

DRAFT

URBAN RIVER MANAGEMENT PLAN

BIJNOR



Madhya Ganga Barrage



BIJNOR MUNICIPAL COUNCIL
UTTAR PRADESH

11th FEBRUARY, 2026

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E. EXECUTIVE SUMMARY

A river and a city have a symbiotic relationship. The river provides the "life" (resources, climate regulation, identity) and in return, the city acts as the "steward" (protecting the catchment, managing flow and maintaining biodiversity). However, in recent times this relationship has devolved into parasitism, where the city extracts resources and dumps waste, slowly killing the host river. Urban River Management Plan (URMP) is a strategic framework designed to shift the urban-river dynamic from "exploitation" (parasitism) to "stewardship" (symbiosis).

The purpose of the Urban River Management Plan (URMP) Bijnor is to develop a dedicated strategy for managing River Ganga and the ponds in the planning area in an efficient and sustainable manner. Unlike many riverine cities, Bijnor lies at a distance of 6.6- 7.6 kms from the Ganga, resulting in an indirect influence on the river through nallahs, groundwater extraction and land-use practices. This distinctive relationship underscores the need for a management approach that not only strengthens the city's internal water systems but also embraces its role as a steward of the larger river basin.

The document is based on the Strategic Framework for Managing Urban River Stretches developed by the National Institute of Urban Affairs (NIUA), in association with the National Mission for Clean Ganga (NMCG). It proposes **tangible and practical actions along with several recommendations under a ten-point agenda** (or objectives), to ensure the "Nirmal" (clean) and "Aviral" (continuous) nature of the river. The interventions are presented at the concept level for broad understanding, with Detailed Project Reports (DPRs) to be prepared subsequently. The URMP document is a living document, evolving continuously to address emerging issues in river management.

Approach adopted for preparing the URMP for Bijnor

To prepare the URMP, a Multistakeholder Working Group (MSWG) comprising 13 members, chaired by the District Magistrate, Bijnor, was constituted to lead the process. The team from NIUA and NMCG jointly facilitated the MSWG meeting. This was followed by a rapid baseline assessment to understand river-related issues and challenges faced by the city and to identify opportunities for enhancing river-city interaction. The assessment was based on secondary data, published reports and ongoing projects. It covered planning provisions related to river, streams, nallahs etc; status of river pollution and groundwater, encroachments in floodplain and ongoing projects in the city and waterbodies. Based on the baseline assessment and MSWG deliberations, 23 projects/interventions were identified for inclusion in the Bijnor URMP.

Envisaged benefits of the URMP for Bijnor city

It is envisaged that implementing the URMP will yield several tangible and intangible benefits, as listed below.

- ▶ It will improve climate resilience and environmental outlook of the city, making it more appealing to residents and visitors as well as help in providing ancillary benefits such as water pollution control, thriving biodiversity, flood mitigation and improved groundwater recharge.
- ▶ It will improve the connect between the residents and the river by creating avenues for recreation, social bonding and leisure thereby improving the quality of life of the residents.
- ▶ It will boost the city's river-related economy and provide livelihood for multiple stakeholders.
- ▶ The URMP will create a premise for shared governance with key stakeholders and citizens and enable them to take on a more active role in managing the city's environmental assets and instilling a sense of ownership around actionable items.

Interventions proposed in URMP

The table below lists the key details of 23 interventions which includes the agencies responsible for implementation, estimated costs and the source of funding against each intervention.

Table E-1: List of Proposed Interventions

Sl. No.	URMP Objective	Intervention	Responsible Agency	Estimated Cost (In rupees)	Potential Financing Sources
1	Regulation of Activities in Flood Plains	Intervention 1: Preparation of a New Master Plan for Bijnor	Town & Country Planning Department, Bareilly; Irrigation Department, Regulatory Authority, SMC		
2	To keep river free from pollution	Intervention 2: Construction of 15 MLD STP for western part	Pay Jal Nigam	₹ 234.1 Cr	Namami Gange
		Intervention 3: Construction of 6 MLD STP for eastern part	Pay Jal Nigam (Urban)	₹ 19Cr	Namami Gange
		Intervention 4: Comprehensive drainage master plan for Bijnor	Pay Jal Nigam	₹ 8-12 Cr	Urban Flood Control and Storm Water Drainage Scheme, UP
		Intervention 5: Integrated Co-Treatment Strategy for City-Wide Faecal Sludge Management	Bijnor Municipal Council	₹ 5 Cr	Namami Gange
		Intervention 6: Preparation of Faecal and Septage Management Plan	BMC	₹ 0.5 Cr	SBM(U)
3	To rejuvenate waterbodies and wetlands in the city	Intervention 7: To create water body Database at city level	BMC, SDA, UPPCB	₹ 0.97 Cr	Municipal Budget, UP Urban Development funds, 15th Finance Commission - Tied Grants (Water & Sanitation)
		Intervention 8: Strategy for Urban Water Body Rejuvenation	BMC	₹ 0.58 Cr (for 1 Waterbody as per DPR & feasibility)	AMRUT 2.0 and SUD Grants
		Intervention 9: Rejuvenation of Diwan Talab	BMC	2.2 to 2.6 Cr	AMRUT 2.0, Component specific PPP, CSR
		Intervention 10: Rejuvenation of Bakshi wala Talab	BMC	₹ 5.5 to 7.0 Cr	AMRUT 2.0, Component specific PPP, CSR
5	To Reuse treated used water	Intervention 11: Reuse of treated water from 24 MLD STP	BMC	₹ 4 Cr	Municipal budget
7	To develop eco-friendly riverfront projects	Intervention 12: Development of Barrage ghat precinct at Madhya Ganga Barrage	Uttar Pradesh Projects Corporation Ltd. (UPPCL) or UP Tourism	₹ 3.6- 4 Cr	NMCG, Ministry of Tourism

Sl. No.	URMP Objective	Intervention	Responsible Agency	Estimated Cost (In rupees)	Potential Financing Sources
9	To inculcate river-sensitive behaviour among citizens	Intervention 13: Installation of interpretive signages and boards”	District Ganga Committee, BMC	₹0.15–0.20 Cr	IEC Budget: BMC & Namami Gange, CSR Funds
		Intervention 14: Distribution of Biodegradable Kits at Jalaj Museum	BMC	First-year cost: ₹ 0.10–0.12 Cr Annual recurring cost: ₹0.08–0.10 Cr	Municipal sanitation budget, CSR (local businesses, flower vendors), Temple trusts & SHG cost-sharing, IEC support (Namami Gange
		Intervention 15: Designated Cloth disposal Zones in Kunds “Arpan Kunds” (Ritual Tanks)	BMC	₹ 0.08 – 0.15 Cr	Municipal sanitation budget, CSR (local businesses, flower vendors), Temple trusts
		Intervention 16: Introduce River clubs in schools and colleges	BMC; District Education Office (DEO) Bijnor, NMCG	₹0.21 Cr	SBM(U) and NMCG subsidies
		Intervention 17: Deploy floating barriers and cleanup teams during high-activity periods (Purnima, Amavasya, etc.).	BMC; district ganga Committee	Annual cost: ₹ 0.10 Cr	Municipal sanitation budget, SBM and DDMA
10	To engage citizens in river management activities	Intervention 18: Formation of River Sabha Committees at City-Level	BMC	Initial setup and training: ₹0.15–0.20 Cr Annual recurring cost: ₹0.10–0.12 Cr	Municipal budget, CSR contributions.
		Intervention 19: Expand Bartan Bank model citywide	BMC	₹ 1-2 Cr	Municipal budget, CSR contributions, 15th Finance Commissions
		Intervention 20: Organize hackathons and competitions for innovative solutions to river and pond pollution	BMC; DGC	₹ 3-4 Cr	Municipal IEC budget allocation under SBM(U), Star innovative Funds, CSR funds
		Intervention 21: Street Plays (Nukkad Natak) by SHGs, RWAs & local community	BMC	Annual cost: ₹ 0.08- 0.10 Cr	Municipal IEC budget
		Intervention 22: Community-led solid waste clean-up campaigns along nallahs and riverbanks	BMC; SBM cell	Annual cost: ₹ 0.04-0.05 Cr	Municipal IEC budget allocation under SBM(U), CSR funds
		Intervention 23: Introduce electric crematoriums and awareness campaigns to encourage eco-friendly practices	BMC	₹ 0.12-0.15 Cr	SBM(U) and NMCG subsidies, CSR funds from local industries/ businesses, Funding from religious boards & funeral trusts
Total				Approx. 292 Cr	

1 INTRODUCTION

The National Institute of Urban Affairs (NIUA) and the National Mission for Clean Ganga (NMCG) have collaborated to promote river-sensitive urban development across cities in the Ganga basin and other Indian river basins. This collaboration aims to harness the role of the cities to rejuvenate and restore river health. As part of this initiative, two major support systems have been developed: Urban River Management Plan (URMP) Framework and Guidelines for creating River-Sensitive Master Plans.

The framework was prepared to help cities improve and sustain river stretches within their boundaries through holistic, ecosystem-based interventions. It underscores that healthy river are essential for urban livability and productivity and its vision is organized around three elements environmental, economic and social, supported by ten objectives. These objectives are translated into city-specific projects, each tied to funding sources and institutional mechanisms for effective implementation.



Figure 1-1: Ten Objectives of the URMP

A total of sixty URMPs are planned in two phases with 25 in Phase I and 35 in Phase II, including five cities in Uttarakhand in the first phase. Funded by the World Bank under Namami Gange Mission II, this initiative is expected to guide Urban Local Bodies (ULBs) in addressing challenges such as drying rivers, poor waste management, loss of green cover, floodplain encroachment and industrial pollution through systematic, city-level planning. The three tiers of governance and monitoring committees at the center, state and city level is depicted in Figure 1-2.

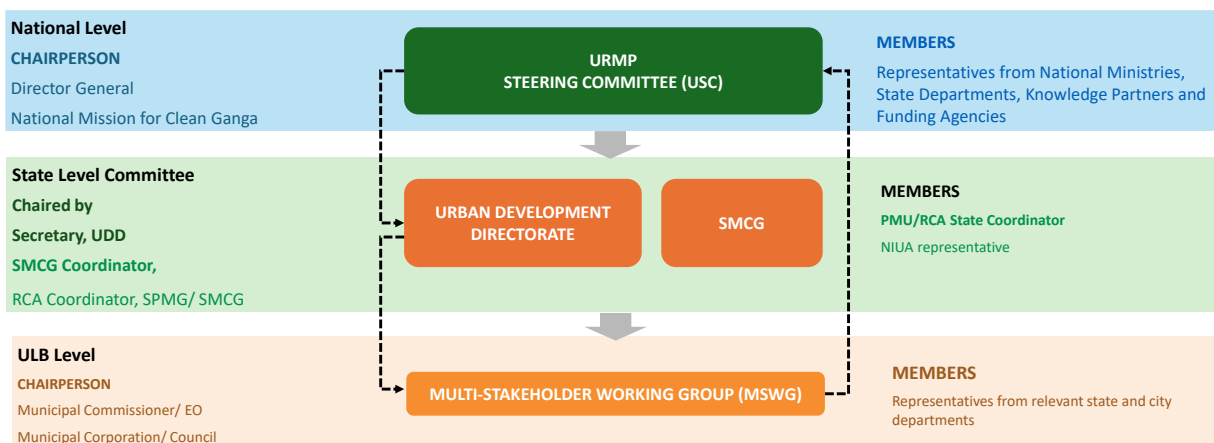


Figure 1-2: National, State & City Engagement for the URMP Preparation

1.1 PROCESS FOR PREPARATION OF THE URMP BIJNOR

The preparation of an URMP follows a systematic approach as per NIUA’s URMP Components and Guidance Note 2020 and strategic guidelines for making River Sensitive Master Plans 2021 to ensure effective river conservation, sustainable management and stakeholder collaboration. The process involves multiple stages, each contributing to a comprehensive and actionable plan as depicted below.

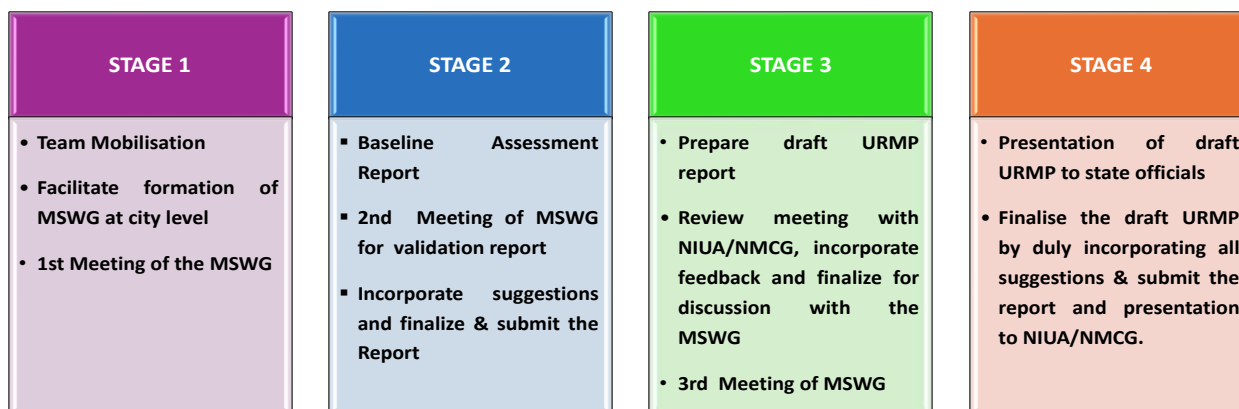


Figure 1-3: Process for preparation of URMP

1.1.1 Study Area

Bijnor city is located approximately 6.6–7.6 km from the River Ganga, with the Barrage Ghat serving as the primary connecting interface for local residents. The study area for the Urban River Management Plan (URMP) in Bijnor has been structured into four distinct zones (refer Map 6-1). The four zones are:

- ▶ Bijnor City Planning Area – Core municipal limits influencing riverfront development.
- ▶ Barrage Ghat – Ghat is used for cultural, religious and recreational activities.
- ▶ Confluence of Malin river tributary– Tributary joins the River Ganga, requiring ecological and pollution management.
- ▶ Adjoining Interface Areas – Transitional spaces linking the city and Barrage Ghat, including peri-urban settlements

In addition to this, in case of riparian buffer, the 13 km stretch along the eastern bank of River Ganga has been considered. In order to ensure that the plan is participatory and has involvement of concerned government agencies from the state to the city level, workshops and meetings have been carried out at all levels.

1.2 STATUS OF WORK AND CONTENTS OF THE PRESENT DELIVERABLE

Tasks one to three as listed in Figure 1-3, have been completed and findings are elaborated in the present deliverable of Draft URMP Report. The detailed content of the report includes the following:

- ▶ Key points discussed during URMP State level Steering Committee Workshop for Uttar Pradesh held on 3rd May 2025 at Lucknow;
- ▶ Discussions during 1st Multistakeholder Working Group (MSWG) meeting at Bijnor on 19th June 2025;
- ▶ Discussions during 2nd Multistakeholder Working Group (MSWG) meeting at Bijnor on 23rd January 2026,
- ▶ Analysis of the field visit, primary and secondary data available in the public domain and collected from various stakeholder departments post the MSWG meeting.

1.2.1 URMP State level Workshop

A State-level URMP Committee, chaired by Secretary, Urban Development Department (UDD), Government of Uttar Pradesh has been constituted to oversee the URMP process. A State level Workshop was held on 3rd May 2025 at Lucknow chaired by Deputy Director General, NMCG and attended by Director Local Bodies & Secretary, Urban Development Department (UDD) UP, Director, NMCG, Urban Lead, NMCG, Technical Advisor, State Mission for Clean Ganga (SMCG), UP and representatives from NMCG, SMCG, State UDD, Directorate of ULBs, city representatives ULBs and NIUA.

The meeting presented the guiding principles, objectives and work plan for preparing URMPs in five cities of the state. Commissioners, Executive Officers and senior officials shared the current status, challenges and future plans for river management in their cities.



Image 1-1: State Level Workshop for Uttar Pradesh on 3 May 2025

1.2.2 Multistakeholder Working Group

To guide the development of city, a Multistakeholder Working Group (MSWG) was formed comprising of 13 representatives from Municipal Council, City Magistrate, Uttar Pradesh, Jal Nigam, UPPCB, Forest Department, Tourism Department, Forest Department, Regulatory Authority, Jal kal and NGO. Post the state level workshop, the first MSWG meeting was held on 19th June 2025 under the chairmanship of District Magistrate, Bijnor, to notify the MSWG for the city and the nodal officer for the URMP (refer Image 1-2).



Image 1-2: MSWG Meeting held on 19th June 2025 in Bijnor

The second MSWG meeting for finalization of the baseline report was held on 23rd January 2026 under the chairpersonship of District Magistrate, Bijnor (Refer Image 1-3).



Image 1-3: 2nd MSWG held on 15th January 2026 in Bijnor

1.2.3 Draft URMP Report

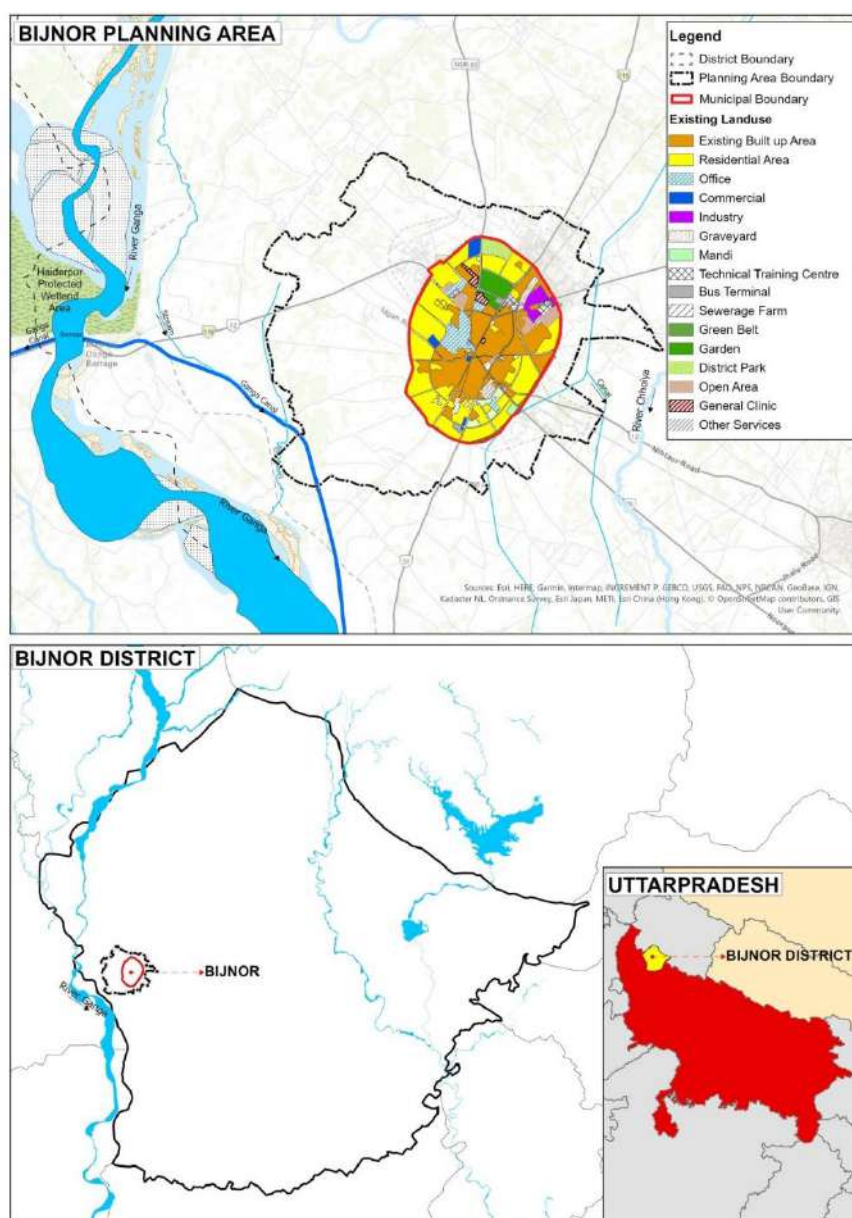
The Draft URMP report includes tangible interventions for river conservation and management for each of the ten URMP objectives. Multiple meetings and consultations with all concerned agencies along with site visits were conducted to assess the ground situation and identify opportunities for future interventions (refer Image 1-4). Based on the gaps and prioritized issues identified in the Baseline Assessment Report, this document outlines interventions and recommended actions. Each intervention is elaborated in detail, including the project rationale, conceptual framework, key components, broad cost estimates, funding source and the designated implementing agency.



Image 1-4: Consultations and Site Visits

2 CITY PROFILE

Bijnor is a Municipal Council located in the north-eastern part of Bijnor district, Uttar Pradesh. The city lies close to the meandering channel of River Ganga, at a distance ranging between 6.7 km at its nearest point from Tibdi village and 7.7 km, farthest from Madhya Ganga Barrage, Bijnor enjoys strategic proximity to major urban centers i.e., Muzaffarnagar (60 km), Meerut (80 km), Delhi (170 km), Lucknow (440 km) and Kanpur (450 km), a major industrial hub. The city is well connected to Uttarakhand and Madhya Pradesh states via National Highway 34, while State Highways 12, 49 and 51 provide access to Haryana, Uttarakhand and other parts of Uttar Pradesh, thereby integrating Bijnor with religious, industrial and commercial centers across the region. Map 2-1 shows the study area of Bijnor taken up for the preparation of the URMP.



Map 2-1: Contextual Setting of Bijnor city

2.1 CITY ADMINISTRATIVE BOUNDARIES

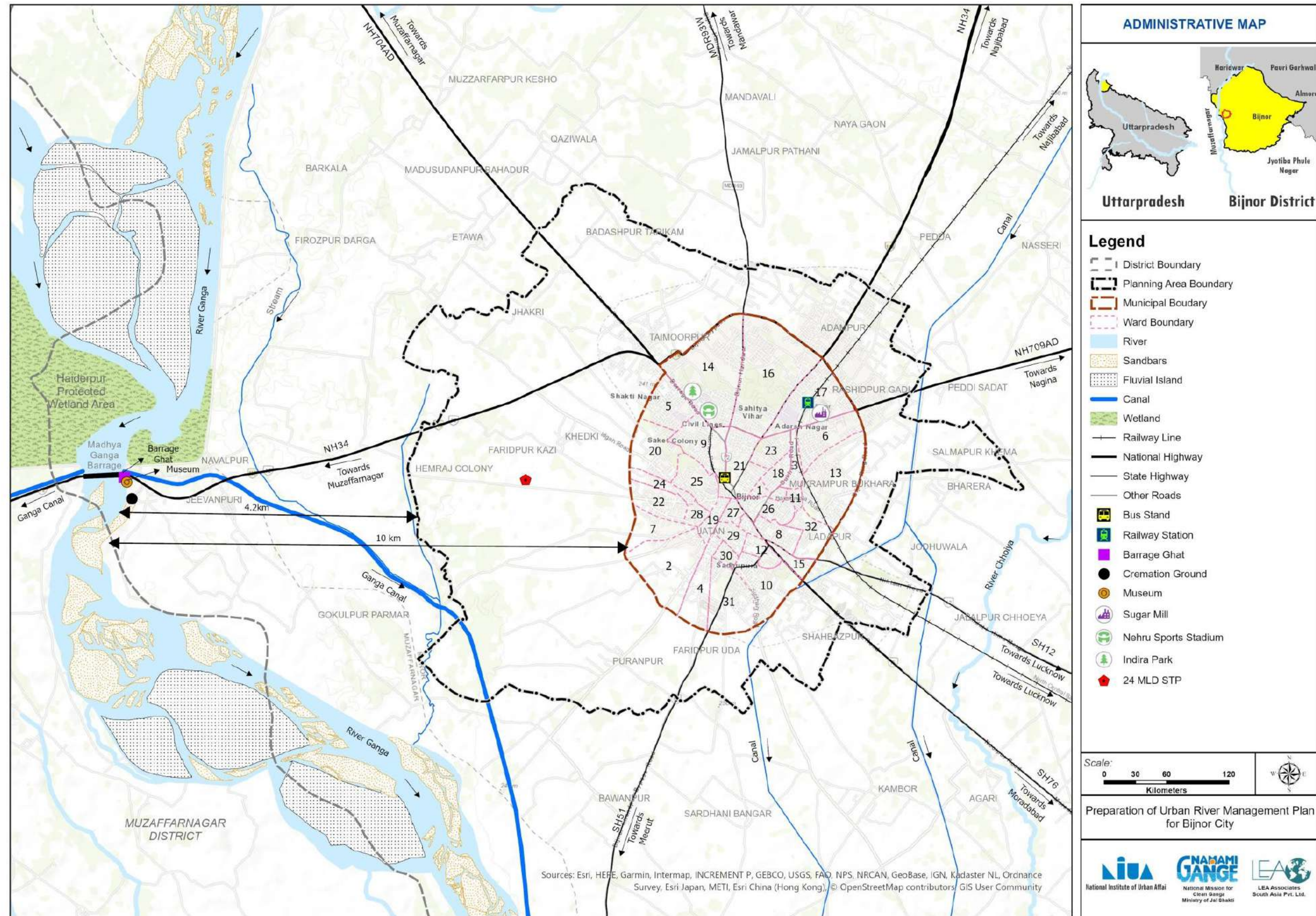
The Bijnor Planning Area covers approximately 46.21 sq km comprising of Bijnor municipal council and 27 villages. The planning area is managed by the regulatory authority responsible for preparing the Master Plan, implementing urban planning policies, regulating land use and activities and overseeing infrastructure development.

The Bijnor MC area has been recently extended in 2020 to 11.62 kms and is divided into 32 municipal wards. The Bijnor MC is responsible for providing and managing key civic services and urban infrastructure, including sanitation, water supply, street lighting, road maintenance and public health. (Refer Map 2-2).

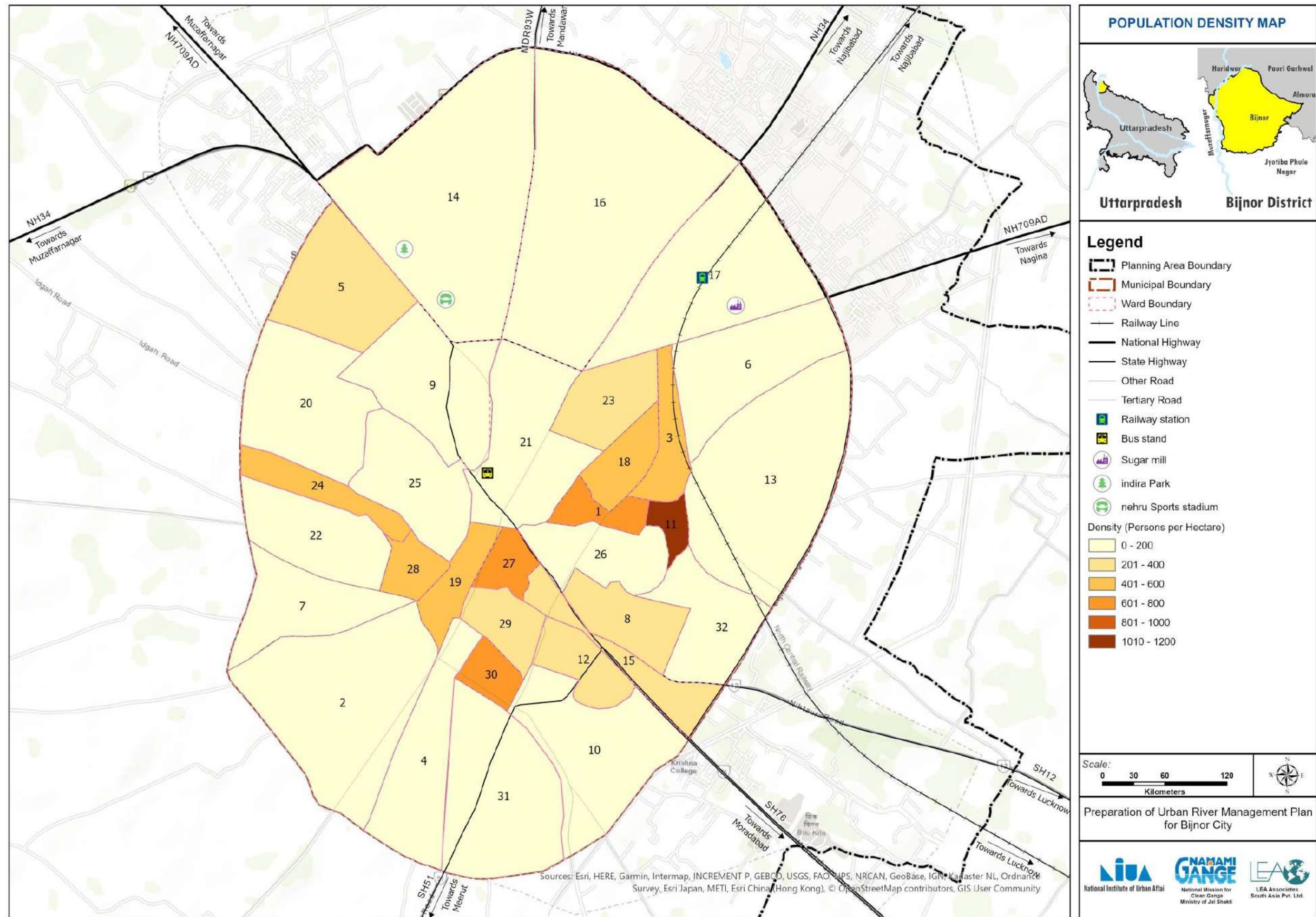
2.2 DEMOGRAPHY

The total population of the Bijnor municipal council is 93,297 (Census 2011) and the population in planning area is 1,43,297 and has increased to 2,34,666 in 2025¹ for municipal council area. The population of the city is expected to grow up to 4.3 lakhs in 2051.

¹ Source: Bijnor Municipal Council



Map 2-2: Administrative map of Bijnor



Map 2-3: Population density map of Bijnor

2.3 PHYSIOGRAPHIC PROFILE

2.3.1 Topography

Bijnor is located in the upper Indo-Gangetic plains and it has flat to gentle slope. The average elevation of the city is 230 meters above sea level, with a gradual slope trending south-west. The slope in eastern side of railway line is in the south-east direction. The physiography is marked by stable upland "Bangar" terrain to the flood-prone "Khadar" plains near the riverbanks.

2.3.2 Geophysical Characteristic

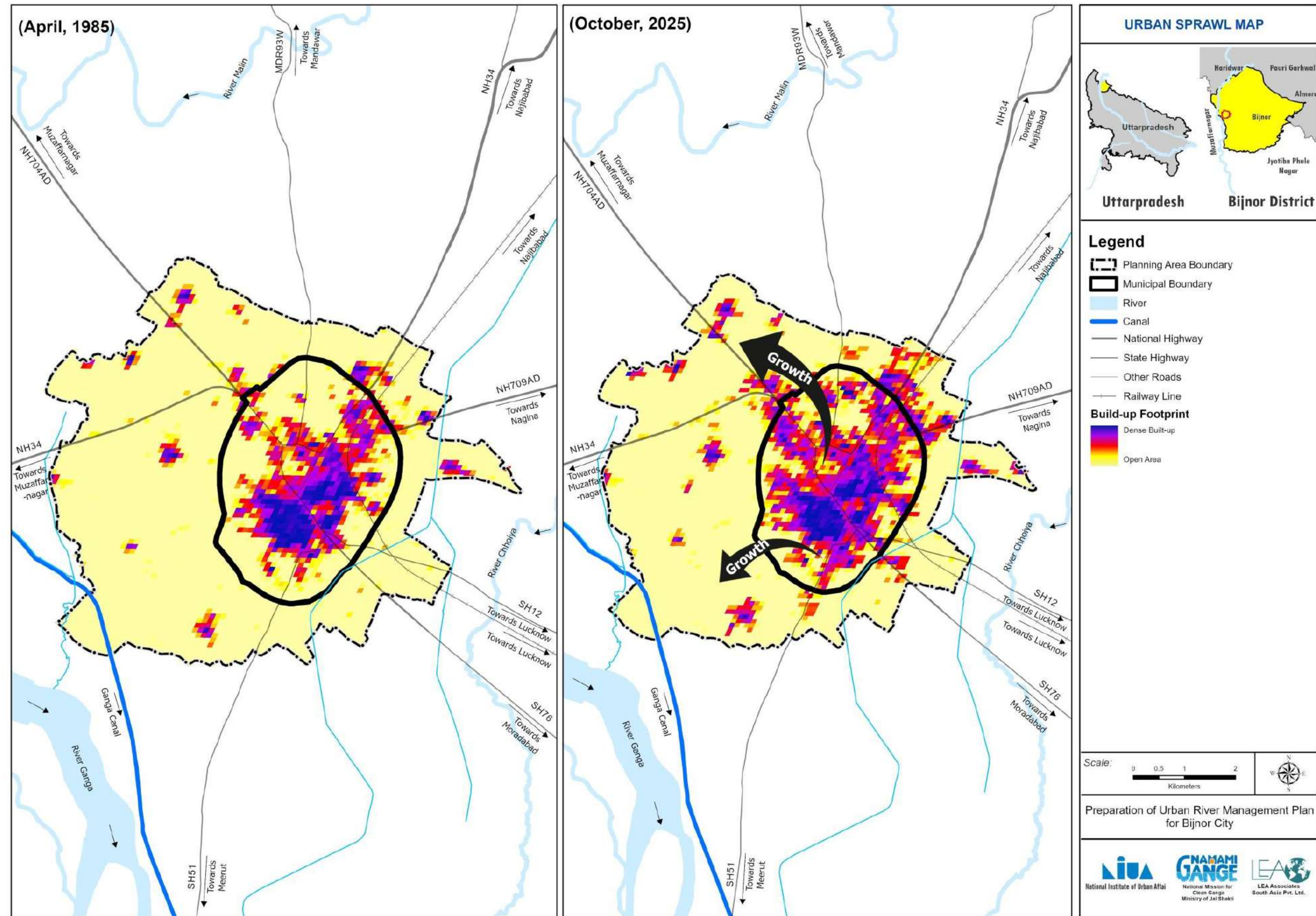
The physical landscape of Bijnor is defined by its position on the upper Indo-Gangetic alluvial plains, with a level terrain marked by fertile alluvium and gentle slopes toward the river.

