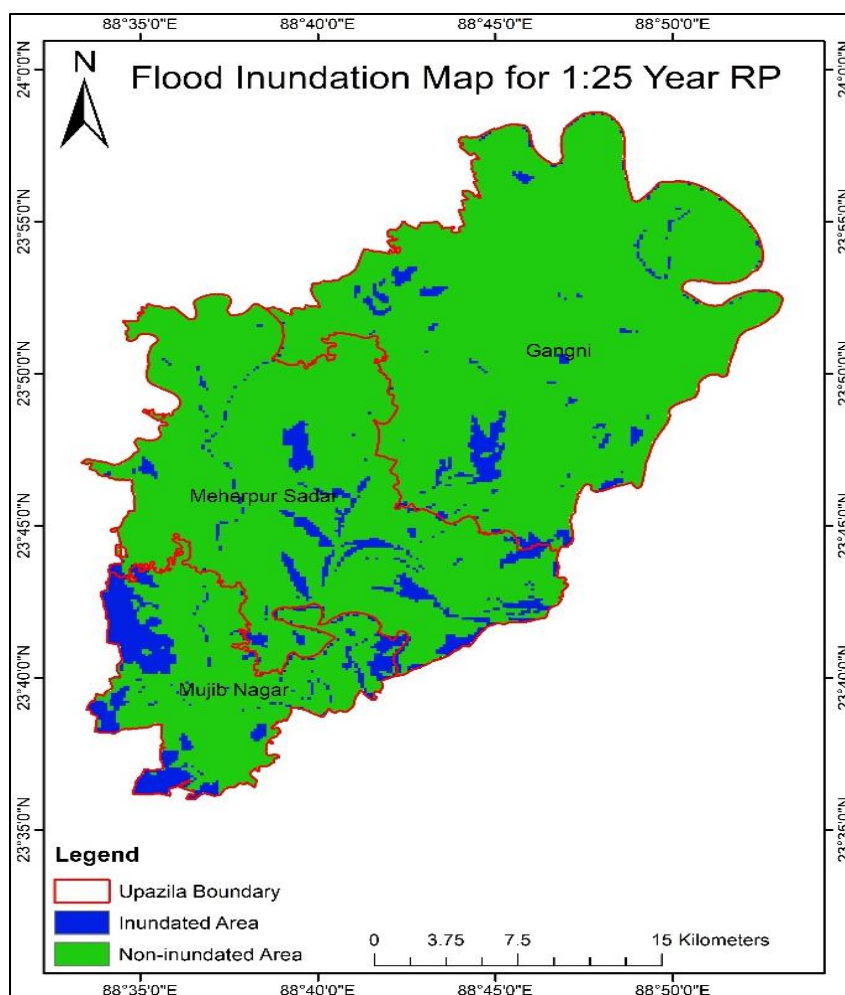


Figure 6: Flood Inundation Map over the project area for 25-year return period

Review of Existing Policies and Legislations

Meherpur District's flood management strategy is intrinsically linked to the broader context of Bangladesh's national flood management, but also includes specific measures to address its localized river systems, primarily the Bhairab River and the influence of cross-border water flow.

Bangladesh Water Act, 2013

Policy Statements	Reflections
Ensuring Normal Flow of Water. (Section 20, Page 17)	It aims not just to stop floods, but to maintain the health and capacity of the river system so that it can handle regular monsoon flow without overflowing its banks unnecessarily.

Policy Statements	Reflections
Protection of Flood Control Embankment. (Section 21, Page 17)	It reflects the recognition that existing structural defenses are valuable assets requiring continuous upkeep to remain effective.
Conservation of Water Source and Management thereof. (Section 22, Page 18)	It reflects an understanding that water is a finite and fluctuating resource (too much during monsoon, too little during the dry season) and must be managed year-round, not just during flood events.
Declaration of Flood Control Zone and Management thereof. (Section 25, Page 19)	It acknowledges that certain areas will always be vulnerable to flooding and that the best strategy is to formally define those risks and manage development within them.

