National Institute of Urban Affairs

DRAFT URBAN RIVER MANAGEMENT PLAN

MATHURA-VRINDAVAN



NAGAR NIGAM MATHURA-VRINDAVAN
UTTAR PRADESH

Consultant

LEA

September, 2026

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Table of Contents

E. EXECUTIVE SUMMARY XI

1 INTRODUCTION 1

1.1 PROJECT BACKGROUND 1
1.2 PROCESS FOR PREPARATION OF THE URMP MATHURA- VRINDAVAN 2
1.2.1 URMP State level Workshop 3
1.2.2 Multistakeholder Working Group 3
1.2.3 Urban River Management Plan 5

2 CITY PROFILE 8

2.1 LOCATION AND CITY CONTEXT 8
2.2 CITY ADMINISTRATIVE BOUNDARIES 10
2.2.1 Mathura-Vrindavan Planning Area 10
2.2.2 Mathura-Vrindavan Nagar Nigam 10
2.3 DEMOGRAPHY 12
2.3.1 Existing population 12
2.3.2 Projected Population 12
2.3.3 Tourist Population 13
2.3.4 Slum Population 13
2.4 PHYSIOGRAPHIC PROFILE 15
2.4.1 Topography and Soil Condition: 15
2.4.2 Geomorphological Profile: 15
2.5 CLIMATE AND NATURAL HAZARD 20
2.6 URBAN GROWTH TRENDS 21
2.7 HISTORICAL AND CULTURAL PROFILE 23
2.8 SOCIO – ECONOMIC PROFILE 26
2.9 INSTITUTIONAL MECHANISM 26

3 ECOLOGICAL PROFILE OF THE CITY 30

3.1 RIVER AND ITS ECOSYSTEM 30
3.1.1 River morphology 30
3.2 BLUE-GREEN RESOURCES IN THE CITY 38
3.2.1 Waterbodies and Wetland 38
3.2.2 Ongoing/ Proposed/ Approved Projects 39
3.2.3 Overall Assessment of waterbodies 39
3.2.4 SWOC Analysis 39
3.2.5 URM_{Index} Score 39
3.2.6 Green Resources 42
3.2.7 Riparian Buffer 45
3.2.8 Biodiversity 49
3.2.9 Ongoing/Proposed and Approved Projects 50
3.2.10 Institutional Mechanism 50
3.2.11 Assessment of Riparian Buffer 50
3.2.12 SWOC Analysis 50
3.2.13 URM_{index} score 50
3.3 CLIMATE CHANGE IMPACT ON MATHURA- VRINDAVAN'S RIVER AND WATERBODY SYSTEMS 51
3.4 ACTIVITY MAPPING 52
3.4.1 Riverfront development 53
3.4.2 Ongoing/ Proposed/ Approved Projects 55
3.4.3 Assessment to develop eco – friendly riverfront projects 55

File No. TE/5/2023-KPMG-NATIONAL MISSION FOR CLEAN GANGA-Part(1) (Computer No. 305778)
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3.4.4 SWOC Analysis *55*
3.4.5 URM$_{index}$ Score *56*
3.4.6 Economic activity *57*
3.4.7 Ongoing /Approved /Proposed Project *58*
3.4.8 Institutional Mechanism *58*
3.4.9 Assessment of Leverage the Economic Potential of River *58*
3.4.10 SWOC Analysis *58*
3.4.11 URM$_{index}$ score *59*
3.5 MAPPING OF FLOOD PLAIN 61
3.5.1 Applicable Guidelines for Floodplain Management *61*
3.5.2 Action plan for Restoration of Polluted Stretch of River Yamuna *65*
3.6 FLOODING 65
3.6.1 Fluvial Flooding: *65*
3.6.2 Pluvial Flooding: *65*
3.6.3 Ongoing/ Proposed/ Approved Projects *70*
3.6.4 Institutional Mechanism *70*
3.6.5 Overall Assessment of Flood Plain *71*
3.6.6 SWOC Analysis *71*
3.6.7 URM$_{INDEX}$ Score *71*

4 RIVER-SENSITIVE BEHAVIOR AMONG CITIZENS & TO ENGAGE CITIZENS IN RIVER MANAGEMENT ACTIVITIES 74

4.1 RIVER SENSITIVE BEHAVIOUR AMONG CITIZENS 74
4.1.1 Overview of IEC Activities of the Nagar Nigam Mathura-Vrindavan: *74*
4.1.2 Overall Assessment of River Sensitive behaviour among citizens and engage Citizens *78*
4.1.3 SWOC Analysis *78*
4.1.4 URM$_{INDEX}$ Score *79*
4.1.5 URM$_{INDEX}$ Score *79*

5 PHYSICAL INFRASTRUCTURE 81

5.1 URBAN WATER MANAGEMENT 81
5.1.1 Surface water *81*
5.1.2 Groundwater *83*
5.1.3 Water supply *85*
5.1.4 Institutional Mechanism *86*
5.1.5 SWOC Analysis *86*
5.2 USED WATER MANAGEMENT 87
5.2.1 Sewage Generation and Coverage *87*
5.2.2 On-site sanitation: *94*
5.2.3 Used Water in Drains: *94*
5.2.4 Industrial Effluent Discharge *96*
5.2.5 Ongoing/Proposed/Approved Projects *96*
5.2.6 Overall assessment *97*
5.2.7 Institutional Mechanism *97*
5.2.8 SWOC Analysis *97*
5.3 SOLID WASTE MANAGEMENT 98
5.3.1 Waste Generation, Collection and Process of Conveyance *98*
5.3.2 Waste Disposal Mechanism *98*
5.3.3 Solid Waste Issues *99*
5.3.4 Religious Waste *99*
5.3.5 Dairy Waste *99*
5.3.6 Institutional Mechanism *100*
5.3.7 SWOC Analysis *100*

File No. TE/5/2023-KPMG-NATIONAL MISSION FOR CLEAN GANGA-Part(1) (Computer No. 305778)
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5.3.8 Overall Assessment of Physical Infrastructure: *100*
5.3.9 URM$_{INDEX}$ Score *101*
5.4 REUSE OF TREATED WATER 103
5.4.1 Applicable guidelines and policies *103*
5.4.2 Quantity and quality of treated used water in the city *106*
5.4.3 Existing reuse of treated used water *107*
5.4.4 Institutional Mechanism *107*
5.4.5 URM$_{Index}$ Score *107*
5.4.6 SWOC analysis *108*
5.5 GOOD QUALITY RETURN FLOW 108
5.5.1 Urban water balance *108*
5.5.2 Good Quality Return Flow *108*
5.5.3 On-going/Proposed/Approved projects *109*
5.5.4 Overall Assessment of Good Quality Return Flow *109*

6 SWOC ANALYSIS AND URM INDEXING OF THE CITY 111

6.1 SWOC ANALYSIS 111
6.2 URM INDEXING OF THE CITY 114

7 URMP VISION FOR MATHURA- VRINDAVAN 117

7.1 URMP VISION 117

8 URMP INTERVENTIONS 121

8.1 OBJECTIVE 1: ENSURE EFFECTIVE REGULATION OF ACTIVITIES IN FLOODPLAIN 121
8.1.1 Recommendation 1: Inclusion of flood-lines in the Mathura-Vrindavan Master Plan, 2031 ..... *121*
8.1.2 Recommendation 2: Suggestions and recommendations for the Subsequent Mathura-Vrindavan Master Plan *121*
8.2 OBJECTIVE 2: KEEP THE RIVER FREE FROM POLLUTION 124
8.2.1 Intervention 1: Constructing a Riser type trash on 5 Nallahs in the city *124*
8.2.2 Intervention 2: Implementation of Integrated Dung Waste Management for Bio-CNG Recovery in Mathura-Vrindavan *127*
8.2.3 Intervention 3: Installation of an automated pump at Vishram Ghat I&D *131*
8.2.4 Intervention 4: Integrated Co-Treatment Strategy for City-Wide Faecal Sludge Management *133*
8.2.5 Intervention 5: Preparation of Comprehensive Faecal Sludge and Septage Management (FSSM) Plan with Structured Containment, Scheduled Desludging, Decentralized Treatment and Institutional Reforms *136*
8.2.6 Recommendation 3: Preventing Untreated Sewage Discharge into the Yamuna River from Masani Drain *141*
8.2.7 Recommendation 4: Capacity Enhancement of STPs *143*
8.2.8 Recommendation 5: Strengthening Solid Waste Management Compliance along the River *144*
8.2.9 Recommendation 6: Eco-friendly Idol Immersion and River Surface Cleaning *144*
8.2.10 Recommendation 7: Integrated Pilgrimage Waste Management and Riverbank Protection Strategy for Chintaharan Mahadev Temple *144*
8.3 OBJECTIVE 3: REJUVENATE WATERBODIES AND WETLANDS IN MATHURA-VRINDAVAN 146
8.3.1 Intervention 6: To create water body Database at city level *146*
8.3.2 Recommendation 8: Restoration of Urban Ponds for Groundwater Resilience and Ecological Renewal *150*
8.3.3 Intervention 7: Rejuvenation of Dampier Nagar Pokhar as a Blue-Green Community Recreation & Seasonal Wetland Park *153*
8.4 OBJECTIVE 4 ENHANCE RIPARIAN BUFFER 160
8.4.1 Intervention 8: Restoration of low density vegetated riparian stretches *160*
8.4.2 Recommendation 9: Conservation and Preservation of Natural Dense Riparian Buffer *164*
8.5 OBJECTIVE 6: GOOD QUALITY RETURN FLOW 166

File No. TE/5/2023-KPMG-NATIONAL MISSION FOR CLEAN GANGA-Part(1) (Computer No. 305778)
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2938630/2026/KPMG Section

8.5.1 Recommendation 10: Transforming Public Parks into Sponge Parks 166
8.6 OBJECTIVE 7 & 8: DEVELOP ECO-FRIENDLY RIVERFRONTS AND LEVERAGE THE ECONOMIC POTENTIAL OF THE RIVER. 167
8.6.1 Intervention 9: Vishram Ghat Riverfront Renaissance: A Safe, Shaded & Sacred Yamuna Experience 168
8.6.2 Recommendation 11: Heritage-Sensitive Ghat Revitalization 173
8.6.3 Intervention 10: Yamuna Heritage Edge: Integrated Riverfront Revitalization, Safety and Visitor Experience Enhancement at Keshi Ghat 174
8.7 OBJECTIVE 9: INCULCATE RIVER-SENSITIVE BEHAVIOUR AMONG CITIZENS 176
8.7.1 Intervention 11: River Awareness Campaign – "Meri Nadi, Mera Shahar" 176
8.7.2 Intervention 12: Distribution of Biodegradable Kits at Major Ghats 178
8.7.3 Intervention 13: Installation of interpretive signages and boards 180
8.7.4 Intervention 14: River Storytelling Corners for community-led narratives and cultural connection... 183
8.7.5 Intervention 15: Engaging Temple and Mosque Networks for River Protection 185
8.8 OBJECTIVE 10: ENGAGE CITIZENS IN RIVER MANAGEMENT ACTIVITIES 186
8.8.1 Intervention 16: Formation of River Sabha Committees at City-Level 186
8.8.2 Intervention 17: "Yamuna Jal Mahotsav: Organizing Annual River Heritage and Conservation Festival 188
8.8.3 Intervention 18: Introducing Youth Internship Program – "Yamuna Warriors" 190
8.8.4 Intervention 19: Community Composting & Waste Segregation Workshops 191
8.8.5 Intervention 20: River Clean-Up Drives – "Yamuna Mitra Abhiyan" 193

9 CONCLUSION 195

BIBLIOGRAPHY 50

List of Figures

Figure 1-1: Ten Objectives of the URMP 1
Figure 1-2: National, State & City Engagement for the URMP Preparation 2
Figure 1-3: Process for preparation of URMP 2
Figure 1-4: Methodology for URMP 6
Figure 2-1: Population projection of Mathura-Vrindavan 13
Figure 5-1: Yamuna River Water Quality at monitoring locations 83
Figure 5-2: Ground Water Level of Mathura-Vrindavan City (2016-2023) 84
Figure 5-3: Water Source of Mathura- Vrindavan city 86
Figure 5-4: Existing sewerage situation of Mathura-Vrindavan city 88
Figure 5-5: Targets in National Framework on safe reuse of treated water issued by NMCG 105
Figure 5-6: Flow diagram of urban water balance 109
Figure 8-1: Process flow diagram of co-treatment units 135
Figure 8-2:Urban Waterbody Diagnostic Key Parameters 147
Figure 8-3: Composition of Committee and working model 187
Figure 8-4: Annual River festival Organization and activity flow 189

File No. TE/5/2023-KPMG-NATIONAL MISSION FOR CLEAN GANGA-Part(1) (Computer No. 305778)
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List of Picture

Picture 1-1: State Level Workshop for Uttar Pradesh on 3rd May 2025 3
Picture 1-2: Introductory meeting held on 14 July 2025 at Mathura-Vrindavan 3
Picture 1-3: 2nd MSWG Meeting held on 2 June 2026 at Mathura-Vrindavan 5
Picture 1-4: Consultations and Site Visits 6
Picture 2-1: Shri Banke Bihari Temple in Vrindavan 23
Picture 2-2: Dwarkadhish Temple in Mathura 23
Picture 3-1: Yamuna River at Asikunda Ghat, Mathura 30
Picture 3-2: Yamuna River near Vishram Ghat, Mathura 30
Picture 3-3: Seasonal Flow variation in Mathura- Vrindavan 31
Picture 3-4: Temporal course change in Mathura- Vrindavan 32
Picture 3-5: Water Level during pre and post monsoon at Bengali ghat 32
Picture 3-6: Cross-Section of Yamuna River at Mathura 36
Picture 3-7: Cross-Section of Yamuna River at Vrindavan 37
Picture 3-8: Ramtal Kund 38
Picture 3-9: Matovan pond 38
Picture 3-10: Indal kund 38
Picture 3-11: Savri Masjid Pond 38
Picture 3-12: Avian species in Mathura- Vrindavan 42
Picture 3-13: Wild animals in Mathura- Vrindavan 42
Picture 3-14: Species of Pisces found in Mathura- Vrindavan 43
Picture 3-15: Reptilian species in Mathura- Vrindavan 43
Picture 3-16: Riparian vegetation along eastern bank of Yamuna River in Vrindavan 45
Picture 3-17: Riparian vegetation along the Yamuna River in Vrindavan 45
Picture 3-18: Native species along the River Yamuna and Mathura-Vrindavan city 49
Picture 3-19: Boating activities along the ghats 57
Picture 3-20: Informal settlements within the HFL along the Yamuna River in Vrindavan 69
Picture 3-21 : Informal settlements within the HFL along the Yamuna River in Mathura 69
Picture 3-22: Water level during monsoon season 70
Picture 4-1: IEC activities by Nagar Nigam Mathura-Vrindavan 77
Picture 5-1: 14.5 MLD STP – WSP Technology 90
Picture 5-2: 8 MLD STP – UASB Technology 90
Picture 5-3: 16 MLD STP – UASB Technology 90
Picture 5-4: 4 MLD STP – WSP Technology 90
Picture 5-5: Ambhakar Drain 95
Picture 5-6: Chaitanya Vihar Drain 95
Picture 5-7: Sunrakh Drain 95
Picture 5-8: Manhole at Vishram Ghat 95
Picture 5-9: Overflow of Masani Drain 95
Picture 5-10: Balbhadra kund 96
Picture 5-11: shiv mandir pond 96
Picture 5-12: Distance of Solid waste processing site from Yamuna River 98
Picture 5-13: Floral offerings accumulated along ghats 99
Picture 5-14: Solid waste accumulated at Sunrakh drain 99
Picture 5-15: Cow dung waste at Octroi post nallah 100
Picture 8-1: Solid waste accumulated at Various Nallahs in the city 124

File No. TE/5/2023-KPMG-NATIONAL MISSION FOR CLEAN GANGA-Part(1) (Computer No. 305778)
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Picture 8-2: Conceptual arrangement of Riser-type Trash Trap systems (floating boom barrier, mechanical screen and belt conveyor) 125
Picture 8-3: Floating barrier before entering to Hussain Sagar Lake 126
Picture 8-4: Vishram ghat I &D 131
Picture 8-5: Sewage inflow of Masani Drain in Yamuna River 142
Picture 8-6: Proposed site of Dampier Nagar Pokhar 153
Picture 8-7: 3D views of Proposed Conceptual Plan 155
Picture 8-8: Existing and Proposed view of Dampier Nagar Pokhar 156
Picture 8-9: Proposed conceptual plan of Dampier Nagar Pokhar 157
Picture 8-10: low- density Riparian stretches along Yamuna River 160
Picture 8-11: Section of the Proposed riparian stretch along eastern and western bank of the Yamuna River 162
Picture 8-12: Illustration of proposed riparian stretch on Yamuna River 163
Picture 8-13: Contextual pictures of conversion of a Public Park into Sponge Park 167
Picture 8-14: Existing condition and proposed views of Vishram Ghat 172
Picture 8-15: Existing condition and proposed views of Asikunda Ghat 174
Picture 8-16: Existing condition and proposed views of Keshi Ghat 175
Picture 9-1: Prioritization of Interventions in Mathura- Vrindavan 197

List of Maps

Map 2-1: Regional setting of Mathura- Vrindavan city 9
Map 2-2: Administrative Map of Mathura-Vrindavan 11
Map 2-3: Population Density map of Mathura-Vrindavan city 14
Map 2-4: Elevation map of Mathura-Vrindavan 16
Map 2-5: Contour map of Mathura-Vrindavan 17
Map 2-6: Slope map of Mathura-Vrindavan 18
Map 2-7: Geomorphological map of Mathura-Vrindavan City 19
Map 2-8: Urban Sprawl Map 22
Map 2-9: Parikarma Marg in Braj region 25
Map 3-1: Temporal Course Change of Yamuna River for 1999 to 2024 33
Map 3-2: River Yamuna water channel in pre-monsoon and post-monsoon months 34
Map 3-3: Waterbodies map of Mathura- Vrindavan 41
Map 3-4: Green Resources in Mathura- Vrindavan 44
Map 3-5: Existing Riparian buffer along Yamuna River 47
Map 3-6: Existing Riparian buffer along Canal/ Steams/ Drain 48
Map 3-7: Activity Mapping (Economic Activity) of Mathura-Vrindavan city 60
Map 3-8 Floodplain Map Mathura-Vrindavan City 64
Map 3-9: Fluvial Flooding map Mathura-Vrindavan city 67
Map 3-10: Pluvial Flooding map Mathura-Vrindavan city 68
Map 5-1: Water quality monitoring station (DO and faecal Coliform) 82
Map 5-2: Categorization of Assessment Units (Block & Urban area) for Ground Water Extraction in Uttar Pradesh 84
Map 5-3: Electrical Conductivity Map of Uttar Pradesh 85
Map 5-4: Drains connected to different STPs in Mathura 91
Map 5-5: Drains connected to different STPs in Vrindavan 92

File No. TE/5/2023-KPMG-NATIONAL MISSION FOR CLEAN GANGA-Part(1) (Computer No. 305778)
Generated from eOffice by Dimple Gulati, Support institution (DG)-O/o ED(PROJECT), PROJECT SUPPORT STAFF, NATIONAL MISSION FOR CLEAN GANGA on 21/10/2026 01:31 pm

Map 5-6: Liquid Waste Management (Sewerage) in Mathura- Vrindavan....93
Map 5-7: Solid Waste Management in Mathura Vrindavan....102
Map 7-1: Riverfront Zoning of Yamuna River in Mathura- Vrindavan City....119
Map 8-1: City- vide coverage of existing physical infrastructure (sewerage)....134
Map 8-2: Existing Low-Density Vegetation in Mathura- Vrindavan....161
Map 8-3: Existing Dense Vegetation Stretches in Mathura- Vrindavan....165
Map 9-1: Intervention Map of Mathura- Vrindavan....196