The soil in the area ranges from sandy loam to loam and these soils are rich in organic matter making it ideal for intensive cropping. They also retain moisture and support major crops such as sugarcane, wheat, rice lentil, mustard etc.

Groundwater occurs within thick alluvial deposits that sustain irrigation and drinking water needs. This interplay of fertile alluvium, hydrological vulnerability and the city's spatial detachment from the river defines Bijnor's geophysical character highlighting both its agricultural potential and the need for resilient urban riverfront management.

2.4 URBAN SPRAWL

The city's growth has been multi-directional, particularly toward the north-east and north-west. The historic core, concentrated in present municipal wards 8, 19, 21 and 22, remained dense and compact until the early 20th century. As the core became saturated, outward expansion began toward the north and northeast, especially along the Kiratpur and Meerut roads. By the mid-20th century, peripheral areas beyond the core urbanized rapidly, reflecting the city's first phase of outward growth. With improved connectivity through NH-34 and Bijnor–Moradabad Road, growth became multi-directional after 1970, marking the onset of urban sprawl. Today, Bijnor's growth is concentrated along major roads, where connectivity acts as the primary driver.



Map 2-4: Urban sprawl in Bijnor city

2.5 HISTORY AND CULTURAL PROFILE

Bijnor holds considerable historical and cultural relevance within the region. It is associated with King Bharat (after whom our country has been named). The city is also referenced in Mahabharata as the residence of Vidur, the prime minister of the Kauravas (currently known as Vidur Kuti located 8.5 km from the Bijnor city). Bijnor is also recognized as the birthplace of Abul Fazal and Faizi, distinguished scholars and one of the Navratnas in the court of Emperor Akbar. In the colonial period, Bijnor was incorporated into the Moradabad collectorate under the East India Company. Owing to its strategic proximity to the Meerut Cantonment, the district headquarter was shifted to Bijnor in 1824. The British formally constituted Bijnor as a municipality in 1866, marking its emergence as an administrative and civic center.

Culturally, Bijnor’s traditions are deeply intertwined with the River Ganga and its fertile plains. The river continues to shape community life, with ghats along its banks serving as focal points for rituals, fairs and seasonal festivals. Temples such as the Vidur Kuti Temple, associated with the Mahabharata and the Hanuman Mandir act as spiritual anchors, while shrines like Jahanara Mosque reflect the city’s Mughal heritage. Thus this diversity has endowed Bijnor with a rich cultural fabric, blending agrarian rituals, devotional practices and Mughal-era arts. Table 2-1 below provides a detailed list of the festivals.

Table 2-1: Festivals and events in Bijnor

Festival Name	Month	Location	Cultural Significance
Dev-deepawali	October–November	Celebrated 15 days after Diwali, on the full moon night of Kartik Purnima	Festival of lights
Amavasya and purnima	fortnightly every month	Barrage ghat	Ritual bathing in River Ganga.

Source –BMC, 2025

2.6 TOURISM PROFILE

Bijnor city is a center for both spiritual and eco-tourism. The Barrage Ghat serves as a focal point for cultural and religious gatherings, with large congregations observed during Dev Deepawali as well as fortnightly bathing rituals on the occasions of Purnima and Amavasya. Complementing this spiritual dimension, the Haiderpur Wetland offers significant eco-tourism opportunities, attracting visitors for birdwatching, nature trails and conservation-oriented experiences. Together, these two locations makes Bijnor as an important destination of spiritual heritage with ecological tourism.

2.7 SOCIO – ECONOMIC PROFILE

2.7.1 Economic Activities along the rivers

Religious activities- Barrage Ghat of the River Ganga is an important location for religious activities. Devotees gather during Hindu festivals and perform ritualistic bathing and offer prayers. There is a mela ground also on the ghat, which hosts large gatherings during Kartik Purnima apart from smaller ones every month on Purnima.



Image 2-1: Barrage ghat and mela ground

Tourism and recreational activities- The Barrage ghat is used for viewing the endangered Ganga River Dolphins in their natural habitat in the post monsoon season. The ghat also has Jalaj Museum which offers various handmade articles produced locally like- handmade jewelries, pickles etc.



Image 2-2: Jalaj Museum

Agriculture: Agricultural activities along the River Ganga is a major activity in Bijnor where the river supports local livelihoods. The fertile floodplains are extensively used for cultivation of crops such as wheat, paddy, sugarcane etc.

2.7.2 IEC and Social Engagement (Annual calendar, frequency, target audience)

Creating a river-sensitive society requires behavioral change, active participation and awareness across all sections of citizens. The focus is on integrating sustainable practices into daily life, ensuring that rivers are seen as community assets that need protection.

1. IEC Activities of NMCG and Wildlife Institute of India

In Bijnor, the Namami Gange programme in collaboration with the Wildlife Institute of India (WII) and the World Resources Institute (WRI) is advancing a holistic approach to river conservation, awareness and community-led stewardship. Key initiatives include habitat protection, conservation of aquatic species and regular monitoring of ecologically sensitive zones along the River Ganga. To integrate conservation with local livelihoods, the programme promotes sustainable eco-tourism through the "Jalaj" model and hosts flagship events like National Ganga River Dolphin Day. These efforts are complemented by intensive IEC activities at the Barrage Ghat, including awareness campaigns, installation of signages discouraging plastic disposal and ritual offerings and cultural programming such as Ganga Aartis and festival events. Educational outreach further engages students (6th- 12th) through painting, slogan writing and essay competitions while mass awareness drives rallies, street plays and signature campaigns reinforce behavioral change.

2. IEC Activities by BMC

The BMC is responsible for delivering services on ghat but occasionally. In October 2025, it undertook a 172-hour cleanliness drive at the Barrage Ghat, aimed at safeguarding river health. However, similar campaigns have not been extended to the city's four water bodies. The Municipal Council of Bijnor has also expanded its role in solid waste management by promoting door-to-door awareness campaigns on wet waste segregation. Complementing this effort, ITC Limited, under its Mission Sunehra Kal initiative, operates extensive programmes that emphasize household-level segregation).



Image 2-3: IEC activities along River Ganga



Image 2-4: 172 hours cleanliness campaign by BMC at Barrage Ghat

3. NGO involvements

The **Lakshay Foundation**, under *Mission Sunhera Kal*, conducts fortnightly awareness drives that include home and temple composting and the formation of women-led *Mohalla Samitis* to mobilize households. Schools and colleges are engaged through competitions and pledges to instil environmental responsibility.

The **Pipal Pilkhan Foundation** focuses on river-sensitive practices through weekly cleanliness drives at Barrage Ghat, festival-time awareness programmes and innovative measures such as the *Bartan Bank* (distribution of steel vessels to reduce single-use plastics) and *Mera Thaila Abhiyaan* (production of cloth bags from recycled materials). Together, these interventions highlight strong partnership between civic bodies, NGOs and communities in fostering eco-friendly practices and river stewardship in Bijnor.



Image 2-5: Community Composting in Bijnor



Image 2-6: Home Composting in Bijnor



Image 2-7: Mera Thaila Abhiyan activities by Pipal Pilkhan Foundataion



Image 2-8: Awareness activities in college



Image 2-9: Awareness by the Pipal Pilkhan foundation

2.8 INSTITUTIONAL MECHANISM

The list of existing agencies responsible for planning, development and service delivery within the Bijnor Planning.

Table 2-2: Role and responsibility of key government agencies for Bijnor City

Sl. No.	Department	Key role and responsibilities	Nodal Officer	Applicable for URMP Objectives
A. Local Level Agencies				
1	Bijnor MC	- Area jurisdiction: Municipal Area - Urban services and infrastructure – solid waste management, maintenance of road & drainage, management of water supply & sewerage	Executive Officer	Objective 2, objective 4, objective 5

Sl. No.	Department	Key role and responsibilities	Nodal Officer	Applicable for URMP Objectives
		- Environment and public welfare activities - Development and planning - Public interface and emergency services.		and objective 9
2	Regulatory Authority	- Area jurisdiction: Municipal Area and villages within the Planning Area - Land-use planning, conversion approvals, building permissions etc. - Monitor progress and ensure timely execution of projects using digital tools and MIS systems	Junior Engineer	Objective 1, objective 5
3.	Jal Kal	Responsible for day-to-day operation and maintenance of water supply systems.	Executive Engineer	Objective 2 (Sewerage and water)
4.	Local NGO/ Civil Society Member	- Educate local communities on river health, waste management and conservation practices. - Organize awareness drives, clean-up campaigns and public meetings. - Promote citizen participation in river protection initiatives. - Lead or support riverbank clean-ups, plantation drives, wetland restoration and lake rejuvenation activities.	Representative	Objective 10
B. Regional/ State level				
5.	State Mission for Clean Ganga, Uttar Pradesh	- Execute centrally funded projects for sewage treatment, river rejuvenation, drainage management and ghat development - Ensure timely completion of STPs (Sewage Treatment Plants), I&D (Interception & Diversion) works and faecal sludge management projects - Oversee construction and beautification of ghats, crematoria and riverfront amenities to enhance religious and tourism experiences while maintaining sanitation. - Undertake awareness campaigns, school programs and public outreach to encourage citizen participation in river conservation.	M&E Officer	Objective 2, objective7 and objective 9
6.	Irrigation Department, Govt. of Uttar Pradesh	- Delineate the river flood line and floodplain - Keep record of all floods, identify and mark the maximum flood level recorded or estimated during a major flood. - Construct and maintain embankments, spurs, check dams and undertake anti-erosion works along rivers - Develop watershed projects to conserve soil and water in hilly terrain.	Executive Engineer	Objective 1
7.	Forest Department	Protect forest areas comprising native flora and fauna, endangered species and biodiversity-rich zones.	Divisional Forest Officer	Objective 4, Objective 9
8.	Tourism Development Department, Govt. of U.P.	- Formulate district tourism policies and long-term development strategies - Monitor environmental and social impact of tourism projects	Secretary, Tourism	Objective 8

Sl. No.	Department	Key role and responsibilities	Nodal Officer	Applicable for URMP Objectives
		Implement safety protocols and eco-friendly practices		
9.	Pey Jal Nigam, Uttar Pradesh	- Prepare Detailed Project Reports (DPRs) and execute works for water supply, sewer networks, sewage treatment plants (STPs) and drainage systems in urban and rural areas both. - Implement rural water schemes such as Jal Jeevan Mission, - Install chlorination units, UV treatment, or filtration systems in contamination-prone zones	Executive Engineer	Objective 2
10.	Uttar Pradesh, PWD	Plan, construct and maintain state highways, district roads, rural roads and bridges.	Executive Engineer	
11.	Town and Country Planning Department, Uttar Pradesh	Prepare Master Plans and Zonal Development Plans for notified areas	Executive Engineer	Objective 1
12.	Uttar Pradesh Pollution Control Board	- Enforce key environmental acts including: Water (Prevention & Control of Pollution) Act, 1974, Air (Prevention & Control of Pollution) Act, 1981, Environment Protection Act, 1986, Plastic Waste Management Rules, 2016, Biomedical Waste Rules, E-Waste Rules, Solid Waste Rules, etc. - Regularly monitor water quality of the rivers, - Actively support the Namami Gange program through monitoring and enforcement, - Conduct regular inspections of industrial units, hotels, stone crushers, mining sites, etc.	Regional Officer	Objective 2
13	District Ganga Plan	- Prepare district-level Ganga rejuvenation plan aligned with National Mission for Clean Ganga (NMCG) guidelines - Coordinate with municipal bodies, irrigation departments, forest divisions and NGOs for integrated action - Ensure convergence of schemes like Jal Shakti Abhiyan, Smart Cities Mission and Swachh Bharat with Ganga-related interventions		Objective 1, 2,3,4,9 and 10

2.9 CONCLUSION

Bijnor has emerged as an urban center with strong agrarian foundations. Situated in the fertile alluvial plains of the River Ganga, the city enjoys both economic advantages and ecological sensitivity, as the river's course continues to shape the land use. Its strategic connectivity through National Highway 34 and several state highways links Bijnor to major NCR hubs such as Muzaffarnagar, Meerut and Delhi, as well as to regional centers like Lucknow and Kanpur.

3 ECOLOGICAL PROFILE OF THE CITY

3.1 RIVER ECOSYSTEM

As stated in the previous chapter, the Bijnor planning area is situated approximately 4.2 km away from the River Ganga, placing the city outside the immediate riverfront zone. Despite this spatial separation, Bijnor remains embedded within the river's broader ecological continuum. The Ganga, a perennial river, enters the district near Bilawal and flows southwards, characterized by a meandering and braided channel system shaped by the flat and low-lying terrain. This geomorphology allows the river to spread and shift its course, carrying high silt loads and exhibiting dynamic morphology, particularly during the monsoon season. Continuous sedimentation creates multiple channels separated by sandbars, fluvial islands and deposits, actively reshaping the floodplain and influencing agricultural land use. Downstream of the barrage, the river has gradually shifted towards the eastern bank, reflecting its dynamic nature.

The Ganga plays a critical role in supporting irrigation through the Ganga Canal and contributes significantly to groundwater recharge. Its macro-ecosystem shapes hydrology, biodiversity and cultural landscapes that extend into Bijnor's hinterland, underscoring the city's indirect yet vital relationship with the river. Thus, while Bijnor is not a riverfront settlement, its environmental resilience and agricultural productivity remain closely tied to the basin-wide ecological processes of the Ganga.

In addition to the above, a tributary of the Malin River flows west of the city in a north-south direction, outside the planning area, The Hemraj drain which carries treated used water, discharges into this tributary.



Image 3-1: River Ganga at barrage ghat

To illustrate the river—and adjoining areas, the river has been divided into three sections, each depicting cross-sections that highlight different aspects of the river–city interface. The details of these cross-sections are as under:

The first cross-section (refer Image 3-2) provides an overview of the floodplain and the urban edge of Bijnor. Extending across 9,480 meters from the Ganga riverbed to the city, it captures the transition from natural to built environments. At this point, the river depth is approximately 6 meters, with the river level at 240 meters compared to the city elevation of 255 meters. The section begins with eroded banks at cremation ground reflecting the river's shifting course, followed by agricultural floodplains. The No Development Zone (NDZ), marked at 246 meters by the Irrigation department delineates the floodplain to construction and intensive land-use changes are restricted. This profile illustrates the continuum from riverine ecology and

agrarian landscapes to structured urban development, emphasizing the spatial interplay between natural systems, productive land use and expanding city form.

The cross section (refer Image 3-3) along a 1200 mts stretch of the river upstream of the barrage. At this location, the river attains a depth of 6–7 meters and spans approximately 650 meters in width. Both banks of this stretch are flanked by the Haiderpur Wetland, which provides significant ecological value and forms a natural buffer zone.

The third cross-section (refer Image 3-4) is in the downstream near the Madhya Ganga Barrage, covering a 780 mts long stretch. The river depth ranges between 3.5–4 meters, with embankments on both banks. The western side features a floodplain adjacent the Dolphin Safari area, serving as an important ecological and recreational zone. On the eastern bank, a kutchra road runs parallel to the river, followed by a mela ground, that functions as a major cultural and community space. This section highlights the interplay of engineered flood protection, ecological assets and socio-cultural activities along the river.

The fourth cross-section (refer Image 3-5) of the river has been taken 3.6 km downstream of the Madhya Ganga Barrage. At this location, the river channel spans approximately 2.4 km in width and is marked by two distinct water channels and a fluvial island. Agricultural activity is prominent along both banks.

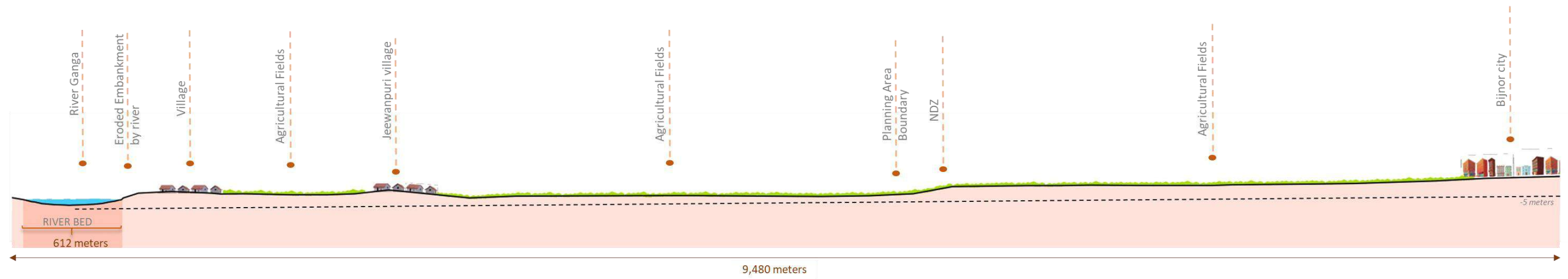
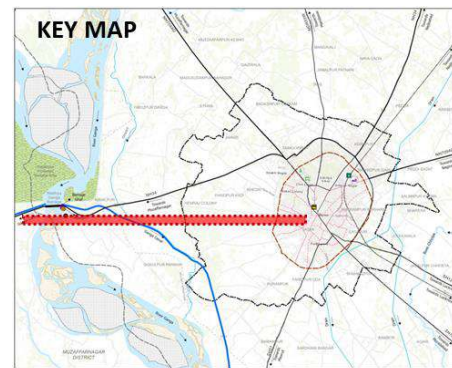


Image 3-2: Cross section of the River Ganga and Bijnor city

KEY MAP

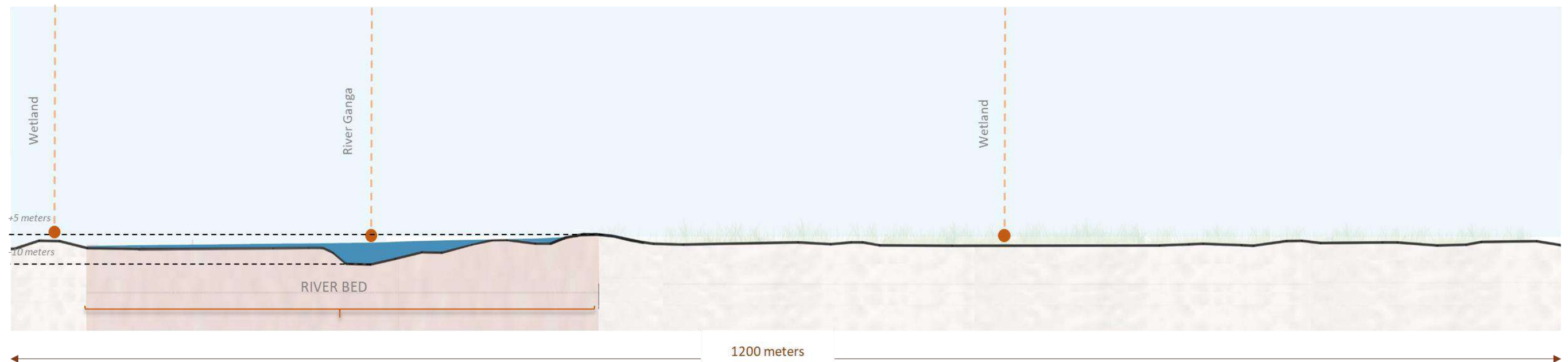
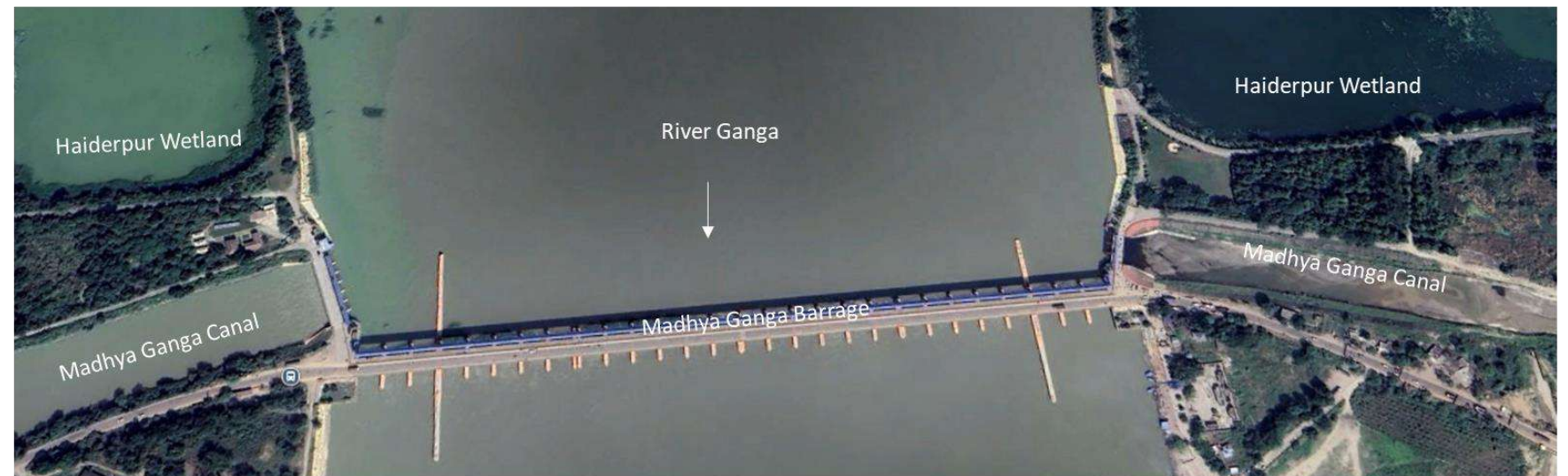
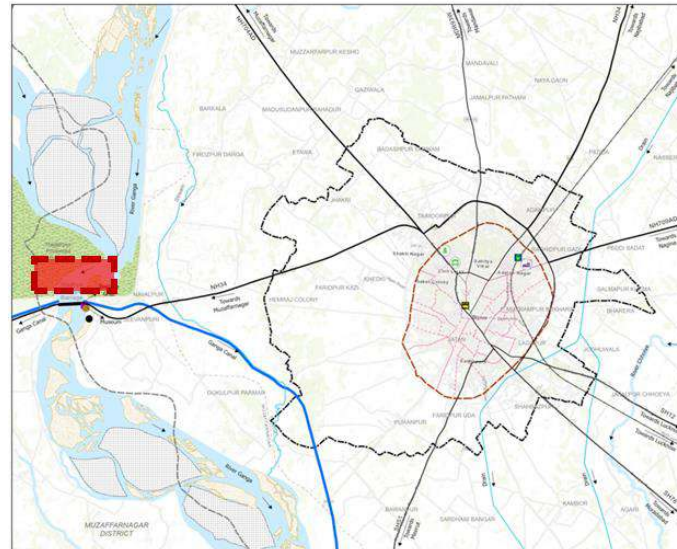


Image 3-3: Cross Section of upstream of River Ganga

KEY MAP

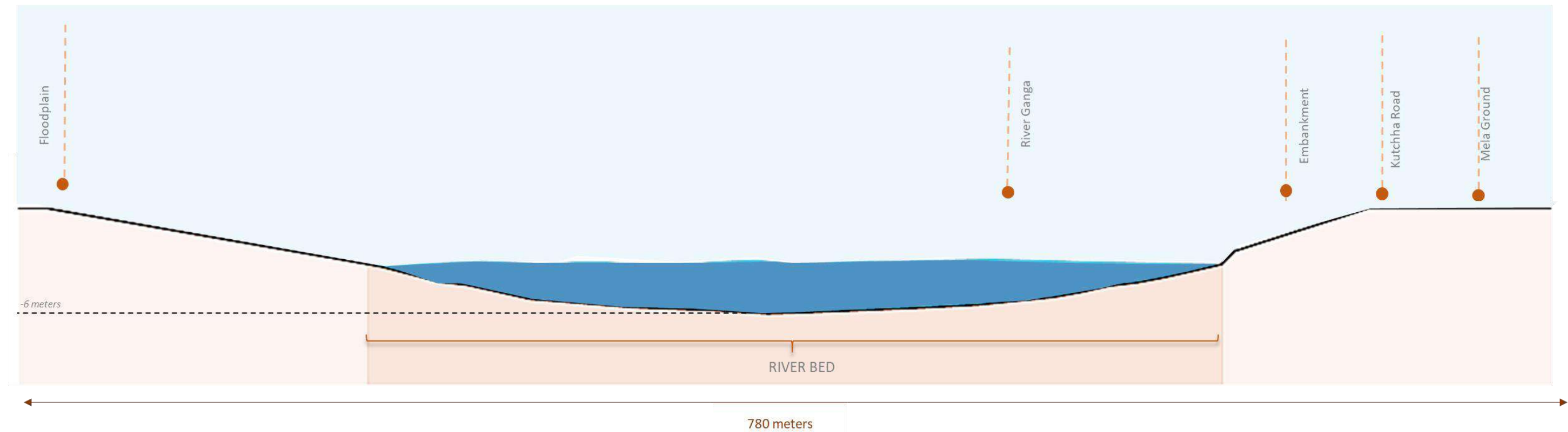
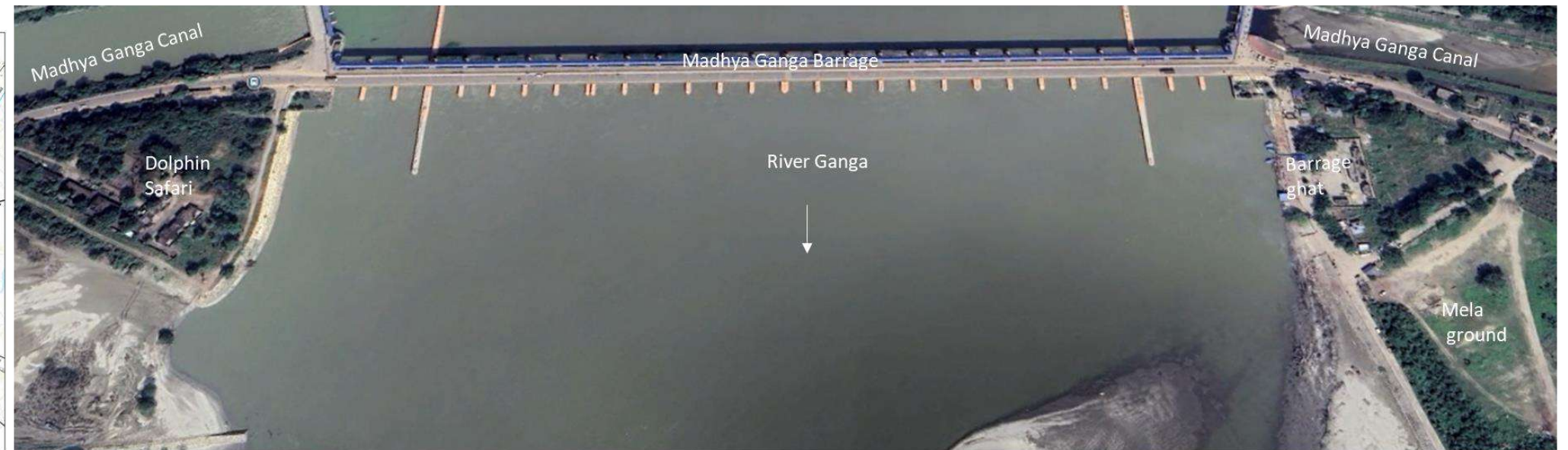
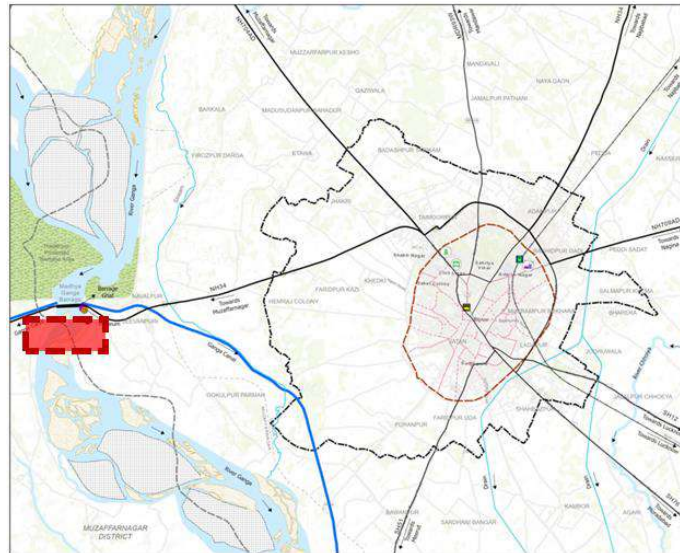


Image 3-4: Cross Section of downstream of River Ganga near the Madhya Ganga barrage

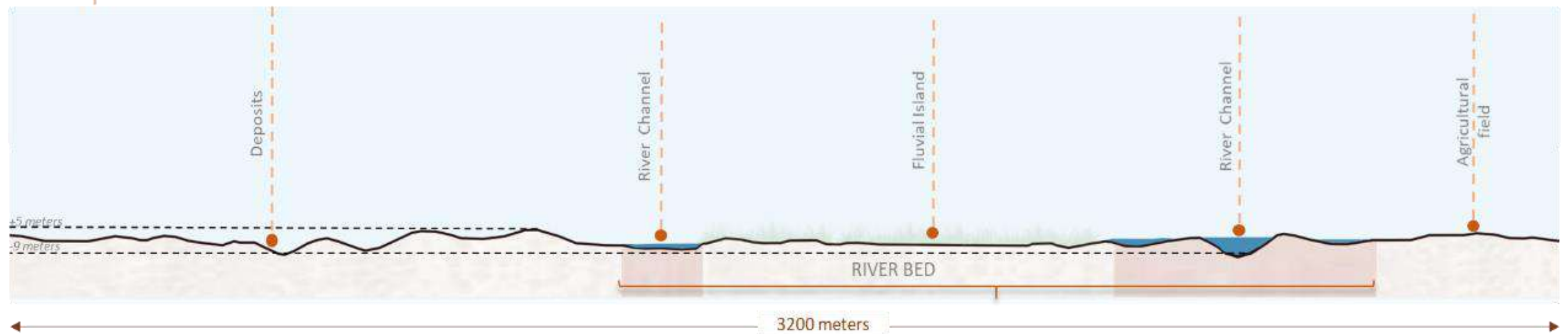
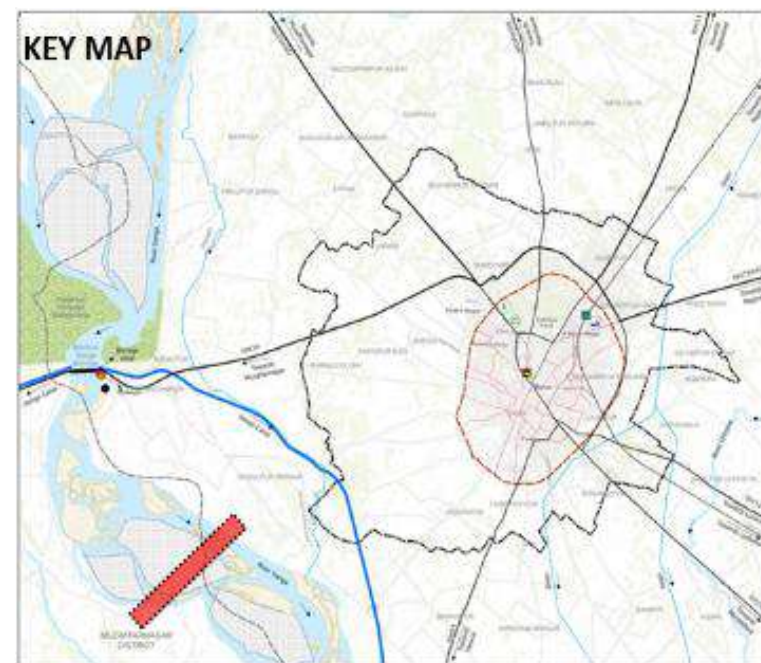


Image 3-5: Cross Section of downstream of River Ganga

3.2 BLUE-GREEN RESOURCES IN THE CITY

3.2.1 Blue Resources

Apart from River Ganga, the Haiderpur wetland, a Ramsar site, located within the Ganga catchment, approximately 6.5 km from Bijnor city. While it lies outside the planning area’s immediate zone of influence, the wetland represents an important ecological feature of the district, contributing to biodiversity conservation and hydrological balance at a regional scale.

Within the planning area, 21 ponds have been identified, of which 5 fall within the Municipal Council (MC) limits. Among these, 4 ponds exceed one acre in size. Out of these ponds, three currently retain water but are heavily invaded with water hyacinth while one pond remains completely dry. Recognizing their ecological and social importance, the Municipal Council has initiated the preparation of a rejuvenation plan aimed at restoring the dry ponds and enhancing their role as urban ecological assets.