Riverine Flood Protection Adaptation Measures for Meherpur District

1. Structural Adaptation Measures

These are physical interventions designed to control floodwater and protect areas from inundation. For Meherpur, river maintenance and bank protection are paramount.

Measure	Objective	Relevance for Meherpur
River Re-excavation (Dredging)	To restore the original depth and width of rivers, increasing their water-carrying capacity and drainage efficiency.	Highly Relevant. Siltation in the Bhairab River has significantly reduced its flow capacity. The "Bhairab River Re-excavation (2nd Phase)" project includes dredging work in Meherpur to enhance drainage and mitigate flooding.
River Bank Protection	To prevent river erosion, stabilize the river course, and protect nearby infrastructure and settlements.	Essential. Erosion is a major threat, particularly during peak monsoon flow from upstream. This involves revetments and concrete structures along vulnerable banks.

2. Non-Structural Adaptation Measures

These focus on minimizing the impact of floods through planning, information dissemination, preparedness, and local capacity building.

Measure	Objective	Relevance for Meherpur
Improved Flood Forecasting and Early Warning System	To provide timely and accurate information on expected flood water levels, inundation areas, and duration.	Crucial. Given its location, an effective system must integrate information from upstream sources (India) and rapidly disseminate it to local communities in an accessible format.
Community-Based Disaster Preparedness (CBDP)	Organizing and training local volunteers to manage local warnings, evacuations, and initial relief efforts.	Highly Effective. Enhances the community's capacity for rapid self-response, which is vital in a disaster-prone area, often involving local NGOs and the Bangladesh Red Crescent Society (BDRCS).
Raised Homesteads and Flood Shelters	Constructing houses and community buildings on raised plinths or stilts to protect people and assets from floodwaters.	Direct Protection. This is a common and effective local-level measure, often supported by government and non-government resilience projects.
Ecosystem-Based Adaptation (EBA) / Afforestation	Planting trees along riverbanks and embankments to stabilize soil, prevent erosion, and serve as natural buffers.	Supportive. Included in current water management projects to enhance the sustainability of the structural works and improve the local environment.
Integrated Land Use Planning	Developing and enforcing regulations that restrict or limit new construction in high-risk flood-prone zones, guiding development to safer areas.	Long-Term Strategy. This helps in reducing future asset exposure and ensuring that infrastructure (roads, bridges) does not impede natural water flow and drainage.

The strategy for Meherpur is an integrated approach, recognizing that structural measures alone are insufficient. The focus is increasingly on a people-centered approach that combines necessary engineering works (like river dredging) with robust non-structural measures (like early warning systems and community resilience building).

Bhairab River Dredging Activities by Meherpur WDB

The Bhairab River re-excavation has been a multi-phase, long-term government initiative.

Phase I of Re-excavation

- **Period:** The initial phase was inaugurated around 2015 and completed by late 2017.
- **Stretch Covered:** Approximately 29 kilometers (km) of the Bhairab River were dredged, running from the Kathuli border area in Mujibnagar Upadistrict to the Rashikpur sluice gate.
- **Objective/Result:** The goal was to restore the river's normal flow. While it brought temporary benefits, reports indicated the flow was not fully restored, suggesting the need for further work.

Phase II of Re-excavation (Ongoing)

- **Project Title:** This work falls under the larger national project, "Bhairab River Re-excavation Project (2nd Phase) (1st revised)."
- **Inauguration:** The second phase was officially inaugurated in March 2022.
- **Stretch Covered:** The work includes the remaining portion in Meherpur and a section in neighboring Chuadanga District.
 - **Meherpur Portion:** Approximately 30 km of the river.
- **Objectives:** The primary goals are:
 1. **Flood Mitigation:** Increasing the river's depth and width to ensure normal water flow and reduce localized flooding during the monsoon.
 2. **Water Conservation:** Allowing the river to retain more water during the dry season, thereby improving irrigation facilities for farmers and helping to raise the declining groundwater level.
 3. **Livelihood Support:** Revitalizing aquatic habitats to boost the fisheries sector and restore water availability for daily domestic use.
- **Status/Progress:** By June 2026, with an initial target to finish the work by this financial year.