List of Table

Table E-1: List of Proposed Interventions and Recommendation xii
Table 1-1: MSWG for Mathura-Vrindavan....4
Table 2-1: Demographic details of Mathura-Vrindavan....12
Table 2-2: Yearly Tourist inflow in Mathura-Vrindavan (Population in lakhs)....13
Table 2-3: Festivals celebrated in Mathura–Vrindavan city....23
Table 2-4: Socio-Economic profile Mathura–Vrindavan city....26
Table 2-5: Role and Responsibility of key government agencies for Mathura-Vrindavan City....26
Table 3-1: Changes in channel width in the last 25 years....31
Table 3-2: Revival Score Calculation Criteria for Water Bodies....39
Table 3-3: Existing Riparian Buffer along the Banks of Yamuna River (in mts.)....45
Table 3-4: List of Flora and Fauna Along the Yamuna River....49
Table 3-5: Departments and their roles and Responsibilities for Riparian Buffer....50
Table 3-6: Point and Non- point sources along the Yamuna River....52
Table 3-7: Infrastructure Assessment of Major Ghats in Mathura....53
Table 3-8: Infrastructure Assessment of Ghats in Vrindavan....54
Table 3-9: Calculation of Eco-friendly riverfront....56
Table 3-10: Summary of river-related policies and guidelines in Uttar Pradesh....61
Table 3-11: Roles and responsibilities of government agencies in flood protection management for Mathura-Vrindavan City....70
Table 3-12: Floodplain Management Score....71
Table 4-1: List of IEC Activities undertaken by Nagar Nigam....74
Table 4-2; List of IEC Activities on Waste Management & Segregation....75
Table 4-3: List of IEC Activities on Community Mobilization....76
Table 4-4: List of IEC Activities on Sanitation & Hygiene....76
Table 4-5: List of IEC Activities on Eco-Friendly & Green Initiatives....77
Table 4-6: Calculation of Citizen Sensitization points....79
Table 5-1: Classification of Yamuna River Water Quality (Parameter-wise Evaluation)....83
Table 5-2: Groundwater Extraction Status Classification Based on Stage of Extraction (%)....83
Table 5-3: Water demand Projections of Mathura-Vrindavan....86
Table 5-4: Water demand and Sewage generation projections of Mathura-Vrindavan for residential and floating population....87
Table 5-5: Inflow and outflow of STPs....89
Table 5-6: DO levels of untapped Water Drains....94
Table 5-7: DO level of ponds of Mathura-Vrindavan....96

File No. TE/5/2023-KPMG-NATIONAL MISSION FOR CLEAN GANGA-Part(1) (Computer No. 305778)
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2938630/2026/KPMG Section

Table 5-8: Applicable Guidelines and Policies for reuse of treated water 103
Table 5-9: Quality of Treated used Water 106
Table 6-1: Prioritization Matrix 115
Table 7-1: Zoning & Vision Framework Strategies/Action Plan 118
Table 8-1: Proposed River-centric development inclusions in the Mathura- Vrindavan Master Plan 2031 122
Table 8-2: Proposed Components in the nallah and the details 125
Table 8-3: Components for creating database of waterbodies 147
Table 8-4: Key components for creating the database of waterbodies in Mathura- Vrindavan city 148
Table 8-5: Prioritization of Waterbodies in Mathura-Vrindavan 150
Table 8-6: Recommendation for existing riparian stretch conservation and preservation 166

List of Annexures

Annexure 1: Steering Committee - Minutes of the Meeting 1
Annexure 2: District Ganga Committee - Minutes of the Meeting 8
Annexure 3: MSWG Notification 13
Annexure 4: Draft Minutes of the Meeting (MOM) 2nd MSWG 14
Annexure 5 Details of on-site survey of water bodies 20
Annexure 6: Flora Found in the Braj Region 22
Annexure 7: Chief Trees and Flora of the Region 22
Annexure 8: Fauna Found in the Braj Region 23
Annexure 9: Existing Riparian buffer along Streams and Canal 25
Annexure 10: Existing Riparian buffer along man-made drains 25
Annexure 11: Existing Riparian buffer along Masani drain 25
Annexure 12: Yamuna River Action Plan–URMP Convergence Matrix 26
Annexure 13: CPCB - Designated Best Use classification 32
Annexure 14: Detailed observations of on-site survey of 36 drains of Mathura-Vrindavan 33
Annexure 15: List of IEC Activities under Swachhata Campaigns 42
Annexure 16: List of IEC Activities on Plastic Pollution Control 43
Annexure 17: List of IEC Activities during Special Events 44
Annexure 18: Draft scope of work for preparation of FSSM Plan 45
Annexure 19: Prioritization methodology for urban water bodies 47
Annexure 20: Priority Table for urban water bodies 48

File No. TE/5/2023-KPMG-NATIONAL MISSION FOR CLEAN GANGA-Part(1) (Computer No. 305778)
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ABBREVIATIONS

Abbreviations	Full form
ADM	Additional District Magistrate
ADB	Asian Development Bank
AMRUT	Atal Mission for Rejuvenation and Urban Transformation
BOD	Biological Dissolved Oxygen
CAMPA	Compensatory Afforestation Fund Management and Planning Authority
CEO	Chief Executive Officer
CETP	Common Effluent Treatment Plant
COD	Chemical Oxygen Demand
CPCB	Central Pollution Control Board
CGWB	Central Ground Water Board
CPHEEO	Central Public Health and Environmental Engineering Organisation
CNG	Compressed Natural Gas
CSR	Corporate Social Responsibility
DEM	Digital Elevation Model
DEWATS	Decentralized Used water Treatment System
DFO	Divisional Forest Officer
DGC	District Ganga Committee
DO	Dissolved Oxygen
DPO	District Planning Officer
EC	Electrical Conductivity
FSSM	Faecal Sludge and Septage Management
FSTP	Faecal Sludge Treatment Plant
GIS	Geographic Information System
GWRA	Ground Water Resource Assessment
GVP	Garbage Vulnerable Point
HFL	High Flood Level
IEC	Information Education Communication
IOCL	Indian Oil Corporation Limited
IPS	Intermediate Pumping Station
ISKCON	International Society for Krishna Consciousness
IWAI	Inland Waterways Authority of India
MLD	Million Liters per Day
MIS	Management Information System
MRF	Material Recovery Facility
MSWG	Multi-Stakeholder Working Group
MVDA	Mathura-Vrindavan Development Authority
MoEFCC	Ministry of Environment, Forest and Climate Change
MPN	Most Probable Number
MNRE	Ministry of New and Renewable Energy
MVDA	Mathura- Vrindavan Development Authority
NBS	Nature-Based Solutions
NDWI	Normalized Difference Water Index
NH	National Highway
NGO	Non- Government Organization
NGT	National Green Tribunal
NIUA	National Institute of Urban Affairs
NMCG	National Mission for Clean Ganga
NTPC	National Thermal Power Corporation Ltd.
NNMV	Nagar Nigam Mathura-Vrindavan
ODF	Open Defecation Free
OSM	Open Street Map
PPP	Public-Private Partnership
PWD	Public Works Department

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Abbreviations	Full form
RRR	Reduce, Reuse and Recycle
SHG	Self Help Groups
STP	Sewerage Treatment Plant
SOPs	Standard Operating Procedure
SATAT	Sustainable Alternative Towards Affordable Transportation
SBM	Swatch Bharat Mission
SBR	Sequencing Batch Reactor
SMCG	State Mission for Clean Ganga
SPCB	State Pollution Control Board
SPS	Sewage Pumping Station
SUP	Single Use Plastic
TCPO	Town and Country Planning Organization
TDS	Total Dissolved Solids
TPD	Total and Permanent Disability
TTZ	Taj Trapezium Zone
TSS	Total Suspended Solids
UASB	Up flow Anaerobic Sludge Blanket
UDD	Urban Development Department
ULB	Urban Local Bodies
UP	Uttar Pradesh
URMP	Urban River Management Plan
UPBTVP	Uttar Pradesh Braj Teerath Vikas Parishad
ULBs	Urban Local Bodies
UPPCB	Uttar Pradesh Pollution Control Board
URDPFI	Urban and Regional Development Plans Formulation and Implementation
UP	Uttar Pradesh
UV	Ultraviolet
WBRF	Water Body Revival Factor
WSP	Waste Stabilization Pond
WTP	Water Treatment Plant

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E. EXECUTIVE SUMMARY

A river and a city share an important relationship. The river supports the city by providing water, helping regulate the climate and shaping the city's identity. In return, the city is responsible for protecting the river by conserving its catchment area, managing water flow and preserving biodiversity. However, in recent years, this relationship has become unbalanced, with city relying on resources from rivers and disposing waste into them, which harms the river's health. The Urban River Management Plan (URMP) is a strategic framework that aims to restore this relationship by moving from exploitation of rivers to their protection and sustainable management.

The Urban River Management Plan (URMP) for Mathura- Vrindavan aims to establish a dedicated strategy for managing Yamuna River, Agra canal, streams and 15 ponds in an efficient and sustainable manner. The city has developed in close interaction with Yamuna River, since the rivers flow in the municipal boundary. This town-river relationship underscores the need for a management approach that strengthens internal water systems while embracing the town's role as a steward of the larger river basin, supported by participatory workshops and coordination with government agencies at state and city levels.

River water quality of Yamuna River in Mathura- Vrindavan meets Class D standards (Propagation of Wild life and Fisheries) by CPCB. The river quality degradation is also due to the impact of indirect pressures from nallahs and groundwater extraction, including solid waste dumping and sewage discharge into river. These interconnected challenges underscore the need for integrated pollution management and ecological restoration within Mathura Vrindavan's urban river framework.

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).

The URMP proposes **tangible and practical actions with several recommendations under a ten-point agenda** (or objectives) to ensure the "Nirmal" (clean) and "Aviral" (continuous) nature of the rivers. The URMP document is a living document, which will address issues related to river management on continuous basis.

Approach adopted for preparing the URMP for Mathura- Vrindavan

To prepare URMP, a Multistakeholder Working Group (MSWG) comprising 16 members, chaired by Hon'ble District Magistrate, Mathura- Vrindavan was constituted to lead the process. This was followed by a rapid baseline assessment to understand river-related issues and challenges faced by the city and 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, 19 projects/interventions were identified for inclusion in the Mathura- Vrindavan URMP.

Envisaged benefits of URMP for Mathura- Vrindavan 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.

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- 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.

URM_{INDEX} for Mathura- Vrindavan

The URMP framework uses the URM_{index}, a 1–5 scoring scale based on 10 indicators aligned with its objectives, to monitor implementation progress. Mathura- Vrindavan currently scores 2.5, placing it at the Elementary level of urban river management. This baseline assessment underscores the need for targeted interventions, with improvements expected as proposed measures are implemented.

Summary of Key Interventions proposed under Mathura- Vrindavan URMP

The table on next page presents the key details of the 19 interventions that includes the agencies responsible for implementation, estimated costs and the source of funding for each intervention.

Table E-1: List of Proposed Interventions and Recommendation

Sl. No.	URMP Objective	Intervention	Responsible Agency	Block Cost (In INR Lakhs)	Potential Financing Sources	Timeline (in Years)
1	**Regulation of Activities in Flood Plains**	**Recommendation 1: Inclusion of flood-lines in the Subsequent Mathura-Vrindavan Master Plan**	-	-	-	-
		Recommendation 2: Suggestions and recommendations for the Subsequent Mathura-Vrindavan Master Plan	-	-	-	-
2	**To keep river free from pollution**	**Intervention 1: Constructing a Riser type trash on 5 Nallahs in the city**	NNMV	225	Namami Gange	0.75-1
		Intervention 2: Implementation of Integrated Dung Waste Management for Bio-CNG Recovery in Mathura-Vrindavan	NNMV	7253	Municipal Budget, SATAT Scheme and MNRE Waste-to-Energy Programme	0.75-1
		Intervention 3: Installation of an automated pump at Vishram Ghat I&D	PeyJal Nigam	1.5	Municipal Budget, Namami Gange	1-2
		Intervention 4: Integrated Co-Treatment Strategy for City-Wide Faecal Sludge Management	NNMV	750	Namami Gange	3-5

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Sl. No.	URMP Objective	Intervention	Responsible Agency	Block Cost (In INR Lakhs)	Potential Financing Sources	Timeline (in Years)
		Recommendation 3: Preparation of Faecal and Septage Management Plan	-	-	-	-
		Recommendation 4: Ensuring no untreated sewage overflows to Yamuna from Masani Drain	-	-	-	-
		Recommendation 5: Capacity Enhancement of STPs	-	-	-	
		Recommendation 6: Eco-friendly Idol Immersion and River Surface Cleaning	-	-	-	-
		Recommendation 7: Integrated Pilgrimage Waste Management and Riverbank Protection Strategy for Chintaharan Mahadev Temple	-	-	-	-
3	**To rejuvenate waterbodies and wetlands in the city**	**Intervention 5: To create water body Database at city level**	NNMV, MVDA, UPPCB	50	Municipal Budget, UP Urban Development funds, 15th Finance Commission - Tied Grants (Water & Sanitation)	0.75-1
		Recommendation 6: Restoration of Urban Ponds for Groundwater Resilience and Ecological Renewal	-	-	-	-
		Intervention 6: Rejuvenation of Dampier Nagar Pokhar as a Blue-Green Community Recreation & Seasonal Wetland Park	NNMV, MVDA	472	UP Urban Development Funds, Municipal Budget, 15th Finance Commission Grants)	3-5
4	**To Enhance riparian buffer**	**Intervention 7: Restoration of low density vegetated riparian stretches**	Forest Department & Irrigation department	624.4	CSR/ Namami Gange/ Forest funds/National Green Mission/CAMPA	0.75-1

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Sl. No.	URMP Objective	Intervention	Responsible Agency	Block Cost (In INR Lakhs)	Potential Financing Sources	Timeline (in Years)
		Recommendation 7: Conservation and Preservation of Natural Dense Riparian Buffer	-	-	-	-
6	**To Ensure Good quality return flow**	**Recommendation 8: Transforming Public Parks into Sponge Parks**	-	-	-	-
7	**To develop eco-friendly riverfront projects**	**Intervention 8: Vishram Ghat Riverfront Renaissance: A Safe, Shaded & Sacred Yamuna Experience**	MVDA, NNMV, UP Irrigation Department / Tourism Department	117.9	National Mission for Clean Ganga (NMCG), UP Urban Development Funds, Municipal Budget, Smart City Mission / Tourism Grants.	1
		Recommendation 9: Heritage-Sensitive Ghat Revitalization	-	-	-	-
		Intervention 9: Yamuna Heritage Edge: Integrated Riverfront Revitalization, Safety and Visitor Experience Enhancement at Keshi Ghat	MVDA, UP Irrigation Department / Tourism Department	85	National Mission for Clean Ganga (NMCG), UP Urban Development Funds, Smart City Mission / Tourism Grants,	1
9	**To inculcate river-sensitive behaviour among citizens**	**Intervention 10: River Awareness Campaign – "Meri Nadi, Mera Shahar"**	NNMV; Supporting Agencies: NMCG, SHGs, NGOs, educational institutions	First-year cost: ₹15–20 lakh Annual recurring cost: ₹5–7 lakh	1. IEC Budget: Nagar Nigam & Namami Gange 2. Community: RWAs & heritage NGOs.	1-5 months
		Intervention 11: Distribution of Biodegradable Kits at Major Ghats	NNMV;	5.25	1. Municipal budget 2. CSR (local businesses, flower vendors) 3. Temple trusts & SHG cost-sharing 4. IEC support (Namami Gange)	0.1-0.5
		Intervention 12: Installation of	District Ganga Committee, NNMV	12.9	IEC Budget: NNMV & Namami Gange, CSR Funds	0.1-0.5

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Sl. No.	URMP Objective	Intervention	Responsible Agency	Block Cost (In INR Lakhs)	Potential Financing Sources	Timeline (in Years)
		interpretive signages and boards				
		Intervention 13: River Storytelling Corners for community-led narratives and cultural connection	NNMV	20.35	1. SBM(U) and NMCG subsidies 2. CSR funds from local industries/businesses 3. Funding from religious boards & funeral trusts	3-5
		Intervention 14: Engaging Temple and Mosque Networks for River Protection	River Sabha Committees;	14.80	1. Municipal IEC budget allocation under SBM(U) 2. CSR funds 3. Community contributions (RWAs)	1-2
10	**To engage citizens in river management activities**	**Intervention 15: Formation of River Sabha Committees at City-Level**	NNMV;	11.28	Municipal budget, CSR contributions.	3-5
		Intervention 16: "Yamuna Jal Mahotsav: Organizing Annual River Heritage and Conservation Festival	NNMV;	18.70	Municipal budget, CSR contributions.	1-2
		Intervention 17: Introducing Youth Internship Program – "Yamuna Warriors"	NNMV	7	Municipal budget, Namami Gange / Swachh Bharat Mission (SBM) funds, CSR contributions	1
		Intervention 18: Community Composting & Waste Segregation Workshops	NNMV;	13.5	Municipal IEC Budget	1-2
		Intervention 19: River Clean-Up Drives – "Yamuna Mitra Abhiyan"	District Ganga Committee, Jal Nigam and Local Volunteers.	19.80	1. Municipal IEC budget allocation under SBM(U) 2. CSR funds 3. Community contributions (RWAs)	1-2

Note: *Timeline is categorized as per Short Term: 0-to-1-year, Medium Term: 1-to-3-year, Long Term: 3 to 5 years*

The total investment requirement for the 19 interventions is estimated approximately ₹ 9,706 lakhs, with funding proposed from Namami Gange, SBM(U), AMRUT 2.0, municipal budgets, CSR contributions, NGO, NNS, Rabha Sabha Committees and other state/national schemes. The proposed

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interventions listed under Objective 2, 5 and 7 have been identified as priority interventions required to be undertaken at the city and state level.

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INTRODUCTION



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1 INTRODUCTION

1.1 Project Background

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 liveability 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 62 URMPs are planned in two phases with 27 in Phase I and 35 in Phase II, including five cities in Uttar Pradesh 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 centre, state and city level is depicted in Figure 1-2.

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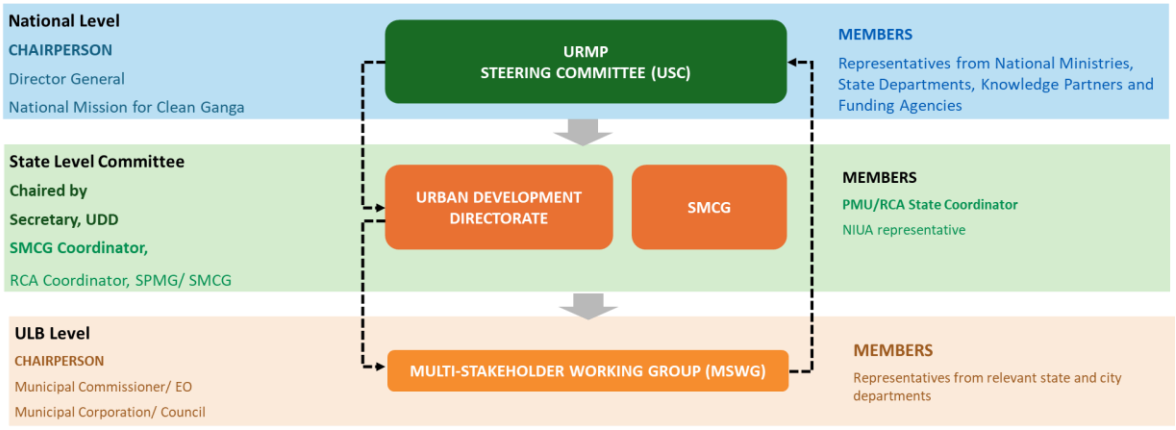


Figure 1-2: National, State & City Engagement for the URMP Preparation

1.2 Process for preparation of the URMP Mathura- Vrindavan

The preparation of an URMP followed a systematic approach and strategic guidelines for making River Sensitive Master Plans 2021, ensuring effective river conservation, sustainable management and stakeholder collaboration. The process involved multiple stages, each contributing to a comprehensive and actionable plan as depicted below in Figure 1-3. In order to ensure that the plan was participatory and had the involvement of concerned government agencies from the state to the city level, workshops and meetings were carried out at all levels.