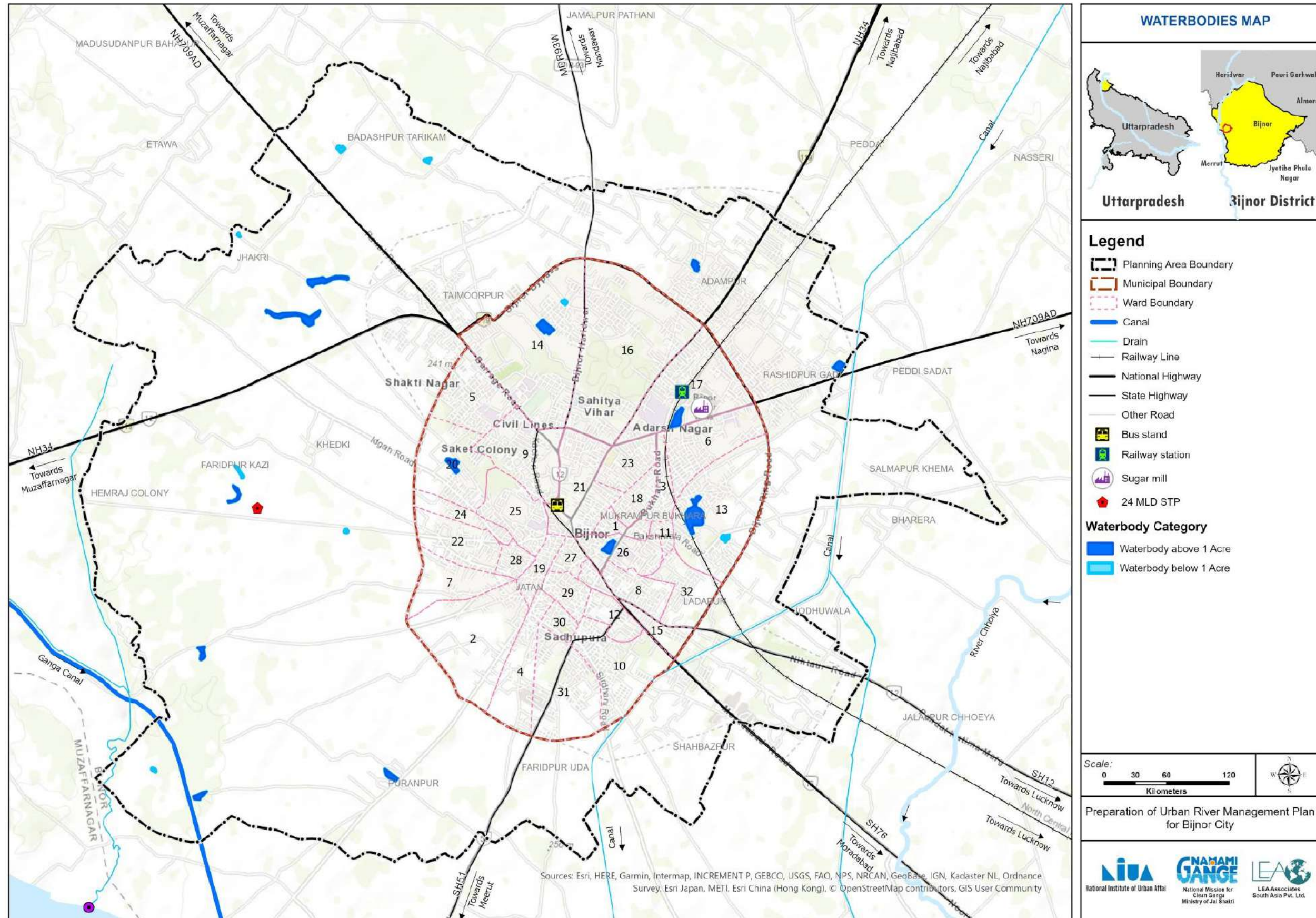
Image 3-6: Diwan pond in Bijnor



Image 3-7: Bakshi wala pond



Image 3-8: Haiderpur Wetland



Map 3-1: Waterbodies within Bijnor study area

3.2.2 Green Resources

- ▶ **Forest:** There are no declared forest areas within the Bijnor Planning Area or the Municipal Council (MC). However, the region supports a rich diversity of flora, dominated by native Elephant grass (locally known as patera) along River Ganga. Additionally, the other native species found in the Bijnor are – sal, teak, neem, peepal, jamun etc.
- ▶ **Fauna:** The Haiderpur Wetland and river Ganga is home to a total of 146 faunal species comprising of leopards, wild cats, wild boars, spotted deer, pythons, cobras, mugger crocodiles, tortoise, Bar-headed Goose, Black Stork, Pied Avocet, Cotton Teal and Gadwall. In addition, the Gangetic dolphins are commonly sighted the near the barrage ghat during post monsoon season, i.e., month of October.
- ▶ **Urban green belt/ parks:** The city has 0.27% green which is less as against a required minimum of 12% as per Urban and Regional Development Plans Formulation and Implementation (URDPFI) guidelines. According to the Bijnor Master Plan 2011, 2.05% (7.50 ha) of the Municipal Council (MC) area and 0.6% (2.4 ha) of planning area was designated for parks. However, presently, only one functional park, namely, Indira Park exists within the city limits. Further, there are multiple privately owned mango farms between the Mandwar and Nazibabad road on the north of the city.
- ▶ **Agriculture:** Agricultural activities along River Ganga is a major activity in Bijnor where the river supports local livelihoods. The fertile floodplains are extensively used for cultivation of crops such as wheat, paddy, sugarcane etc.

3.2.3 Riparian Buffer

As mentioned in Section 1.1.1, the riparian buffer along River Ganga has been assessed over a 13 kms stretch on the eastern side, within the study area. River Ganga meanders through both Bijnor and Muzaffarnagar districts. Upstream, the eastern bank falls within Bijnor district whereas downstream the river weaves in and out of Bijnor and Muzaffarnagar districts.

The riverbank of the Ganga in this area are characterized by sandbars, dense vegetation and embankments. Within the 30-meter buffer zone, riparian vegetation plays a vital role in regulating water flow, reducing flood risks and sustaining ecological balance. Vegetation consists mainly of native grasses, shrubs and aquatic plants. Most of the land along the banks is under the jurisdiction of the Irrigation Department and Forest Department, underscoring the need for coordinated stewardship to strengthen ecological resilience.

The methodology for deriving percentages of river stretch within the 30-meter buffer considers the total length of the river bank measured from the river’s edge. This length is then subdivided into categories such as embankments, dense forest and agricultural field, from which proportional percentages are calculated.

Thus Table 3.1 presents the existing land use along eastern bank of the river.

Table 3-1: 30 mts Buffer along the River Ganga in eastern bank

Type	River bank stretch (in meters)
Dense vegetation	1,341
Agriculture	1,073
Sand bar	9,274
Embankment	1,401
Spur	523
Total	13,089

Source: Consultant’s analysis from site observation & satellite imagery

3.2.4 Biodiversity

As mentioned in section 3.2.2 the flora and fauna along the River Ganga and in the city include species like Sal, Sheesham, neem, elephant grass etc. help to stabilize banks and filter runoff.

Elephant grass, native to the city, plays a vital role in stabilizing wetlands, preventing erosion and reinforcing riverbanks. Acting as a natural biofilter, it improves water quality by absorbing pollutants, while its dense vegetation provides habitat for birds, amphibians and aquatic species. Beyond ecology, it supports rural livelihoods through traditional uses in mats, baskets, ropes and roofing materials; and holds cultural significance in household practices and rituals. Recent research also highlights its medicinal properties, including antioxidant and wound-healing benefits.

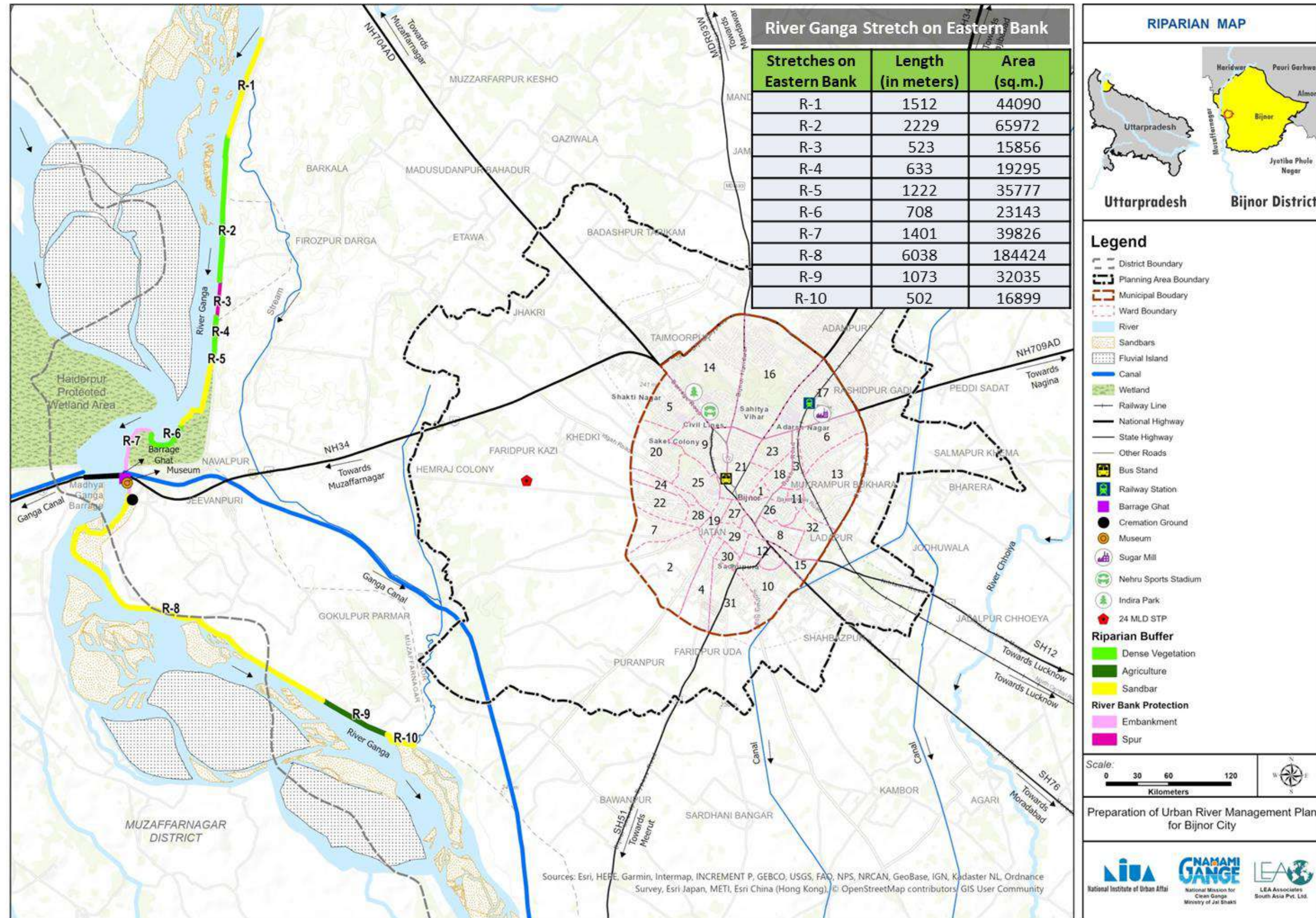
The common flora species has been listed as under:

Table 3-2: List of Flora and Fauna Along the River Ganga

Parameter	River Ganga (Bijnor stretch)
Riparian Vegetation Composition	Diverse native vegetation including grasses, herbs, shrubs and mature trees such as Neem (<i>Azadirachta indica</i>), Shisham (<i>Dalbergia sissoo</i>), Mango (<i>Mangifera indica</i>) and Peepal (<i>Ficus religiosa</i>). Plantation belt near ghat enhance ecological and cultural value. Vegetation zones range from grasses/herbs along active sandbars to dense tree cover in relatively undisturbed stretches.
Buffer Width and Condition	Buffer width varies between 30–120 m. Wider buffers are observed near rural and semi-natural stretches, providing erosion control and ecological resilience. In contrast, urbanized stretches near settlements and agricultural fields show narrowing and fragmentation.
Faunal Presence	Rich faunal diversity including Ganges River Dolphin, Gharials and Mugger Crocodiles, Bar-headed Goose, Northern Pintail and the endangered Black-bellied Tern and Fish Species: Varieties like Rohu, Katla and Mahseer.



Image 3-9: Native species along the River Ganga and Bijnor city



Map 3-2: Riparian stretch along River Ganga

3.3 ACTIVITY MAPPING ALONG THE RIVER

Activities observed along the River Ganga has been undertaken through a physical and satellite survey (refer Map 3-3), which are as follows:

- ▶ **Religious activities-** Barrage Ghat of River Ganga is an important location for religious activities. Devotees gather during festivals and perform ritualistic bathing and offer prayers. There is a mela ground also on the ghat, which hosts large gatherings during Kartik Purnima apart from smaller ones every month on Purnima.
- ▶ **Tourism and Recreational activities –**
 - Haiderpur Wetland: Offers immersive ecotourism, especially in winter with migratory bird arrivals. Infrastructure includes watchtowers, viewing huts and nature trails, making it a prime destination for birdwatchers and nature enthusiasts
 - Dolphin safari: the Gangetic dolphins are commonly sighted near Madhya Ganga barrage during the month of October, post the monsoon season. The Dolphin safari point is located on the western bank of the river Ganga but dolphins are often sighted near barrage ghat. Additionally the turtles and migratory birds are also sighted here.
 - Boating: At the Barrage Ghat, visitors can enjoy the scenic Ganga River through both motorized and non-motorized boat rides.
 - Commercial establishment: Licensed vendors and shopkeepers at the ghat sell Ganga Jal, prayer essentials, eatables and spiritual souvenirs.
- ▶ **Agriculture-** Along the riverbanks, fertile alluvial soils support the cultivation of key crops such as sugarcane, wheat and rice.
- ▶ **Cremation activities-** Adjacent to the mela ground is a cremation area; however, due to cultural preferences, 60–70 cremations are performed daily directly on the banks of the Ganga, occasionally leading to drowning incidents.



Map 3-3: Activity mapping along the River Ganga

3.4 FLOODING

Fluvial Flooding:

The River Ganga experiences recurrent seasonal flooding during intense monsoon surges. As per the Hon'ble NGT order dated 10.12.2015 in OA No. 200 of 2014, the area extending up to 200 meters on either bank of the river in plain regions shall be demarcated as a No Development Zone (NDZ). Accordingly, the Irrigation Department has surveyed and delineated the NDZ and placed boundary pillars mark its extent (Refer Map 3-4). This demarcation represents the 25-year flood line along the River Ganga.

Developments within NDZ line:

The NDZ spans approximately 920 acres on the western side of the city. Within the planning boundary, no urban or built-up developments currently exist. Field observations and satellite imagery confirm that the area is exclusively under agricultural use, with farmers cultivating seasonal crops on the fertile alluvial soils. This zone thus functions as a buffer landscape, maintaining ecological balance and supporting livelihoods.

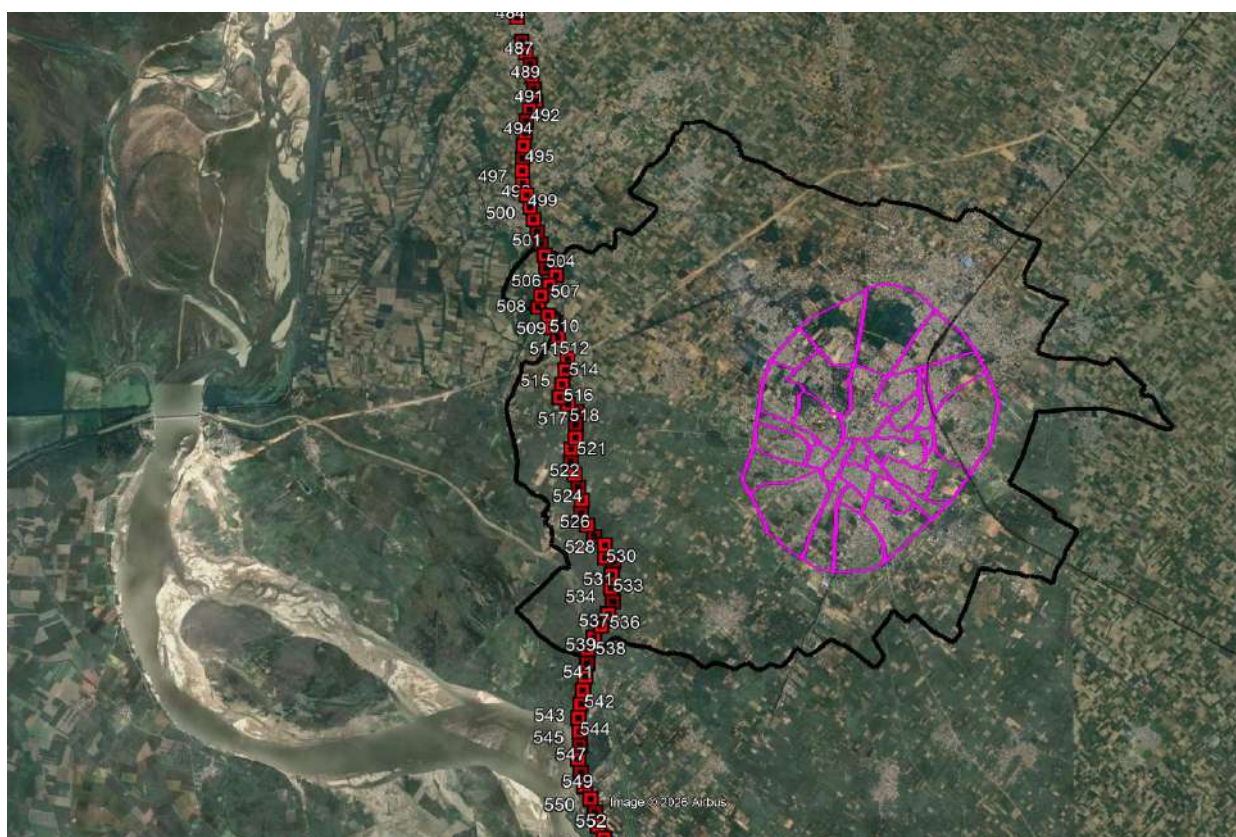
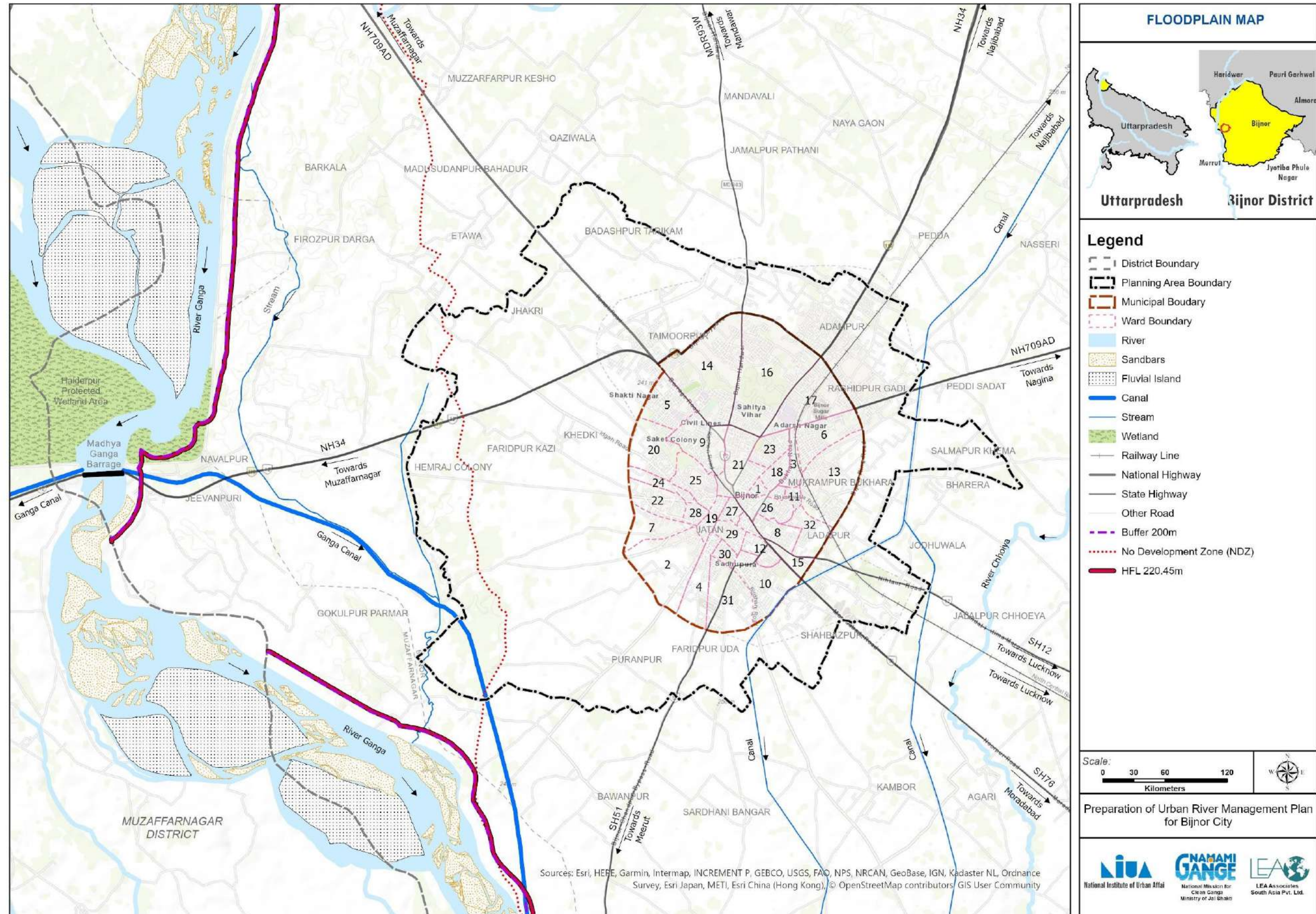


Image 3-10: NDZ line as shared by Irrigation Department

Pluvial Flooding:

Settlements in ward nos. 13, 17 and 20 located near Bakshi Wala Pond, Dhobi Ghat Pond and Sugar Mill Pond, experience flood-like conditions during the monsoon season. Heavy rainfall causes these ponds to overflow, inundating adjacent residential areas. Despite their role as traditional water bodies, inadequate drainage linkages and limited flood management measures exacerbate the problem, leading to pluvial flooding.



Map 3-4: Floodplain map of Bijnor city

3.5 EXISTING/ UPCOMING/ PROPOSED PROJECTS

Currently, there is no ongoing flood protection and mitigation outlined by Irrigation Department.

3.6 INSTITUTIONAL MECHANISM

The Irrigation Department is responsible for bank protection and embankment works, while the Forest Department oversees ecological planning, plantation and conservation initiatives. The Municipal Council manages public amenities and ensures urban integration along the riverfront.

Table 3-3: Roles and responsibilities of government agencies in ecological management for Bijnor City

Departments	Role
Irrigation Department	Lead agency for river bank protection, embankment construction and flood mitigation
Forest Department	Custodian of forested riparian zones and biodiversity conservation

4 PHYSICAL INFRASTRUCTURE

4.1 WATER SUPPLY

As mentioned in section 3.2.1 above, Bijnor city is entirely dependent on groundwater to meet domestic and commercial water requirements.

4.1.1 Water Demand Supply

The city currently operates 32 functional tube wells, ensuring groundwater extraction of 17.68 MLD against a total demand of 31.5 MLD, leaving a shortfall of 13.82 MLD. The average daily municipal water supply per capita is significantly below demand, which has led to widespread dependence on private submersible pumps, with households extracting approximately 155 LPCD individually.

The distribution network is anchored by 12 overhead tanks, which supply treated water after chlorination through the pipeline system managed by the Jal Kal Department. However, due to insufficient municipal supply, reliance on decentralized private extraction remains high, highlighting a critical gap between demand and supply.

4.1.2 Water Quality

Water quality assessment under the National Water Monitoring Programme (NWMP) was carried out in August 2025 at two monitoring points, Madhya Ganga Barrage, Bijnor and Nandur–Hastinapur Bridge, Meerut (downstream). At Madhya Ganga Barrage, Bijnor, Dissolved Oxygen (DO) was recorded at 9.4 mg/L and Biochemical Oxygen Demand (BOD) at 1.2 mg/L, indicating good oxygenation and relatively low organic pollution. Total Coliform levels were 1100 MPN/100 ml and Fecal Coliform levels were 460 MPN/100 ml, reflecting moderate faecal contamination from untreated or partially treated sewage discharge. Based on CPCB criteria, the water quality has been classified as Category C (Drinking water source with conventional treatment followed by disinfection).

At Nandur–Hastinapur Bridge, DO was slightly lower at 8.8 mg/L, while BOD was higher at 1.6 mg/L, suggesting greater organic loading compared to Bijnor. Total Coliform levels were 1100 MPN/100 ml and Fecal Coliform levels were 680 MPN/100 ml, indicating higher faecal contamination. This location is also classified as 'Category C'.

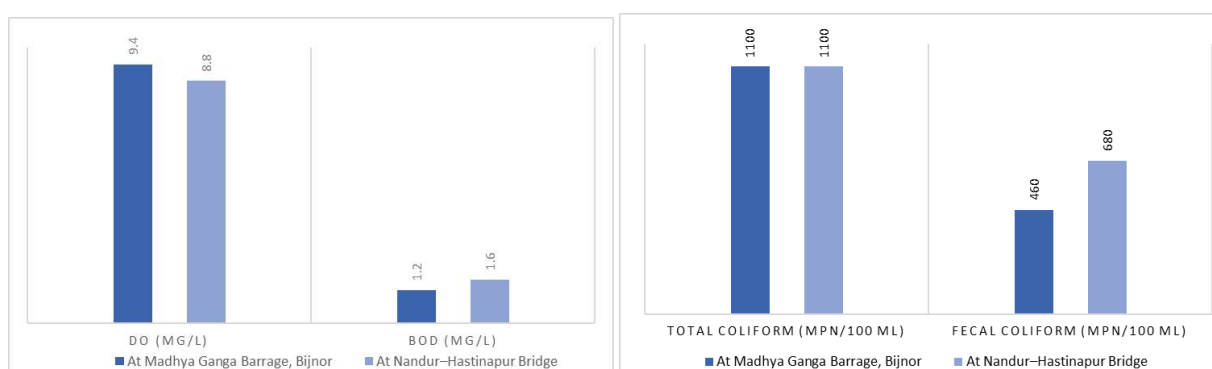


Figure 4-1: Water quality of Ganga River at Madhya Ganga Barrage, Bijnor and Nandur–Hastinapur Bridge, Meerut (August 2025)

Table 4-1: Classification of River Ganga Water Quality (Parameter-wise Evaluation)

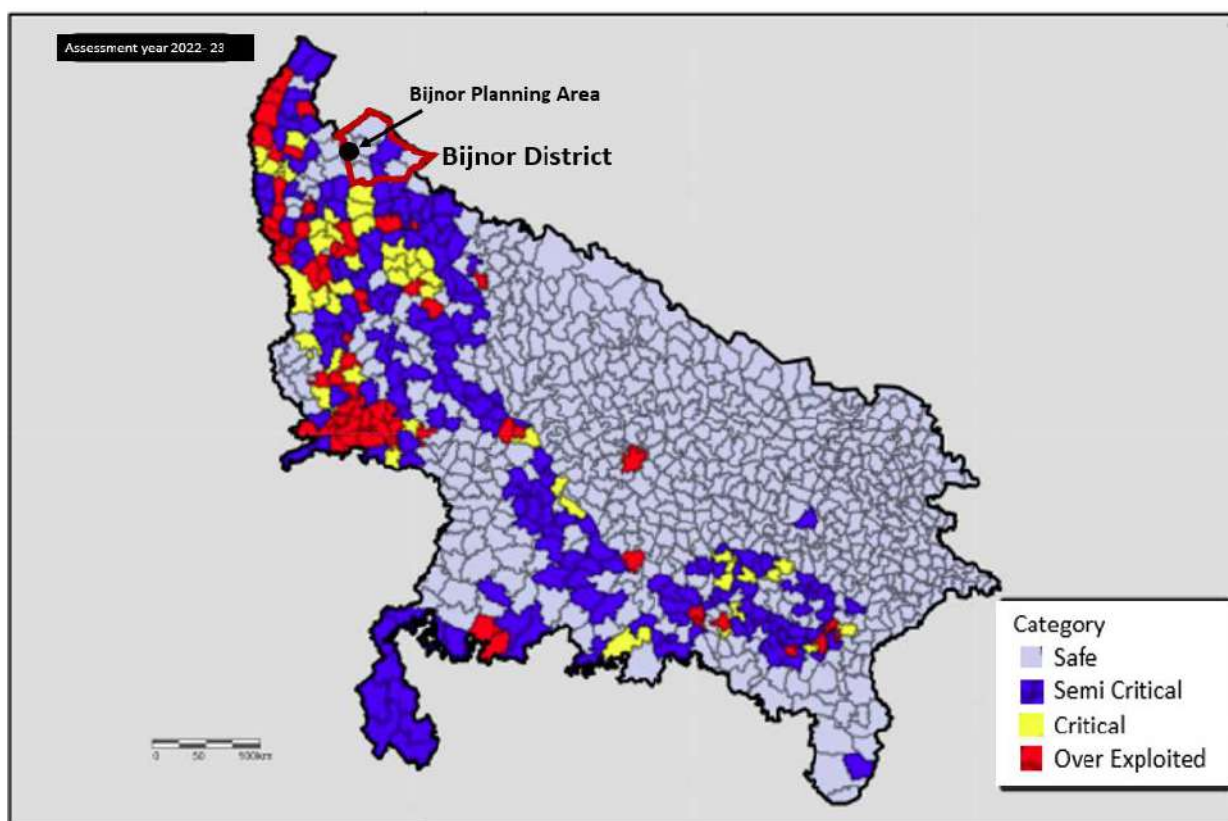
Parameter	Madhya Ganga Barrage	Nandur–Hastinapur Bridge	CPCB Class Criteria Met
DO (mg/L)	9.4	8.8	✓ Meets Class A (≥ 6)
BOD (mg/L)	1.2	1.6	✓ Meets Class A/B/C
Total Coliform (MPN/100 ml)	1100	1100	✗ Fails A/B; ✓ C (≤ 5000)
Fecal Coliform (MPN/100 ml)	460	680	✗ Fails A/B; ✓ C (≤ 5000)

Source: SPCB, August 2025

4.1.3 Groundwater

As mentioned in section 4.1.1 above, the city is dependent on groundwater and the treated water is supplied through the pipeline system. As per the Central Ground Water Board’s National Compilation on Dynamic Ground Water Resources of India (2023 assessment), the groundwater in Bijnor district has been categorized as ‘Safe’, indicating that annual extraction remains within the permissible limits of recharge at the block scale (refer Map 4-1).

However, monitoring data from the Jal Jeevan Mission (MC Bijnor) shows a gradual decline in groundwater levels between 2014 and 2023, with minor fluctuations influenced by rainfall patterns. Readings from the Digital Water Level Recorder (DWLR) installed at Vikas Bhawan indicate that the depth of groundwater availability has increased from 12.7 m in 2014 to 14.6 m in 2023, reflecting a long-term decline (refer Figure 4-1). The city’s reliance on groundwater, combined with limited recharge structures and increasing urban expansion, underscores the need for aquifer protection, rainwater harvesting and recharge pit installation.



Map 4-1: Dynamic Ground Water Resources, Uttar Pradesh, 2023, CGWB

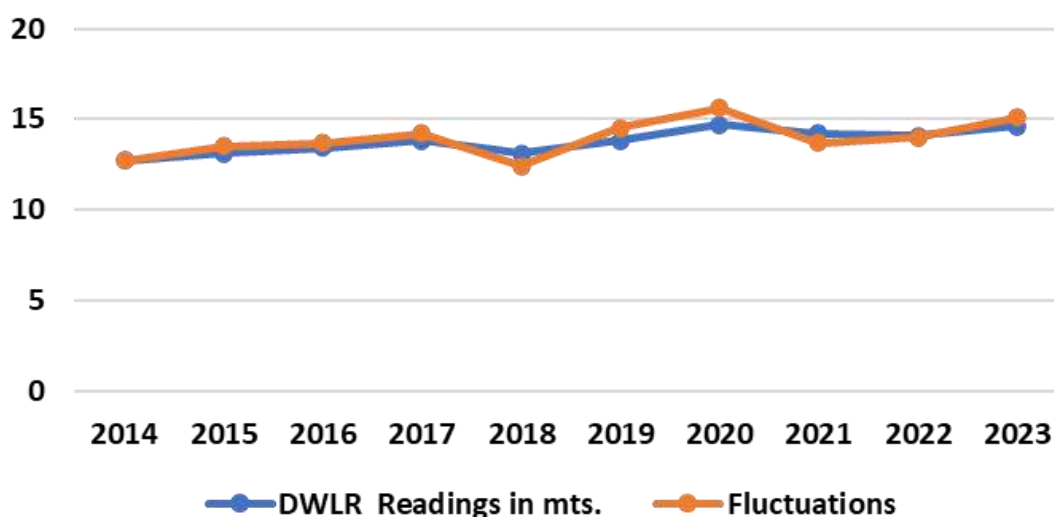


Figure 4-2: Digital Water Level Recorder data of Vikas Bhawan, Bijnor City

4.1.4 Institutional Mechanism

Departments	Role
Jal Kal Department	Responsible for day-to-day operation and maintenance of water supply systems.

4.2 SEWERAGE SYSTEM

4.2.1 Sewage Generation and Coverage

Bijnor city generates an estimated 29.11 MLD of sewage per day from households. The city has approximately 80.72 km of sewer lines, but most remain unconnected to households, resulting in used water flowing through open nallahs. As detailed in the ecology section 3, the city is divided into western and eastern catchment. The western catchment generates about 26.6 MLD of sewage. The used water flows through the roadside nallahs, which are tapped at 21 locations and diverted into the sewer system. However, site inspections revealed that 2.58 MLD continues to be discharged untreated into open lands, ponds and agricultural fields. On the eastern catchment, two wards without sewer coverage contribute 2.5 MLD of sewage. This used water flows through roadside nallahs along the natural slope, with no connection to the sewer network. As a result, sewerage coverage remains limited, with large volumes continuing to discharge untreated.

On-site Sanitation: Faecal sludge generated daily from 46,933 households (100%) is estimated at 78 KLD, primarily contained in septic tanks. The city operates a fleet of 11 desludging vehicles, but only 1–2 is in regular use, leaving service delivery inadequate.

4.2.2 Existing Sewage infrastructure

Bijnor is currently serviced by a single 24 MLD Sewage Treatment Plant (STP) located at Kherki village, which was commissioned in 2017 and operates on UASB technology. The plant receives its full design inflow of 24 MLD through the city’s nallahs. The upstream UASB units treat sewage with an influent BOD of approximately 230 mg/l, producing effluent with BOD levels below 10 mg/l. The polishing pond, however, receives diluted inflows with BOD concentrations ranging between 80–100 mg/l.

The STP produces a treated sewage outflow of 23.5 MLD, of which 21.4 MLD is discharged into the River Ganga via Hemraj drain, 2 MLD is supplied for agricultural irrigation through a dedicated pipeline and about 4 KL per day is utilized for vehicle washing through two tankers.

Onsite sanitation: In addition, a 20 KLD co-treatment facility was integrated into the STP in 2022 to manage faecal sludge. While this facility provides the city’s primary infrastructure for faecal sludge management, its capacity is insufficient compared to the daily generation of 78 KLD, leaving a gap of 58 KLD and resulting in significant volumes of untreated sludge.



Image 4-1: 24 MLD STP and 20MLD Co-treatment Plant at kherki village

The detailed sewerage system is shown in the flow chart below (Refer Figure 4 3).

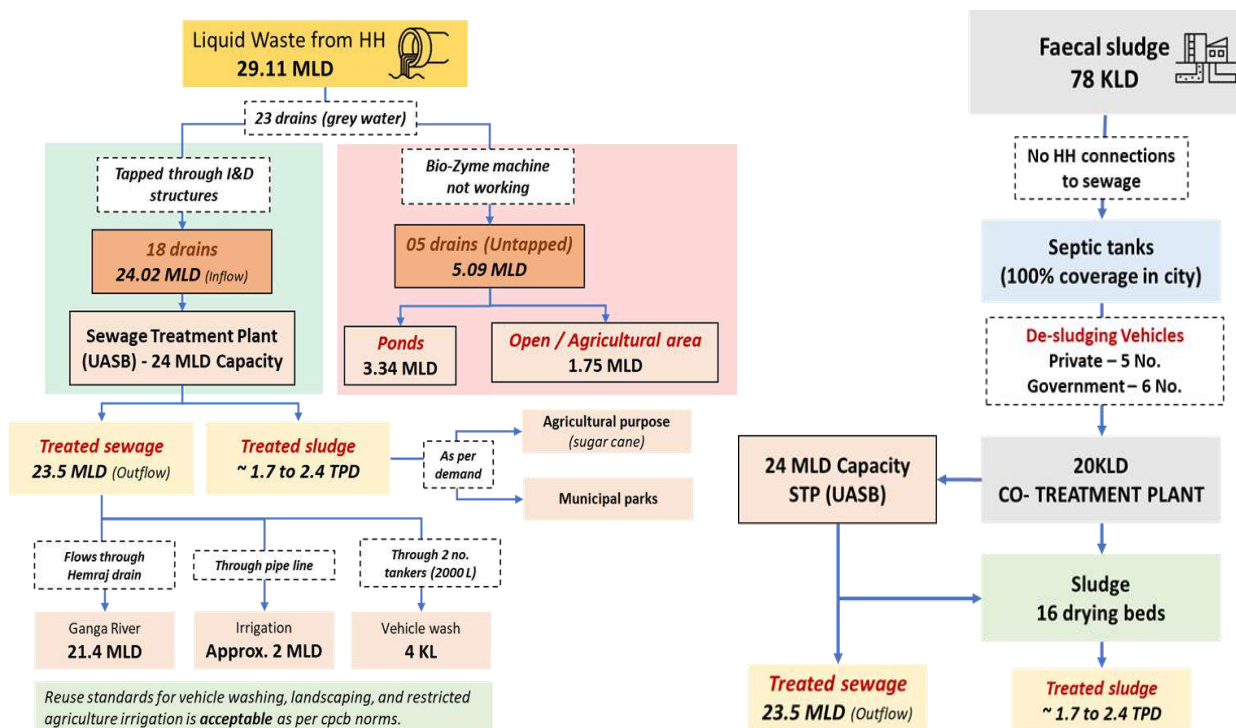


Figure 4-3: Flow chart of liquid waste in Bijnor city

4.3 STORM WATER MANAGEMENT

Bijnor city is served by 23 storm water drains, comprising 3 major drains, 13 medium drains and 7 minor drains. Of these, 18 drains are tapped, channeling approximately 24.02 MLD of used water into the STP. The remaining 5 untapped drains discharge about 5.09 MLD directly into natural water bodies, open lands and agricultural areas. To address pollution loads, Bio-Zyme machines were introduced at six locations across the untapped drains. However, due to contractual closure, none of these machines are currently operational.



Image 4-2: Nallah Tapping and Bio-Zyme machine on Barrage Road Nallah

4.3.1 Cleaning Mechanism

Solid waste carried by storm water drains and surface runoff often accumulates in drains, obstructing flow by plastics, packaging materials and floating debris at tapping points, is cleaned twice a day by municipality as per the consultation and no major pollution hotspot is observed in the drains.

4.3.2 Institutional Mechanism

Departments	Role
Uttar Pradesh Jal Nigam	Authority in charge of project design, planning and implementation of sewerage projects and operations.
BMC	Maintenance of storm water drains and sewer lines

4.4 SOLID WASTE MANAGEMENT

4.4.1 Residential Waste

According to the Municipal Council, Bijnor city generates approximately 51.18 TPD of solid waste. This comprises 36.6% (18.75 TPD) dry waste, 64.75% (31.44 TPD) wet waste. Further it also comprises of 1.93% (0.99 TPD) domestic hazardous and sanitary (DH&S) waste. During stakeholder consultations, it was reported that 100% of the waste is collected through a combination of door-to-door services and community bins, 2.81 TPD of Wet Waste on Site Process (By Home and Community composting) and 3.73 TPD of Construction and Demolition (C&D) waste. Field observations reveal unauthorized dumping in certain pockets of the city.

4.4.2 Waste Processing Facilities

The city has established systems for managing the waste routed to the Material Recovery Facility (MRF) located about 3.6 km outside the planning boundary and 6 km from the River Ganga. It has sorting, processing and converting waste into usable by-products such as compost, recyclables and bricks. However, utilization remains limited.

4.4.3 Institutional Mechanism

Departments	Role
BMC	Key functions such as door-to-door waste collection, transportation and processing

4.5 KEY ISSUES/ GAPS

Sewerage and Liquid Waste Management:

- ▶ The 24 MLD STP at Kherki is inadequate to meet current and future sewage loads; polishing pond effluent is projected to exceed permissible limits once household connections are completed.

- ▶ Untreated used water continues to discharge at Mandwar Road, Moradabad Road, Meerut Road, Jalalpur Road and Jhakri Banger into open lands, ponds and agricultural fields.
- ▶ The eastern part (Bakshi wala Pond area) lacks sewerage system, resulting in continuous inflow of untreated sewage into the pond and adjoining agricultural lands, contaminating soils and groundwater (Refer Map 4-3).

Stormwater and Drainage:

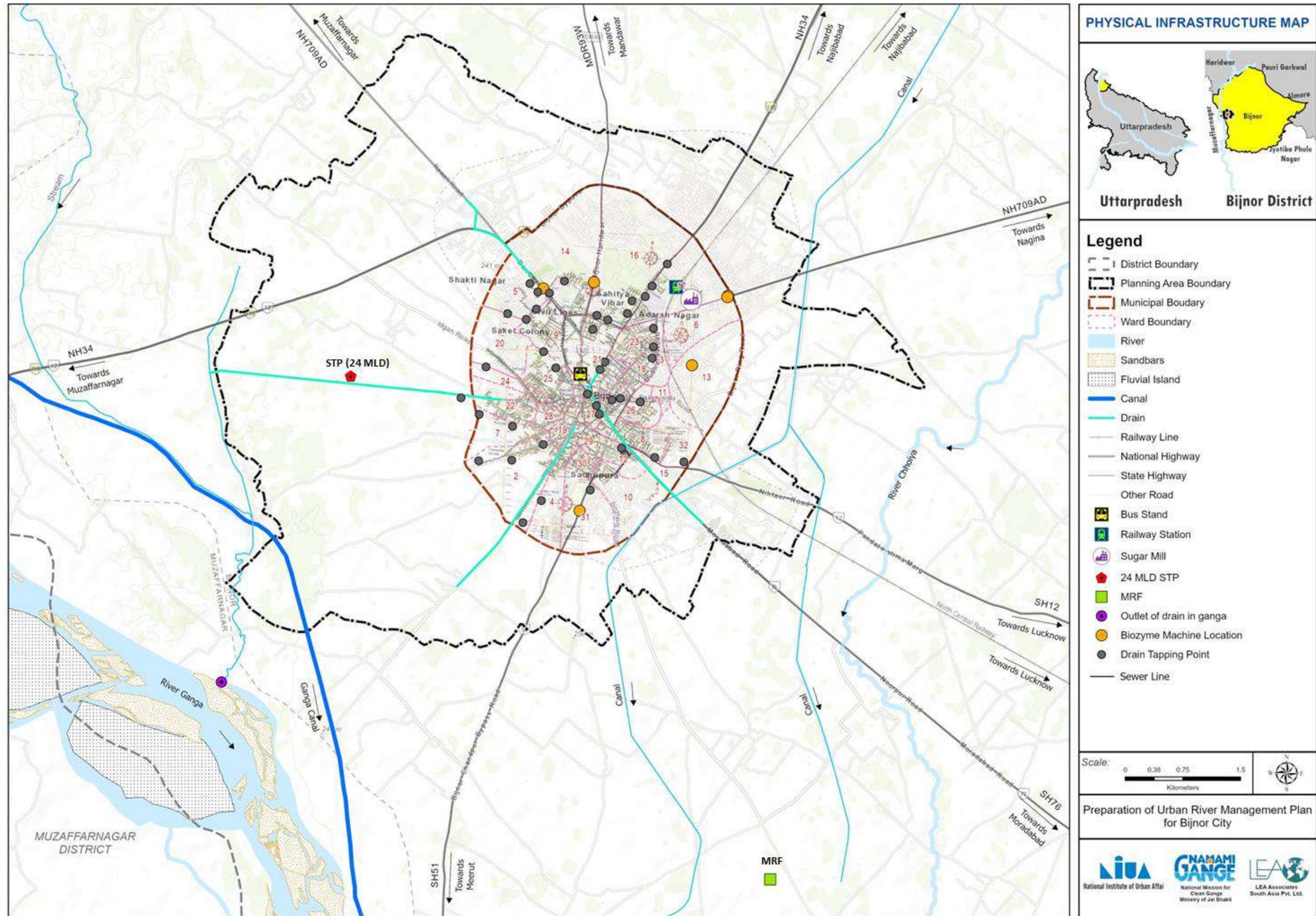
- ▶ The city’s drainage network was historically laid along roads without proper slope or catchment-based design, causing stormwater runoff to stagnate in low-lying ponds and agricultural depressions, leading to waterlogging and localized flooding.

Faecal Sludge and Septage Management (FSSM):

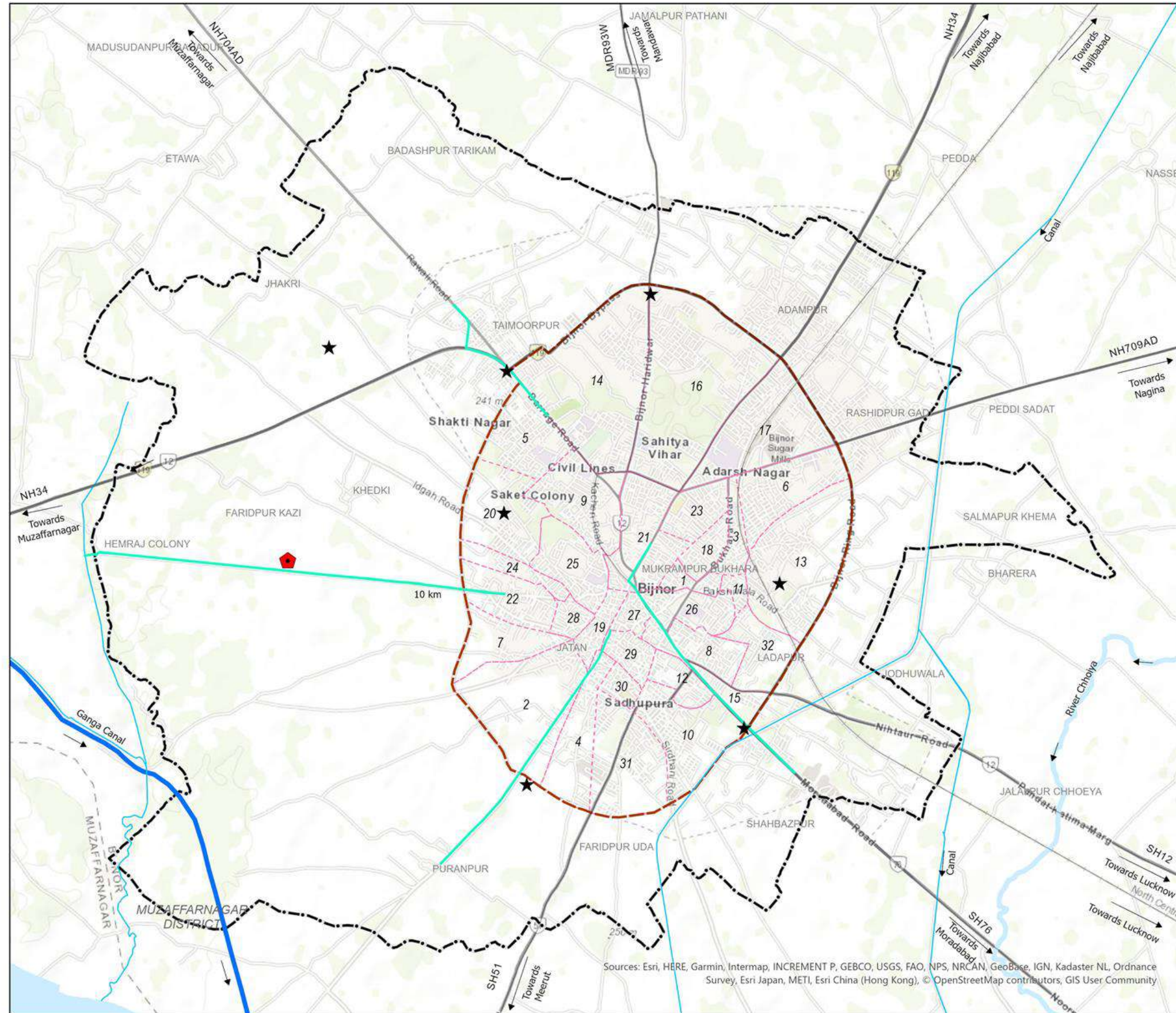
- ▶ The city generates 78 KLD faecal sludge daily, but only 20 KLD treatment capacity exists at the co-treatment facility in Kherki STP, leaving a gap of 58 KLD.
- ▶ Of 11 desludging vehicles, only 1–2 operate regularly, leading to unsafe disposal of sludge into drains and agricultural lands.

Solid Waste Management:

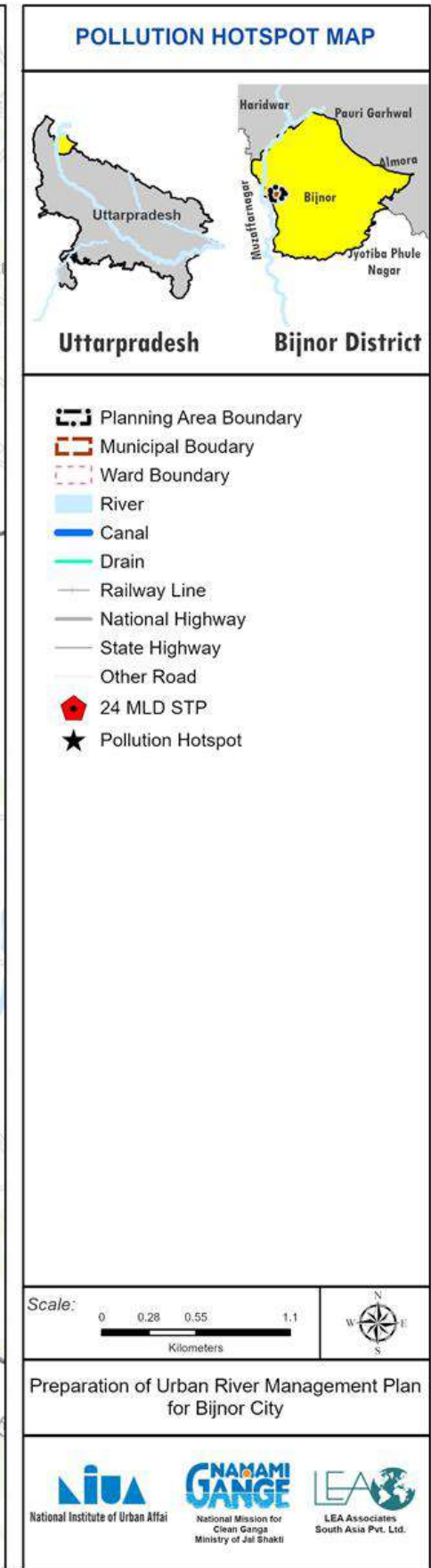
- ▶ Indiscriminate dumping of solid waste at the barrage ghat contributes directly to river pollution and at the water bodies and minor nallahs (Refer Map 4-3).



Map 4-2: Physical Infrastructure Map



Map 4-3: Pollution hotspots in the Bijnor planning area



5 SWOC ANALYSIS AND URM INDEXING OF THE CITY

5.1 SWOC ANALYSIS

Based on the baseline assessment of Bijnor city, various issues and gaps have been identified. Based on this, a SWOC analysis has been done and presented below:

	STRENGTHS • Demarcation of “No Development Zone” from the river on its either side • Two-thirds of all storm water drains are intercepted in the STP. • Bijnor has 20 KLD co -treatment plant catering to household level septic tanks. • Bijnor falls in the safe category of ground water • Mandatory reuse for non-potable applications by BMC. • Cultural and spiritual significance of River Ganga promotes regular footfall, especially during major festivals. • Dedicated Awareness Campaigns like- cleanliness drives (e.g., the 172-hour campaign) and installation of prominent signage • Awareness programs are effectively integrated into schools and colleges
	WEAKNESS • Cremation along the River Ganga. • Solid waste directly dumped into the river during festivals. • The storm water drains carry grey water • STP is operating beyond its designed capacity. • Out of the four large water bodies three receive grey water from the surrounding area and is currently dry • Ground water is the main source of water which may lead to resource depletion. • Limited organized riverfront infrastructure; only one ghat with basic facilities • Limited scope of water body protection as the city is away from the river. • Absence of targeted IEC activities related to ponds/lakes.
	OPPORTUNITIES • The from the treated used water from the STPs for irrigation purposes. • Agricultural fields can benefit from treated used water (19 MLD) as it goes into Hemraj drain • Potential to expand the existing STP and new STP for the eastern and northern localities • Tourism circuit connected from Vidur Kuti to Haiderpur wetland via Bijnor city. • Skill development for boat operators, fisherfolk, vendors and SHGs along with eco-friendly boating can enhance income sources. • opportunity to replicate the IEC activities and engagement models to protect and conserve the city lakes and ponds
	CHALLENGES • Inadequate drainage infrastructure in newly developed areas causing waterlogging • Connecting households to sewerage network to prevent grey water discharge into the ponds. • Coordinating multiple stakeholders including authorities, communities and religious groups. • Course change and increase in water level threatens agriculture and settlements along the river

5.2 URM INDEXING OF THE CITY

The URMP framework provides a clear indexing/ scoring mechanism to monitor progress of project implementation recommended under URMP vis-à-vis its objectives. The implementation of the URMP is monitored through 10 indicators, one for each objective of the URMP framework. The URM_{index} is measured on a scale of one to five and is useful to paint a snapshot of the situation, which can be used to monitor the implementation of the URMP and develop overall strategies and policies for enhancement.

In order to understand the present status of water resources in the city, an assessment has been made using the URM_{index} . With a score of 2.6, Bijnor is at average level of urban river management. This score shall improve upon implementation of proposed interventions against each objective. The figure below shows the current status of the city against each of the objectives of urban river management.

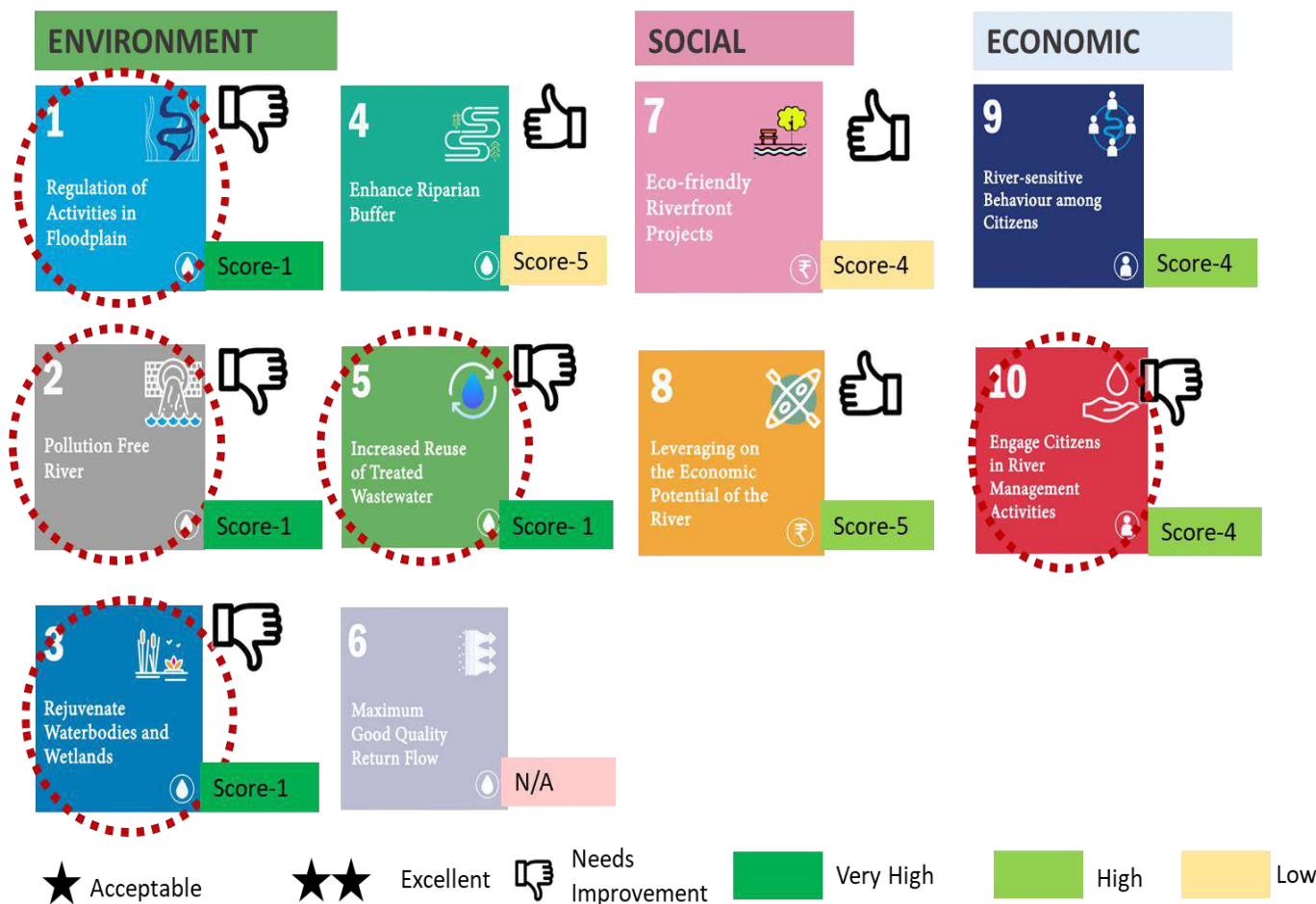


Table 5-1: Prioritization Matrix

6 URMP VISION FOR THE CITY AND ZONING

6.1 URMP VISION FOR BIJNOR

The Urban River Management Plan (URMP) envisions Bijnor as a Blue and Green city, where the **Sacred Ganga** and the network of **Urban Ponds** function together, wherein the ponds act as ecological sponge and River Ganga remains as a spiritual anchor. The vision emphasizes decentralized sanitation, pond-based treatment and ecological rejuvenation, ensuring that clean water, biodiversity and cultural identity are restored. By linking pond systems with city planning and the Ganga corridor, Bijnor aims to reduce pollution loads, enhance resilience and strengthen civic stewardship of water heritage.

River–City–Pond Zoning – Bijnor Municipal Council

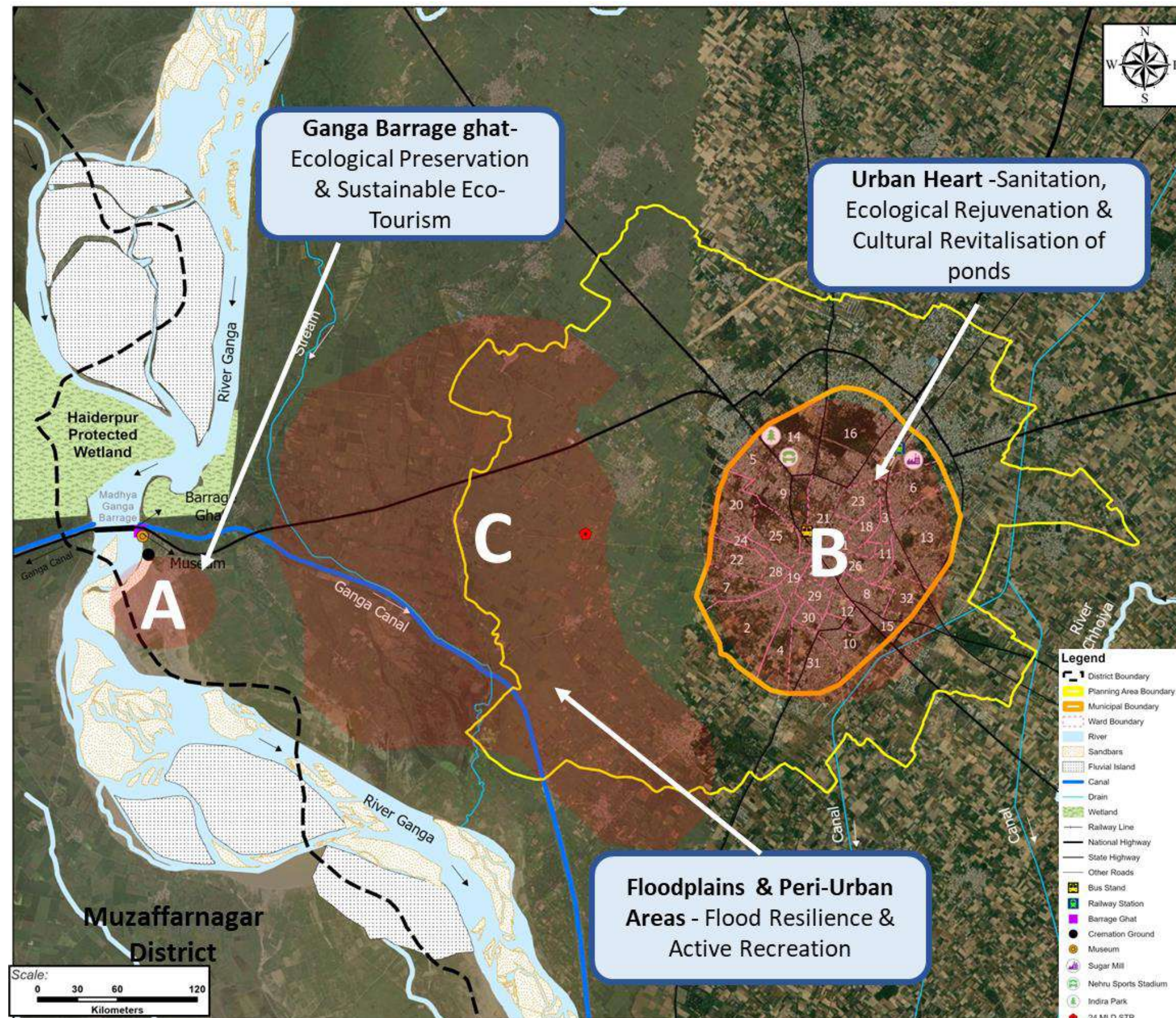
The River Ganga shapes the city's ecological resilience. Its dynamic course across expansive floodplains and relative distance from the city centre positions the Ganga Barrage as the city's principal physical and spiritual gateway. Within municipal limits, ponds often function as greywater receptacles, located in the compact residential clusters. Based on the river characteristics and nature of river-city interaction the entire stretch has been divided into 3 stretches-

- ▶ **Zone A:** Ganga Barrage ghat
- ▶ **Zone B:** Urban Core (Densely Populated Settlements)
- ▶ **Zone C:** Downstream Floodplains & Peri-Urban Ponds

Details of the two stretches are presented in the following table and Map 6-1.

Zone A: Ganga Barrage ghat	
Location	: Barrage ghat and adjoining Mela ground
Theme	: Ecological Preservation & Sustainable Eco-Tourism
Description	: The Barrage Ghat is Bijnor's primary interface with the Ganga, attracting large congregations during fairs and festivals. The vision is to strengthen their role as inclusive public spaces by embedding ecological safeguards and eco-sensitive tourism infrastructure.
Key Strategies	: • Strict regulation of tourism activities through licensing and municipal oversight. • Awareness programmes to promote eco-friendly practices during fairs and gatherings. • Eco-sensitive infrastructure upgrades such as solar lights, permeable paving and plastic-free zones, • Engaging youth in maintenance, eco-guiding and waste management. • Integration with Haiderpur Wetland conservation highlighting biodiversity and ecological habitats. • Development of interpretation centres and cultural circuits linking fairs, ghats and ecological education.
Zone B: Urban Core and Ponds	
Location	: Bijnor city and Ponds
Theme	: Sanitation, Ecological Rejuvenation & Cultural Revitalisation
Description	: Ponds in the urban core currently receive greywater inflows and face flood risks. Despite these challenges, they hold potential for ecological restoration, recreation and community engagement.

Key Strategies	: • Interception and treatment of polluted drains, • Wetland conservation as ecological buffers, • Integration of green belts around ponds into city planning, • Development of inclusive recreation spaces and water quality monitoring; and • Community stewardship programs with schools, NGOs and local residents. • Civic campaigns such as “Mera Talaab, Mera Shahar” and annual Bijnor Jal Mahotsav to embed stewardship.
Zone C: Downstream Floodplains & Peri-Urban Areas	
Location	: Floodplains downstream of River Ganga & Peri-Urban Ponds
Theme	: Flood Resilience & Active Recreation
Description	: These areas lie at the interface of rural floodplains and expanding urban settlements, vulnerable to seasonal inundation due to river Ganga’s dynamic course.
Key Strategies	: • Establishment of urban forests with native species such as Arjun, Jamun and Kadam to stabilize soils and conserve biodiversity • Development of Flood-adaptive infrastructure such as sponge parks, embankments and green corridors • Development of eco-parks, walking trails and community gardens for recreation and livelihood. • Promoting participatory monitoring and youth volunteer initiatives for long-term sustainability. • Promoting flood-resilient farming and use of organic fertilizers. • Integration of peri-urban ponds into climate resilience planning, linking them with groundwater recharge and biodiversity corridors



Map 6-1: Spatial Division of River Ganga and ponds BMC

6.2 OBJECTIVE 1: INTERVENTIONS TO ENSURE EFFECTIVE REGULATION OF ACTIVITIES IN FLOODPLAIN

Interventions under Objective 1 are designed to strengthen the Bijnor Master Plan by embedding flood resilience, ecological restoration and sustainable water management into core planning framework of the town. Measures such as validated flood lines, encroachment free flood plains, river and stream buffer conservation, naturalized bank protection, ground water recharge will enhance resilience, reduce disaster risks, safeguard communities and protect critical infrastructure. Aligned with national floodplain zoning and climate adaptation guidelines, these planning interventions will ensure balanced urban growth with long term sustainability.

6.2.1 Intervention 1: Preparation of a New Master Plan for Bijnor

The existing Master Plan for Bijnor has surpassed its intended horizon period (2011) and requires immediate revision. While preparing the new Master Plan, any extension of the planning area towards the River Ganga or its floodplain shall ensure that the river is integrally incorporated into the vision, land use framework and conservation strategies. Further, the new Master Plan shall also ensure the inclusion of storm water drains. The following recommendations shall be incorporated in the new Master Plan.

Table 6-1: Proposed Interventions for Flood and Water Management in Bijnor’s New Master Plan

Sl. No.	Aspects	Recommendation	Rationale/Justification
1.	River Context & Basin Integration	Include basin-level diagnostics: catchment, tributaries, historical course, flood history, hydrology and cultural significance of River Ganga.	Aligns with MoHUA River Centric Guidelines (2021) which mandate contextual understanding of river systems for spatial planning.
2.	River Zone Delineation & Land Use	- Designate a “River Conservation Zone” (RCZ) covering active channel, floodplain, riparian buffers and wetlands. - Delineate & Integrate 25-year and 100-year flood lines from Irrigation Dept. into land use zoning.	Required under Flood Plain Zoning Guidelines (MoJS, 2025)
3.	Flood Plain Zoning & Permissible Uses	- Adopt FPZ categories (high, moderate, low risk zones) with permitted, restricted and prohibited activities. - Prohibit basements and permanent structures in high-risk zones.	Based on MoJS Technical Guidelines on Flood Plain Zoning (2025); reduces exposure and supports climate resilience.
4	No Development Zone	- Inclusion of the NDZ delineation into the new master plan - Allow only eco-sensitive uses (e.g., riverbank plantations, ghats for religious use, eco-parks) subject to strict environmental clearance - Dedicate the 920 acres of land into green land.	Incorporating it into the DGP ensures enforceability under planning laws and compliance with NGT directives
4.	Riparian Buffers & Setbacks	Notify and enforce buffer zone (a) 100 m from the river bank and (b) along the ‘No Development Zone’ delineated by Irrigation Department.	Buffers prevent erosion, protect biodiversity and reduce flood risk.