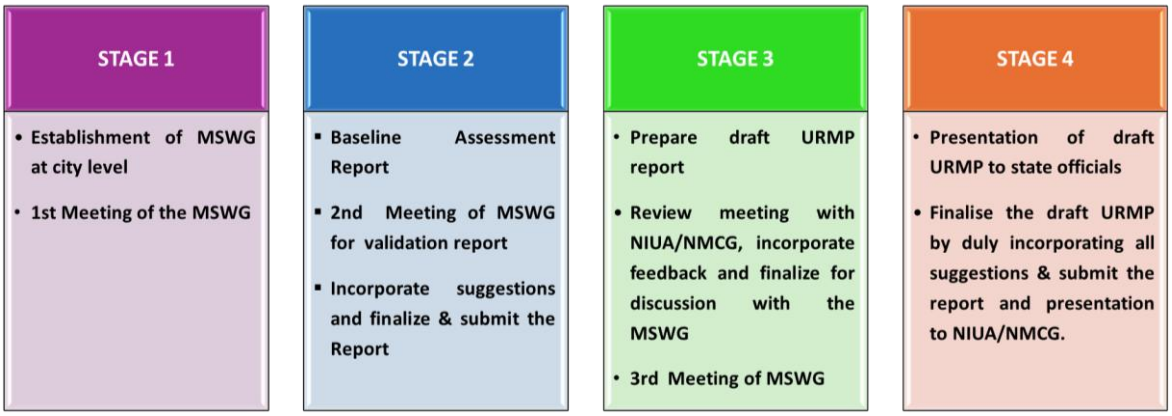


Figure 1-3: Process for preparation of URMP

Source: Urban River Management Framework, NIUA

Status of work and contents of the present deliverable Tasks one to three as listed in the previous section have been completed and findings are elaborated in the present deliverable of final URMP Report. The detailed content of the report includes the following:

- Key points discussed during URMP State level Workshop for Uttar Pradesh held on 3rd May 2025 at Lucknow; (Refer Annexure 1)
- Discussions during First Multistakeholder Working Group (MSWG) meeting at Mathura-Vrindavan on 14th July 2025; (Refer Annexure 2),
- Discussions during Second Multistakeholder Working Group meeting at Mathura-Vrindavan on 2nd June 2026; (Refer Annexure 4), and
- Analysis of the field visit, primary and secondary data available in the public domain and collected from various stakeholder departments post the MSWG meeting.

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1.2.1 URMP State level Workshop

A State-level URMP Committee, chaired by the Secretary of the 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 of 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 State UDD, Directorate of ULBs, city representatives of 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.




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

1.2.2 Multistakeholder Working Group

To guide the development of city's URMP, a MSWG comprising representatives of the municipality and key stakeholder agencies operating within the city was formed. Post the state-level workshop, an introductory meeting was held on 14 July 2025 under the chairmanship of Additional Nagar Ayukt, Mathura-Vrindavan (refer Picture 1-2). The main aim of the meeting was to notify the MSWG for the city and the nodal officer for the URMP.




Picture 1-2: Introductory meeting held on 14 July 2025 at Mathura-Vrindavan

Further, to guide the development of city URMP, a Multistakeholder Working Group (MSWG) was conducted during the District Ganga Committee (DGC) meeting on 28 August, 2025 under the chairmanship of the District Magistrate, to notify the MSWG for the city. The minutes of the meeting is at Annexure 2.

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The MSWG for Mathura-Vrindavan comprises the following departments and their concerned officers as given in Table 1-1. The Minutes of the DGC meeting and the notification of the MSWG are enclosed in Annexure 3.

Table 1-1: MSWG for Mathura-Vrindavan

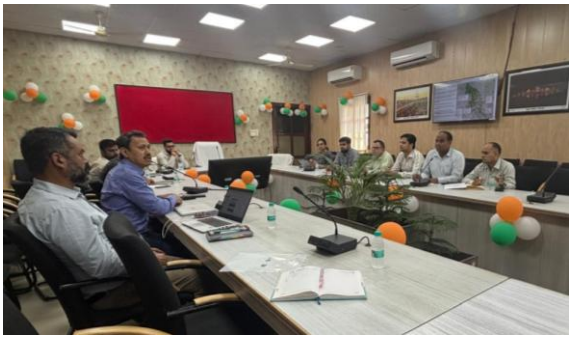
S. No.	MSWG Member	Role & Responsibility in URMP
1	Municipal Commissioner, Nagar Nigam Mathura-Vrindavan	oversee URMP implementation, inter-departmental coordination, budgeting, municipal infrastructure improvements, and monitoring of riverfront and sanitation interventions.
2	CEO, Braj Teerath Vikas Parishad	Guide integration of river conservation with pilgrimage, tourism, cultural heritage, and ghat management initiatives.
3	Town Planner, Mathura-Vrindavan Development Authority	Ensure integration of URMP recommendations into master plans, zoning regulations, riverfront development, and land-use planning frameworks.
4	Executive Engineer, Mathura-Vrindavan Development Authority	Provide technical inputs on riverfront infrastructure, public realm improvements, stormwater management, and implementation of urban development projects.
5	Executive Engineer, Uttar Pradesh Jal Nigam (Urban)	Coordinate planning and execution of sewerage networks, STPs, used water treatment infrastructure, and pollution abatement projects.
6	General Manager, Jal Kal Department	Monitor water supply, sewerage operations, and service delivery; support initiatives to improve used water collection and reduce river pollution.
7	Executive Engineer, Upper Division, Agra Canal, Mathura	Coordinate canal operations, water regulation, and management of hydraulic structures influencing river flows and water distribution.
8	Executive Engineer, Irrigation and Water Resources Department	Provide technical guidance on flood management, river hydraulics, drainage systems, embankments, and water resource planning.
9	Executive Engineer, Uttar Pradesh Ground Water Board	Assess groundwater conditions, aquifer recharge opportunities, groundwater monitoring, and conjunctive water management measures.
10	Regional Officer, Uttar Pradesh Pollution Control Board	Monitor river water quality, enforce pollution control regulations, identify pollution hotspots, and provide compliance guidance.
11	Divisional Forest Officer, Mathura-Vrindavan Forest Division	Support riparian plantation, biodiversity conservation, ecological restoration, wetland protection, and green-buffer development.
12	General Manager, District Industries Centre	Facilitate engagement with industries, promote pollution control compliance, and encourage adoption of cleaner production practices.
13	Project Officer, Swachh Bharat Mission (Urban)	Coordinate solid waste management, cleanliness campaigns, faecal sludge management, and community awareness initiatives.
14	Nodal Officer, Mathura-Vrindavan Smart City	Integrate smart technologies, GIS-based monitoring, citizen engagement platforms, IEC campaigns, and smart riverfront interventions.
15	Representative of Naavik Sangh/Association	Represent boat operators and river-dependent communities; provide local knowledge, participate in stewardship activities, and support awareness programs.
16	District Programme Officer (DPO), State Mission for Clean Ganga (SMCG)-UP	Facilitate alignment of URMP interventions with Namami Gange and SMCG priorities; support funding convergence, monitoring, stakeholder coordination, and implementation of river rejuvenation initiatives.

For the **Mathura-Vrindavan URMP Multi-Stakeholder Working Group (MSWG)**, the roles should align with each agency's institutional mandate and contribution to river management, urban planning, service delivery, and community engagement.

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The second MSWG meeting for finalization of the baseline report was held on 2 June 2026 under the chairpersonship of Municipal Commissioner (Refer Picture 1-3). The draft baseline assessment report and preliminary interventions were presented by the Consultants. The Municipal Commissioner suggested the concerned officials to accompany the team and share details of solid waste dumping in drains, overflow issue at Masani drain, to assist in the preparation of the final URMP. He further directed to include the implementation of the URMP in the agenda of the District Ganga Committee (DGC) meetings to review its progress on a monthly basis.





Picture 1-3: 2nd MSWG Meeting held on 2 June 2026 at Mathura-Vrindavan

1.2.3 Urban River Management Plan

URMP report includes tangible interventions for river conservation and management for each of the ten URMP objectives. Multiple meetings and consultations with all the concerned agencies along with site visits were conducted to assess the ground situation and identify opportunities for future interventions (refer Figure 1-4 and Picture 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.

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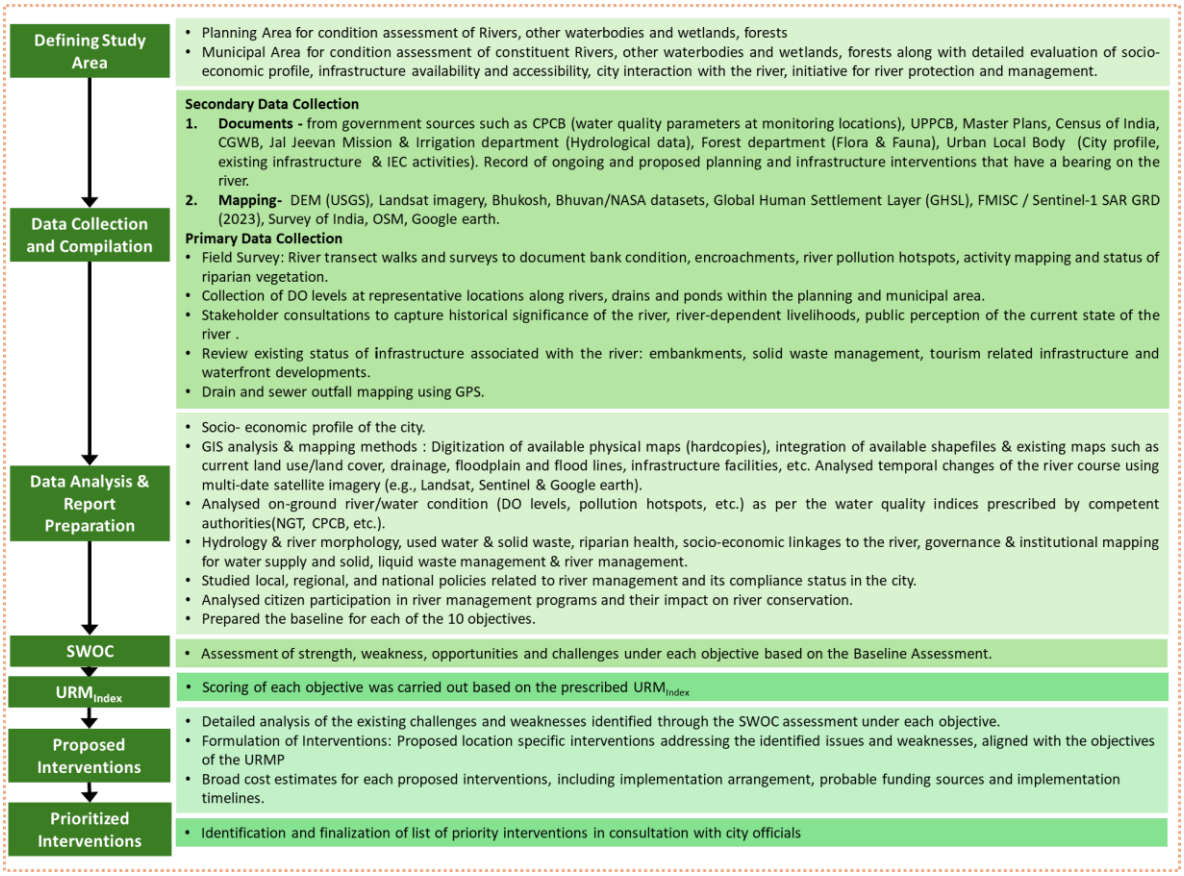


Figure 1-4: Methodology for URMP



Picture 1-4: Consultations and Site Visits

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CITY PROFILE



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2 CITY PROFILE

2.1 Location and city Context

Mathura-Vrindavan (27.49° to 27.58° N and 77.67° 77.70° E) is a twin city in the western part of Uttar Pradesh. It is a prominent pilgrimage destination, strategically located within broader Golden Triangle tourist circuit (Delhi-Agra-Jaipur). The city is situated along the western bank of Yamuna River.

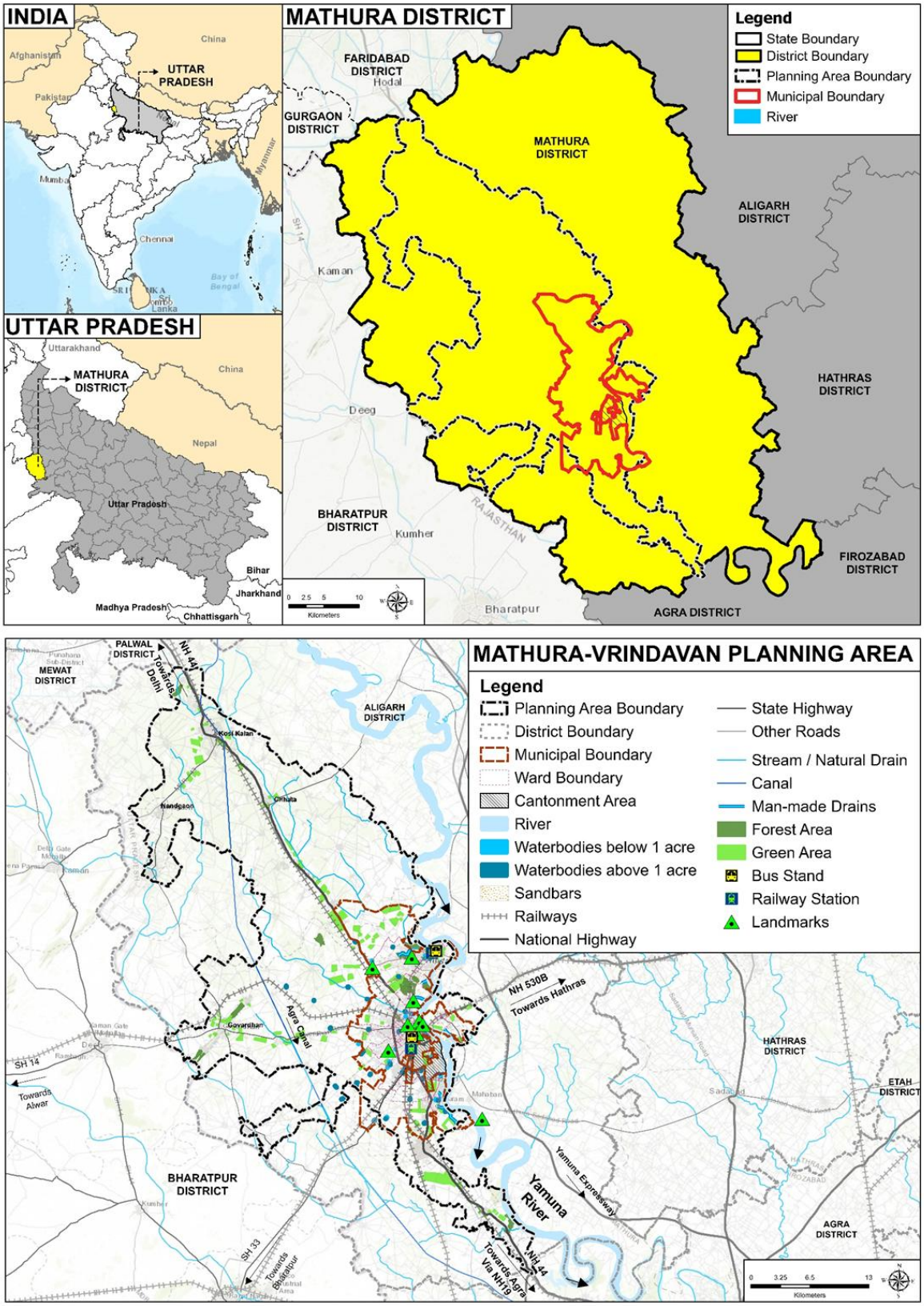
Mathura-Vrindavan lies about 160 km. from New Delhi, around 70 km. from Agra, 225 km. from Jaipur and 305 km. from the state capital Lucknow, serving as a node for the religious, economic and transportation networks of western Uttar Pradesh. The planning area largely falls within the Taj Trapezium Zone (TTZ). The Mathura Oil Refinery is the major industry located within the planning area.

Road connectivity: The city is well connected by two national highways i.e., NH-44 and NH 19. Yamuna Expressway from Greater-Noida to Agra also passes through the city, connecting Noida, Agra, Kanpur and Lucknow. These routes link the city to Delhi in the north and Agra, Kanpur and Kolkata in the south and east. Within the city, auto-rickshaws, e-rickshaws and tempos dominate short-distance travel.

Rail Connectivity: City is served by two railway stations i.e., Mathura Junction and Vrindavan railway station. Mathura is a major railway junction situated on the major Delhi-Mumbai rail route. Both Central Railway and Western Railway routes pass through Mathura. Vrindavan Railway Station primarily handles local trains and railbuses connecting to Mathura.

Air connectivity: Currently the city has no airport. The nearest airport is Agra Kheria Airport, located approximately 60 km away, which caters to domestic air travel, while for international connectivity, Indira Gandhi International Airport in New Delhi, about 150 km away, serves as the nearest gateway. The new Airport at Jewar in Greater Noida is approximately 75 km from Mathura.

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Map 2-1: Regional setting of Mathura- Vrindavan city

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2.2 City Administrative Boundaries

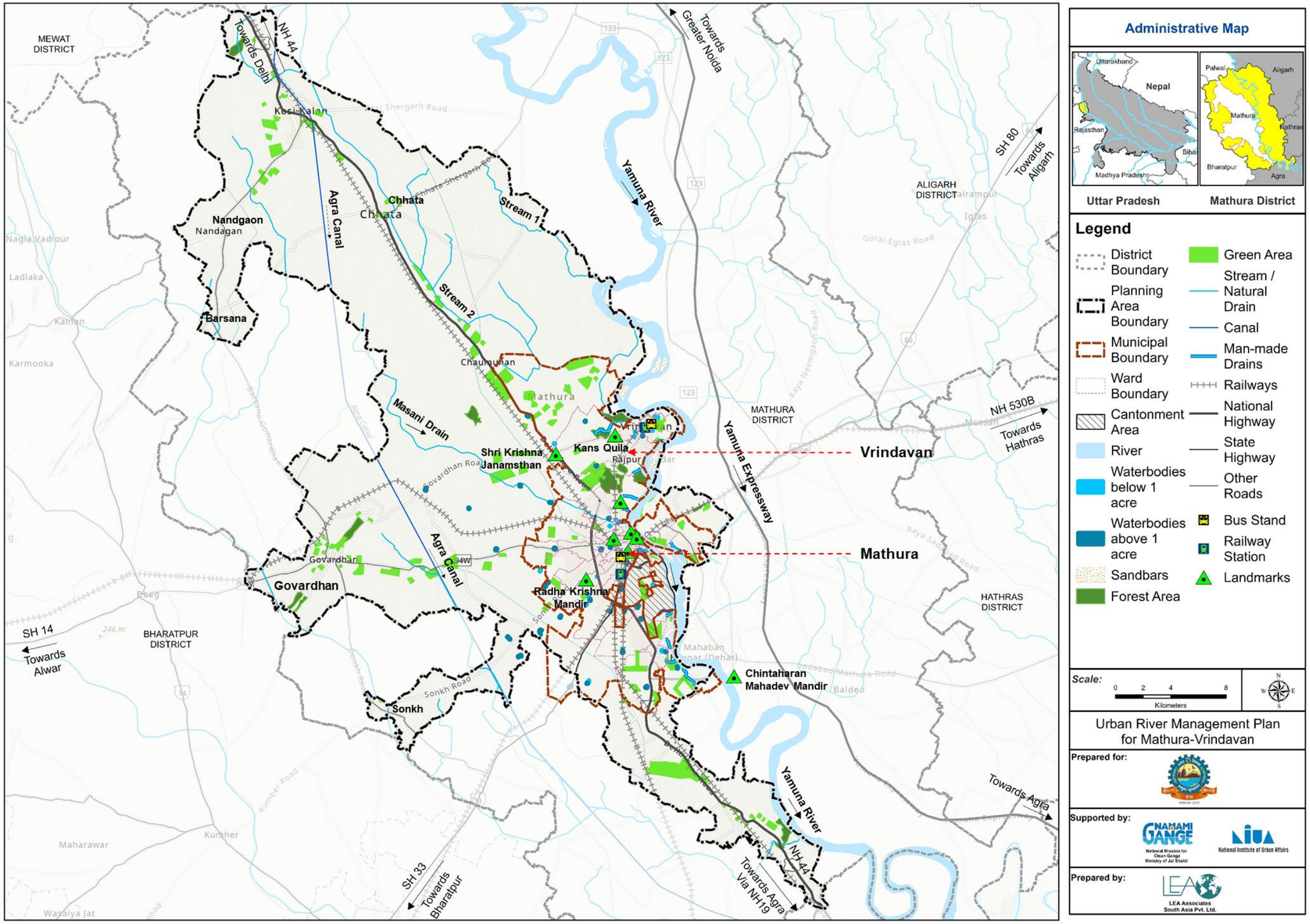
2.2.1 Mathura-Vrindavan Planning Area

The Mathura–Vrindavan Planning Area covers approximately 1,076.36 sq. km, comprising the twin towns of Mathura and Vrindavan along with 209 villages. Planning and development within the Planning Area is overseen by the Mathura–Vrindavan Development Authority (MVDA), while the Uttar Pradesh Braj Teerath Vikas Parishad (UPBTVP) supervises major infrastructure and heritage development projects within the planning area. MVDA is mandated to prepare and implement development plans, regulate land use, coordinate infrastructure projects and guide urban expansion.