Sl. No.	Aspects	Recommendation	Rationale/Justification
		Restrict permanent structures and allow only eco-compatible uses.	
5.	Drainage & Water Body Integration	Map and protect natural drains, canals, tanks and wetlands. Treat them as separate land use zones with buffer provisions.	Ensures hydrological connectivity and flood resilience; supported by MoHUA guidelines.
5.	Pollution Abatement & Water Quality	- Ensure complete sewerage coverage and adequate STP capacity. - Prohibit untreated discharge into river or nallahs. - Identify solid waste hotspots and stormwater litter zones.	Required under National River Conservation Plan (NRCP) and State Water Strategy (2025); protects aquatic ecosystems and public health.
6.	Groundwater Management	- Map aquifers and recharge zones. - Regulate borewell extraction near river. - Prohibit recharge from polluted open areas.	Required under Central Ground Water Authority (CGWA) guidelines, National Aquifer Mapping and Management Programme (NAQUIM) and Namami Gange.
8.	Rainwater Harvesting & Urban Recharge	- Mandatory RWH for plots ≥ 300 sq m and all public buildings/open spaces. - Integrate bio-swales, recharge trenches and rain gardens in parks and streets.	Enhances water security and reduces runoff.
9.	Riverfront Development & Public Access	Plan low-impact riverfront access: eco-trails, ghats, meditation decks, interpretive signage. Avoid concrete hardscapes in buffer zones.	Encouraged under MoHUA River Planning Guidelines; balances public access with ecological integrity.
10.	Vulnerability Assessment & Risk Reduction	Identify flood-prone zones, erosion hotspots and landslide risks. Avoid critical infrastructure in high-risk areas.	Required under Flood Plain Zoning Guidelines (2025) and State Disaster Risk Reduction Framework.
11.	Institutional Framework & Enforcement	Establish a River Corridor Management Committee (RCMC) with Development Authority, ULB, Irrigation, Forest, Jal Sansthan and PCB. Define roles, SOPs and reporting.	Ensures coordinated governance; supported by MoHUA and Jal Shakti directives for river zone enforcement.
12.	Monitoring & Evaluation	- Set up GIS-based monitoring stations. - Track encroachments, water quality, biodiversity and buffer compliance. - Publish public dashboards.	Enables adaptive management and transparency; mandated under MoHUA River Planning Guidelines and State Water Strategy.

6.2.2 Recommendation 1: Strengthening the provisions of District Ganga Plan, Bijnor

The draft district Ganga Plan (DGP) for Bijnor provides a comprehensive framework to guide the district in river-centric management and ecological restoration. It emphasizes addressing key water management challenges, including urban run-off from settlements, disposal of burnt body waste and persistent threats of pollution from liquid waste and solid waste (specifically single-use plastic). In addition, the plan highlights

the urgent need for water conservation measures to safeguard groundwater resources and ensure sustainable availability for future generations.

At present, as the river flows 6.6-7.6 kms. away from the planning area, it does not fall within the jurisdiction of the master plan. Therefore, until a new Master Plan for Bijnor is prepared, particularly where the planning area extends towards the River Ganga and its floodplain, the District Ganga Plan shall serve as the guiding framework for river-centric management. Taking this into account, the following gaps have been identified in the DGP:

- ▶ **Delineation of No Development Zone (NDZ):** The Irrigation Department has delineated the NDZ along the River Ganga, identifying areas where construction and intensive land use must be restricted to safeguard ecological integrity. However, this critical delineation has not yet been formally incorporated into the existing DGP.
- ▶ **Riparian Buffer Zone:** In alignment with river-centric guidelines, provisions pertaining to the establishment of a riparian buffer zone along the river ganga and other waterbodies is not mentioned in the DGP.

The following recommendations shall also be incorporated in the Draft District Ganga Plan of Bijnor.

Sl. No.	Aspects	Current Vision	Recommendation	Rationale/ Justification
1	Flood Management	No explicit mention of flood returns periods, flood zoning, or delineation of flood lines	- Integrate baseline hydrological assessment covering flood lines for 5, 25 and 100-year return periods. - Adopt Flood Plain Zoning guidelines (MoJS, July 2025 – Sec. 7, para 7.2, pp. 23–24). - Incorporate GIS-based flood hazard mapping. - Define regulatory zones (prohibited, restricted, regulated use) within floodplains.	Provides scientific delineation of flood-prone areas along River Ganga.
2	Riparian buffer	No separate riparian buffer marked along the waterbodies	- Include riparian buffer zones in the DGP, aligned with NGT orders, CPCB river conservation guidelines and MoHUA's riverfront development framework. - Issue district-level notification defining minimum buffer widths (e.g., 50–100 m for Ganga main channel, 30–50 m for tributaries/ponds) - Ensure buffer zones are reflected in urban master plans, land-use maps and cadastral records - Define institutional arrangements for floodplain and buffer management.	Formal inclusion in the DGP ensures compliance with national directives, prevents legal disputes and strengthens the enforceability of river-centric planning in Bijnor.

6.3 OBJECTIVE 2: INTERVENTIONS TO KEEP THE RIVER FREE FROM POLLUTION

Objective 2 interventions focus on ensuring that the River Ganga, its tributaries and the streams feeding into it remain free from both liquid and solid waste pollution. In Bijnor, the predominant sources of liquid waste contamination are untreated used water discharges from domestic and agricultural activities, including the direct outfall of a stream into the river along the eastern bank. Likewise, indiscriminate disposal of municipal solid waste in and around the barrage ghat and adjoining agricultural fields constitutes a major contributor to solid waste pollution.

6.3.1 Intervention 2: Construction of 15 MLD STP for western part

As outlined in Section 4.2, the city generates approximately 29.11 MLD of sewage from household sources. The western catchment, comprising 38 wards (including one partially covered), currently contributes about 26.62 MLD of sewage. Based on average annual population growth, this volume is projected to increase to 38.5 MLD by the year 2041. The key concerns are listed below;

- ▶ The existing 24 MLD STP cannot accommodate current or future sewage loads.
- ▶ Effluent quality risks exceeding permissible limits once household connections are completed.
- ▶ Unsewered areas discharge untreated used water into open lands, agricultural fields and ponds.
- ▶ Drains at Mandwar Road, Moradabad Road, Meerut Road and Jalalpur Road release untreated sewage into natural watercourses.
- ▶ Absence of proper weirs and inadequate solid waste management at tapping points causes overflow and operational inefficiencies.

Proposed Interventions:

To address these challenges, a comprehensive plan has been formulated that combines centralized treatment, expansion of the sewer network and nature-based decentralized solutions. The proposed interventions include:

- ▶ Construction of a new 15 MLD sewage treatment plant by repurposing the existing polishing pond,
- ▶ Laying of approximately 80–100 km of new sewer lines to connect households and integrate the existing sewer lines
- ▶ Treatment of Unserved Areas:
 - Establishment of constructed wetlands at Mandwar Road, Moradabad Road, Meerut Road and Jhakri banger.
 - Construction of an interception and diversion structure at Jalalpur Road

Detailed Proposals

A. Construction of New 15 MLD Sewage Treatment Plant (STP) by removal of Polishing Pond

A 15 MLD Sewage Treatment Plant (STP) is proposed with an area of 1.8 ha on the existing site by replacing the polishing pond. The capacity has been determined considering present sewage generation gap of 2.6 MLD, projected Mandwar of approximately 38.5 MLD by 2041, overall gap of 14.5 MLD is present. At present, the polishing pond receives diluted inflows with BOD levels of 80–100 mg/l. The upstream UASB units treat sewage with influent BOD of about 250 mg/l and produce effluent below 10 mg/l. However, once household connections are completed, the polishing pond effluent is expected to rise to nearly 20 mg/l, exceeding the permissible limits prescribed by the National Green Tribunal (NGT).

To ensure compliance, the polishing pond will be removed and replaced with a new STP designed using Sequential Batch Reactor (SBR) technology, ensuring high-quality effluent, operational flexibility and adherence to discharge standards. The inlet of the polishing pond will be connected directly to the new STP, which will be designed for influent BOD of approximately 230 mg/l and consistently deliver effluent quality below 10 mg/l. This intervention will cater to household connections and simultaneously treat outlet flows from the existing UASB units, thereby strengthening the overall treatment capacity of the western catchment.

B. Laying of approximately 80–100 km of new sewer lines to connect households and integrate the existing sewer lines

To achieve full connectivity, it is proposed to construct an additional 80–100 km of sewer lines, aligned along road rights-of-way and municipal land to minimize land acquisition and avoid conflicts with existing utilities. Although 80.72 km of sewer lines already exist, they are not connected to households and used water continues to flow through open drains tapped. The expanded network will ensure that household used water is conveyed directly to the treatment plants, thereby reducing untreated discharges into open lands and natural watercourses.

Both the alignment of interceptor sewers and location of treatment infrastructure will be finalized based on hydraulic feasibility, land availability and integration with existing and planned sewer networks during the DPR Stage.

C. Treatment of Unserved Areas

As mentioned in Section 4.2.1, the total sewage generated in the western part is 26.6 MLD. Of this, 2.58 MLD is discharged at four locations - open lands, ponds and agricultural areas as observed during site inspections. The detailed bifurcation of these discharges is provided below.

- **Constructed Wetland at Mandwar Road:** as per the field observations, estimated approx. 0.6 MLD untreated used water from Mandwar Road presently discharges into agricultural lands. As diversion into the centralized system is not feasible until the new STP is constructed, a subsurface horizontal flow constructed wetland of about 1 ha is proposed at a tentative location within the agricultural area. This intervention will provide decentralized treatment and prevent pollution of agricultural lands. (Refer Image 6-6).



Image 6-1: Showing discharge and proposed constructed wetland location at Mandwar Road

- ▶ **Constructed Wetland at Moradabad Road:** Approximately 1 MLD untreated used water from Moradabad Road drains into adjoining open lands. To address this, a subsurface horizontal flow constructed wetland of about 2 ha is proposed at a tentative location. This intervention will provide decentralized treatment and reduce pollution load on the surrounding environment.
- ▶ **Constructed Wetland at Meerut Road:** Approximately 0.2 MLD untreated used water continues to discharge from drain into a low-lying pond outside the municipal boundary, despite tapping into the sewer lines. Firstly, the weirs are raised at the tapping point and a subsurface horizontal flow constructed wetland of about 1 ha is proposed at pond to treat. This intervention will improve water quality in the peri urban zone which is used for agriculture purposes. (Refer Image 6-12).



Image 6-2: Showing discharge and proposed constructed wetland location at Meerut Road

- ▶ **Constructed Wetland at Jhakri Banger:** Approximately 0.8 MLD untreated used water from local drains discharges into a pond, causing localized pollution and health concerns. A subsurface horizontal flow constructed wetland of about 1.6 ha is proposed adjacent to the pond. This intervention will provide decentralized treatment, improve pond water quality and enhance ecological resilience in the settlement area. (Refer Image 6-13).



Image 6-3: Showing discharge and proposed constructed wetland location at Meerut Road

Design and Planting Scheme: All wetlands will be designed as subsurface horizontal flow systems to prevent mosquito breeding and ensure continuous treatment outside flood periods (Refer Figure 7.6). Robust emergent species such as Common Reed (*Phragmites australis*), Cattails (*Typha latifolia*, *Typha angustifolia*) and Bulrushes (*Scirpus* species) will be planted, along with ornamental species like *Canna indica*. These plants are effective in nutrient uptake, aeration and used water treatment, ensuring ecological sustainability and aesthetic enhancement.

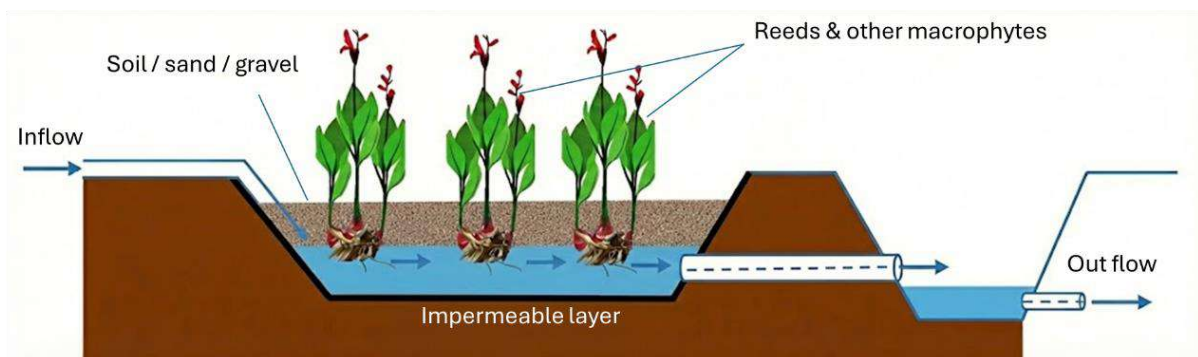


Figure 6-1: Schematic diagram of subsurface horizontal flow constructed wetland

Construction of I&D Structure at Jalalpur Road

It is proposed to construct a single Interception and Diversion (I&D) structure of approximately 0.2 MLD capacity (to be confirmed during DPR preparation) along Jalalpur Road. The structure will intercept the used water flow and divert it into the existing sewer line (Refer Figure 6-2). This sewer line conveys sewage to the 24 MLD STP, thereby ensuring treatment prior to discharge into the pond.

The I&D structure will be located within the Jalalpur Road right-of-way, with its outlet directly connected to the sewer line for conveyance to the STP. The flow arrangement will be designed to ensure hydraulic feasibility and seamless integration with the existing network. The flow arrangement is presented in Figure 6-2 and the conceptual layout of the I&D components is shown in Figure 6-3.

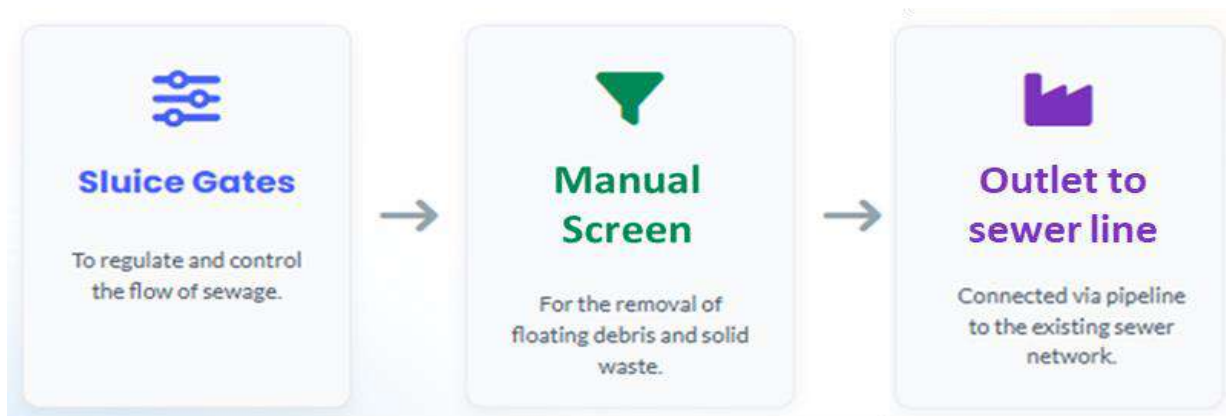


Figure 6-2: Flow arrangement of proposed I & D Structure



Image 6-4: Showing discharge and proposed I&D location at Jalalpur Road

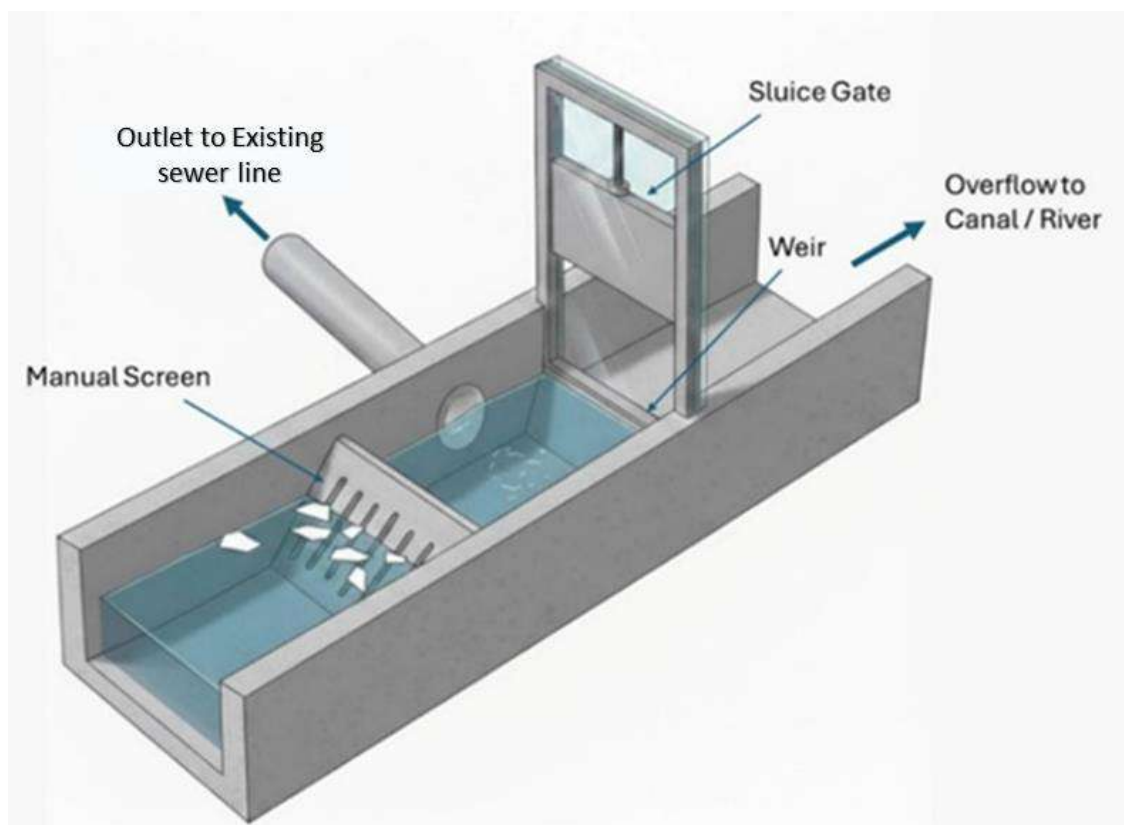
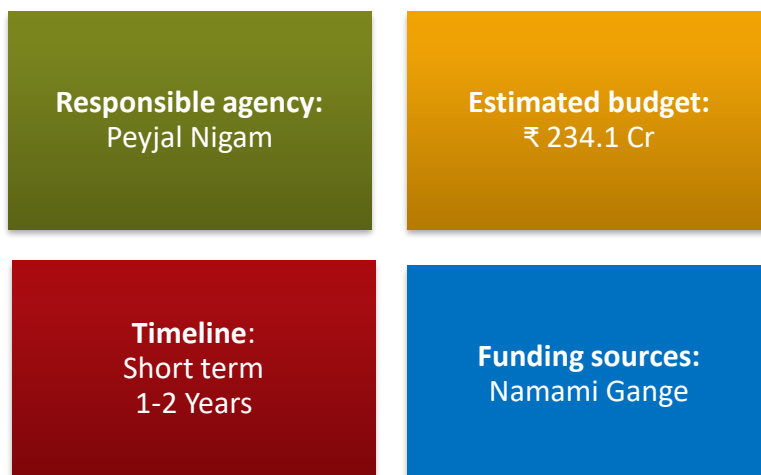


Figure 6-3: Proposed I & D Structure

The overall locations of these above interventions are shown in Map 6-2.

Implementation Framework:



6.3.2 Intervention 3: Construction of 6 MLD STP for eastern part

As outlined in Section 4.2, the city generates approximately 29.11 MLD of sewage from household sources. The eastern catchment, comprising three wards (with one partially included), currently generates about 2.5 MLD of sewage, projected to reach 3.6 MLD by 2041 based on average annual population growth. Due to slope constraints, used water presently flows through roadside nallahs and discharges directly into Bakshi wala Pond and adjoining agricultural lands, resulting in ecological degradation and public health risks.

- ▶ Absence of a structured sewerage system in the eastern catchment.
- ▶ Continuous inflow of untreated sewage into Bakshi wala Pond and adjoining agricultural lands.
- ▶ Convergence of drains into Bakshi wala Pond without treatment.
- ▶ Lack of slope-compatible conveyance infrastructure.
- ▶ Contamination of agricultural soils and deterioration of groundwater quality.

Proposed Intervention:

To eliminate uncontrolled sewage discharge into Bakshi wala Pond and adjoining lands, a comprehensive intervention comprising a Sewage Treatment Plant (STP), Sewage Pumping Station (SPS), Interception & Diversion (I&D) structures and a structured sewerage network is proposed.

A 6 MLD STP is proposed outside the municipal boundary in the green area as a tentative location (Image 6-13). The capacity has been determined considering present sewage generation of 2.5 MLD, projected demand of approximately 3.6 MLD by 2041 and anticipated urban expansion in the eastern part as mentioned in section 2.4. The STP will be designed using Sequential Batch Reactor (SBR) technology, ensuring high-quality effluent, operational flexibility and compliance with discharge standards. This requires a minimum land area of approximately 1.5ha, subject to final site selection and layout optimization during the DPR stage. This ensures future-proofing against settlement growth, compliance with CPHEEO and MoHUA guidelines and availability of adequate land for treatment facilities and green buffer infrastructure.

A 4 MLD SPS is proposed at Malti Nagar, beside Bakshi wala Pond (refer Image 6-13), which is a critical location as the natural slope of the eastern catchment drains towards the pond. The SPS will require an area of approximately 30×30 m with tentative locations identified. The final siting will be determined during the DPR stage and implemented based on land availability and SPS design criteria. The SPS will intercept used water from the drains through three I&D structures and lift the flow via rising mains to the STP. Until

the comprehensive household-level sewerage network is laid across the eastern catchment, I&D structures (5x5 m area) along the pond boundary will serve as interim protection, intercepting and diverting untreated used water into the SPS, thereby preventing direct discharge into Bakshi wala Pond. The conceptual layout of the I&D components is shown in Figure 6-3. This integrated approach ensures immediate containment of inflows, ecological restoration of the pond, improvement in water quality, reduction of soil and groundwater contamination and mitigation of public health risks.

A structured sewerage network will subsequently be laid across the eastern catchment to ensure complete household and drain coverage, slope-compatible conveyance and interception of all used water. This network will provide long-term resilience by preventing untreated sewage from entering Bakshi wala Pond and adjoining agricultural lands.

The proposed locations shown in the referenced maps are indicative and will be finalized during the Detailed Project Report (DPR) stage, following detailed engineering, hydrological and environmental assessments.



Image 6-5: Proposed I&D location around Bakshi wala Pond

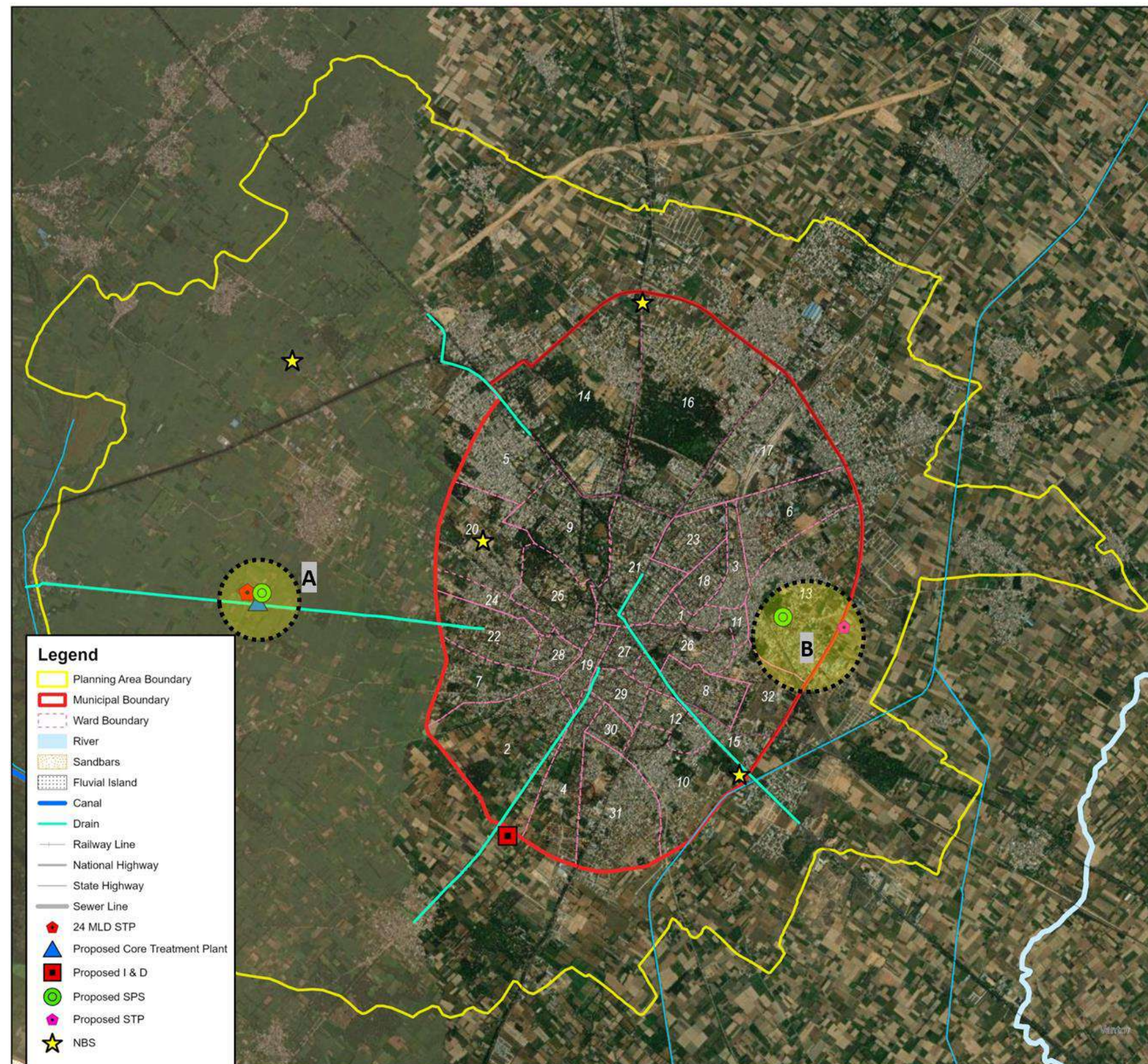
Implementation framework:

Responsible agency:
Peyjal Nigam

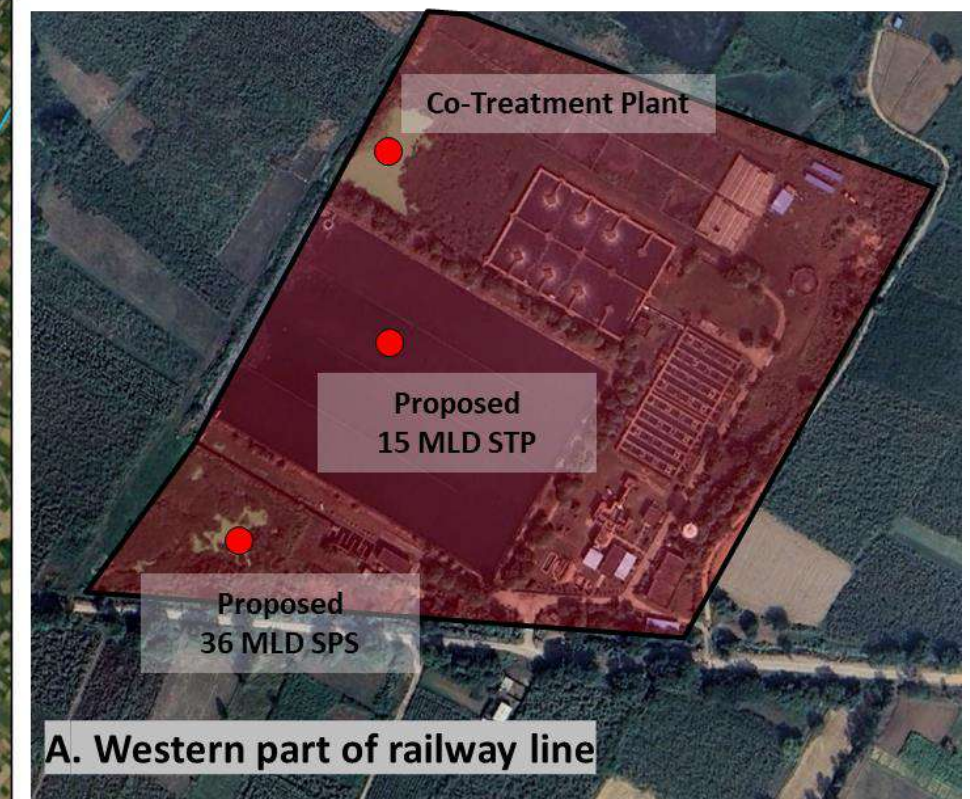
Estimated budget:
₹ 19 Cr

Timeline:
short term
1-2 Years

Funding sources:
Namami Gange



Map 6-2: Proposed Sewerage infrastructure for Bijnor city



6.3.3 Intervention 4: Comprehensive drainage master plan for Bijnor

As highlighted in section 4.3, Bijnor city’s drainage network was historically laid along roads without proper slope or catchment-based design. At present, stormwater runoff is directed into low-lying ponds such as Bakshi wala Pond and Jalalpur Road Pond, as well as adjoining agricultural areas. These depressions temporarily hold excess water but are not designed as structured drainage systems.

The city do not have natural drains within their boundaries, though a tributary of the Malin river lies to the west and provides a potential outfall for a planned network. With rapid urban expansion, reliance on ponds and agricultural depressions will lead to increasing problems of waterlogging, localized flooding and sanitation risks. Encroachment and indiscriminate solid waste disposal further reduce the efficiency of existing drains. The concerns identified are listed below;

- ▶ Storm water drains lack catchment-based planning and adequate slopes, leading to stagnation, backflow and localized flooding.
- ▶ Presently, storm water flows into low-lying ponds and agricultural depressions, causing waterlogging.
- ▶ Encroachment and indiscriminate solid waste disposal obstruct drains and diminish conveyance capacity.
- ▶ Expansion into new planning areas without integrated stormwater drainage systems increases flood risks.
- ▶ Absence of a comprehensive drainage master plan elevates pollution loads and sanitation hazards.
- ▶ Future urban expansion will exacerbate flooding and waterlogging unless addressed through structured planning.

Proposed Interventions

A. Preparation of Drainage Master Plan

- Develop a **comprehensive, Integrated Urban Stormwater Drainage Master Plan** for Bijnor under the Uttar Pradesh government’s 2025–2026 initiative taken for 15 priority cities.
- Base the plan on **catchment delineation** and hydrological modeling, considering the tributary of the Malin river to the west of the planning area.
- Identify outfalls, low-lying ponds (Bakshi wala, Jalalpur Road Pond) and agricultural depressions currently receiving stormwater and integrate them into the planned system.

B. Catchment-Based Drainage Design

- Redesign the drainage network using **hydrological catchments** as per CPHEEO standards.
- Apply the **Rational Method** for discharge estimation with IMD rainfall intensity data.
- Ensure minimum drain slopes of **0.05%–0.1%** depending on terrain, to prevent stagnation and backflow.
- Establish a hierarchy of **primary, secondary and tertiary drains** linked to planned outfalls and the Malin river tributary.

C. Stormwater Management Infrastructure

- Construct **retention/detention basins** sized for 25–50 year return period rainfall events.
- Develop **recharge pits and rainwater harvesting structures** as per CGWB norms to enhance groundwater recharge.
- Integrate **bio-swales, rain gardens and permeable pavements** in new planning areas to reduce runoff and improve infiltration.

D. Floodplain Zoning & Regulation

- Conduct **GIS-based hydrological modelling** to delineate flood-prone zones.
- Restrict construction in **1-in-100-year flood zones** and protect eco-sensitive areas, ponds and agricultural depressions from encroachment.
- Incorporate floodplain zoning provisions into **Development Control Regulations**.

E. Solid Waste & Community Engagement

- Integrate **solid waste management** with drainage planning to prevent clogging.
- Ensure **door-to-door collection and segregation** per Swachh Bharat Mission protocols.
- Conduct **IEC campaigns** to discourage waste dumping into drains and promote rainwater harvesting practices.

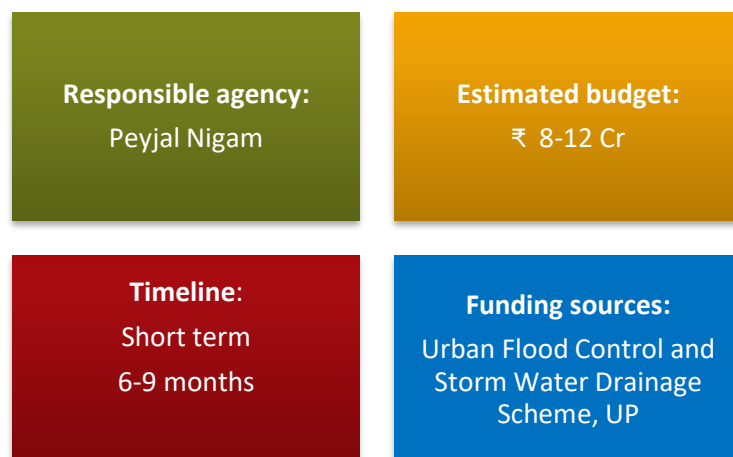
F. Monitoring & Governance

- Develop **GIS-based mapping** of the drainage network, updated annually.
- Install **IoT sensors** for real-time water level monitoring in critical drains, linked to SCADA systems.
- Establish a **multi-agency coordination mechanism** for stormwater drainage management.