2.2.2 Mathura-Vrindavan Nagar Nigam

Nagar Nigam Mathura-Vrindavan (NNMV) was formally constituted on 12 May 2017; before this, both Mathura and Vrindavan functioned as separate Nagar Palika Parishads. The Nagar Nigam area is 226.75 sq. km., which is divided into 70 municipal wards and is headed by an elected Mayor, with overall administration managed by the Municipal Commissioner. Nagar Nigam is responsible for providing and managing key civic services and urban infrastructure across the twin holy cities, including sanitation, solid waste management, water supply, street lighting, road maintenance and public health. (Refer Map 2-2).

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Map 2-2: Administrative Map of Mathura-Vrindavan

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2.3 Demography

2.3.1 Existing population

As per Census 2011, the population of Mathura city is 3,49,909 and for Vrindavan city, it is 63,005. Thus, the total population of Nagar Nigam, Mathura-Vrindavan is 4,12,914. The total population of planning area in 2011 is 6,76,3091. The detailed demography is presented in Table 2-1 below.

Mathura city: As per Census 2011, the average household size was 5.4. The working population comprise 30.37% of the total population. The literacy rate is 77.77%.

Vrindavan city: As per Census 2011, the average household size is 6. The working population comprise 30.46% of the total population. The literacy rate is 74.97%.

Table 2-1: Demographic details of Mathura-Vrindavan

Sl. No.	Parameters	Mathura Nagar Palika Parishad Area	Vrindavan Nagar Palika Parishad Area	Combined Urban Area (Mathura + Vrindavan)	Mathura District	Uttar Pradesh
1	**Population / Share of District**	3,49,909	63,005	4,12,914	25,47,184	19,98,12,341
1.1	Urban Population	3,49,909	63,005	4,12,914	7,55,993	4,44,95,063
1.2	Rural Population	—	—	—	17,91,191	15,53,17,278
2	Area (Sq. Km)	28.05	13.05	41.10	3,340	240,928
3	**Population Density (Persons per Sq. Km)**	11,862	4,532	9,610	763	829
4	**No. of Households**	59,781	11,637	71,418	4,23,125	3,32,10,929
5	**Sex Ratio**	881	812	866	863	912

Source: Census of India, 2011

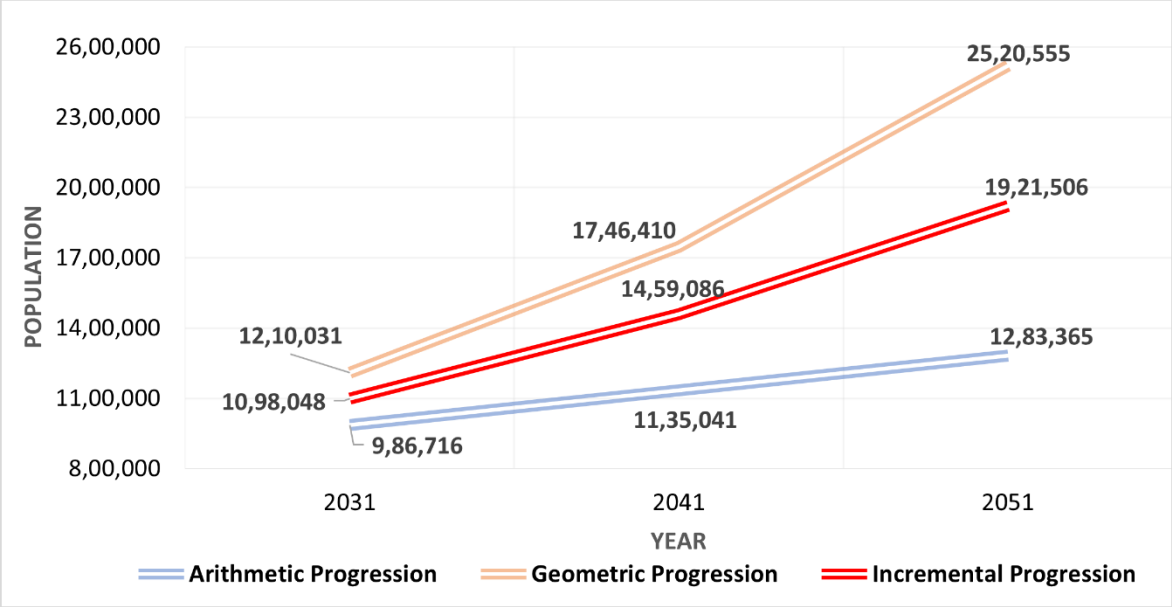
Out of the total wards in the city, 14 are densely populated which are 9,18, 22, 23, 26, 35, 40, 42, 44, 56, 61, 64, 65 and 70 (Refer Map 2-3).

2.3.2 Projected Population

As per the Mathura–Vrindavan Master Plan 2031, the city's population in 2021 is estimated at 605,282. However, officials of the Mathura-Vrindavan Nagar Nigam indicated that the population had increased to 838,391 in 2023. Based on the information provided by the Nagar Nigam and the consultant's analysis, the population for 2025 has been estimated at approximately 9,30,088. Furthermore, population projections for the years 2041 and 2051 have been derived using the decadal growth trends provided in the Mathura–Vrindavan Master Plan 2031 (Refer Figure 2-1).

[1] *Source: Census 2011*

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Source: Nagar Nigam Population, for the year 2023 and further projected up to 2051

Figure 2-1: Population projection of Mathura-Vrindavan

As per the consultant analysis, the population of the city is expected to grow up to 19.22 lakhs in 2051 (Refer Figure 2-1) by Incremental Progression. This progression has been considered since it reflects a linear growth pattern.

2.3.3 Tourist Population

Nagar Nigam, Mathura–Vrindavan supports a permanent resident population of approximately 9.30 lakhs. However, the effective infrastructural demand is significantly shaped by the continuous floating population associated with year-round spiritual tourism. On average, the twin cities accommodate a daily inflow of approximately 125,000 visitors, increasing the civic load by more than 15% under normal conditions. During major festivals such as Janmashtami and Holi, the tourist/ pilgrim population increases to 5,00,000–7,00,000 pilgrims entering the urban core within a short span. Tourism is predominantly domestic, though international visitation remains notable in Vrindavan. The domestic and international tourist inflow of last 3 years is mentioned in Table 2-2 below.

Table 2-2: Yearly Tourist inflow in Mathura-Vrindavan (Population in lakhs)

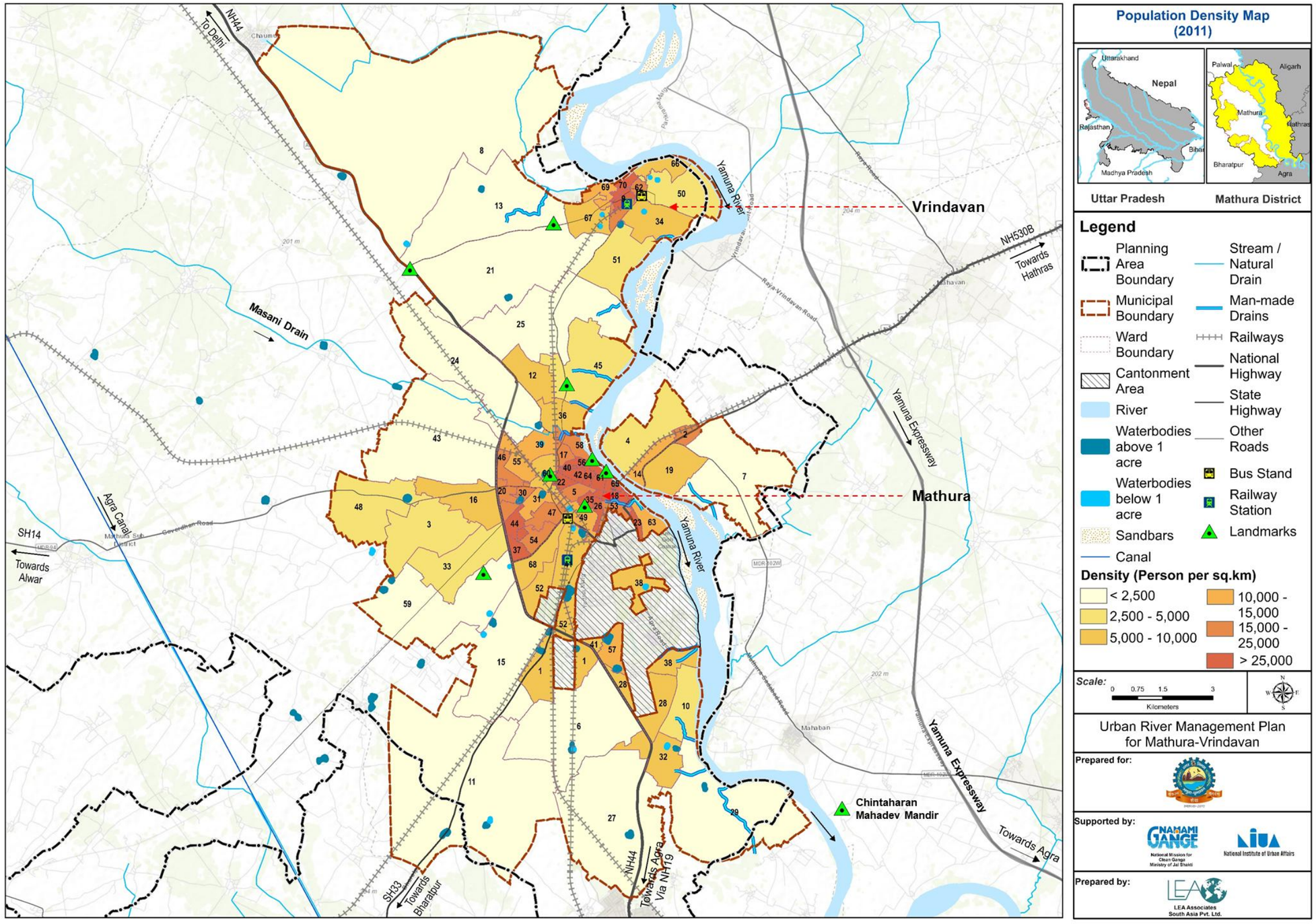
Year	Mathura			Vrindavan			Total		
	International	Domestic	Total	International	Domestic	Total	International	Domestic	Total
2022	0.31	88.85	89.16	0.6	176.29	176.89	0.91	265.14	266.05
2023	0.35	112.24	112.59	0.67	217.37	218.04	1.02	329.61	330.62
2024	0.36	126.19	126.55	0.7	254.63	255.32	1.06	380.81	381.88

Source: Braj Teerath Vikas Parishad, 2025

2.3.4 Slum Population

As per the Mathura-Vrindavan Master Plan 2031, a total of 100 slums have been notified within the city. Out of these slums, 23 are located near large and small drains and 4 along rivers and ponds. In the year 2013, the total population living in slums in in the city is 1,71,438.

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Source: 1) Admin Boundaries: Mathura-Vrindavan Masterplan 2031; 2) Municipal Boundary, Population Data: Nagar Nigam Mathura Vrindavan; 3) Transport Network: OSM; 4) Consultant Analysis; 5) Waterbodies: Braj Teerath Vikas Parishad

Map 2-3: Population Density map of Mathura-Vrindavan city

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2.4 Physiographic Profile

2.4.1 Topography and Soil Condition:

Mathura-Vrindavan is situated in the fertile alluvial plains of the upper Indo-Gangetic region. The topography is mainly levelled with very gentle slope. The overall terrain tilts gradually from the north-west towards the south-east, draining naturally into Yamuna River. There are no hills, ridges or significant natural elevations within the twin city. Mathura has an average elevation of approximately 187 meters above sea level, while Vrindavan is slightly lower at around 170 meters.

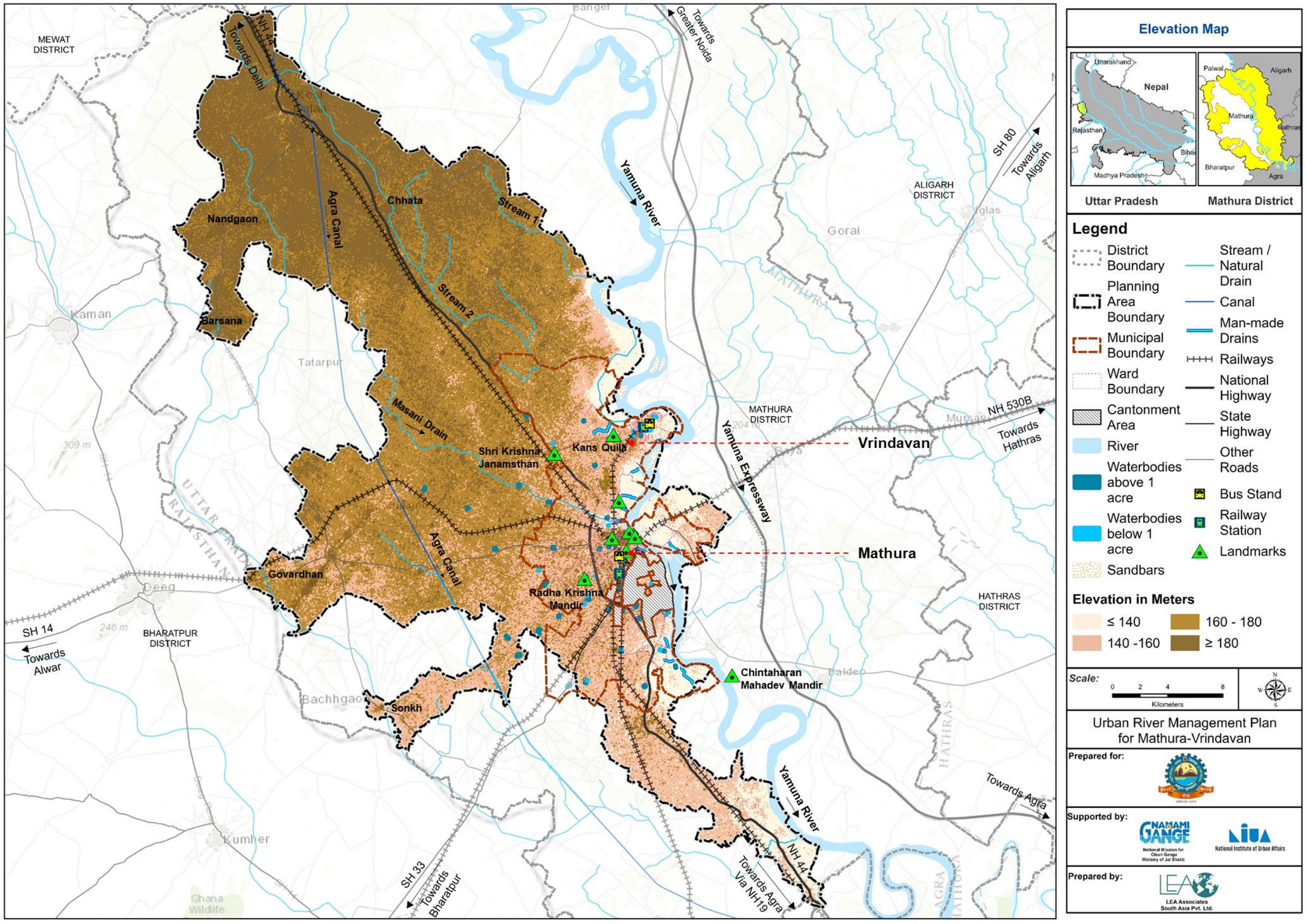
The terrain across both cities is broadly divided into two distinct land types: Bangar land and Khadar land. The soil across Mathura-Vrindavan is predominantly alluvial in nature. Soil in the higher Bangar area tend to be loamy and moderately fertile, while soil in the lower Khadar area is finer, silty and extremely fertile due to annual flood deposits though they also retain moisture and are prone to waterlogging after heavy rains (Refer Map 2-4 & Map 2-5).

2.4.2 Geomorphological Profile:

Mathura–Vrindavan lies within the Yamuna River floodplain, a part of the Ganga Alluvial Plain characterized by fertile alluvial deposits and dynamic fluvial geomorphology shaped by river processes and seasonal hydrological variations. Active floodplains and older alluvial terraces support agriculture, aquifer recharge, settlements and temple clusters. The Quaternary sediments of sand, clay and kankar sustain both agriculture and groundwater systems replenished through monsoon flooding and canal irrigation. These geomorphic conditions have historically influenced the location of sacred ghats, pilgrimage routes, and temple precincts along the Yamuna (Refer Map 2-7).

Most ghats developed on geomorphologically stable straight reaches or inner meander banks, where low erosion, natural point-bar deposition and predictable floodplain behaviour provided safe and accessible sites for ritual activities.

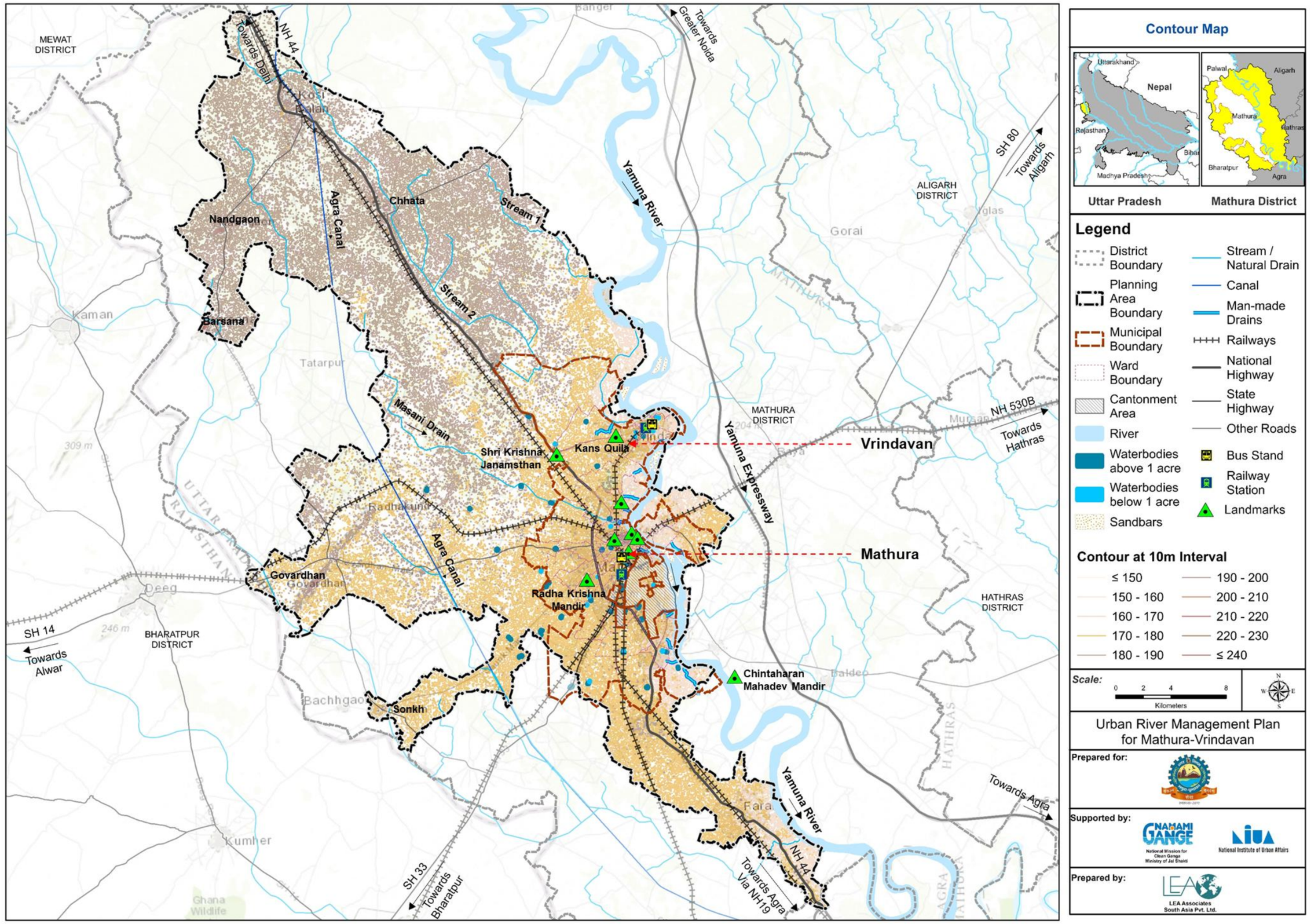
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Map 2-4: Elevation map of Mathura-Vrindavan