The proposed interventions will transform Bijnor’s drainage system into a catchment-based, resilient and sustainable network, reducing flooding, improving sanitation and STP efficiency and safeguarding natural water bodies against urban expansion and climate variability.

These measures are fully aligned with national standards, including CPHEEO Sewerage Manual (2013), MoHUA Storm Water Drainage Guidelines (2019), CGWB norms for recharge structures and Swachh Bharat Mission protocols for solid waste management.

Implementation Framework:



6.3.4 Intervention 5: Integrated Co-Treatment Strategy for City-Wide Faecal Sludge Management

As outlined in Section 4.2, in Bijnor, 100% of households rely on on-site sanitation (OSS) systems. Grey water is conveyed through the drainage network, while faecal sludge generation across the city is estimated at approximately 78 KLD. Despite a fleet of 11 de-sludging vehicles, only 1–2 operate regularly, discharging into the existing 20 KLD co-treatment facility at the 24 MLD STP in Kherki. This limited capacity is insufficient to manage the city’s total faecal sludge load, leaving significant volumes untreated.

As a result, faecal sludge collected from distant locations is frequently disposed of in open drains or agricultural lands to reduce travel distance and operational costs. These unsafe practices introduce untreated waste into the environment, causing pollution, increasing public health risks and undermining the city’s sanitation objectives.

Proposed Intervention

To address these challenges, a comprehensive co-treatment strategy is proposed. This approach integrates existing and proposed sewage treatment infrastructure to expand capacity and ensure city-wide coverage. Two 30 KLD co-treatment plants will be established:

- ▶ Within the premises of the existing 24 MLD STP
- ▶ Within the premises of the proposed 8 MLD STP

Together, these facilities will provide adequate treatment capacity for the entire city, ensuring safe and efficient management of faecal sludge from all catchments.

Process flow: Vacuum trucks will discharge faecal sludge into the co-treatment units, beginning with a Screen Chamber for removal of coarse solids. The sludge will then enter a Homogenisation Tank to achieve uniform consistency before separation. Solids will be directed to a Dewatering Unit and subsequently to Sludge Drying Beds for safe disposal or reuse. Liquids and filtrate will be routed to the STP Inlet Chamber for biological treatment alongside sewage. This structured flow prevents shock loading and maintains treatment efficiency (refer Figure 6-4).

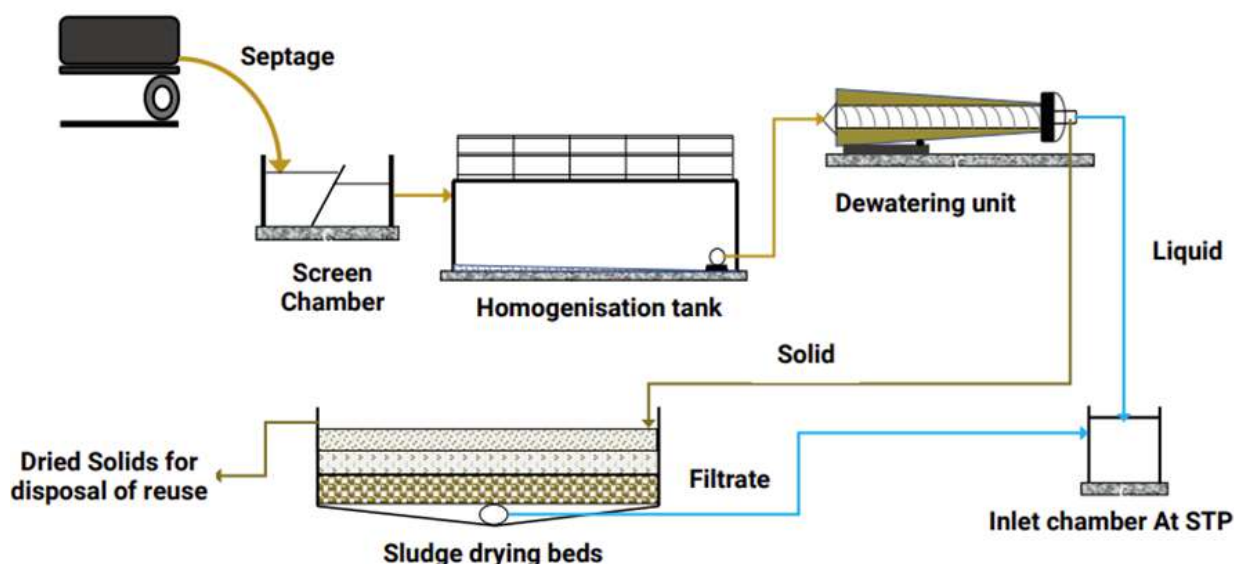


Figure 6-4: Process flow diagram of co-treatment units

By establishing two 30 KLD co-treatment facilities as a single integrated intervention, Bijnor will achieve city-wide coverage of faecal sludge management. The intervention expands treatment capacity to match the 78 KLD faecal sludge load, eliminates unsafe disposal into drains and agricultural lands and strengthens collection efficiency.

This unified strategy leverages existing and proposed STP infrastructure, minimizes land and capital requirements and ensures safe, sustainable faecal sludge management. It will significantly improve environmental outcomes, reduce public health risks and align Bijnor’s sanitation framework with national FSSM objectives.

Implementation Framework:



6.3.5 Intervention 6: Preparation of Faecal and Septage Management Plan

As outlined in section 4.2, Bijnor is a rapidly expanding district headquarters town whose spatial footprint has tripled following municipal boundary extension. All households continue to rely on onsite sanitation systems, primarily septic tanks that are often poorly designed, non-watertight and rarely desludged. A 20 KLD co-treatment facility was added in 2022 at 24 MLD STP; however, integration with desludging operations remains weak. The sanitation service chain is fragmented, resulting in risks of groundwater contamination, environmental pollution and governance challenges.

1. **Containment:** The city has approximately 46,933 households, all of which rely on onsite sanitation systems (septic tanks or fully lined tanks). Most tanks are poorly designed, not watertight and rarely desludged, could create risks of leakage and groundwater contamination. There is no municipal registry to record tank size, desludging frequency or maintenance condition.
2. **Storage:** Faecal sludge generation across the city is estimated at nearly 78 KLD. Monitoring of containment performance is absent and manual access points expose desludging workers to occupational health and safety risks.
3. **Transport:** The city has a fleet of 11 desludging vehicles, but only 1–2 operate regularly. Operations remain demand-based, with weak enforcement of discharge protocols. GPS or digital tracking systems are not in place and most vehicles bypass the designated co-treatment facility.
4. **Treatment:** A 20 KLD co-treatment unit was established in 2022 at the 24 MLD STP in Kherki with support from CSE under Namami Gange. While it represents Uttar Pradesh’s first flagship co-treatment project, its limited capacity covers only approx. 25% of the city’s total faecal sludge load of 78 KLD, leaving significant volumes untreated. To bridge this mismatch, **two additional co-treatment plants of 30 KLD each** are proposed at the existing and upcoming STPs, raising total treatment capacity to 80 KLD and ensuring full coverage listed in intervention 2.
5. **Reuse:** At present, there is no reuse of treated faecal sludge. Composting, fertilizer production and market linkages have not been established, leaving the potential for biosolids recovery and circular economy integration untapped.

Proposed Intervention

To bridge the identified gaps in containment, storage, transport, treatment and reuse, Bijnor Municipal Council must adopt a structured Faecal Sludge and Septage Management (FSSM) Plan. This plan should be anchored in clear municipal bylaws, licensing of service providers and ring-fenced O&M funding, ensuring

accountability and sustainability in line with the *Faecal Sludge and Septage Management in Urban Areas of India – Standard Operating Procedures (SOPs)* and the *Operationalization of Uttar Pradesh State Septage Management Protocol (2019)*.

The interventions below combine baseline findings from the existing situation and Septage Management in Bijnor Town report and SOP-mandated best practices to ensure technical compliance, environmental safety and institutional accountability.

Intervention in Detail

1. Safe Containment

- ▶ Retrofit septic tanks to watertight standards with baffles, venting and inspection ports.
- ▶ Ensure accessibility for periodic desludging and prevent leakage into drains or groundwater.
- ▶ Mandate geo-tagged household registry integrated with municipal GIS/property tax systems.

Best Practices: Tiruchirappalli (Tamil Nadu) has successfully implemented watertight septic tank retrofits and household registries under its citywide FSSM program.

City Application: Bijnor requires retrofitting and a centralized database of all onsite containment systems, consistent with the SSMP directive for municipal registries.

2. Scheduled and Regulated Desludging

- ▶ Municipal bylaws should mandate desludging cycles of 3–5 years.
- ▶ Licensed service providers (currently 5 private and 6 government vehicles) must operate GPS-equipped desludging vehicles to minimize illegal dumping.
- ▶ BNPP should establish a regulated desludging schedule integrated with citizen service requests.

Best Practices: Navi Mumbai (Maharashtra) has implemented a regulated desludging schedule with licensed operators and municipal monitoring.

City Application: Current practice in Bijnor is reactive desludging, with low utilization (approx. 10 KLD/day vs. 78 KLD potential). A regulated schedule will ensure safe handling of faecal sludge and compliance with SSMP’s emphasis on scheduled desludging.

3. Transport and Tracking

- ▶ A digital tracking system (GPS and mobile app) should be deployed for all desludging vehicles, with trip logs integrated into municipal dashboards.
- ▶ Geo-tagged proof of discharge at designated treatment points must be required.

Best Practices: Bhubaneswar (Odisha) has adopted GPS-based tracking of desludging vehicles, ensuring transparency and accountability.

City Application: In Bijnor, trucks often bypass the co-treatment facility and discharge informally, creating risks of uncontrolled disposal. GPS-based tracking will prevent illegal dumping and enforce discharge at the 20 KLD co-treatment unit.

4. Treatment Infrastructure

- ▶ Co-treatment at the 24 MLD STP must be optimized through controlled inlet dosing to prevent shock loading and maintain stable performance.
- ▶ Enforce scientific co-treatment protocols: screening chambers, homogenization tank (60 KL), sludge drying beds (2 of 16 designated for co-treatment, with solar roofs) and filtrate sump integration.
- ▶ Establish monitoring frameworks to record inflow volumes, sludge characteristics and treatment efficiency.

- ▶ Expand decentralized FSTPs in peri-urban areas to intercept untreated sludge before it enters drains.

Best Practices: Bijnor’s own scientific co-treatment model supported by CSE.

City Application: The 20 KLD co-treatment unit is underutilized (50% capacity). Integration of desludging operations with this facility, supported by SOP-mandated monitoring protocols, will maximize resource use and reduce capital expenditure.

5. Reuse and Resource Recovery

- ▶ Treated sludge should be converted into compost in compliance with Fertilizer Control Order (FCO) standards.
- ▶ MoUs should be established for offtake by horticulture, forestry and municipal parks.
- ▶ Market linkages for compost sales must be developed to promote circular economy integration.

Best Practices: Indore (Madhya Pradesh) has pioneered reuse of treated sludge as compost for municipal parks and agriculture.

City Application: Bijnor currently has negligible reuse (approx. 1.7–2.4 TPD treated sludge wasted generated from existing 20 KLD Co-treatment plant) and also for the proposed co-treatment plants. Resource recovery initiatives will align with SSMP’s emphasis on circular economy integration.

6. Operation & Maintenance (O&M)

- ▶ Continuous funding must be ensured through ring-fenced municipal budgets dedicated to FSSM operations.
- ▶ Trained staff should undergo quarterly refresher courses on SOPs, PPE use and emergency response.
- ▶ Service contracts with private operators for plant operation, desludging and transport must be tied to performance indicators, with preventive maintenance schedules and independent audits instituted.
- ▶ O&M budgets must cover expanded **80 KLD treatment capacity**.

Best Practices: Warangal (Telangana) has successfully ring-fenced O&M budgets and contracted trained operators for its FSTPs, ensuring >95% uptime.

City Application: Bijnor currently relies on minimal staffing for co-treatment operations, resulting in sludge accumulation and seasonal drying challenges. Ensuring dedicated O&M funding, comprehensive training and performance-linked service contracts will be critical for long-term sustainability.

7. Policy, Regulation & Institutional Framework

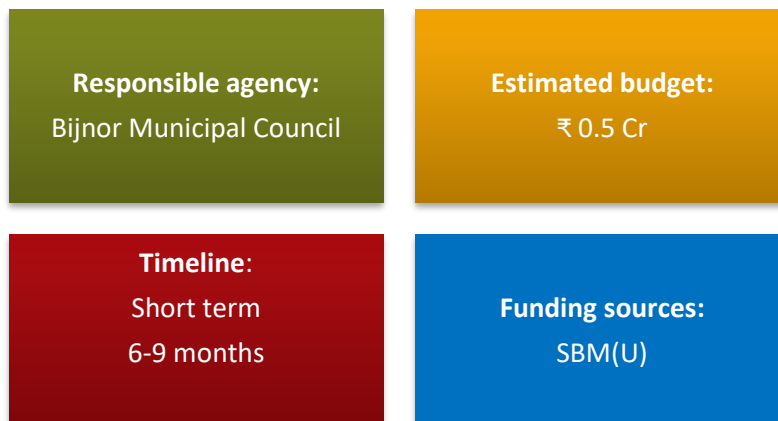
- ▶ Clear municipal bylaws regulating desludging frequencies, service standards, licensing and fines for illegal disposal must be drafted and notified.
- ▶ Strengthen the existing City Sanitation Task Force (CSTF) to coordinate containment, desludging, transport, treatment and reuse, avoiding duplication.
- ▶ Citizen dashboards for service requests, compliance monitoring and grievance redressal should be launched.

Best Practices: Devanahalli (Karnataka) has adopted municipal bylaws for desludging cycles and established a dedicated sanitation cell, ensuring compliance and transparency.

City Application: Bijnor has a functioning City Sanitation Task Force (CSTF), but enforcement is weak. Adoption of bylaws regulating 3–5year desludging cycles, licensing of private desludging vehicles and penalties for illegal dumping will institutionalize accountability and align with the Operationalisation of Uttar Pradesh State Septage Management Policy (2019).

Draft Scope of Work for Faecal Sludge and Septage Management (FSSM) is presented in **Annexure 1**.

Implementation Framework



6.4 OBJECTIVE 3: INTERVENTIONS TO REJUVENATE WATERBODIES AND WETLANDS IN BIJNOR

As mentioned in Section 3.2.1, BMC encompasses 5 waterbodies, of which 4 exceeds 1 acre in size. While these assets are crucial for stormwater drainage, groundwater recharge, flood moderation and ecological balance; their condition has deteriorated due to encroachment, siltation, untreated used water inflows and solid waste dumping. This has led to declining water quality, reduced storage capacity and weakened ecological services. To address these challenges, enhanced safeguards, targeted pollution mitigation and systematic integration of waterbodies into the city’s water management framework are essential to reinstate their ecological and functional roles.

6.4.1 Intervention 7: To create water body Database at city level

While Bijnor’s waterbodies are recognized for their ecological and hydrological importance, the absence of a comprehensive, city-wide inventory and monitoring framework has constrained the ULB’s capacity to safeguard, manage and rejuvenate these assets. The encroachments and uncontrolled inflows of sewage and solid waste have progressively diminished both water quality and the storage potential of several assets.

Proposed Intervention

The initiative seeks to establish a city-level comprehensive waterbody database for Bijnor, functioning as a centralized digital repository of all waterbodies within municipal jurisdiction. This database will enable real-time monitoring, integrated planning and enforcement coordination across relevant agencies, thereby strengthening institutional capacity for waterbody management.

The design and implementation of the Bijnor Waterbody Database will be guided by the Urban Water Body Diagnostic Tool (UWBDT)² developed by the National Institute of Urban Affairs (NIUA). The UWBDT provides a standardized assessment framework encompassing critical parameters such as physical condition, hydrological connectivity, water quality, ecological health, governance structures and risk exposure. Adoption of this framework will ensure systematic evaluation, evidence-based decision-making and long-term rejuvenation strategies for Bijnor’s urban waterbodies.

² <https://uwdtool.in/>; https://nmcg.nic.in/writereaddata/fileupload/56_Urban-Water-Body-Diagnostic-Tool-Manual.pdf

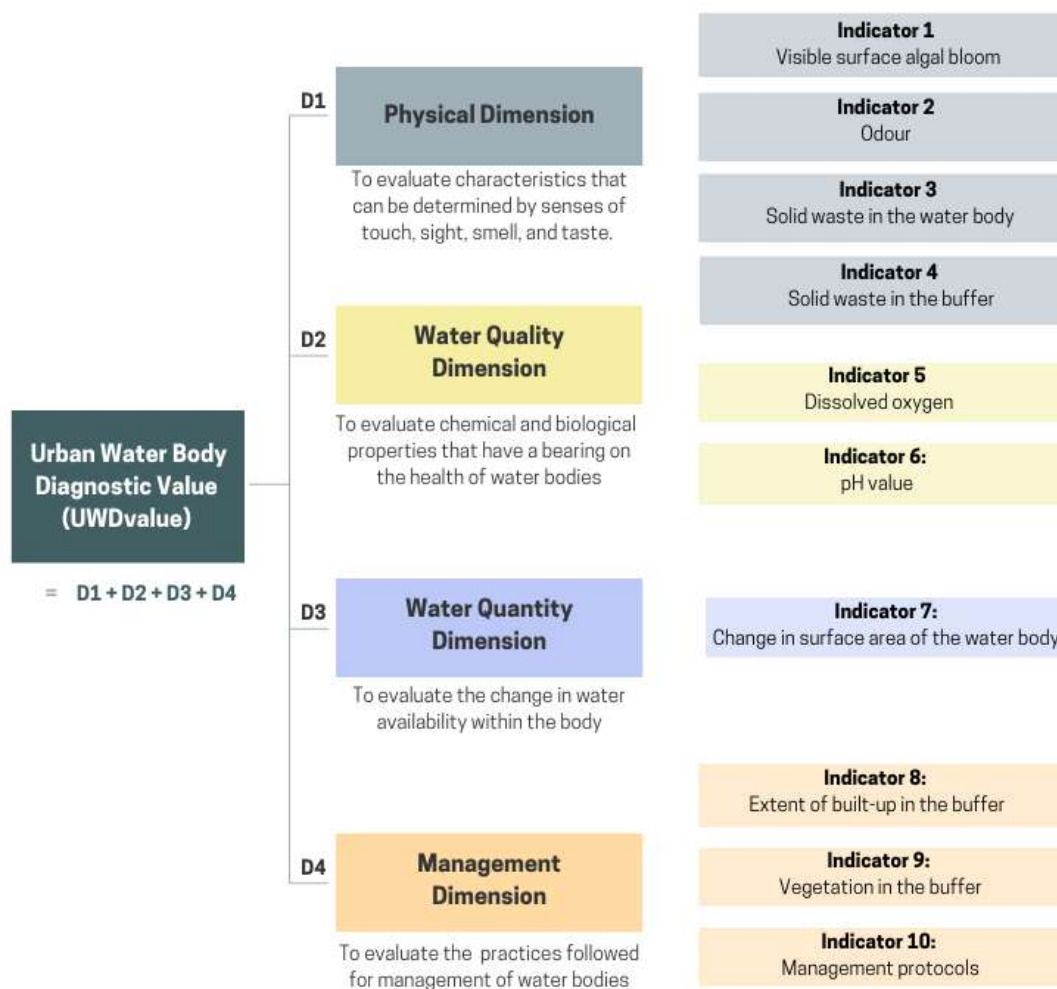
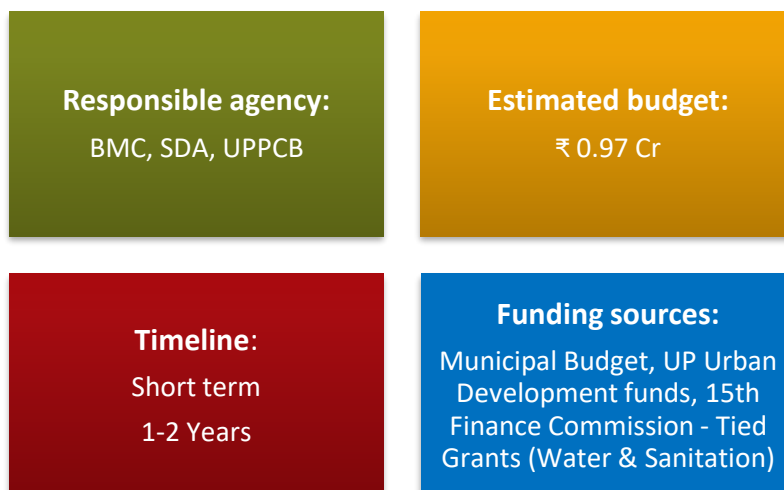


Image 6-6: Urban Waterbody Diagnostic Key Parameters

The following are the key components essential for creating the database of waterbodies.

Stages	Actions to be taken
Data Collection	- Geo-referenced mapping of all waterbodies (area, boundary, catchment) - Ownership and administrative details - Current land-use and encroachment status - Hydrological connectivity with nallahs, rivers and floodplains - Water quality parameters and pollution sources - Economic Potential (Boating, Fishing, Recreational) - Flooding and waterlogging history - Rejuvenation status and maintenance records
Database Integration	- All collected data is consolidated into a dynamic, spatially enabled digital repository. The database is structured using the Urban Water Body Diagnostic Tool (UWBDT) developed by NIUA, which provides a standardized framework for assessment. Key features include: - Centralized access for municipal departments - Real-time updates and monitoring tools - Structured evaluation across ecological, hydrological and governance dimensions
Application & Outcomes	Monitoring: Enables regular surveys, hydrological assessments and pollution tracking Planning: Informs integrated land-use strategies and conservation measures Enforcement: Facilitates encroachment removal, pollution control and compliance with buffer zone regulations

Implementation Framework



6.4.2 Intervention 8: Strategy for Urban Water Body Rejuvenation

Bijnor’s dependence on groundwater, coupled with declining recharge trends between 2014–2019, has heightened vulnerability to water scarcity and deteriorating quality. Encroachment, loss of protective buffer zones, inflows of untreated used water, solid waste dumping, siltation and proliferation of invasive species such as water hyacinth have progressively degraded urban ponds.

Historically, these ponds functioned as natural recharge basins sustaining aquifers and community needs. Their degradation has weakened resilience and water security, making systematic rejuvenation essential for long-term sustainability.

Proposal Intervention:

Given limited municipal budgets and widespread degradation, a data-driven Prioritization Matrix has been developed to rank waterbodies by hydrological importance, ecological health and feasibility. This ensures resources are allocated strategically and interventions are phased.

Based on the NIUA Urban Water Body Diagnostic Tool, all the 4 ponds having above one acre area within municipal limits were assessed across three dimensions:

- ▶ Physical parameters (encroachment, buffer condition, bed type)
- ▶ Water quality and hydrology (Used water inflows, solid waste, dissolved oxygen)
- ▶ Socio-economic context (accessibility, cultural significance, surrounding land use)

The detailed methodology outlining how each parameter was scored and the pond-wise scoring was done (Refer Annexure 2). Based on composite scores, ponds have been categorized into priorities as presented in Table 6-2. As per the table above, strategic categorization of Bijnor ponds places those with critical sanitation issues under Priority A (Drainage Interventions), ensuring Used water diversion and treatment before any beautification. Once sanitation is stabilized, ponds with natural pervious beds and strong physical scores are classified as Priority B (Recharge Zones) to enhance groundwater recharge. Finally, ponds that are clean, accessible and socially viable are designated as Priority C (Recreation) for landscaping, aeration and public use.

Table 6-2: Prioritization of Ponds

Priority	Focus	Number of Ponds	Key Issues Addressed
Priority A	Drainage & Sanitation-first	3	Raw sewage inflows, solid waste, low DO
Priority B	Recharge-focused	1	Dry, moderate pollution

Priority	Focus	Number of Ponds	Key Issues Addressed
Priority C	Recreation & Amenity Upgrades	0	None

Source: Consultant analysis

Implementation Measures by Priority

Priority A – Drainage & Sanitation

Ponds under Priority A are severely degraded due to raw sewage inflows, solid waste dumping and critically low dissolved oxygen levels. The immediate objective is to stabilize water quality and eliminate pollution sources before recharge or recreational use is considered.

Implementation Measures:

- ▶ Construct Interception & Diversion (I&D) drains with stone pitching and bamboo culverts to redirect untreated Used water.
- ▶ Establish decentralized Used water treatment units (Phytorid wetlands or DEWATS) using gravel beds, vetiver grass and native reeds.
- ▶ Implement solid waste management through bamboo fencing, recycled signage and community led clean up drives.
- ▶ Undertake aquatic weed management with manual removal and floating wetlands of native plants.
- ▶ Introduce solar powered water quality monitoring sensors for DO, BOD and COD.
- ▶ Develop a mandatory 9-meter vegetated buffer zone with vetiver, neem and bamboo to prevent encroachment and filter runoff.

Priority B – Recharge-Focused Interventions

Ponds under Priority B retain natural soil beds and moderate pollution levels, making them suitable for groundwater recharge. The focus is on restoring infiltration capacity and protecting aquifer pathways.

Implementation Measures:

- ▶ Conduct desilting operations to restore depth (2–3 m) and reopen aquifer pathways, reusing silt for landscaping.
- ▶ Construct sedimentation basins at inlets using stone bunds and vegetated traps to settle solids before water enters.
- ▶ Install recharge shafts and percolation pits (brick lined, gravel filters) aligned with natural flow directions.
- ▶ Establish vegetative buffer zones with vetiver, bamboo and neem to reduce runoff contamination.
- ▶ Preserve natural soil beds by avoiding concrete lining and maintaining $\geq 90\%$ perviousness.
- ▶ Ensure a 9-meter green belt around pond peripheries for ecological protection.

Priority C – Recreation & Amenity Upgrades (Future Phase)

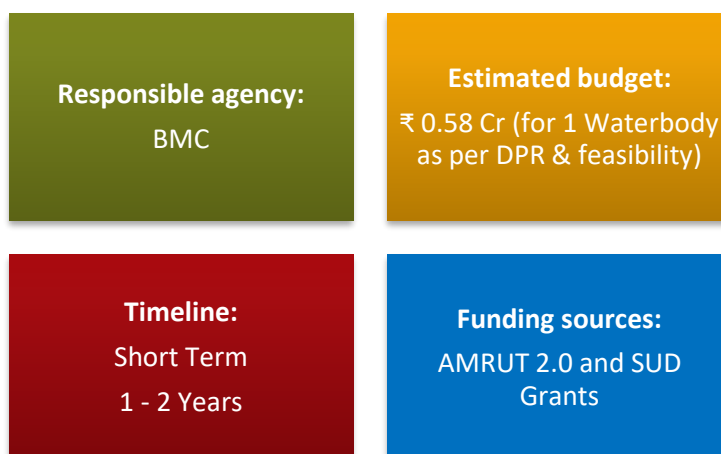
No pond currently qualifies for Priority C. However, once sanitation and recharge measures are successfully implemented, select ponds may transition to this category. The focus will be on enhancing community value while retaining ecological buffers.

Implementation Measures:

- ▶ Develop landscaped ghats and walking paths (≥ 1.5 m wide) using stone and bamboo decking.
- ▶ Install solar powered aeration fountains to improve dissolved oxygen and aesthetics.

- ▶ Provide solar lighting and recycled signage for safety and awareness.
- ▶ Designate cultural activity zones (10–15% of periphery) with bamboo platforms and shaded seating.
- ▶ Enhance the green belt with flowering and shade trees such as gulmohar, neem and amaltas.

Implementation framework:



6.4.3 Intervention 9: Rejuvenation of Diwan Talab

The Diwan Talab is centrally located in Bijnor town between the Chahshirin locality to its west and the Bijnor Inter College to its east. The total site area is approximately 2.3 acres which includes an embankment that surrounds the triangular shaped pond. The southern side of pond shares its boundary with a burial ground.

The pond does not have any inlet and a catchment area. The adjacent roadside nallahs along either edge of the pond carry used water from adjacent settlements and are tapped for diversion to the STP for treatment.



Image 6-7: The pond is surrounded by an embankment



Image 6-8: Adjacent nallah along western edge is tapped downstream

The pond does not have water and is used a play area by the nearby residents. Informal fish and poultry market operates along the western edge of the pond whereas the eastern and southern edge is used for parking of buses and small trucks.



Image 6-9: Fish and poultry market along western edge



Image 6-10: Parking of buses and small trucks

The city authorities have identified this pond for conversion into a recreation hub. Past efforts to retain water in the pond by filling it with bore well water have failed since the pond has a porous bed with a high rate of infiltration.

Based on the above understanding the following key intervention measures have been proposed for rejuvenation of the Diwan talab:

- ▶ Tapping and purifying adjacent nallah water to fill the pond,
- ▶ Bed and slope treatment of the pond to improve water retention and
- ▶ Landscape intervention of lake front embankment for recreation

Tapping and purifying adjacent nallah water: To fill the pond with surface water it is proposed to redirect the used water flowing in the western nallah along outer edge of the pond embankment. A constructed wetland within the pond bed is proposed to purify the water prior to utilizing it for filling the pond (refer Figure 6-5).

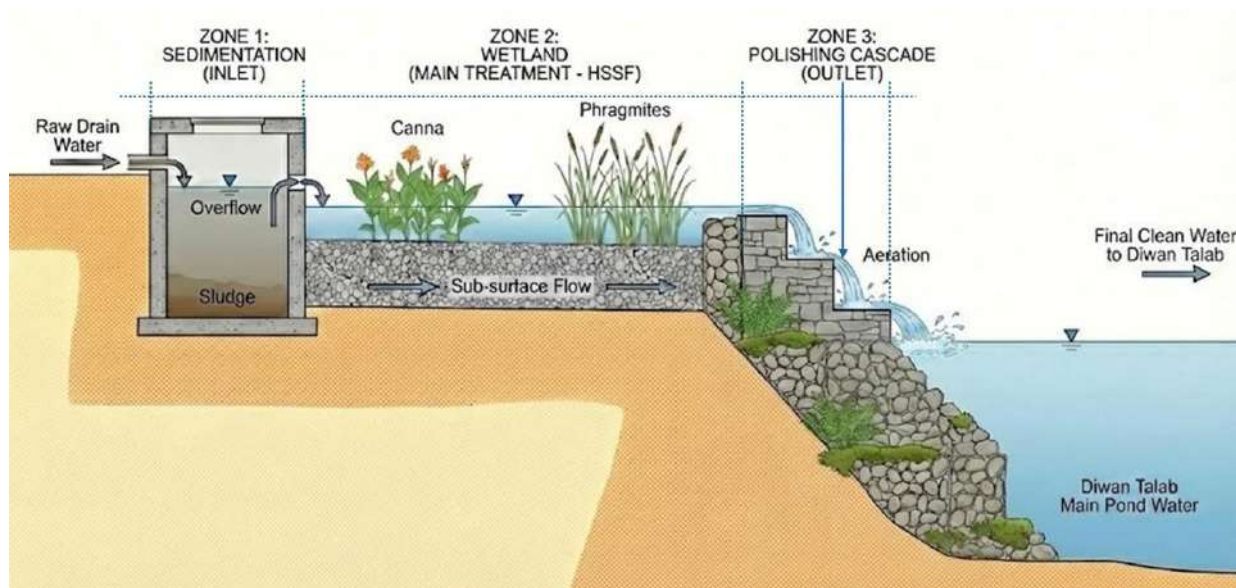


Figure 6-5: Cross section of proposed terraced wetland within Diwan talab

A Terraced Wetland System is proposed to treat approximately 0.5 MLD of nallah water (DO ~3.0 mg/L). As illustrated in the above cross-section, the system is divided into three distinct functional zones that purify water while creating a naturalistic landscape.

- ▶ **Zone 1: Pre-Treatment (Sedimentation)** Raw nallah water enters this deep settling tank where heavy sludge and solid waste settle to the bottom, preventing clogging in the wetland bed. The clarified water overflows into the next zone.

- ▶ **Zone 2: The Bio-Filter (Sub-Surface Wetland):** This zone comprises 0.3-acre horizontal sub-surface flow (HSSF) wetland where water flows beneath the gravel surface, ensuring no bad odours or mosquito breeding. The plant roots and biofilm on the gravel naturally strip nutrients (Nitrates/Phosphates) and reduce BOD over a 1.5-day retention cycle.
- ▶ **Zone 3: The Polishing Rapids (Outlet & Aeration):** This zone comprises a rocky slope zone (an earth embankment clad with stone gabion mattress) connecting the upper wetland to the lower pond. Here treated water tumbles creating a mountain stream effect. This physical agitation results in passive aeration and increases the Dissolved Oxygen levels in the water before it enters the main lake.

Bed and slope treatment to improve water retention: To prevent infiltration from the bed and side slopes of pond it is proposed to lay 60 cm compacted clay liner on the side slopes and pond bed and cover it with 30 cm soil (refer Figure 6-6).