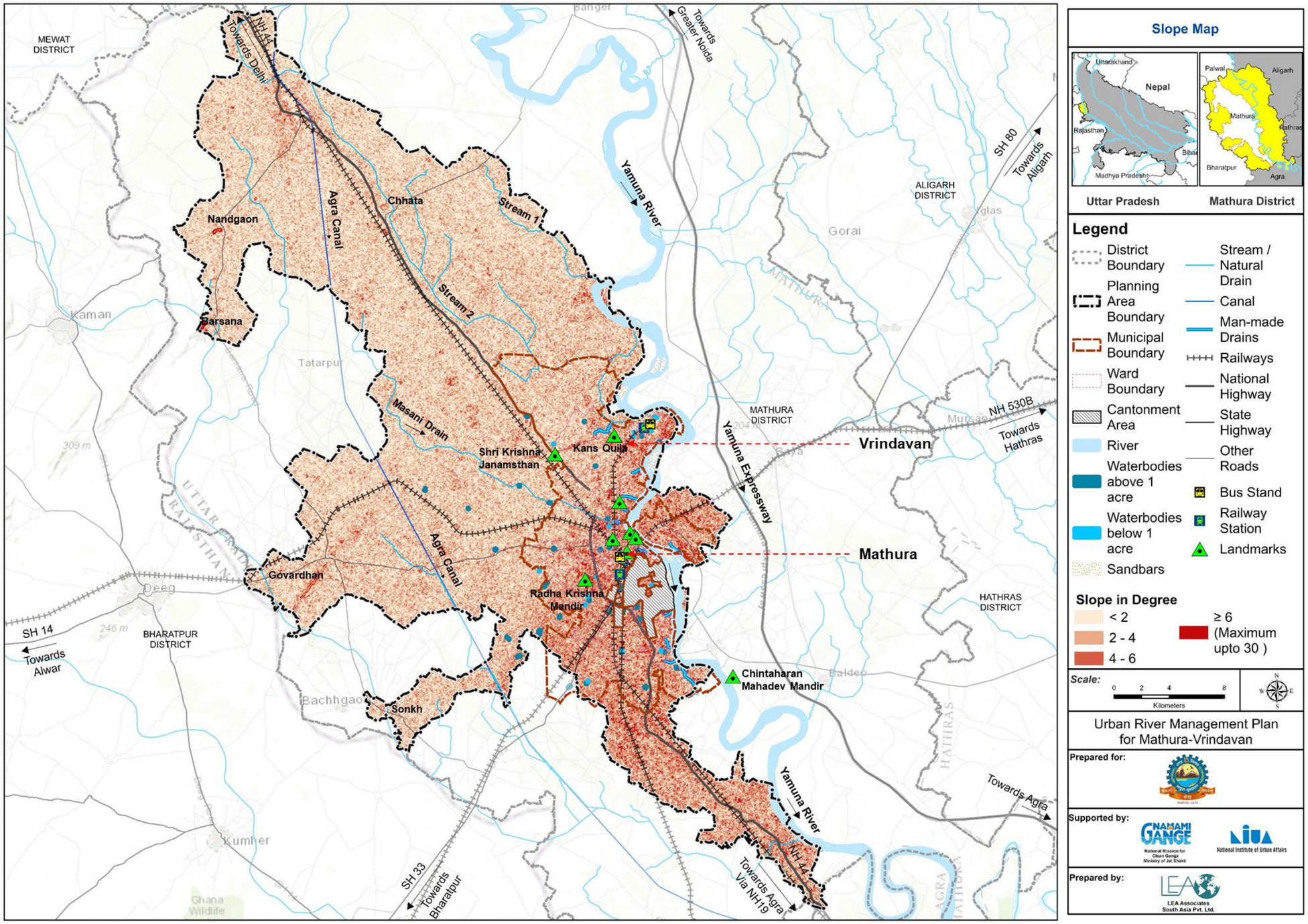
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Map 2-5: Contour map of Mathura-Vrindavan

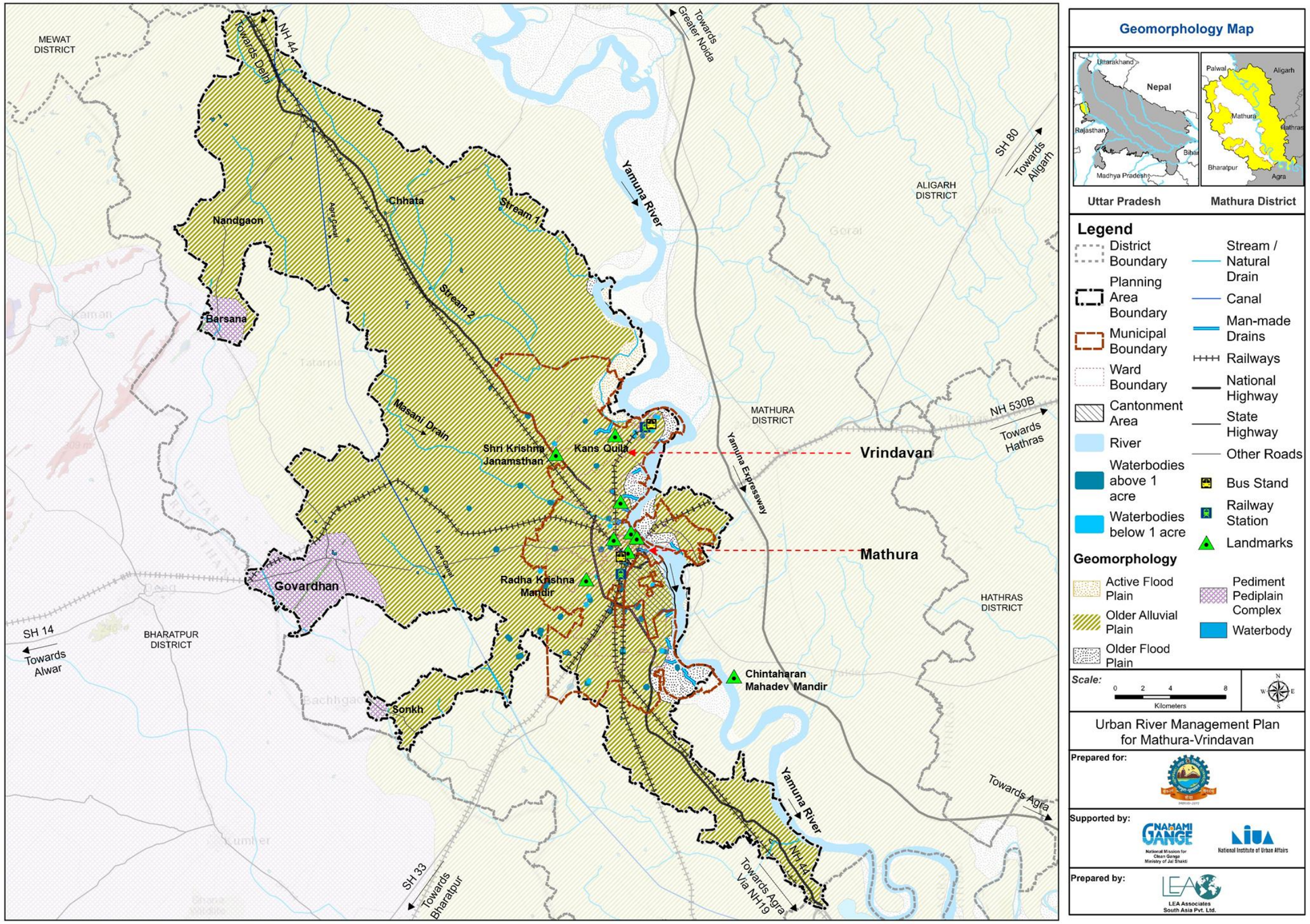
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Source: 1) Admin Boundaries: Mathura-Vrindavan Masterplan 2031; 2) Municipal Boundary: Nagar Nigam Mathura Vrindavan; 3) DEM; 4) Transport Network: OSM; 5) Waterbodies: Braj Teerath Vikas Parishad

Map 2-6: Slope map of Mathura-Vrindavan

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Source: 1) Admin Boundaries: Mathura-Vrindavan Masterplan 2031; 2) Municipal Boundary: Nagar Nigam Mathura Vrindavan; 3) Geomorphology Data: Bhukosh; 4) Transport Network: OSM; 5) Waterbodies: Braj Teerath Vikas Parishad

Map 2-7: Geomorphological map of Mathura-Vrindavan City

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2.5 Climate and Natural Hazard

a) Climate: Mathura-Vrindavan city experiences a subtropical climate. It experiences extreme temperature i.e., scorching summers and cold foggy winters, with most of the rainfall concentrated in the monsoon months.

- Summers (March to June) are intensely hot and dry, wherein, the month of May is especially considered as the hottest month, with an average high temperature of 43.3°C and low of 30.8 °C. Humidity remains high during August, at 78%.
- Winters (December to February) are the coldest months, with an average maximum temperature of 21.6°C and a minimum temperature of 8.8 °C. Dense fog in the early morning hours is a common feature during peak winter, often disrupting road and rail connectivity.
- The city receives average annual rainfall of 754 mm, mostly from the south-west monsoon between the months of July and September.
- Average wind speeds are around 10-18 km/h throughout the year.

b) Natural Hazards:

Floods: Yamuna River occasionally overflows during the monsoon season (June–September) due to heavy rainfall and upstream releases, leading to waterlogging in low-lying wards and heritage precincts. In the last 5 years, floods occurred in 2021, 2023 and 2025, with 2021 being the most severe, causing widespread waterlogging and damage to heritage precincts.

The flood vulnerability of Mathura and Vrindavan is primarily influenced by their location along the banks of the Yamuna River and within its active floodplain. During the monsoon season, intense rainfall coupled with high upstream releases from barrages such as Hathni Kund, Tajewala, and Okhla often causes the river to exceed the danger level, resulting in inundation of the floodplain and adjoining low-lying urban areas. Consequently, several settlements, riverfront ghats, and infrastructure located within these vulnerable zones are exposed to recurrent flood risks. The major flood-prone areas in Mathura–Vrindavan are presented in the table below.

Vulnerable Areas in Mathura	
Yamuna Khadar Belt	The vast stretch of fertile floodplain extending from Mathura to Vrindavan is the most geographically vulnerable region. Villages located within this belt, such as Isapur, Hansganj, and Jafarpur Khadar, frequently face severe inundation that cuts off road access and submerges the ground floors of homes.
Vishram Ghat & Riverbank Markets	As the central and most prominent bathing ghat in Mathura, it sits directly on the water's edge. When the Yamuna swells, this area and its adjoining markets are among the first to experience waterlogging, disrupting daily commerce and religious activities.
Trans-Yamuna & Low-	Residential zones like Laxmi nagar (specifically Tiwari Puram) are situated in topographic depressions.

Vulnerable Areas in Vrindavan	
Parikrama Marg	The sacred 11-kilometer circumambulation path wraps around the town, closely following the Yamuna's historical course. Because of its low elevation, it acts as a primary flood zone, and sections of the road are frequently swallowed by the river, halting movement completely.
Historic Ghats	A continuous string of prominent ghats—including Keshi Ghat, Cheer Ghat, Bhramar Ghat, Shringar Ghat, and Govind Ghat—bear the immediate brunt of the swelling river. During severe floods, the lower levels of these structures and the entry points to adjacent riverside temples become entirely submerged.
Riverside Residential Colonies	Neighbourhoods built close to the river, such as Shyam Kuti and Ganesh Dham, face extreme risk. The lack of

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Vulnerable Areas in Mathura		Vulnerable Areas in Vrindavan	
Lying Colonies	Floodwaters easily breach these areas, leading to prolonged waterlogging and forcing residents to evacuate to higher ground or relief camps.		buffer zones means water routinely breaches these residential pockets, often disrupting power and clean water supplies.
Baldev Area	Downstream from the main city, areas around Khadera Ghat are highly susceptible. Rising waters here routinely submerge local Shiva temples, cremation grounds, and agricultural spaces.	**Gyan Gudri**	While situated slightly further inland, extreme historical flood events (which locals refer to as the formation of the Yamuna Pulin) can push water deep enough into the town to reach this religiously significant area, highlighting the maximum extent of the Yamuna's floodplain reach.

Source: Stakeholder consultation and site observation

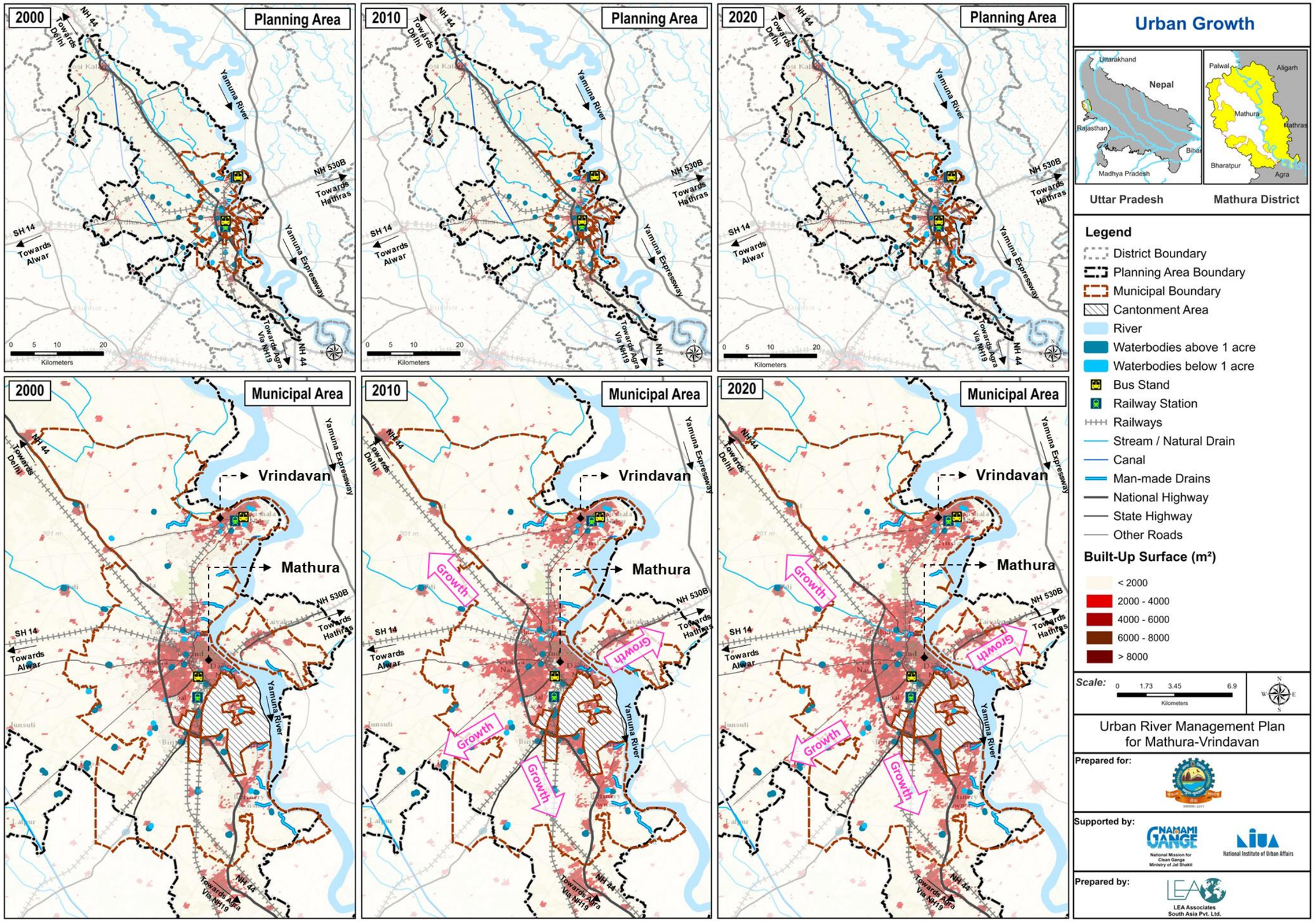
Because these areas represent a mix of ancient riverside architecture and rapidly expanding modern colonies built into the natural floodplains, they require constant monitoring and evacuation protocols during the peak monsoon season.

2.6 Urban Growth Trends

Between 2000 and 2020, Mathura-Vrindavan experienced rapid, asymmetrical urban expansion heavily concentrated along the western bank of the Yamuna River, transforming two distinct historical pilgrimage nodes into a continuous, high-density built-up corridor. Guided by major transit arteries, primary growth vectors pushed radially northwest toward Delhi along NH 44, southwest toward Alwar along SH 14, and south toward Agra, while the eastern trans-Yamuna region remained largely undeveloped due to river corridor constraints. This multi-decade growth involved intense spatial infill around city cores and transit hubs, which systematically encroached upon active floodplains, natural drainage channels, and local inland water bodies, underscoring the urgent need for integrated sustainable development and strict river buffer management.

Impact of river corridor: The outward spread of built-up areas has increasingly influenced the river corridor in Mathura-Vrindavan. Urban expansion within the planning and municipal areas predominantly concentrated along the western bank has extended rapidly towards the Yamuna River and its associated water bodies, placing severe pressure on the natural drainage network, active floodplains, and surrounding open spaces. These growth pressures highlight the need for integrated planning measures within the URMP to regulate urban expansion, enforce restrictions, and safeguard the river corridor and sensitive blue-green assets.

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Source: 1) Admin Boundaries: Mathura-Vrindavan Masterplan 2031; 2) Municipal Boundary: Nagar Nigam Mathura Vrindavan; 3) Transport Network: OSM; 4) Built Up Surface: GHSL built-up grid (100m spatial resolution; values representing scaled 0-10,000); 5) Waterbodies: Braj Teerath Vikas Parishad

Map 2-8: Urban Sprawl Map

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2.7 Historical and Cultural Profile

Mathura–Vrindavan holds exceptional historical, cultural and spiritual importance in the Braj region. Mathura is revered as the birthplace of Lord Krishna, while Vrindavan is celebrated as the sacred landscape of his youthful pastimes, together forming the heart of Vaishnavite devotion. References in the Mahabharata and Bhagavata Purana underscore Mathura's antiquity, while Vrindavan rose as a major Bhakti center during the medieval period under saints like Chaitanya Mahaprabhu. The Mughal era saw both temple patronage and destruction and the colonial period integrated Mathura into the Agra Division while Vrindavan's temple economy expanded.

The Yamuna River remains the lifeline of the twin cities, shaping rituals, festivals and cultural practices along its ghats. Iconic temples such as Krishna Janmabhoomi in Mathura, Banke Bihari in Vrindavan and ISKCON's Krishna-Balaram Mandir, along with Mughal-era structures like Mathura's Jama Masjid, anchor the region's diverse heritage.

Mathura- Vrindavan is known for the various parikarma's. The Braj 84 Kos Parikrama is a sacred pilgrimage circuit spanning approximately 252 kilometres (84 *kos*, an ancient unit of distance) that encompasses the sacred forests, villages, and sites associated with the life of Lord Krishna across present-day Uttar Pradesh, Rajasthan, and Haryana. Within this vast cultural landscape, pilgrims also perform shorter *parikramas* around specific holy centers to express their devotion. The most notable of these are the 21-kilometer **Govardhan Hill Parikrama**, which honours Krishna lifting the mountain to protect the villagers of Vrindavan from torrential rain, and the **Vrindavan Parikrama**, a barefoot walk around the perimeter of the temple town dedicated to Radha and Krishna. Together, these walking traditions weave physical endurance with deep spiritual contemplation (Refer Map 2-9).

The list of major festivals celebrated here is presented in Table 2-3.



Picture 2-1: Shri Banke Bihari Temple in Vrindavan



Picture 2-2: Dwarkadhish Temple in Mathura

Source: Site Visit 2025

Table 2-3: Festivals celebrated in Mathura–Vrindavan city

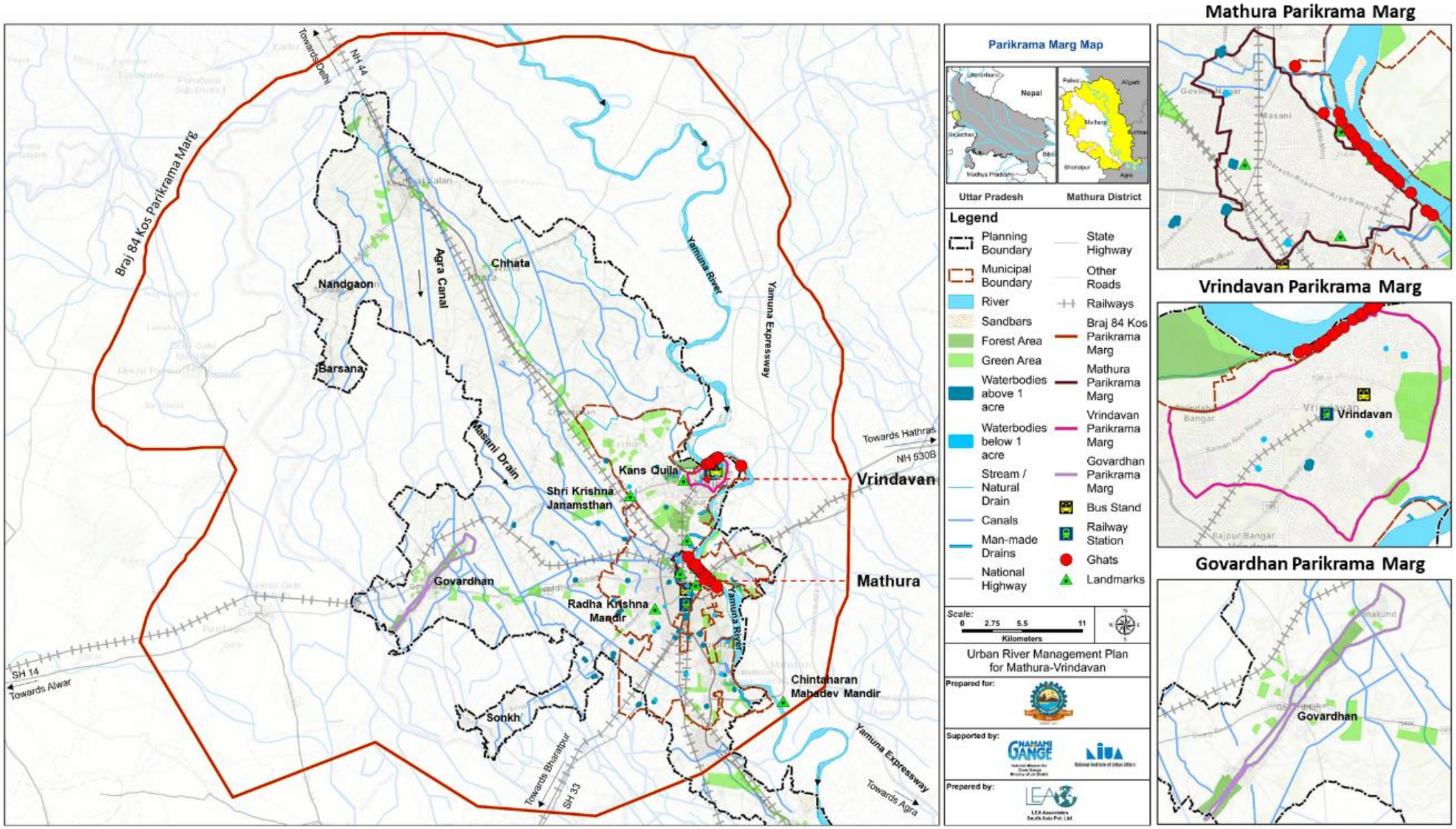
Festival/Event	Time of Year	Key Features & Practices	Cultural/Spiritual Significance
Janmashtami	August/September	Midnight celebrations at Krishna Janmabhoomi; temple rituals, devotional songs, enactments of Krishna's birth	Celebrates the birth of Lord Krishna; Mathura is considered his birthplace, making this the most important festival
Holi (Braj Holi)	February/March	Latham Holi in Barsana and Nandgaon; colours, songs, dances, temple festivities in Vrindavan	Symbolizes joy, divine play (*Leila*) of Krishna and Radha; globally renowned for its vibrant celebrations
Radhashtami	August/September	Special pujas at Radha temples; devotional singing and offerings	Honours the birth of Radha, Krishna's consort, central to Braj devotional traditions
Govardhan Puja/Annakut	October/November (Diwali period)	Offerings of food arranged as Govardhan hill; rituals at Govardhan and Mathura temples	Commemorates Krishna lifting Govardhan Hill to protect villagers;

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Festival/Event	Time of Year	Key Features & Practices	Cultural/Spiritual Significance
			emphasizes ecological and communal harmony
Kartik Purnima	October/November	Yamuna aarti, temple rituals, devotional singing; pilgrims bathe in the river	Marks the auspicious full moon of Kartik; associated with Krishna's *Raslila* and spiritual renewal
Rath Yatra	June/July	Chariots carrying deities through Vrindavan streets; devotional singing and dancing	Symbolizes Krishna's journey with devotees; ISKCON temples play a central role
Jhulan Yatra	July/August	Swing festival in temples; idols of Radha-Krishna placed on decorated swings	Celebrates the monsoon season and Krishna's playful nature
Raslila Performances	Seasonal (esp. Kartik)	Dramatic enactments of Krishna's life and divine play; staged across Vrindavan	Reinforces Braj's identity as the sacred landscape of Krishna's Leela's

Source: Tourism Department Mathura-Vrindavan 2026

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Map 2-9: Parikarma Marg in Braj region

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2.8 Socio – Economic Profile

As per the Mathura-Vrindavan Masterplan 2031, the economy of the city is driven by agriculture and dairy in the primary sector, small-scale manufacturing in the secondary sector and is dominated by tourism, trade and hospitality in the tertiary sector. Its socio-economic profile is structured across three domains in Table 2-4.

Table 2-4: Socio-Economic profile Mathura–Vrindavan city

Sector	Key Features	Highlights
Primary	Agriculture and dairy	The city relies heavily on mustard, wheat, and dairy farming and is famous for being major hub for milk-based sweets like its renowned Peda. • 58.52% cultivable land • 26.87% forest cover • 73% net sown area in rural zones • Irrigation: canals (53.63%), tube wells (26.04%)
Secondary	Industry and Manufacturing	This sector includes major oil refinery, brass ornament manufacturing, textile printing (particularly traditional apparel like dhotis and sarees), and the intricate production of devotional items and deity dresses (Poshak). • Small-scale industries: textiles, handicrafts, incense, religious artifacts • Agro-based industries and oil refinery in Mathura • Construction and infrastructure growth linked to tourism and urban expansion
Tertiary	Religious tourism	• Dominant sector driven by religious tourism • Millions of pilgrims annually for Holi, Janmashtami and other festivals • Hospitality: hotels, ashrams, Dharamshalas, restaurants and retail trade. • Expanding education, healthcare and financial services • Tourism sustains local artisans, guides and small businesses

Source: Masterplan report of Mathura-Vrindavan 2031

The economy of the city is also anchored by religious, cultural and historical legacy. Beyond this Mathura relies heavily on mustard, wheat, and dairy farming and is famous for being major hub for milk-based sweets like its renowned Peda. The region is driven by small and medium enterprises. These include a major oil refinery, brass ornament manufacturing, textile printing (particularly traditional apparel like dhotis and sarees), and the intricate production of devotional items and deity dresses (Poshak). However, religious and cultural tourism acts as the major economic engine, integrating life into almost every sector. The massive, perennial influx of millions of pilgrims and international tourists for festivals like Holi and Janmashtami directly sustains the hospitality, transport, retail, and handicraft sectors, transforming temple management, guiding services, and street commerce into the primary livelihoods for a vast majority of the local population.

2.9 Institutional Mechanism

There are multiple agencies responsible for planning, development and service delivery within the Mathura-Vrindavan Planning that are relevant for Urban River Management within Mathura-Vrindavan. The key agencies and their roles and responsibilities are presented in the following table.

Table 2-5: Role and Responsibility of key government agencies for Mathura-Vrindavan City

Sl. No.	Department	Key Role and Responsibilities
A. Regional/ State level		
1.	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

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Sl. No.	Department	Key Role and Responsibilities
		• 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.
2.	Tourism Development Department, Govt. of U.P.	• Formulate district tourism policies and long-term development strategies • Monitor the environmental and social impact of tourism projects • Implement safety protocols and eco-friendly practices
3.	Uttar Pradesh Pey Jal Nigam	• 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. • Implement rural water schemes such as Jal Jeevan Mission, • Install chlorination units, UV treatment, or filtration systems in contamination-prone zones
4.	Uttar Pradesh, PWD	• Plan, construct and maintain state highways, district roads, rural roads and bridges.
5.	Town and Country Planning Department, Uttar Pradesh	• Prepare Master Plans and Zonal Development Plans for notified areas
6.	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 the 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.
B. District level		
7.	District Administration Mathura-Vrindavan	• Maintaining law and order, coordinating civic operations and ensuring regulatory compliance across the city. • Land revenue records
C. Local Level		
8.	Mathura-Vrindavan Development 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
9.	Nagar Nigam, Mathura Vrindavan	• Area jurisdiction: Municipal Area • Urban services and infrastructure – solid waste management, maintenance of roads and drainage, • Environment and public welfare activities • Development and planning • Public interface and emergency services.
10.	Uttar Pradesh Braj Teerath Vikas Parishad	• Heritage Conservation & Development – Preserve and restore temples, ghats, kunds, forests and sacred sites, while maintaining Braj's cultural and ecological identity. • Tourism & Pilgrimage Infrastructure – Promote integrated tourism, improve facilities for pilgrims and organize cultural festivals to strengthen Braj's spiritual and global appeal.

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Sl. No.	Department	Key Role and Responsibilities
		• Planning, Advisory & Community Engagement – Prepare and monitor the Braj Development Plan, coordinate with local authorities, manage water bodies and green corridors and mobilize public participation and funding.
11.	Jal Kal Department	• Responsible for day-to-day operation and maintenance of water supply systems.
12.	Irrigation Department, Mathura-Vrindavan Division, 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.
13.	Forest Department	• Protect forest areas comprising native flora and fauna, endangered species and biodiversity-rich zones.
14.	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.

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Pag28

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ECOLOGICAL PROFILE OF THE CITY

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3 ECOLOGICAL PROFILE OF THE CITY

3.1 River and its Ecosystem

The hydrological ecosystem of Mathura-Vrindavan is shaped by Yamuna River, which sustains ecological balance, cultural and religious activities and urban life.

The Yamuna River enters the planning area through Vrindavan in the north and flows towards Mathura in the south. The length of the river within planning area is approximately 51 km and within the municipal limits it is about 33 km. Originating from the Yamunotri Glacier in Uttarakhand, Yamuna is a perennial river with continuous flow throughout the year. Within the Mathura-Vrindavan stretch, the river meanders eastward, traversing urban, cultural and pilgrimage zones that are central to the city's identity. Seasonal fluctuations are moderate, though monsoon flooding is common, impacting settlements, ghats and infrastructure along its banks.

Several prominent ghats such as Vishram Ghat in Mathura and Keshi Ghat in Vrindavan are located along its course, serving as focal points for ritual bathing, evening aarti and festive congregations. Beyond its hydrological role, the Yamuna holds immense religious, cultural and economic importance supporting agriculture in its fertile floodplains, sustaining fisheries, enabling tourism through boat rides and heritage walks and anchoring pilgrimage activities that draw millions of devotees annually.



Picture 3-1: Yamuna River at Asikunda Ghat, Mathura



Picture 3-2: Yamuna River near Vishram Ghat, Mathura

3.1.1 River morphology

The Yamuna River in the Mathura–Vrindavan region exhibits a highly sinuous to meandering planform typical of a mature alluvial river within the Ganga plains. The river corridor is characterized by extensive sandy floodplains (Khadar), point bars, and palaeo-channels, with an asymmetrical cross-section comprising a constrained western bank defined by historic settlements and ghats, and a broader eastern floodplain supporting agriculture and seasonal flood retention. The river displays significant seasonal variability, with exposed sandbars and multiple shallow channels during lean-flow periods, and expanded channel dimensions and floodplain inundation during the monsoon season.

Channel Pattern: The analysis of the Yamuna River channel demonstrates dynamic behaviour characterized by periodic widening and narrowing of the active channel belt, lateral migration of meander bends, and extensive in-channel sediment redistribution. The channel width decreased from approximately 160 m in 1999 to 142 m in 2009, followed by a substantial widening to 221 m in 2014, likely associated with high-flow events and enhanced bank erosion processes. Subsequently, the channel stabilized within a broader corridor, with widths ranging between 193 m and 199 m during 2019–2024. These variations reflect the natural fluvial processes of erosion, deposition and sediment reworking.

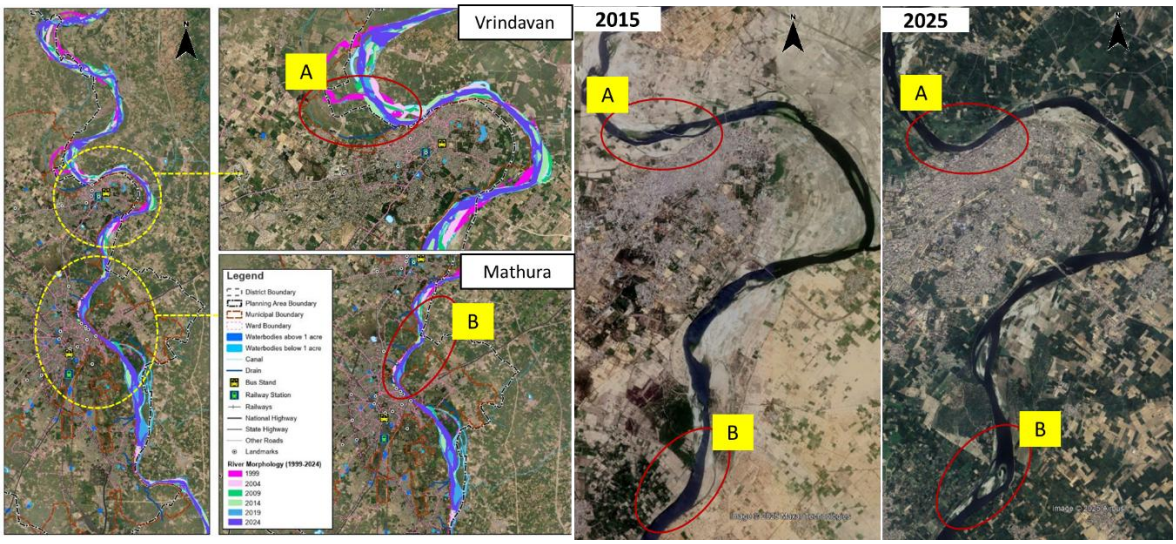
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Table 3-1: Changes in channel width in the last 25 years

Sl. No.	Year	Width of the river channel in April (m)
1	1999	160
2	2004	160
3	2009	142
4	2014	221
5	2019	193
6	2024	199

Source: NDWI Analysis using Landsat 5, 7, 8 data

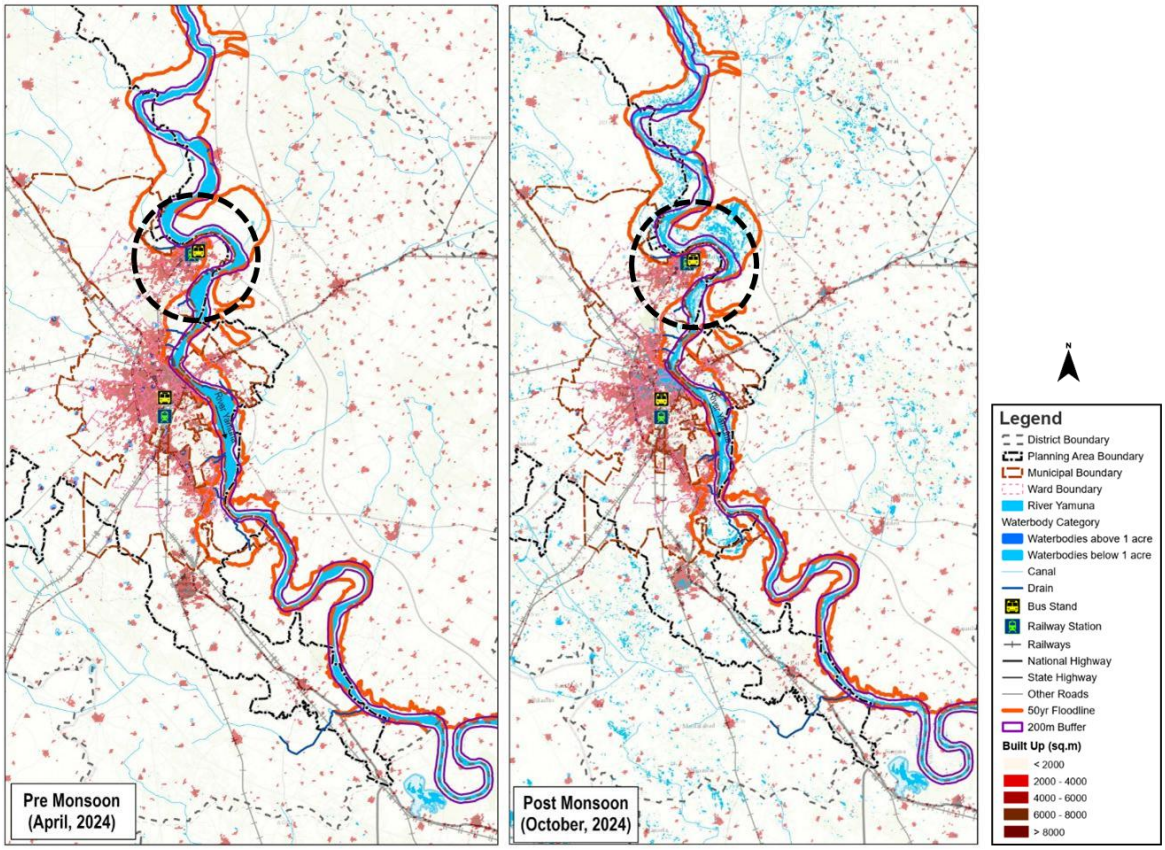
Temporal Course Change of Yamuna River: Analysis of satellite imagery from 1999 to 2024 (refer Map 3-1) indicates that Yamuna River has undergone localized lateral adjustments rather than a uniform directional shift. The most notable morphological changes have occurred along the central Mathura–Vrindavan reach, where portions of the active channel belt have migrated towards the western urban edge, accompanied by significant sediment redistribution and sandbar reconfiguration, particularly near the Keshi Ghat and Vishram Ghat stretches. In contrast, river reaches adjoining historic ghats and urban embankments have remained relatively stable due to anthropogenic interventions and riverbank protection measures.



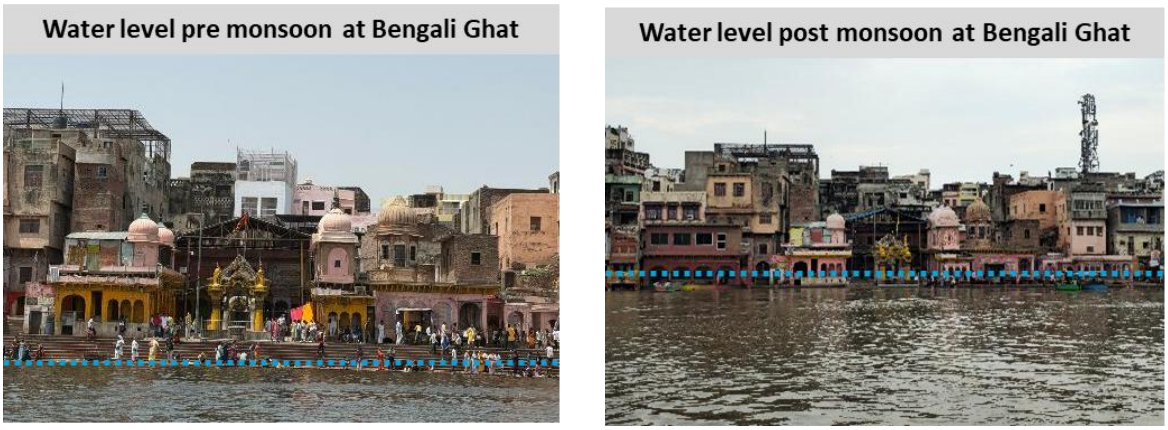
Picture 3-3: Seasonal Flow variation in Mathura- Vrindavan

Seasonal Flow Variation: The Yamuna River in the Mathura–Vrindavan region exhibits significant seasonal variability in channel morphology, primarily driven by fluctuations in river discharge between pre-monsoon and post-monsoon periods. Comparative analysis of satellite imagery from April and October 2024 (refer Map 3-2) indicates substantial seasonal expansion of the active channel and increased floodplain connectivity during the monsoon season. Post-monsoon conditions are characterized by greater channel width, inundation of active floodplain areas, and partial or complete submergence of exposed sandbars. In contrast, pre-monsoon conditions exhibit reduced flows, resulting in the exposure of extensive sandbars and the formation of multiple shallow flow channels. The most prominent seasonal morphological changes occur along the meander reaches near Keshi Ghat and Vishram Ghat, where active sediment redistribution and bar reconfiguration are evident. However, the overall river alignment remains largely stable, indicating that seasonal variations are dominated by changes in channel extent and sediment dynamics rather than significant lateral migration of the river course.