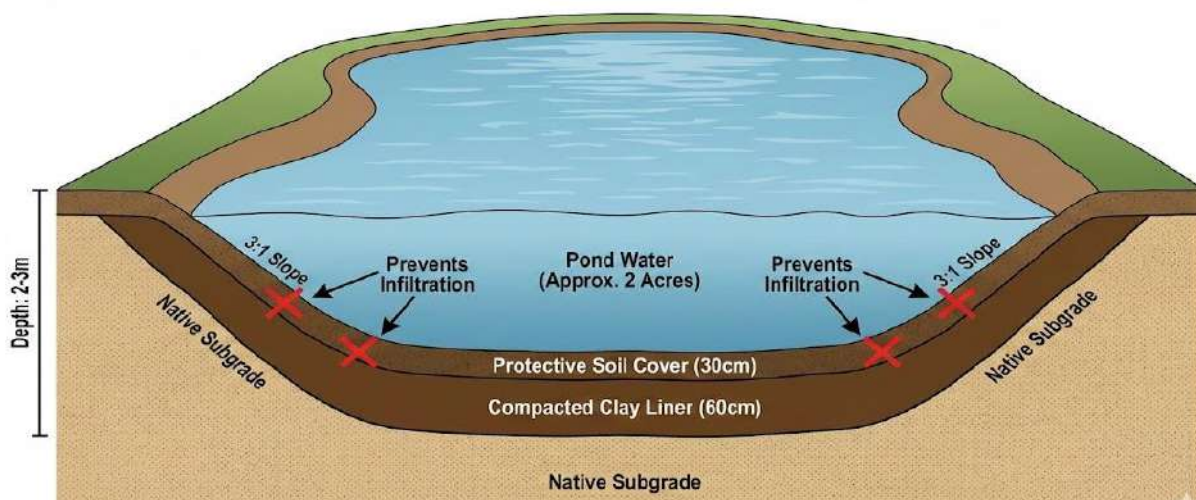


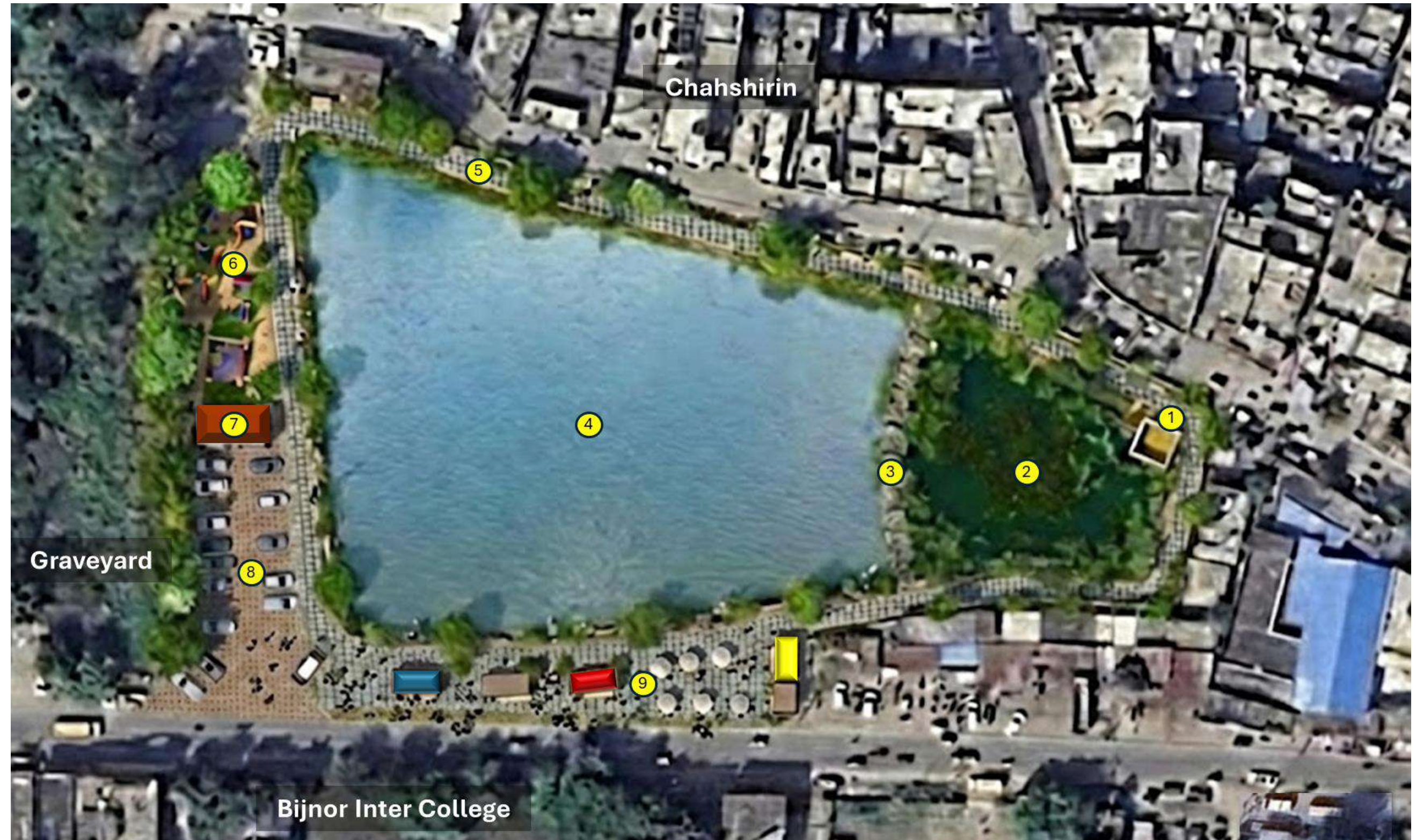
Figure 6-6: Bed and slope treatment with impervious clay liner to minimise infiltration

Landscape intervention of lake front embankment: Hard and soft landscape treatment of the pond embankment is proposed for converting the pond into a recreation zone for the citizens. The key elements comprise:

- ▶ Pedestrian promenade of permeable paver blocks along with safety railing, lights, benches, planting, etc.
- ▶ Children's play area,
- ▶ Food kiosks with seating along main road,
- ▶ Car and two-wheeler parking
- ▶ Toilet block



Image 6-11: View of proposed Diwan Talab promenade



- | | |
|----------------------------------|--------------------------------|
| 1. Sedimentation inlet | 6. Children's play area |
| 2. Subsurface wetland | 7. Toilet block |
| 3. Stone gabion polishing rapids | 8. Car and two-wheeler parking |
| 4. Clear water of pond | 9. Food kiosks with seating |
| 5. Pedestrian promenade | |

Image 6-12: Plan of proposed interventions for Diwan Talab rejuvenation

Implementation framework:

Responsible agencies:
BMC

Estimated budget:
₹ 2.2 to 2.6 Cr

Timeline:
Medium term
9 - 12 months

Funding sources:
AMRUT 2.0, Component
specific PPP, CSR

6.4.4 Intervention 10: Rejuvenation of Bakshi wala Talab

Bakshi wala talab located in eastern part of Bijnor along the railway line, is spread over an area of 8.4 acres. It receives used water from three major nallahs, two from the north (Bakshi wala) and one from the south across the railway line (Bukhara). There are no sewerage lines in these areas (refer Image 6-13).



Image 6-13: Nallahs flowing into Bakshi wala talab



Image 6-14: Nallahs flowing into Bakshi wala talab from north



Image 6-15: Nallah flowing into Bakshi wala talab from south

Satellite imageries of 2014 and 2025 indicate that whereas parts of the water body have been encroached, parts of earlier development have also been lost to submergence due to increase in water level (refer Image 6-16).



Image 6-16: Bakshi wala talab in 2014 and 2025

The pond has experienced significant eutrophication due to inflow of used water from the adjacent nallahs. Hence, it is proposed to construct I&D structures at the nallah outlets and run the intercepting sewers along a peripheral pathway to a new SPS at the eastern bank of the pond. After diversion of the nallah water, the pond will receive storm water supported by treated used water from the nearby STP (proposed) to maintain its water level (refer Image 6-17).



Image 6-17: Diversion of used water to proposed STP and its reuse for filling pond

As an interim measure till the STP and nallah diversion network is established, constructed wetlands at the outlets of the three nallahs is proposed to client the used water flowing into the pond. Further, desilting of the pond and removal of weeds is proposed.

Once, the proposed interventions lead to acceptable water quality in the pond, the city establishment may consider investing in landscaping the precinct areas of the pond for recreation purposes (refer Image 6-18).

Responsible agencies:
BMC

Estimated budget:
₹ 5.5 to 7.0 Cr

Timeline:
Medium term
9 - 12 months

Funding sources:
AMRUT 2.0, Component
specific PPP, CSR



- | | |
|---|---|
| 1. South constructed wetland | 5. Park and playground |
| 2. Permeable paver pathway on gravel base | 6. Parking area |
| 3. North constructed wetland | 7. Access road to park and parking area |
| 4. Boardwalk stretch | 8. Sewage Pumping Station (SPS) |

Image 6-18: Proposed rejuvenation plan for Bakshi wala Talab

6.4.5 Recommendation 2: Protection of Jalalpur Road Talab

The Jalalpur Road Talab is located at the crossing point of Jalalpur Road and Bijnor Ring Road. It lies just outside the municipal boundary along the southern edge of the Ring Road which forms the southern limit of current municipal boundary of the town (refer Image 6-19).



Image 6-19: Jalalpur Road Pond located along Ring Road in rural setting

The adjacent land use of the pond is primarily agriculture. However, the pond is prone to encroachment in future due to its proximity to the intersection of two major roads of the town. Since, the pond lies outside the municipal area, the regulatory authority should immediately demarcate and fence the pond and its buffer area. Only barbed wire with bio-fencing natural vegetation should be used instead of concrete walls to mark the boundaries.

Further, it is imperative that the Master Plan of Bijnor incorporates the following measures to preserve the pond and its catchment area (refer Image 6-20).

- ▶ **Water Body Integration:** The pond should be integrated into the city's plan of open space network (parks/greenways).
- ▶ **Provision Buffer Zone:** The pond should have a buffer zone of 30 meter from the Full Tank Level (FTL) on all sides as per the widely accepted standard, frequently enforced by the NGT and various state high courts. Since most of the water enters the pond as a sheet flow rather than through specific channels the protection strategy of this pond is proposed through managing its perimeter. The buffer zone is proposed as an active Bio-filtration System comprising a Vegetated Filter Strip (VFS) of native tussock grasses and shrubs with deep roots and dense ground cover to trap silt and filter the runoff before it enters the pond.
- ▶ **Provision of Perimeter protection measures:** At the edge of the perimeter depending on the type of development and inflow of water the following measures need to be ensured:
 - Laying of Interceptor Drains outside the buffer zone to intercept sewage from the catchment area so it doesn't flow into the pond.
 - A Perimeter Bioswale (a vegetated ditch) for trapping silt from sheet flow runoff along the outer edge of the buffer zone.
- ▶ **Impervious cover limit:** In the immediate catchment within 200m of the pond and Impervious Cover Limit should be enforced in the Master Plan. For example, within 200m of the pond all developments should have a maximum of 30% paved surface and 70% pervious surface (landscaped or natural) to ensure that the sheet flow remains relatively clean and mimics the natural hydrological cycle.

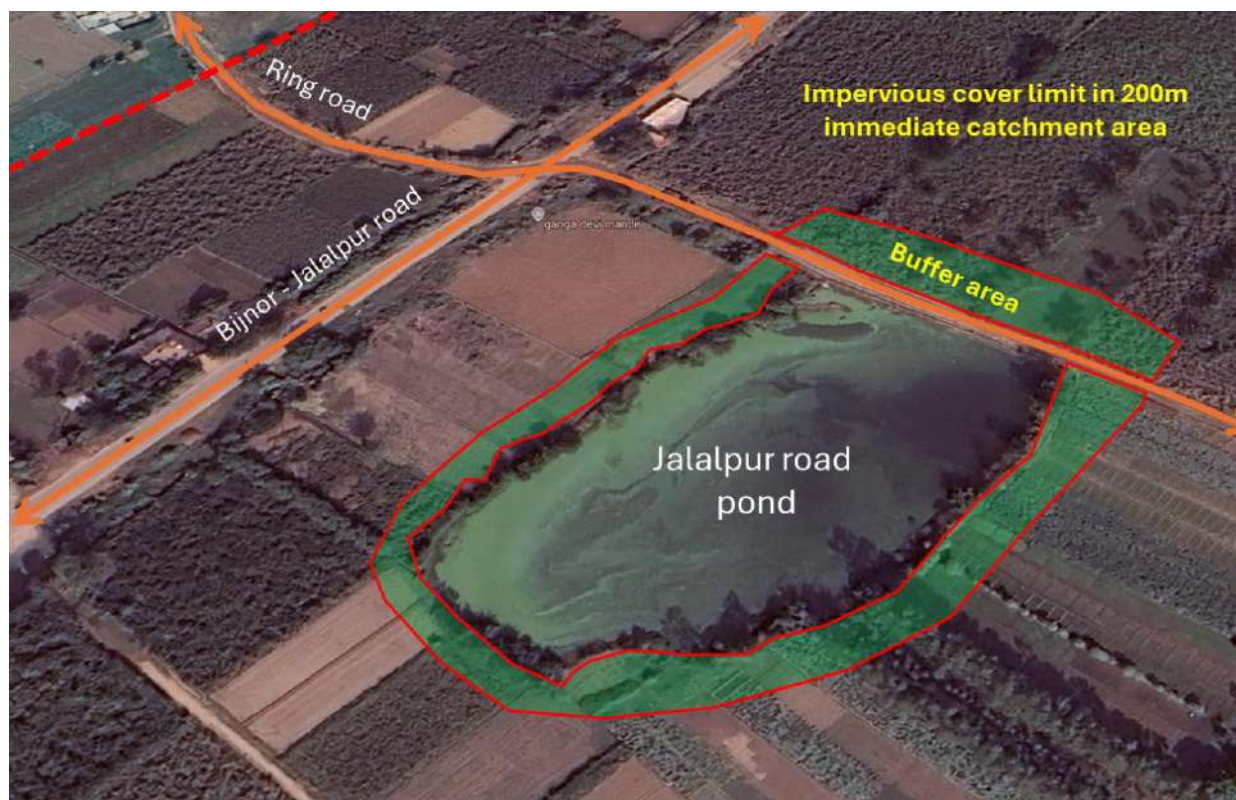


Image 6-20: Proposed protection measures for Jalalpur Road pond

6.4.6 Recommendation 3: Strengthening of water bodies below one acre

In addition to the ten major ponds, smaller water bodies below one acre also require systematic attention to strengthen city-wide resilience. These sites, though limited in size, play a critical role in local recharge, pollution control and ecological balance. Their management must therefore be integrated into the broader Urban River Management Plan (URMP).

Implementation Measures:

- ▶ **Mapping and Monitoring:** All sub-acre ponds will be mapped and regularly monitored to detect encroachment, solid waste dumping and pollution sources. This ensures early intervention and prevents irreversible degradation.
- ▶ **Integration into Recharge Networks:** Smaller ponds will be connected to city recharge systems through percolation pits and infiltration structures, enabling them to contribute to aquifer replenishment despite their limited size.
- ▶ **Nature-Based Solutions:** Rain gardens, bioswales and micro-wetlands will be developed around these ponds to filter runoff, enhance biodiversity and improve water quality using low-cost, eco-friendly methods.
- ▶ **Policy Inclusion:** These water bodies will be formally incorporated into future URMP updates, ensuring that they are not overlooked in planning frameworks and receive sustained attention in monitoring and funding cycles.

6.5 OBJECTIVE 5: INTERVENTION FOR REUSE OF TREATED USED WATER

6.5.1 Intervention 11: Reuse of treated water from 24 MLD STP

As outlined in Section 4.2.2, Bijnor city operates a single Sewage Treatment Plant (STP) with a capacity of 24 MLD. Of the 23.5 MLD treated outflow, 21.4 MLD is discharged into the Ganga River through the Hemraj drain, 2 MLD is supplied for agricultural irrigation via a dedicated pipeline and 4 KL per day is utilized for vehicle washing through two tankers.

The treated effluent meets CPCB reuse standards, making it suitable for irrigation, landscaping and restricted agricultural applications. Despite this, the current reuse volume remains limited, reflecting underutilization of available resources.

As per AMRUT 2.0 guidelines, the city is required to reuse at least 20% of its treated used water, equivalent to approximately 4.7 MLD. Present levels fall short of this benchmark, indicating a compliance gap and necessitating targeted measures to enhance sustainability and resource efficiency.

Proposed Intervention:

To address this gap and initiate sustainable reuse, the following measures are proposed, focusing on the reuse potential of the Bijnor STP:

- ▶ **Reuse in Irrigation:** With completion of household sewer connections in the western part of the railway line, inflow to the STP is projected to rise to 26.6 MLD. This volume will serve approximately 50 hectares of agricultural land adjacent to the STP, ensuring productive utilization and surpassing mandated reuse thresholds. A 12 MLD STP is proposed within the premises to meet requirements for present and over the next 15 years, strengthening long term reuse potential.
- ▶ **Pumping Station:** A pumping station with a civil structure capacity of 36 MLD will be constructed. Initially, equipment will be installed for 26 MLD, with provision for future upgradation to 36 MLD.
- ▶ **Conveyance System:** Treated water will be conveyed through DI and HDPE pipelines (approx. 2.5 km) from the STP outlet to the irrigation system.
- ▶ **Distribution System:** An Outlet Management System (OMS) will regulate discharge into irrigation inlet tanks. A field level distribution network will ensure uniform coverage across the 50-hectare command area.

The map below shows the proposed irrigation coverage area and the preliminary alignment of the conveyance system. These details are indicative and will be further refined during the preparation of the Detailed Project Report (DPR), which will include hydraulic modelling, verification of land ownership and consultations with stakeholders.

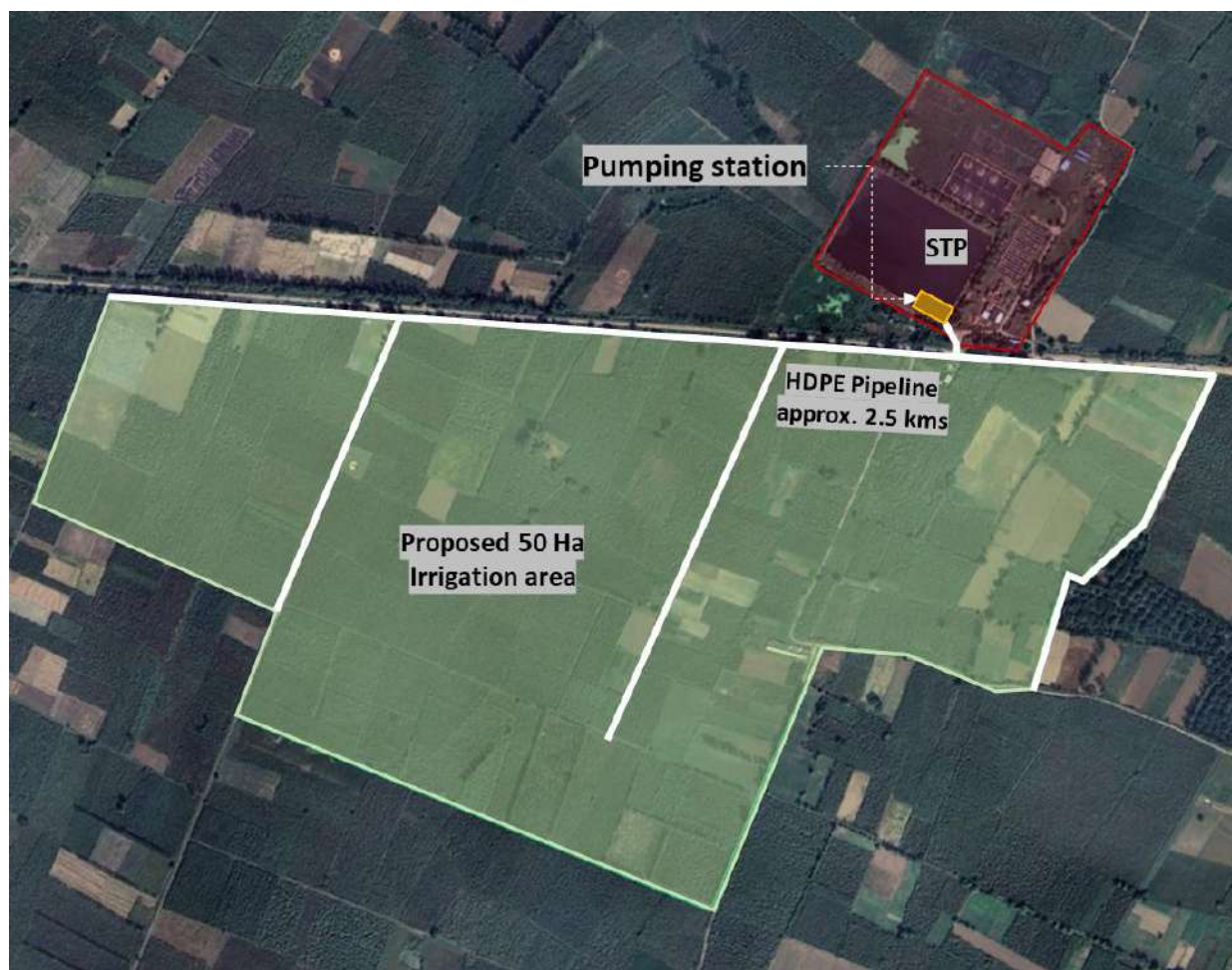
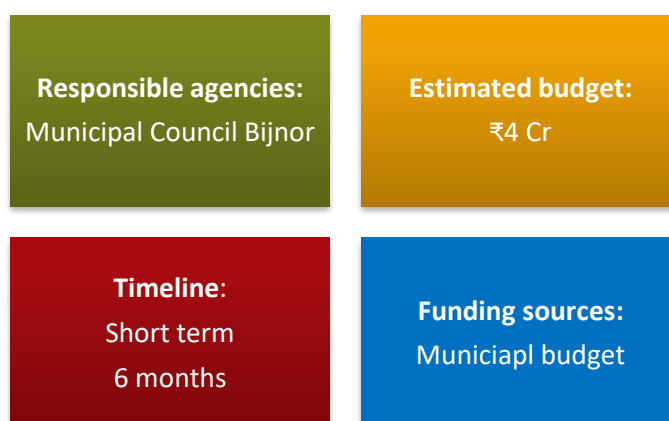


Image 6-21: Proposed Pipeline for reuse of treated used water

Implementation Framework:



6.6 OBJECTIVE 7: INTERVENTIONS TO DEVELOP ECO-FRIENDLY RIVERFRONT PROJECTS

As stated earlier, though River Ganga flows far away from Bijnor town the areas where the city interacts with the river have been identified for URMP intervention. The Bijnor Municipality is connected to the Barrage Ghat at the Madhya Ganga Barrage primarily through service provision, tourism development and

waste management, even though the physical barrage structure is owned by the state Irrigation Department.

6.6.1 Intervention 12: Development of Barrage ghat precinct at Madhya Ganga Barrage

An area of approximately 15 acres comprising the Barrage ghat, Mela ground and the crematorium located between the river and the silt ejector channel of left bank Madhya Ganga Canal Phase-II has been delineated for improvement (refer Image 6-22).



Image 6-22: Key developments around URMP intervention area at Madhya Ganga Barrage

Key issues identified during site visits at the intervention area have been listed in Image 6-23.

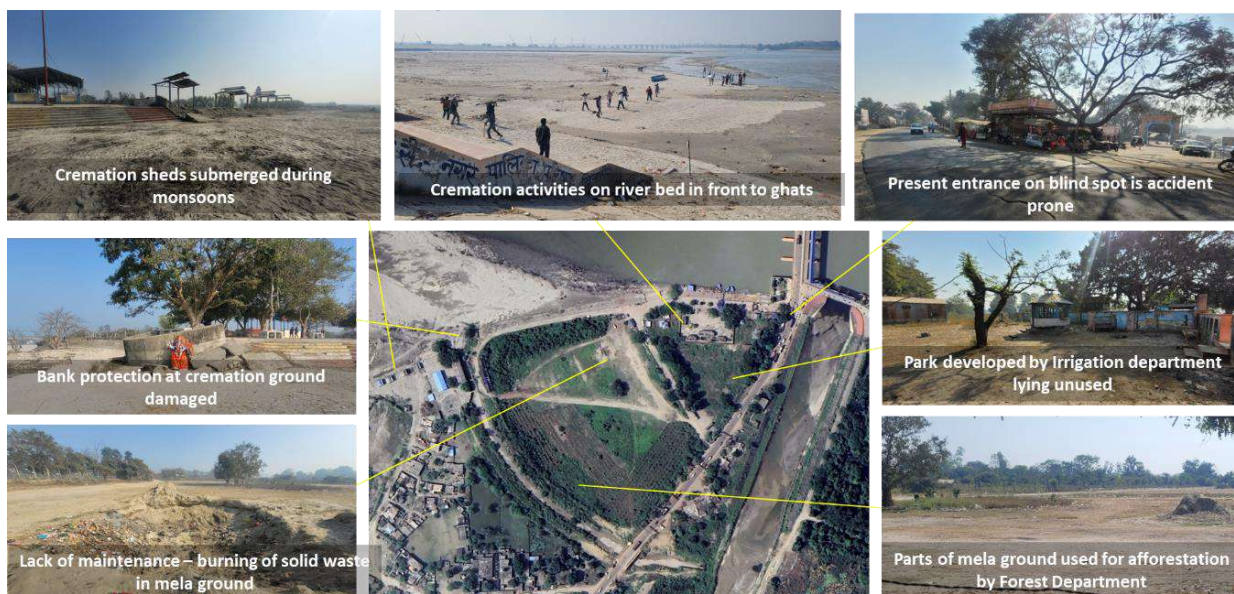


Image 6-23: Site observations at Ganga Barrage

Apart from addressing the existing issues, future potential of the site with respect to tourism was explored and discussed with city officials as stated below:

- ▶ The site’s proximity to Vidur Kuti which is a prominent destination of Mahabharata circuit may be leveraged through establishment of Mahabharata-theme temple and a Bijnor haat. URMP interventions may comprise improvement of the temple precinct such as the haat area.
- ▶ The existing Jalaj Museum may be further expanded to align with Mahabharata theme in addition to the focus on River Ganga, ecology and an outlet for selling local produce and handicrafts.

Proposed interventions at Barrage ghat: Based on those above assessments the following interventions are proposed at the Barrage ghat at the Madhya Ganga Barrage location:

- ▶ Separation of cremation activities from the religious, cultural and recreation activities of the ghat area,
- ▶ Improvement and Introduction of new activities in the Barrage ghat and mela precinct.

Separation of Cremation activities: It is proposed to prevent the spill over of cremation activities near the Barrage ghat through the following interventions:

- ▶ Create a Ganga channel to flow close to the crematorium to discourage these activities being performed near the ghat,
- ▶ Extend bank protection up to the new NH 34 bridge so that the crematorium premises stay protected,
- ▶ Ensure crematorium performs to its full capacity even during monsoons by raising the new sheds above flood level,
- ▶ Introduce electric / gas-based crematorium that are more eco-friendly

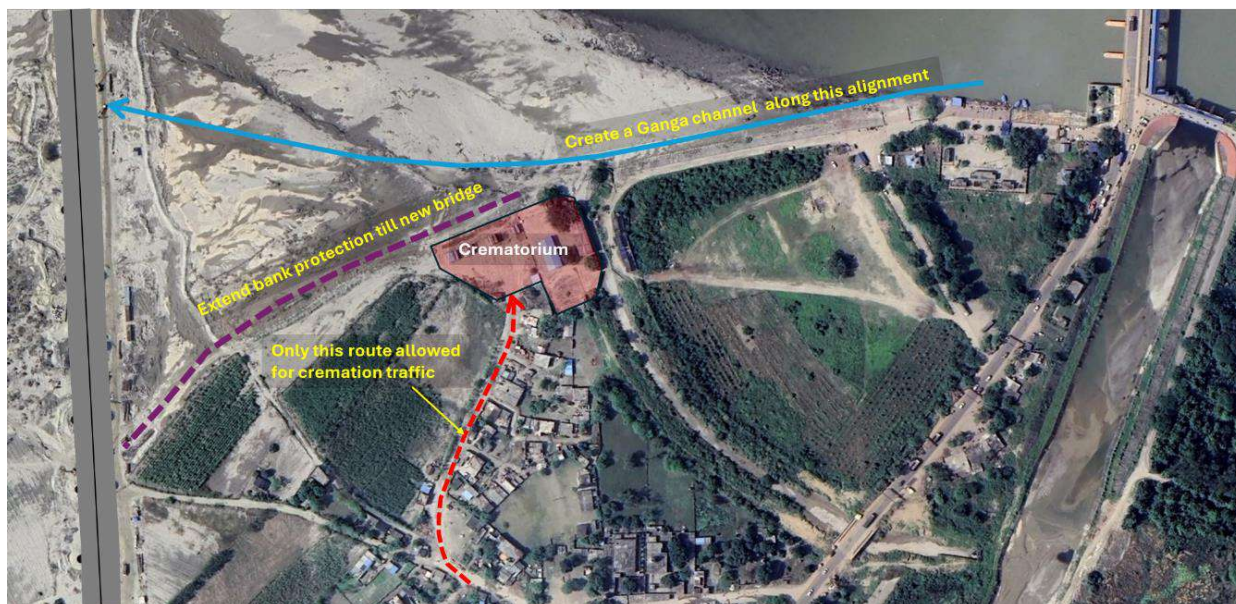


Image 6-24: Proposals to restrict cremation activities within the crematorium

Infrastructure improvement and Introduction of new activities in Barrage ghat area: The following measures are proposed to improve the Barrage ghat area to increase tourist footfalls and encourage river based economic development.

- ▶ Extending the pedestrian bollards close to the road and removing the vehicular parking adjacent to the barrage as this is an accident prone zone
- ▶ Provision of a parking area for the both the riverfront and mela ground along with a toilet block for visitors and vehicle drivers,

- ▶ Developing the defunct irrigation department park behind the ghat area into a park with children’s playground,
- ▶ Provision of paved area next to the ghat for holding Bijnor Haat at frequent intervals which can form part of the larger mela ground during large fairs,
- ▶ Provision of space for establishment of Mahabharata themed temple as future development
- ▶ Expansion of Jalaj museum to a two-storey structure

Implementation Framework:





- | | |
|-----------------------------------|--|
| 1. Only pedestrian entry | 6. Mela ground |
| 2. Expansion of Jalaj Museum | 7. Bijnor haat |
| 3. Park and children's playground | 8. Temple and temple precinct (future development) |
| 4. Toilet block | 9. Connecting pathway from parking area |
| 5. Parking | 10. Realigned Ganga River channel to flow along Barrage ghat |

Image 6-25: Proposals for development of Barrage ghat precinct

6.7 OBJECTIVE 9: INTERVENTION TO INCULCATE RIVER-SENSITIVE BEHAVIOR AMONG CITIZENS

The interventions under Objective 9 are designed to embed ecological awareness and cultural pride into everyday practices, ensuring citizens adopt river-sensitive behavior. From awareness campaigns and eco-clubs to storytelling corners, smart signages and annual river festivals, these measures collectively strengthen emotional, cultural and behavioral ties with River Ganga. The detailed interventions are listed in the sections below.



Figure 6-7: River-sensitive practices and cultural awareness

6.7.1 Intervention 13: Installation of interpretive signages and boards

Bijnor continues to face ecological stress from solid waste dumping, grey water discharge and ritual offerings. The lack of culturally sensitive, river-focused signage at strategic locations fails to discourage these practices, while IEC campaigns remain generic and do not incorporate behavioral science-based cues tailored to sacred sites and community traditions. In addition, limited monitoring and reinforcement mechanisms weaken community accountability, undermining ongoing efforts to rejuvenate wetlands and sustain groundwater recharge:

- ▶ Religious offerings and waste dumping (flowers, plastic bags, food items) are commonly thrown into river leading to water pollution and choking of aquatic species.
- ▶ Despite repeated awareness campaigns, behavioral change in Bijnor remains weak. Citizens often revert to old practices once events conclude
- ▶ Limited monitoring and reinforcement mechanisms to sustain long-term behavioural change

Proposed Intervention:

- ▶ **Installation of Interpretive Boards:** m Multilingual boards shall be placed at strategic public locations like- barrage ghat, near ponds etc. Use culturally sensitive messaging with clear visuals discouraging waste and ritual offerings.
- ▶ **Creative Signboards:** Install durable, weather-resistant signages at nallahs, ghats and solid waste dumping hotspots with impactful messages discouraging littering.

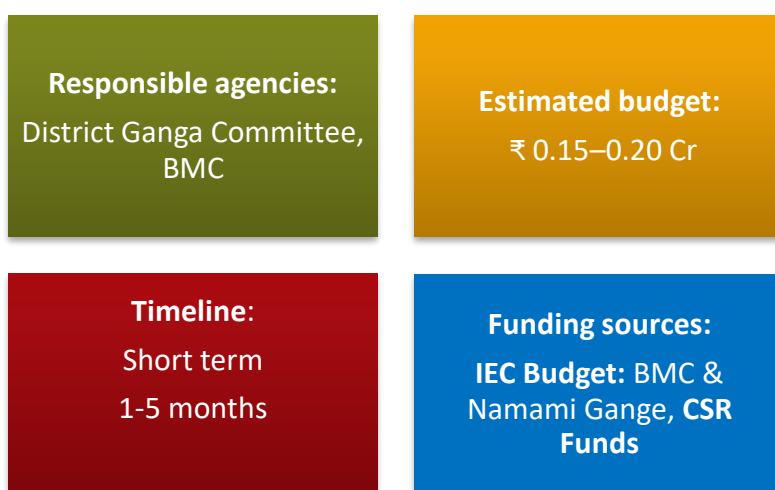
- ▶ **Behavioural Science Design and River ecology Awareness Boards:** Incorporate social norm cues (“Most citizens keep this ghat clean”), positive reinforcement and eye-catching visuals to influence behavior.
- ▶ **Targeted Messaging:** Customize signages for commuters and market users with practical, context-specific call of action.
- ▶ **Community Involvement:** Engage RWAs and SHGs to identify priority locations and co-design culturally relevant messages.

Frequency: The signages will be installed as a one-time intervention with maintenance and review conducted quarterly to ensure their effectiveness and condition.