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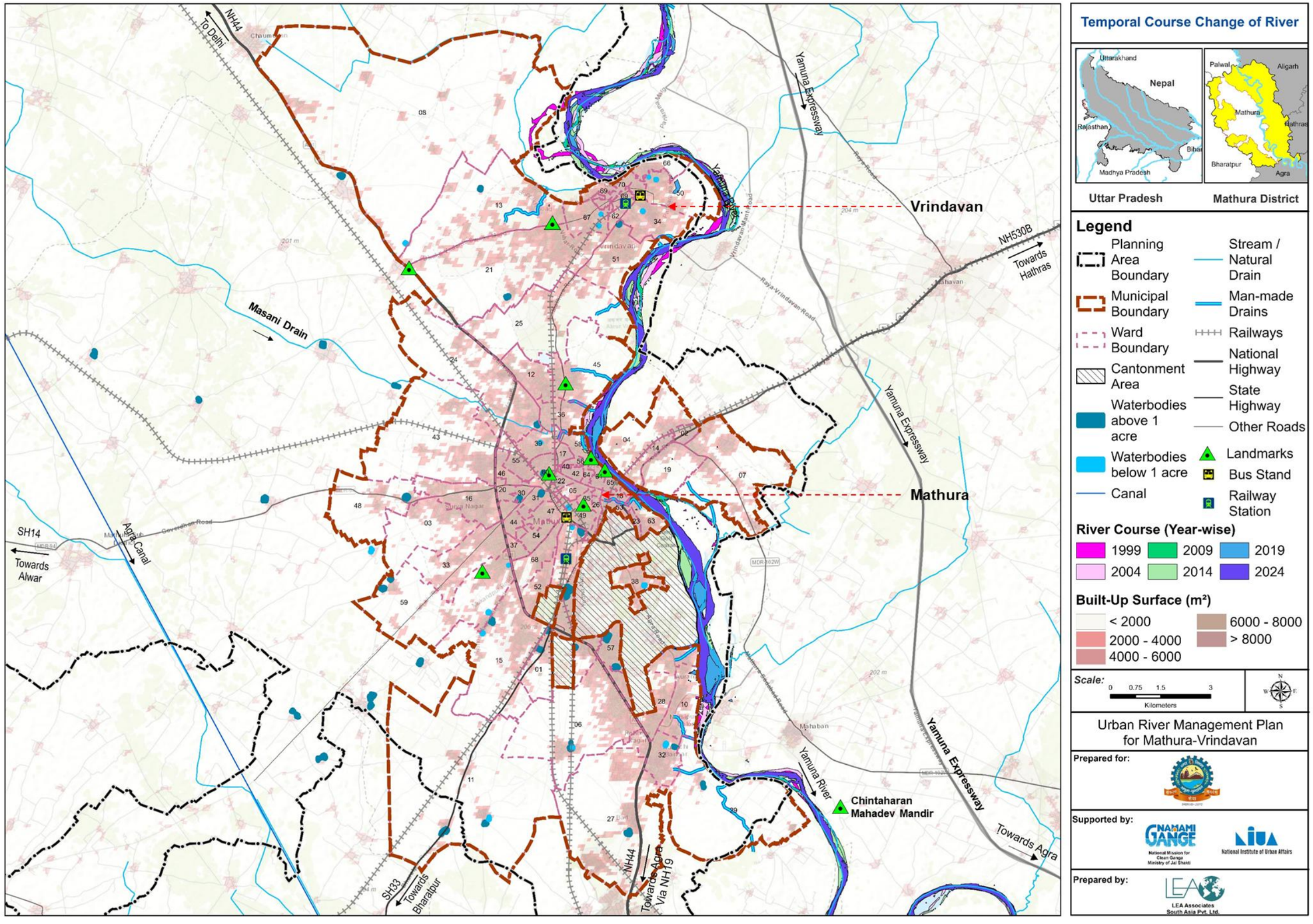


Picture 3-4: Temporal course change in Mathura- Vrindavan



Picture 3-5: Water Level during pre and post monsoon at Bengali ghat

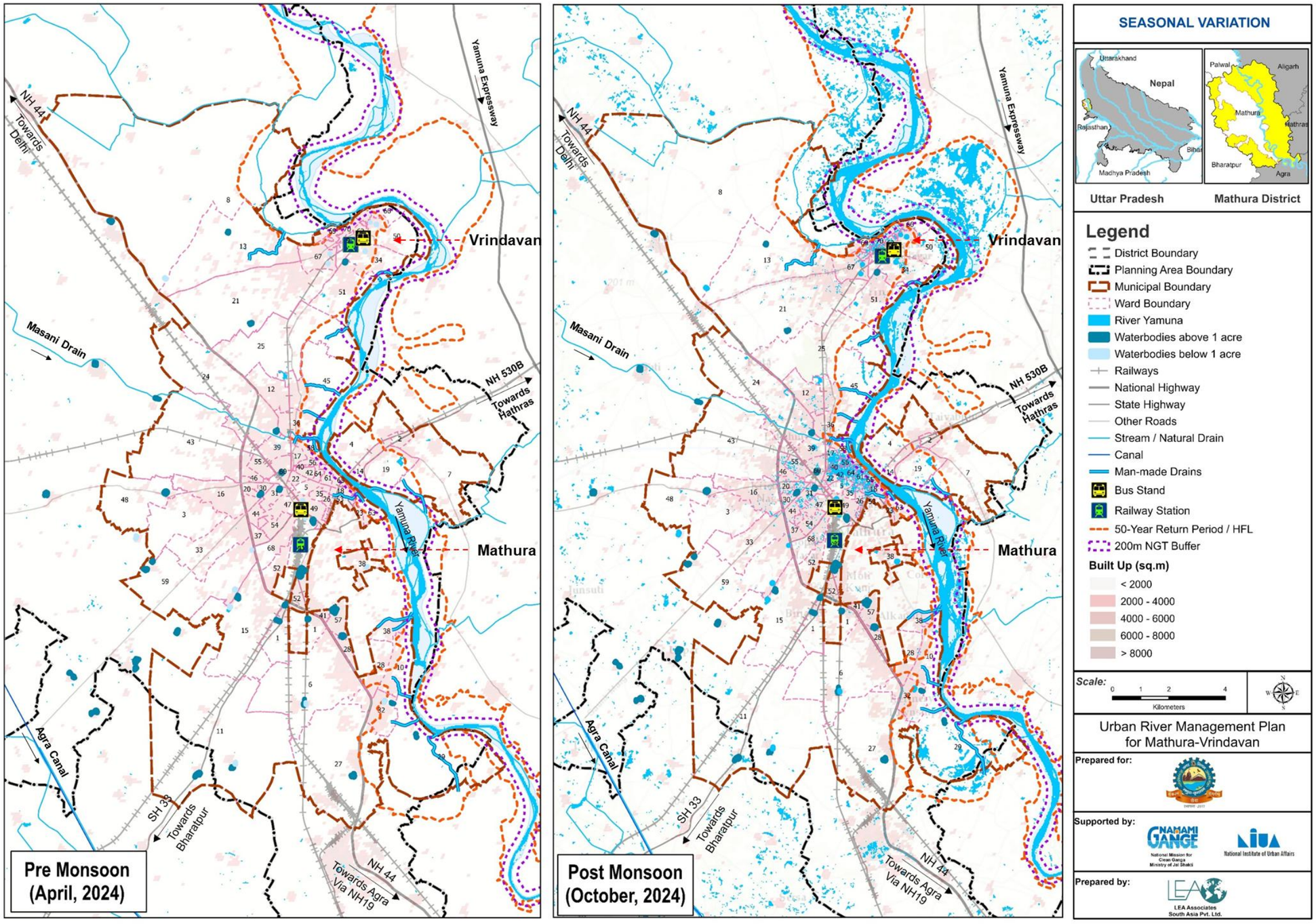
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Source: 1) Admin Boundaries: Mathura-Vrindavan Masterplan 2031; 2) Municipal Boundary: Nagar Nigam Mathura Vrindavan; 3) Transport Network: OSM; 4) NDWI/ NDBI analysis : DEM Data; 5) Waterbodies: Braj Teerth Vikas Parishad

Map 3-1: Temporal Course Change of Yamuna River for 1999 to 2024

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Map 3-2: River Yamuna water channel in pre-monsoon and post-monsoon months

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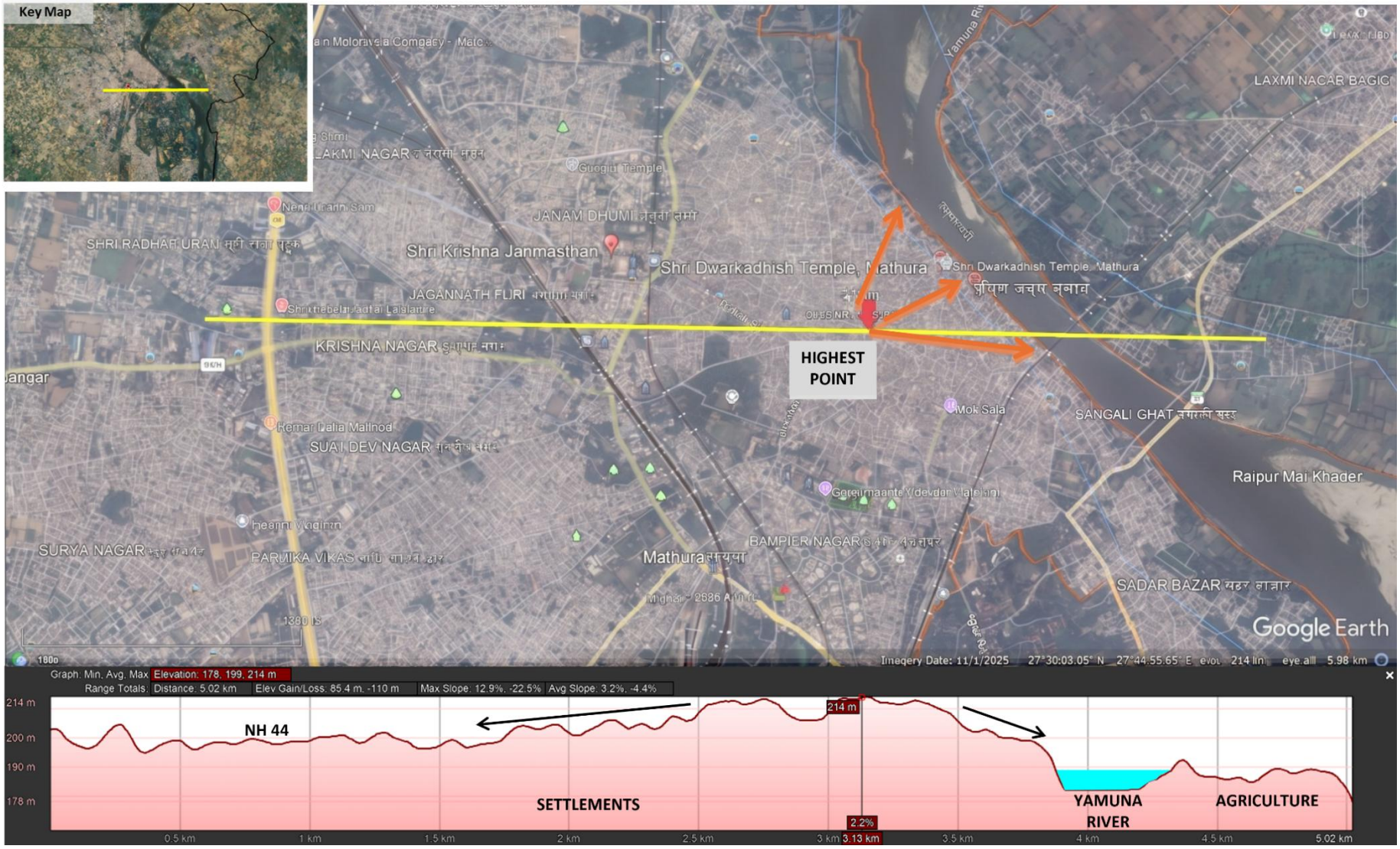
Cross-section of Yamuna River:

Mathura city: The cross-section (refer Picture 3-6) of Mathura city shows an elevation range of approximately 35 meters observed from the satellite imagery. The elevation profile reveals an undulating pattern of higher and lower grounds in the Mathura city, which lies on the western bank of Yamuna River. The elevation is the highest adjacent to the river from where it slopes steeply towards the Yamuna River to the east. Agricultural areas occupy flatter terrain closer to the river, benefiting from fertile alluvial soils but the remaining area is exposed to seasonal inundation. The Yamuna River corridor, being the lowest point, functions as the natural drainage sink.

Vrindavan City: The cross-section (refer Picture 3-7) reveals an elevation range of approximately 20 meters between the Yamuna River bed and the western high point. Vrindavan is shaped by the Yamuna River's deep meandering loop. The highest elevation is along the eastern edge of the river which gently flows towards the western bank of meandering river.

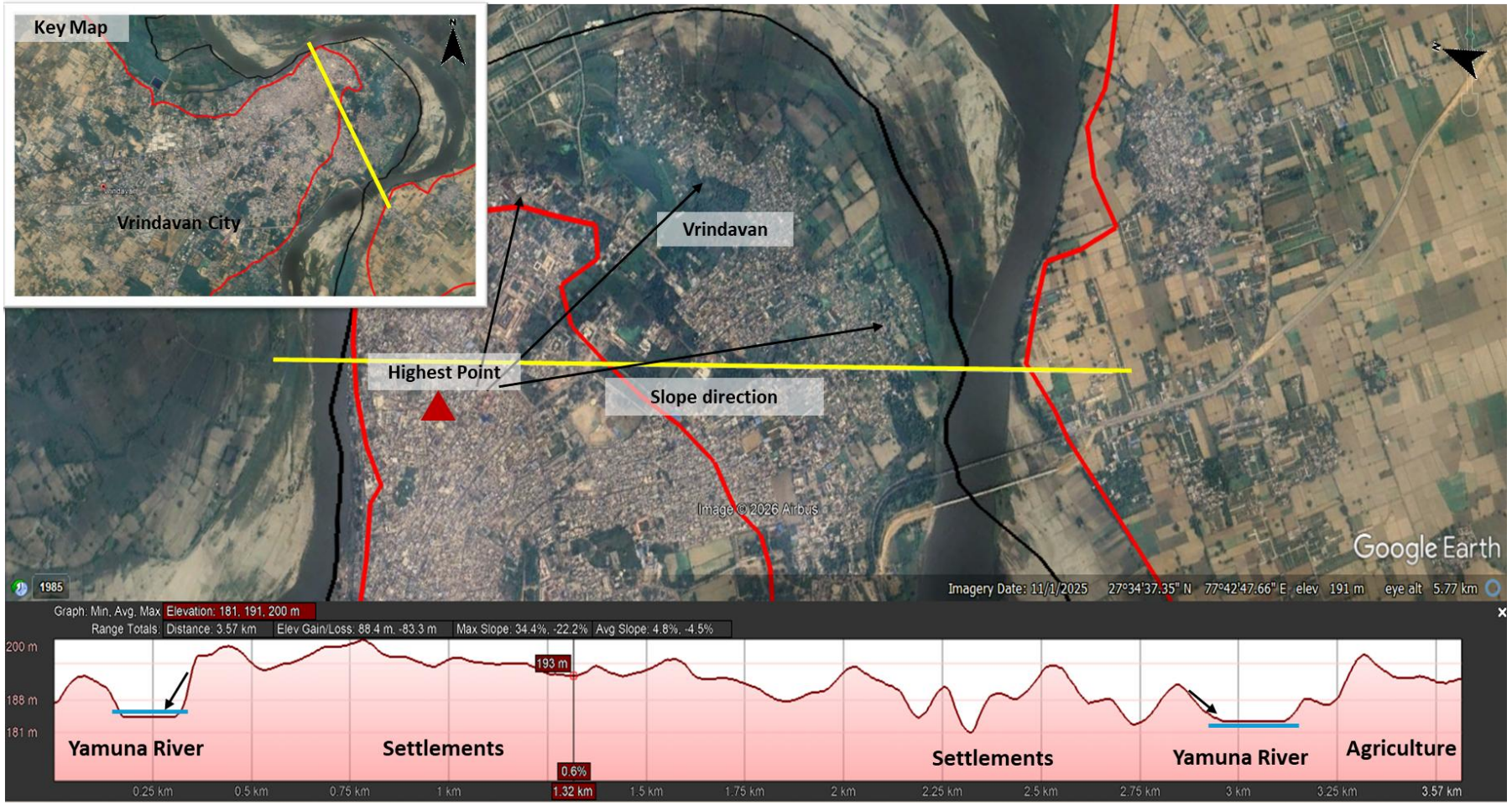
Agricultural areas occupy flatter terrain, benefiting from fertile alluvial soils but the remaining area is exposed to seasonal inundation. The Yamuna River corridor, being the lowest point, functions as the natural drainage sink.

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Picture 3-6: Cross-Section of Yamuna River at Mathura

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Picture 3-7: Cross-Section of Yamuna River at Vrindavan

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3.2 Blue-Green Resources in the City

As per Mathura–Vrindavan Master Plan 2031, the planning area comprises 12.64% green and 2.2% blue resource. Blue resources include ponds, rivers, canals and nallahs. Green resources include e regional parks, district parks and sector park.

3.2.1 Waterbodies and Wetland

Agra Canal Passes through north west to south east direction on the western side of the planning area but outside the municipal limits of Mathura- Vrindavan. In addition to it, there are 372 ponds located within the planning area, of which 15 fall within the Mathura-Vrindavan Nagar Nigam. All the ponds within the Nagar Nigam area exceed one acre in size. Out of these ponds, 3 are seasonally dry while eutrophication was observed in the rest. There are no wetlands within the planning area.

A broad condition assessment was undertaken for all the fifteen identified water bodies. Key observations included solid waste disposal and discharge of untreated used water from adjoining settlements, with boundary protection absent in ten ponds. Visible Eutrophication was recorded in 14 ponds. One pond, Saraswati Kund, could not be assessed as it lies within a temple premises that was closed during the survey period. Dissolved Oxygen (DO) samples were collected for 14 water bodies to enable a comprehensive evaluation of their current ecological condition. The detailed findings are presented in the Annexure 5**.**



Picture 3-8: Ramtal Kund



Picture 3-9: Matovan pond



Picture 3-10: Indal kund



Picture 3-11: Savri Masjid Pond

[2] *Source- Braj Teerath Vikas Parishad*

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3.2.2 Ongoing/ Proposed/ Approved Projects

Currently, there is no ongoing, proposed or approved flood protection and mitigation projects outlined by the Irrigation Department.

3.2.3 Overall Assessment of waterbodies

Mathura-Vrindavan city is primarily dependent on groundwater to meet its domestic and commercial water requirements, with limited supply from surface sources. The Yamuna River remains largely untapped and is highly vulnerable to contamination from untreated sewage inflows, solid waste and agricultural runoff. Groundwater levels in Mathura fluctuates between 12–16 m below ground level during 2016–2020, showing relative stability with seasonal variation between pre- and post-monsoon values. Several of the city's water bodies receive untreated used water from nearby settlements posing risks to public health.