Image 6-26: A concept design of Behavioural Science Design and River ecology Awareness board

Implementation Framework:



6.7.2 Intervention 14: Distribution of Biodegradable Kits at Jalaj Museum

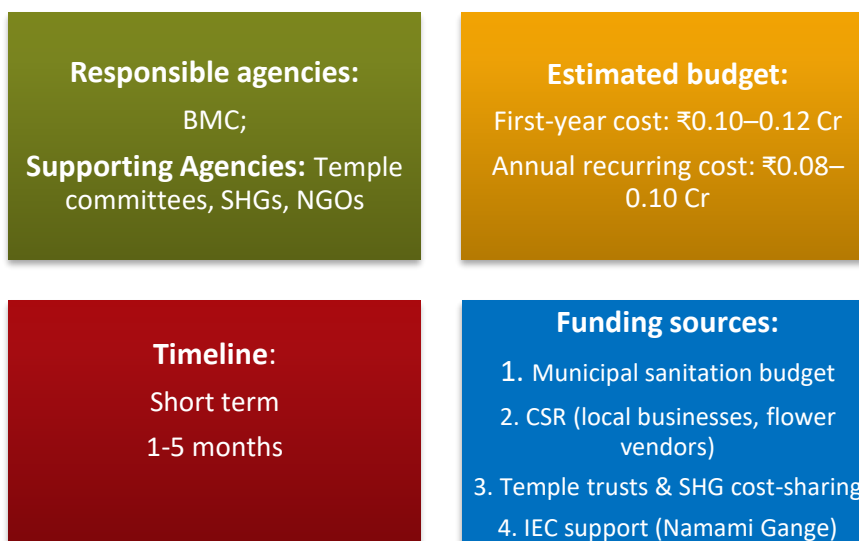
Along the River Ganga near Ganga Barrage ritual activities such as **cremations on the riverbed** and **ritual bathing during Amavasya and Purnima** are commonly observed. While these practices hold deep cultural

and spiritual value, they often involve the immersion of single use plastics and non-biodegradable packaging, which accumulate along the riverbanks and within the water itself.

Proposed Intervention:

- ▶ **Biodegradable Ritual Kits:** Introduce kits comprising dried flowers, tulsi leaves and compostable containers.
- ▶ **Distribution Channels:** Ensure availability through Self-Help Group (SHG) kiosks in major festival congregation points.
- ▶ **IEC Activities:** Promote ecological values embedded in religious practices through targeted Information, Education and Communication (IEC) campaigns, with slogans prominently displayed at distribution points.
- ▶ **Awareness and Advocacy:** Conduct awareness drives in collaboration with priests and temple committees to encourage adoption among devotees.
- ▶ **Community Participation:** Train SHGs to prepare and package kits, thereby fostering livelihood opportunities and strengthening community ownership.
- ▶ **Monitoring and Evaluation:** Municipal staff will monitor kit usage during festivals to assess reductions in plastic waste and track behavioural change.

Implementation Framework:



6.7.3 Intervention 15: Designated Cloth disposal Zones in Kunds “Arpan Kunds” (Ritual Tanks)

Ritual Tanks act as safe, designated cloth disposal points at Barrage Ghat, supported by infrastructure, recycling partnerships, priest advocacy, IEC messaging and monitoring. This intervention reduces ritual waste entering the Ganga while empowering SHGs and reinforcing eco-sensitive practices.

Proposed Interventions

- ▶ **Dedicated Ritual Tanks (Arpan Kunds):** Construct or retrofit dedicated kunds in the shape of an urn (Kalash) at barrage Ghat for cloth disposal with proper lining to prevent seepage into the river.
- ▶ **Segregation & Collection System:** Provide separate bins with compartments for cloth offerings and biodegradable ritual waste, with daily collection by municipal staff or contracted NGOs to prevent overflow.

- ▶ **Recycling & Repurposing Pathways:** Partner with SHGs and textile recyclers to convert collected cloth into reusable products such as bags, mats and rags, while exploring composting for natural fibers and ensuring safe disposal of synthetic materials.
- ▶ **Awareness & IEC Messaging:** Install clear signage at ghat entry points stating, ‘Dispose ritual cloth in Arpan Kunds – Protect the Ganga’ and engage priests and temple committees to guide devotees during rituals.
- ▶ **Monitoring & Reporting:** Municipal staff and NGOs shall daily monitor cloth disposal volumes during peak festivals and periodically during other days. A bi-monthly reporting should be done to assess reductions in waste entering the river.
- ▶ **Tourist & Resort Outreach:** Resorts and wellness centres should include information on Arpan Kunds in their visitor guides and encourage tourists to participate in eco-sensitive rituals by using designated disposal zones.



Image 6-27: Ritual Tanks (Arpan Kunds) at Barrage Ghat

Implementation Framework:

Responsible agencies: BMC; Supporting Agencies: Temple committees, SHGs	Estimated budget: cost: ₹ 0.08 - 0.15 Cr
Timeline: Short term 1-2 years	Funding sources: 1. Municipal sanitation budget 2. CSR (local businesses, flower vendors) 3. Temple trusts

6.7.4 Intervention 16: Introduce River clubs in schools and colleges

Bijnor’s proximity to the Ganga and its cultural-spiritual significance make it a prime candidate for youth-led river conservation. Currently, challenges include:

- ▶ Lack of awareness about river pollution, biodiversity loss and unsustainable practices.
- ▶ Minimal youth engagement in river-related planning and monitoring.
- ▶ Disconnect between education and local ecology, especially in urban settings.

To cultivate environmental awareness, civic responsibility and river stewardship among students by institutionalizing River Clubs in educational institutions across Bijnor.

Proposed Intervention:

- ▶ **Institutional Integration:** Establish River Clubs in all government and private schools and colleges, registered under the District Education Department. It shall be integrated into co-curricular frameworks under Eco Clubs, NSS, NCC and Yuva Tourism Clubs. Each club shall comprise of a faculty coordinator (teacher in environmental studies/ Science), Student Council (president, secretary, eco-volunteers). These clubs will work in partnership with NGOs, SMCG and Bijnor Municipal Council. These clubs shall function as youth-led platforms for river stewardship. Each club shall be assigned a nearby river stretch for conducting cleanliness drives and awareness campaigns.
- ▶ **Curriculum & Activities:** Develop a River Literacy Toolkit covering:
 - Ganga’s ecology, pollution sources and conservation laws.
 - Local river heritage, ghats and biodiversity.
 - Sustainable practices: waste segregation, water conservation and eco-tourism.

Monthly activities:

- ▶ River walks and clean-up drives
- ▶ Water testing and biodiversity mapping
- ▶ Poster-making, debates and street plays
- ▶ Heritage trail documentation and storytelling
- ▶ Monitoring cremation practices and promoting electric crematoriums

Frequency: River Clubs shall conduct weekly meetings for awareness and small campus actions, conducting monthly clean-up drives and workshops, preparing quarterly river health report cards and celebrating annual festivals and awards. This will ensure continuous engagement, builds civic responsibility and integrates cultural, ecological and educational dimensions to protect river Ganga while empowering students as **“River Ambassadors.”**

Monitoring: Create a “Bijnor River Youth Dashboard” within the website of Bijnor Municipal Council for sharing the findings, blogs and creative content.

Implementation Framework:

Responsible agencies:

BMC; District Education Office
(DEO) Bijnor, NMCG

Estimated budget:

₹ 0.21 Cr

Timeline:

Mid term
5-7 Years

Funding sources:

SBM(U) and NMCG
subsidies

6.7.5 Intervention 17: Deploy floating barriers and clean-up teams during high-activity periods (Purnima, Amavasya, etc.).

The banks of river Ganga experiences high footfall during religious observances as listed in Table 2-1 above. The devotees gather at barrage ghat to perform rituals and immerse offerings. These materials continue to accumulate along the bank of the river, leading to deterioration of water quality and impacting aquatic species.

Proposed Intervention

- ▶ **Design of floating barrier:** Install temporary floating barriers (e.g., nylon mesh booms, anchored nets) To intercept floating waste while allowing water flow.
- ▶ **Placement of floating barrier:** Near barrage ghat during the high-footfall days- Purnima and Amavasya
- ▶ **Clean-up Team:** The team shall comprise of 10-15 trained sanitation workers and volunteers from River Clubs. They shall be equipped with gloves, nets, biodegradable waste bags, protective gear and floating platforms where needed.
- ▶ **Monitoring:** CCTV to be installed to track crowd and waste hotspots. The Clean-up team shall record the waste volumes which can be part of the Bijnor River Youth Dashboard.
- ▶ **Awareness campaign:** Use social media and local radio to highlight success stories and promote behavioral change.



Image 6-28: Floating Barrier at Barrage ghat

Implementation Framework

Responsible agencies: BMC; District Ganga Committee Supporting Agencies: SHGs, NGOs	Estimated budget: ₹ 0.10 Cr
Timeline: Short term 1-5 months	Funding sources: 1. Municipal sanitation budget 2. SBM 3. DDMA

6.8 OBJECTIVE 10: INTERVENTION TO ENGAGE CITIZENS IN RIVER MANAGEMENT ACTIVITIES

Objective 10 focuses on active citizen participation and structured stewardship of the rivers in Bijnor. Through River Sabha Committees, creative competitions, street plays and clean-up drives, these interventions institutionalize community involvement, empower residents and youth and strengthen accountability in river governance.

6.8.1 Intervention 18: Formation of River Sabha Committees at City-Level

One of the most pressing environmental challenges in Bijnor is the indiscriminate dumping of solid waste into the city nallahs, which is degrading the water quality and also undermining the ecological health of River Ganga. Community participation in river governance remains fragmented, with limited platforms for collective decision-making. Existing structures such as RWAs and SHGs lack defined responsibilities, resulting in weak engagement and minimal accountability.

- ▶ No formal citizen-led body for river stewardship to coordinate community efforts or provide continuity in monitoring.
- ▶ Weak accountability and transparency in reporting violations such as dumping of solid waste in Nallahs and rivers.

Proposed Intervention:

- ▶ Establish River Sabha Committees at city and ward levels with defined roles and responsibilities.
- ▶ The committee shall comprise of SHGs, youth leaders, RWAs and ward officials to ensure diverse representation.
- ▶ Identify dumping hotspots, cattle bathing points and nallahs discharging into rivers,
- ▶ Committees shall integrate reporting into SBM/URMP dashboards for transparency and accountability.
- ▶ Volunteers shall be trained as to conduct awareness drives, monitor violations and report issues.
- ▶ NSS/NCC units shall be mobilized for monthly riverbank clean-up campaigns, coordinated through the committees.
- ▶ Committees shall hold quarterly meetings to review progress, share updates with municipal authorities and recommend corrective actions.

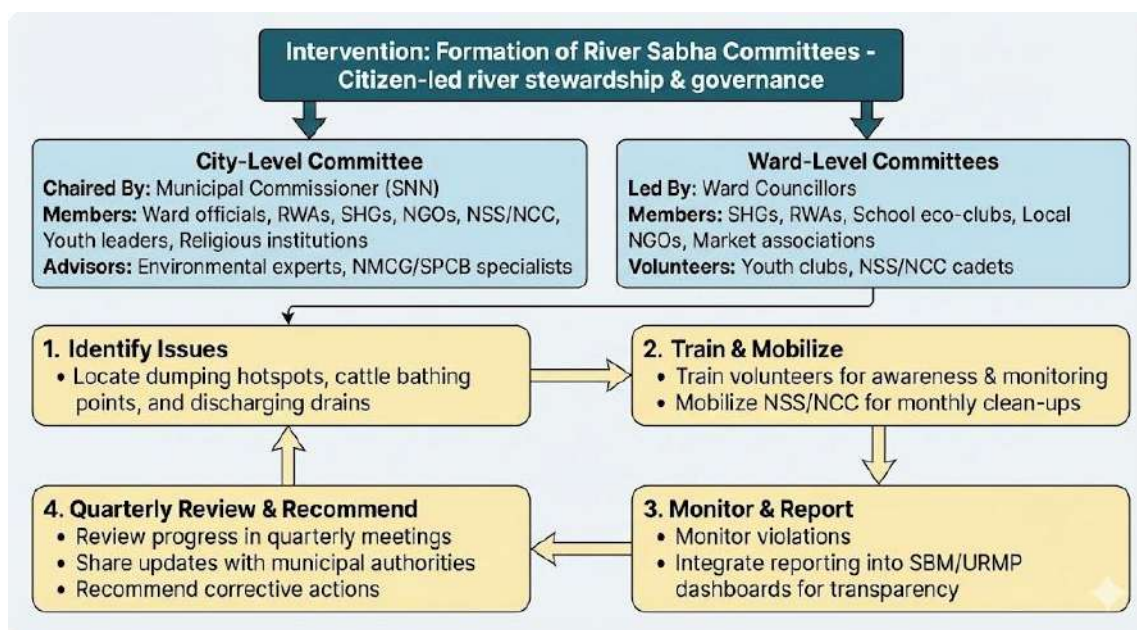
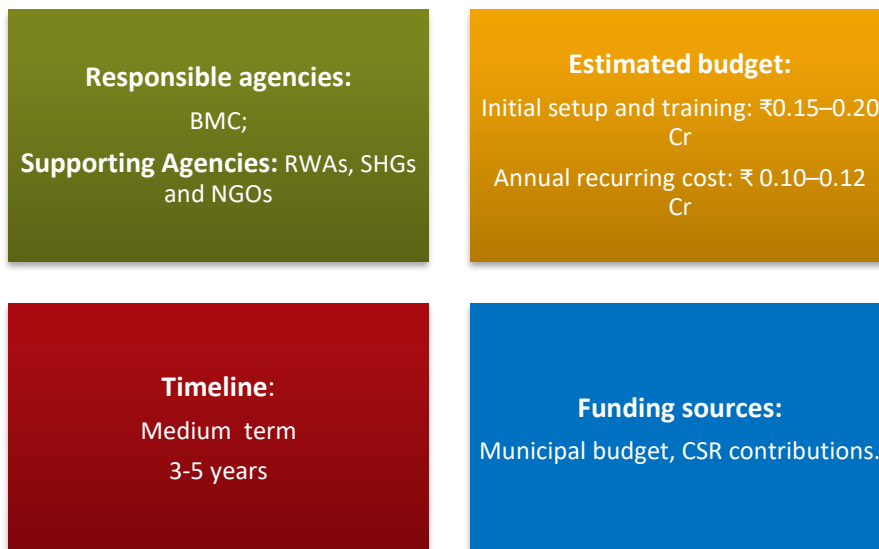


Figure 6-8: Composition of Committee and working model

Implementation Framework:



6.8.2 Intervention 19: Expand Bartan Bank model citywide

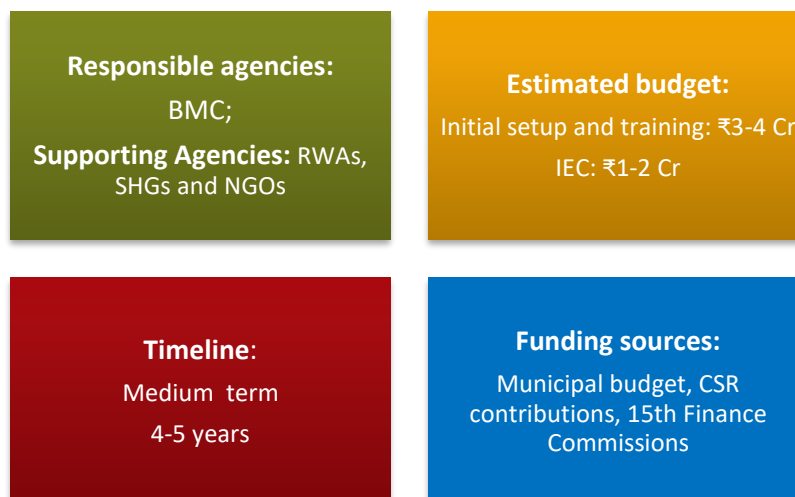
As mentioned in Section 2.7.2, the Pipal Pilkhan Foundation give free utensils during large gatherings to reduce single-use waste. During the large gatherings in the city large volumes of single-use plastics (SUPs) and thermocol waste, is generated. Post-event waste often ending up in nallahs, clogging the local sanitation system. Burning or improper disposal of SUPs releasing toxic fumes and microplastics, deteriorating air quality

Proposed Intervention:

The Bartan Bank model, wherein communities manage the stock of reusable steel utensils, has proven to be effective in reducing disposable waste.

- ▶ Scale up Bartan Banks across major temples, ghats, community halls and municipal wards
- ▶ Offer municipal incentives to event organizers who adopt Bartan Bank services.
- ▶ Recognize “Plastic-Free Festival Champions”
- ▶ Introduce rental and return systems
- ▶ Ban single-use plastics at public events; mandate Bartan Bank use.

Implementation framework



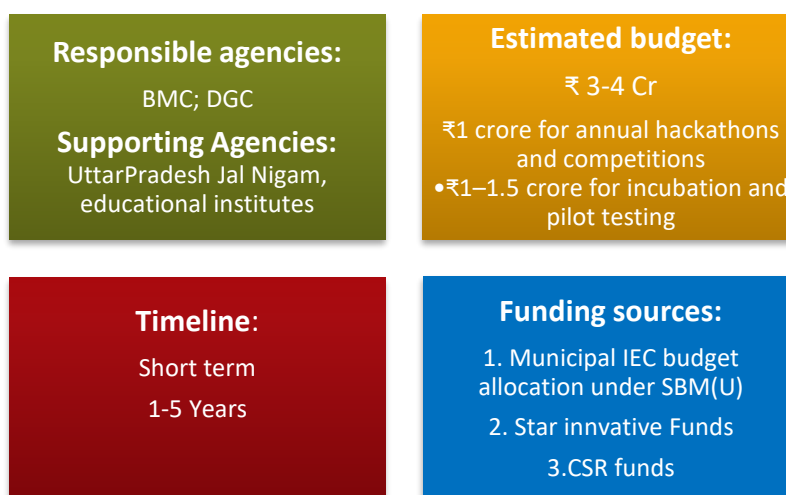
6.8.3 Intervention 20: Organize hackathons and competitions for innovative solutions to river and pond pollution

Bijnor city faces persistent challenges of river and pond pollution due to indiscriminate dumping of solid waste and ritual offerings at ghat and ponds. While municipal and state agencies have introduced cleanliness drives, competitions, pledges in educational institutions and awareness campaigns, they often fall short in addressing localized pollution hotspots. Drains and ponds remain vulnerable, where unmanaged waste accumulates.

Proposed Intervention:

- ▶ **Annual citywide hackathons:** These events will serve as platforms for ideation, collaboration and rapid prototyping.
- ▶ **Create thematic tracks** such as:
 - a. Low-cost used water treatment prototypes
 - b. Digital monitoring tools (apps, IoT sensors)
 - c. Nature-based solutions (floating wetlands, biofilters)
 - d. Community-driven waste management models
- ▶ Winning ideas will receive seed funding, mentorship and incubation support to transition from prototypes to pilot projects
- ▶ Successful prototypes and pilot interventions will be documented and showcased through exhibitions, public demonstrations and digital platforms.

Implementation Framework:



6.8.4 Intervention 21: Street Plays (Nukkad Natak) by SHGs, RWAs & local community.

Street plays are an effective medium for raising awareness about river-related issues. However, in Bijnor, such performances are rarely organized, as current IEC campaigns remain largely dependent on posters and rallies conducted within educational institutions.

Proposed Interventions:

- ▶ Monthly Nukkad Nataks in high-footfall areas such as dense residential settlements, local market and temple precincts should be showcased by the SHG and RWAs.
- ▶ Scripted performances will focus on themes of river pollution, household waste segregation and eco-spiritual values rooted in local traditions.

- ▶ Rotational scheduling across different wards to ensure wider community coverage and sustained visibility.
- ▶ Alignment with cultural calendars so that plays coincide with major festivals and weekly market days, maximizing audience engagement.

Implementation Framework:



6.8.5 Intervention 22: Organizing community-led solid waste clean-up campaigns along nallahs and riverbanks

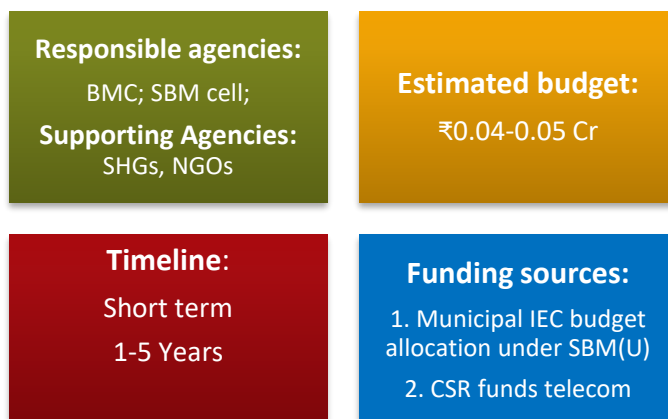
Refer section 4.4 on solid waste management. It was observed that large amounts of waste including plastics, construction debris and organic material are dumped directly onto the nallahs and ponds. No clean-up drives are being undertaken, resulting in limited opportunity for community involvement. The baseline assessment highlights the following key concerns:

- ▶ Weak integration with municipal reporting and monitoring systems
- ▶ Limited acknowledgment and visibility of citizen-led contributions

Proposed Intervention:

- ▶ Conduct monthly clean-up drives led by River Sabha Committees, SHG sand youth clubs.
- ▶ Deploy ward-level monitoring teams to prevent dumping on floodplains and riverbanks.
- ▶ Establish designated waste collection points near dense settlements to reduce direct dumping.
- ▶ Mandate contractors to dispose of debris at authorized sites with penalties for violations.
- ▶ Engage Swachh Sarthi Clubs to adopt nallahs in their localities, reporting blockages and illegal dumping.

Implementation Framework:



6.8.6 Intervention 23: Introduce electric crematoriums and awareness campaigns to encourage eco-friendly practices

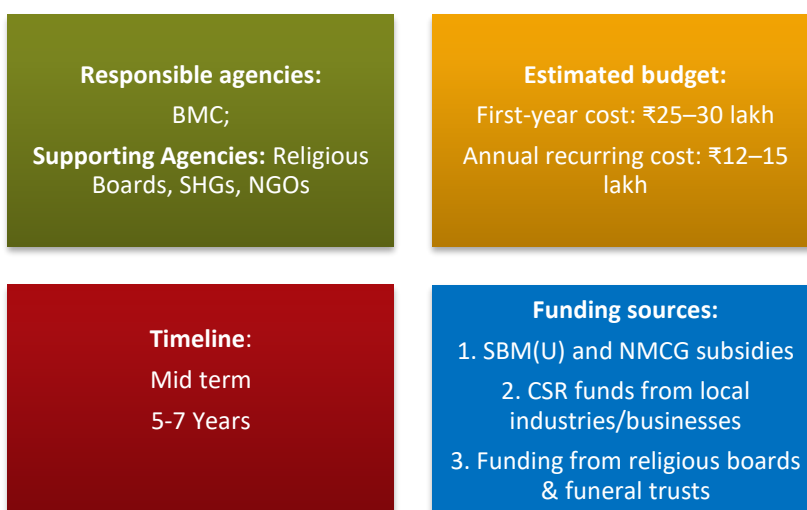
The crematorium in Bijnor city is located on the river bank, due to prevailing religious beliefs and long-standing traditions, majority of the local community prefer traditional wood-based cremations conducted along the riverbank.

Post-cremation remains such as ashes, flowers and ritual offerings are routinely deposited into the river, contributing to water pollution. Despite the availability of electric cremation facilities, citizens remain largely unaware of the subsidies offered and the ecological benefits associated with their use.

Proposed Intervention:

- ▶ Promote electric crematoriums as sustainable alternatives to traditional wood-based practices, emphasizing their ecological and health benefits.
- ▶ Establish formal MoUs with religious boards and cremation committees to secure institutional support and foster wider community acceptance.
- ▶ Organize quarterly workshops with priests, elders and funeral service providers to build awareness and dialogue around environmental and public health impacts.
- ▶ Implement targeted IEC campaigns using posters, short videos and testimonials from families who have adopted electric cremation, to normalize and humanize the practice.
- ▶ Conduct awareness drives to disseminate clear information on available subsidies, municipal support schemes and long-term cost savings.
- ▶ Recognize and empower community leaders as “Eco-Cremation Champions” to serve as trusted advocates and role models for sustainable practices.

Implementation Framework:



Annexures

Annexure 1: Draft scope of work for preparation of FSSM plan

The scope of work under this intervention covers the planning, institutionalization and operationalization of a city-wide Faecal Sludge and Septage Management (FSSM) framework for Bijnor. It builds upon the ongoing infrastructure interventions (co treatment facility, mobile septage treatment unit and resilient FSTP retrofitting) and integrates them into a structured plan aligned with national SOPs.

Key Components of Scope

1. Safe Containment

- Survey and geo tagging of all onsite sanitation systems (OSS).
- Retrofitting septic tanks to watertight standards with baffles, venting and inspection ports.
- Development of a centralized household registry capturing tank size, desludging history and effluent pathways.

2. Scheduled and Regulated Desludging

- Drafting and notification of municipal bylaws mandating desludging cycles (3–5 years).
- Licensing of service providers and deployment of GPS equipped desludging vehicles.
- Transition from reactive desludging to a regulated, city-wide schedule.

3. Transport and Tracking

- Implementation of a digital tracking system (GPS + mobile app) for all desludging vehicles.
- Integration of trip logs into municipal dashboards.
- Requirement of geo tagged proof of discharge at designated treatment points.

4. Treatment Infrastructure

- Operationalization of the 32 KLD co treatment facility at the 40 MLD STP.
- Deployment of the Mobile Septage Treatment Unit (MSTU) for decentralized treatment.
- Flood resilient retrofitting of the Kakra FSTP, including elevation of electrical panels, MCC/PLC systems and solar arrays.
- Planning for additional decentralized FSTPs at strategic locations to reduce transport distances.

5. Reuse and Resource Recovery

- Conversion of treated sludge into compost compliant with Fertilizer Control Order (FCO) standards.
- Establishment of MoUs with farmers’ associations, forestry and municipal parks for offtake.
- Promotion of circular economy practices to recover 15–20 tons/month of compostable material.

6. Operation & Maintenance (O&M)

- Ring fencing of municipal budgets dedicated to FSSM operations.
- Training of operators with quarterly refresher courses on SOPs, PPE use and emergency response.
- Service contracts with private operators tied to performance indicators.
- Preventive maintenance schedules and independent audits for all treatment facilities.

7. Policy, Regulation & Institutional Framework

- Drafting and enforcement of municipal bylaws regulating desludging frequencies, service standards, licensing and penalties for illegal disposal.
- Establishment of a dedicated FSSM Cell within the municipality to coordinate containment, desludging, transport, treatment and reuse.

Launch of citizen dashboards for service requests, compliance monitoring and grievance redressal.

Annexure 2: Prioritization methodology for urban water bodies

This annexure details the methodology used for scoring and prioritizing ponds in Bijnor under the Urban River Management Plan. The framework is based on the **NIUA Urban Water Body Diagnostic Tool**, adapted to enforce a phased logic of “**Sanitation First - Recharge Second - Recreation Last.**” The approach ensures that ecological stability and pollution control measures precede recharge interventions and recreational upgrades.

1. Scoring Framework

Each pond was assessed across three diagnostic dimensions, with indicators scored on a **1–5 scale** (5 = optimal condition, 1 = severe degradation). Composite scores were calculated for each dimension to guide prioritization.

► Dimension 1: Physical Parameters (The Container)

- **Extent of Encroachment:** % of original area lost (1 = >50% encroached; 5 = 0% encroached).
- **Buffer Zone Condition:** Vegetation/open space around rim (1 = concrete edge; 5 = natural vegetation buffer ≥5m).
- **Nature of Bed:** Perviousness of pond bottom (1 = fully concrete lined; 5 = natural soil/sand).

► Dimension 2: Water Quality & Hydrology (The Content)

- **Used water Inlets:** Number and type of nallahs (1 = multiple raw sewage inlets; 5 = no nallahs/treated inflows).
- **Solid Waste Dumping:** Garbage/plastic presence (1 = heavy dumping; 5 = clean surface and banks).
- **Dissolved Oxygen (DO):** DO level in mg/L (1 = <1 mg/L; 5 = >6 mg/L).

► Dimension 3: Social & Economic Potential (The Value)

- **Accessibility:** Ease of public access (1 = landlocked/private; 5 = main road frontage).
- **Cultural Significance:** Association with temples/festivals (1 = none; 5 = active religious/historical use).
- **Surrounding Land Use:** Settlement type (1 = industrial/slum; 5 = residential/institutional).

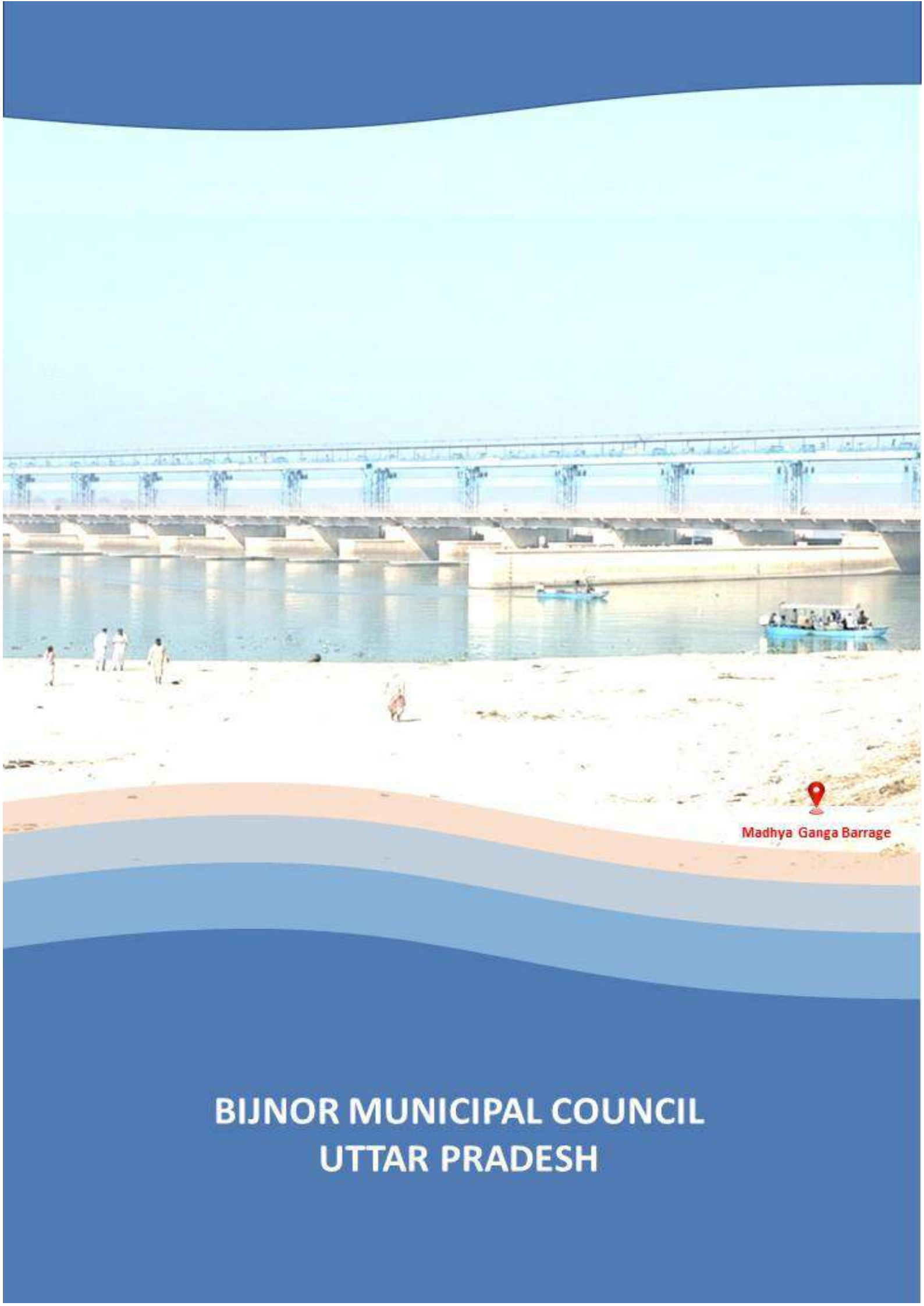
2. Gate Conditions for Prioritization

To prevent misclassification, gate conditions were applied before assigning priorities:

- **Priority A – Drainage & Sanitation-First:** A pond is placed in Priority A if it shows any critical sanitation concern — specifically, multiple raw sewage inlets, visible solid waste dumping, dissolved oxygen levels below 2 mg/L, or a total water quality score of 6 or less.
- **Priority B – Recharge-Focused:** A pond qualifies for Priority B only after sanitation issues are resolved. It must have a natural or mostly natural bed (score ≥4), a physical score ≥10, a water quality score ≥8 and a social score ≥6.
- **Priority C – Recreation & Amenity Upgrades:** A pond is eligible for Priority C only after sanitation is cleared. It must score ≥10 in physical, water quality and social dimensions, with individual scores of at least 4 in accessibility, cultural significance and surrounding land use.

Annexure 3: Water Body Prioritization list for Bijnor City

Sl. No.	Pond Name / Location	Physical Parameters			Water Quality & Hydrology			Social & Economic Potential			Physical Parameters	Water Quality & Hydrology	Social & Economic Potential	New priority
		Extent of Encroachment	Buffer Zone Condition	Nature of Bed (Bottom)	Used Water Inlets	Solid Waste Dumping	Dissolved Oxygen (DO)	Accessibility	Cultural Significance	Surrounding Land Use				
1	Pond 1 (Near STP)	0	1	4	1	2	2	3	1	3	5	5	7	PRIORITY A
2	Pond 2 (Near Sugar Mill)	3	1	3	1	2	2	4	1	1	7	5	6	PRIORITY A
3	Pond 3(Near Bijnor Inter-college)	5	1	5	5	4	5	5	1	5	11	14	11	PRIORITY B
4	Pond 4 (Near Railway line)	0	1	3	1	1	2	3	1	5	4	4	9	PRIORITY A



Madhya Ganga Barrage

BIJNOR MUNICIPAL COUNCIL UTTAR PRADESH