3.2.4 SWOC Analysis

STRENGTHS	WEAKNESS
• 372 ponds exist in the planning area, a significant inherited network of blue assets for a city of this size. • The city has kunds which historically served as natural detention basins and social/cultural hubs	• All assessed ponds are facing discharge of untreated used water from nearby settlements and solid waste dumping, leading to widespread eutrophication • Most ponds show low DO levels falling below the 4 mg/L Many ponds dried up during the summer.
OPPORTUNITIES	**CHALLENGES**
• Small-scale, decentralized treatment systems at the entry points of these ponds could improve water quality • Restoring the historic *kunds* offers the dual benefit of improving urban aesthetics and creating recreational spaces	• Fragmented institutional responsibilities among multiple agencies hinder coordinated planning, restoration, and long-term management of waterbodies. • Climate variability and declining groundwater levels have increased the incidence of seasonal drying, reducing the ecological and hydrological functions of waterbodies.

3.2.5 URM_{Index} Score

The assessment under this objective involves evaluating the condition of existing water bodies within municipal limits through both qualitative and quantitative indicators.

Water bodies larger than 1 acre and in acceptable condition are considered for assessment. The Water Body Revival Factor (WBRF) is used to quantify the overall condition; which is calculated as:

$$WBRF = \frac{\text{Number of water bodies in acceptable condition}}{\text{Total number of water bodies}} \times 100$$

As per the URM framework, the acceptable condition of a water body is determined based on the following six qualitative parameters:

Table 3-2: Revival Score Calculation Criteria for Water Bodies

Sl. No	Scoring Criteria
1	No presence of solid waste in or around the water body
2	No discharge of untreated used water in the water body
3	Presence of a boundary protection around a water body
4	No visible eutrophication in the water body
5	Minimum DO of 4 mg/l

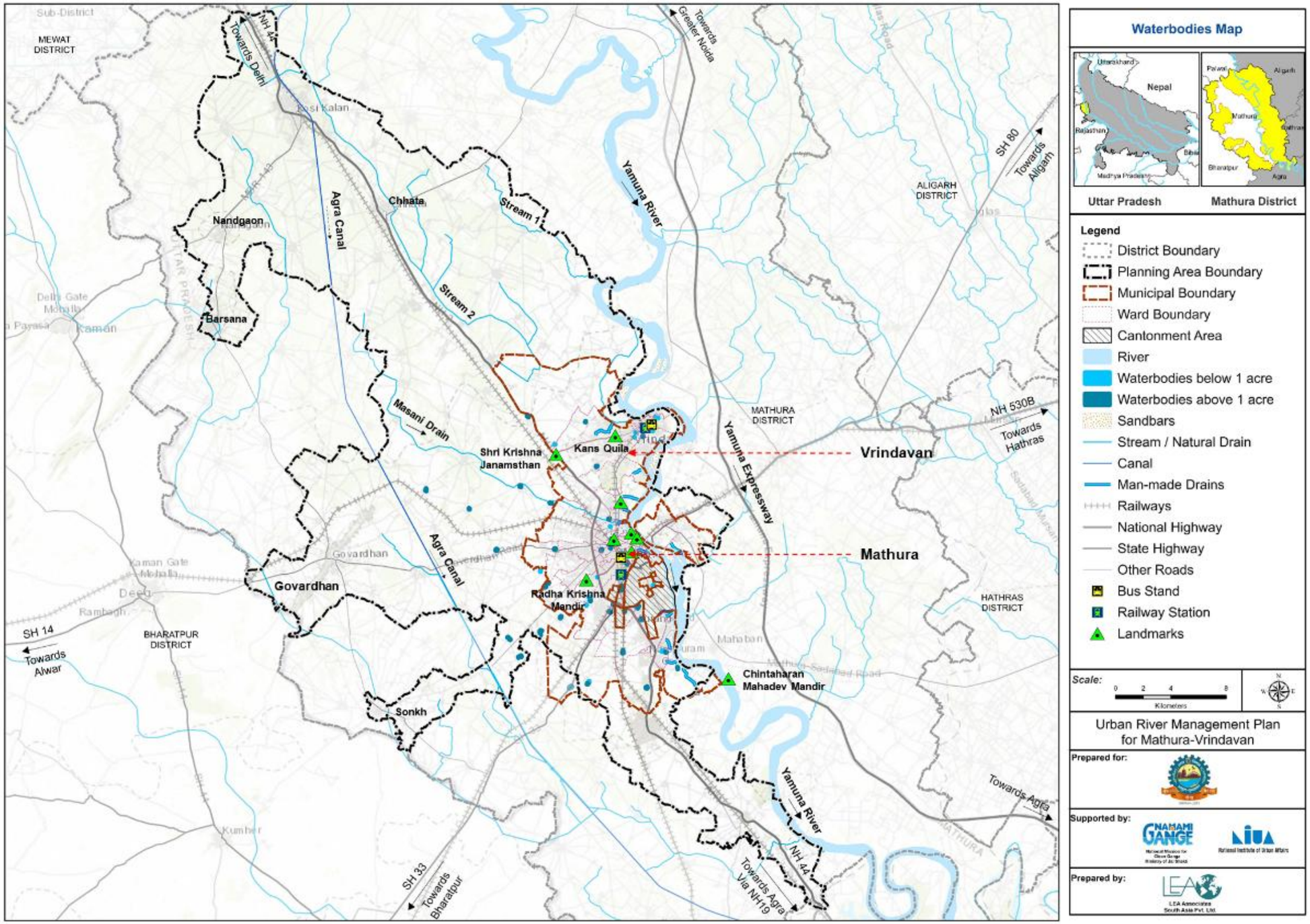
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Sl. No	Scoring Criteria
6	No reduction in volume of water from previous year

Based on the assessment, out of the 14 water bodies, 5 of the waterbodies has been found to be in an acceptable condition (Refer Annexure 5).

As per the URMP scoring framework, when the WBRF is less than 33 %, the corresponding Water Body Revival Score (WBRS) is 1.

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Source: 1) Admin Boundaries: Mathura-Vrindavan Masterplan 2031; 2) Municipal Boundary: Nagar Nigam Mathura Vrindavan; 3) Transport Network: OSM; 4) Waterbodies: Braj Teerath Vikas Parishad

Map 3-3: Waterbodies map of Mathura- Vrindavan

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3.2.6 Green Resources

Forest: Mathura-Vrindavan lies within the Braj region, where forested landscapes are historically associated with Krishna's Leela's. While dense natural forests are limited within the municipal boundary, the adjoining areas include protected groves and sacred woodlands such as Nidhivan and Seva Kunj in Vrindavan, which are revered for their cultural and ecological significance. Further two demarcated Reserved Forests, exist at Sunrakh Reserved Forest (near Sunrakh village, west of Vrindavan) and Vrindavan RF (south-west of Vrindavan near Madal Kos Pillar) these are dominated by dense Acacia nilotica (babul) cover, that is characteristic of the semi-arid Braj landscape. Pockets of dense mixed jungle and riparian scrub are also located along the Yamuna floodplain near Akrur and Chhanhri, alongside invasive kikar (Prosopis juliflora) groves near Nagla Sudama[3] (Refer Picture 3-18).

Wildlife: Yamuna River provides habitat for a variety of faunal species, including water birds such as herons and kingfishers. The river has traditionally supported diverse fish population, such as Rohu (Labeo rohita), Catla (Labeo catla) and Mrigal (Cirrhinus mrigala). Other common natives include Wallago attu (freshwater shark/Boal), Chitala (featherback) and several species of catfish and snakeheads (Channa). The urban and peri-urban landscape also hosts peafowl, monkeys and cattle, while scrub forests on the outskirts shelter larger and smaller fauna such as nilgai (blue bull), golden jackals and Indian hares[3] (Refer Annexure 8).



Grey Heron **Kingfisher** **Lesser Fkorican** **Stork**

Picture 3-12: Avian species in Mathura- Vrindavan



Hayena **Nilgai** **Hog Deer** **langur**

Picture 3-13: Wild animals in Mathura- Vrindavan

[3] *Source: Forest Department*

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Mahseer **Mullet** **Mrigala** **Katla**

Picture 3-14: Species of Pisces found in Mathura- Vrindavan



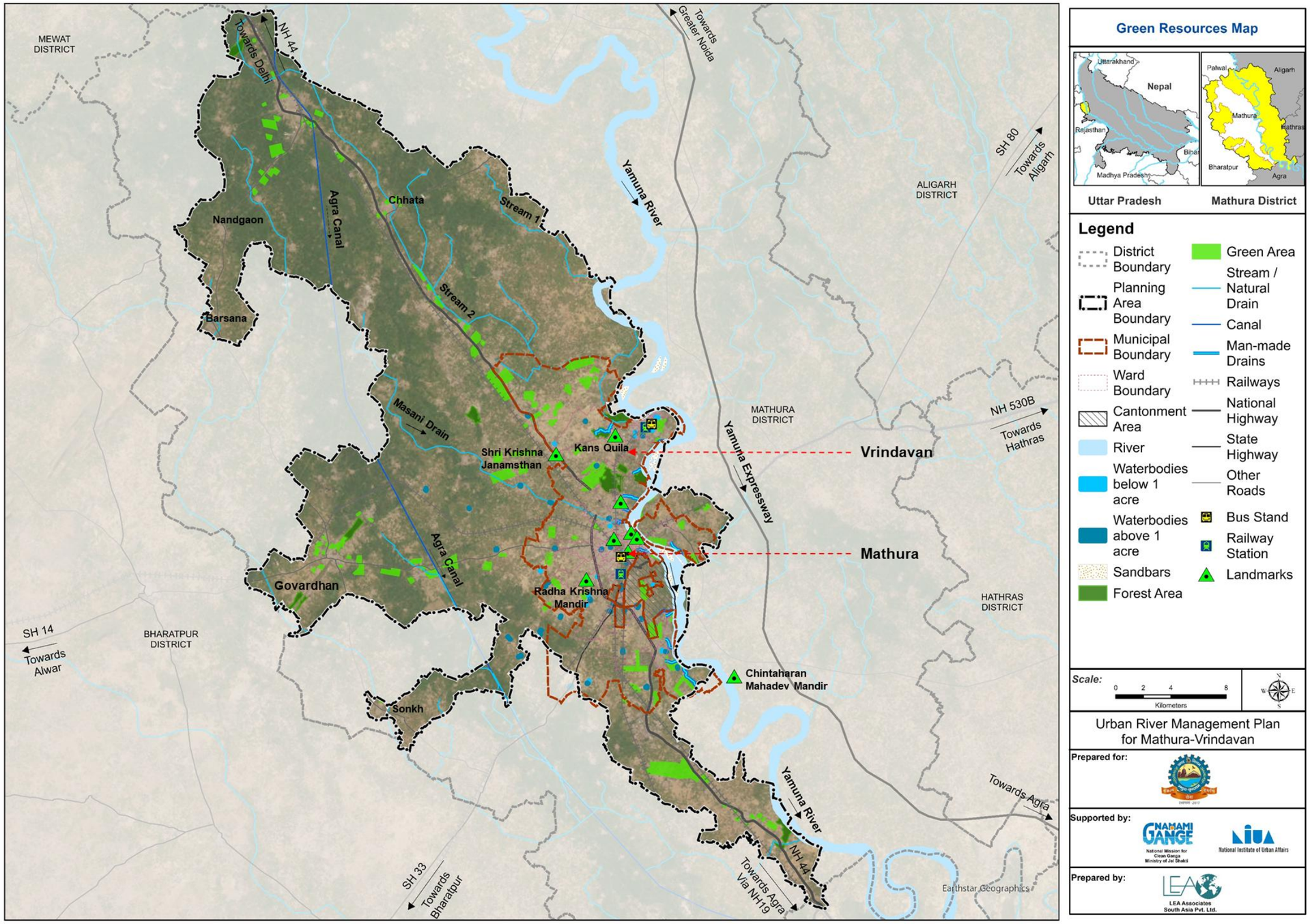
Crocodile **Rat Snake** **Oriental garden lizard** **Pond turtle**

Picture 3-15: Reptilian species in Mathura- Vrindavan

Urban green belt/parks: As per the Mathura–Vrindavan Master Plan 2031, 12.64% of the planning area is designated as green space, including riverfront buffers, temple precinct gardens and heritage kunds. However, less than 1% is formally developed as planned parks or playgrounds, indicating a shortfall in provision of structured recreational green areas as per URDPFI's 12% minimum guideline. Prominent public parks include Jai Gurudeva Park, Prem Mandir Gardens and municipal gardens near Dwarkadhish Temple.

Agriculture: Agricultural activity along Yamuna floodplains remains a major livelihood source. The fertile alluvial soils support the cultivation of wheat, paddy, sugarcane and vegetables. Floriculture and vegetable cultivation also prominent in the area.

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Source: 1) Admin Boundaries: Mathura-Vrindavan Masterplan 2031; 2) Municipal Boundary: Nagar Nigam Mathura Vrindavan; 3) Transport Network: OSM; 4) Waterbodies: Braj Teerath Vikas Parishad

Map 3-4: Green Resources in Mathura- Vrindavan

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3.2.7 Riparian Buffer

The riverbank of the Yamuna is 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. Only riparian buffer of width greater than 7.5 mts. is considered in the analysis. Vegetation consists mainly of native grasses, shrubs and trees. The Mathura- Vrindavan Master Plan (2031) has lacks regulatory provision for buffer zones along river, canals and nallahs. The methodology for deriving length 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

The assessment is based on site visits and satellite imagery. The vegetative buffer is composed of native grasses, shrubs and aquatic vegetation. Most of the land along the banks of the river is under the ownership of Irrigation and Forest Departments.

Riparian buffer along Yamuna River: The Yamuna River flows primarily from North to South and meanders South-Southeast. The river enters Vrindavan from the north, looping around the town. It continues flowing southward toward Mathura.

Table 3-3 outlines the spatial extent of existing land-use typologies across the Western and Eastern banks of the Yamuna River

Table 3-3: Existing Riparian Buffer along the Banks of Yamuna River (in mts.)

Typology	Western Bank	Eastern Bank	Average width
Agriculture	1,7476	16,861	-
Built-up	2,285	1,712	-
Low Density Vegetation	4,018	1,238	25
Dense Vegetation	3,794	249	25
Sandbar	1,490	0	-
Grand Total	**29,063**	**20,060**	

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

The spatial analysis of the riparian corridor indicates a degraded riverine ecosystem dominated by agricultural land use (69.9% across both banks) and 3,997 hectares of built-up area within the immediate floodplain. The Western bank retains dense vegetation cover in 3,794 mts whereas in eastern side it is 249 mts only. The sandbars are only in western bank in 1,490 mts. The corridor lacks sufficient capacity to filter agricultural runoff, stabilize banks against severe erosion, or attenuate flood surges—underscoring an imperative for prioritized bio-engineering afforestation along the Eastern bank, mandatory vegetated filter strips in agricultural zones, and strict enforcement of non-development buffers along the active floodplain.



Picture 3-16: Riparian vegetation along eastern bank of Yamuna River in Vrindavan



Picture 3-17: Riparian vegetation along the Yamuna River in Vrindavan

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Riparian buffer along canal and streams- The Agra Canal flows in a North to South (specifically North-Northwest to South-Southeast) direction through the western part of Mathura. Similarly, the 2 streams also run north to south but merge into the Yamuna River in Vrindavan.

Agra Canal: The data indicates dense riparian vegetation along both the banks (69,881.50 meters). (Refer Annexure 9)

- **Stream 1:** Out of total length of 24,348.40 m, agricultural land (13,561.40 m) is dominated. Vegetation accounts for a significant portion which includes dense vegetation (6,226.10 m) and low-density vegetation (2,641.60 m), while built-up areas occupy the smallest share 1,919.30 m.

Stream 2: It is dominated by dense vegetation (64,233.40 m) and agricultural land (40,728.50 m). It is followed by built-up areas which is 1,457.70 m. (Refer Annexure 9)

Riparian buffer along nallahs and ponds -

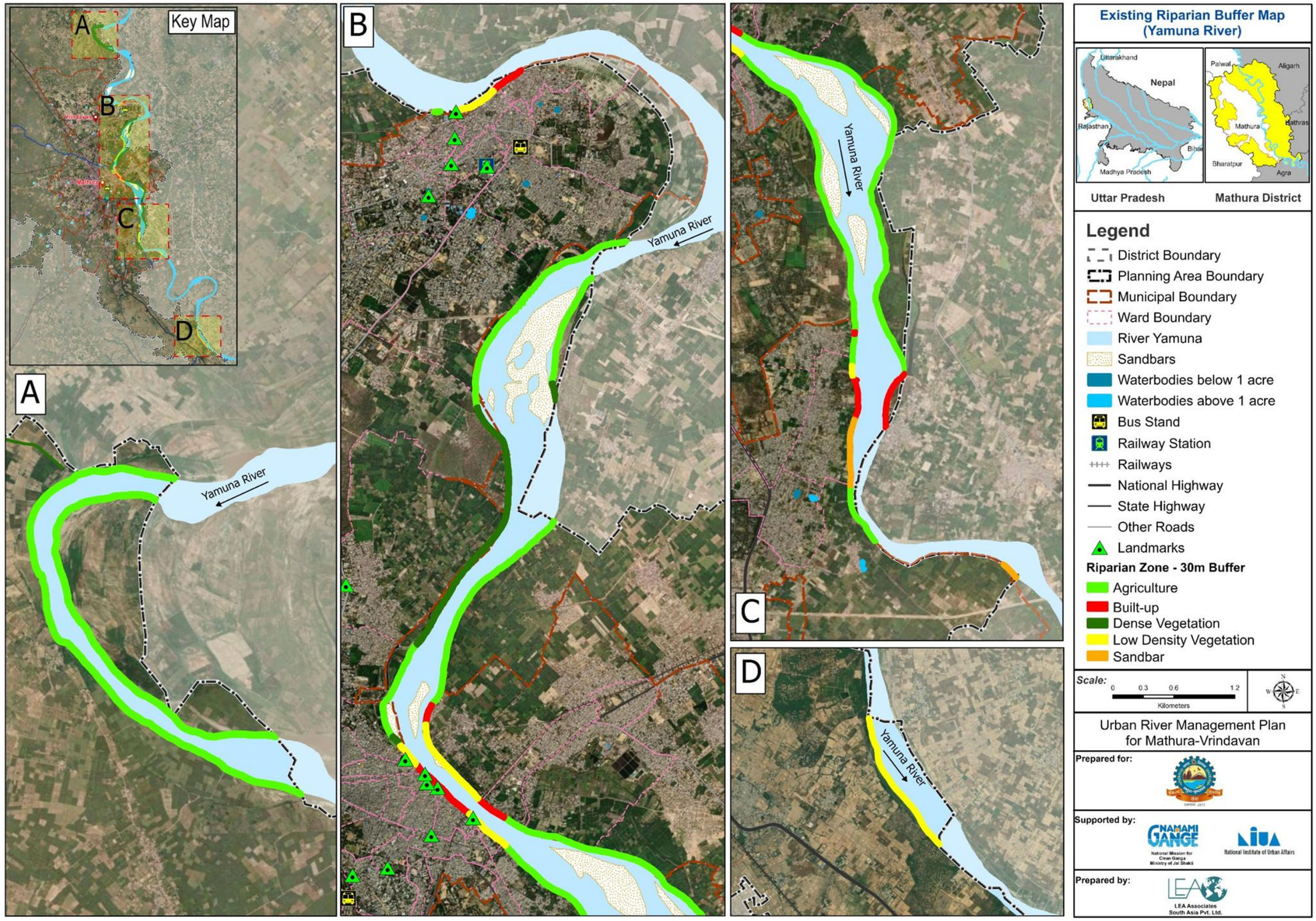
a. Drain:

Man- made drain: The spatial analysis of the 475,834-meter man made drains shows a predominantly natural buffer, comprising dense vegetation (145,889 m) and low-density vegetation (89,185 m) accounting nearly half of the total stretch. Structural embankments constitute 141,594 meters indicating slope stabilization and bio-engineering to prevent soil erosion and siltation. Agricultural land covers 59,239 m; and built-up development cover 39,927 m.

Masani drain: Out of the total riparian buffer, Dense Vegetation dominates the buffer 145,889 meters and followed by Embankments 141,594 meters. Low Density Vegetation accounts for 89,185 meters while Agricultural Land covers 59,239 meters (12.45%). (Refer Annexure 11)

b. **Ponds:** As mentioned in section 3.2.1 the ponds lack protective vegetative and physical buffer zones.

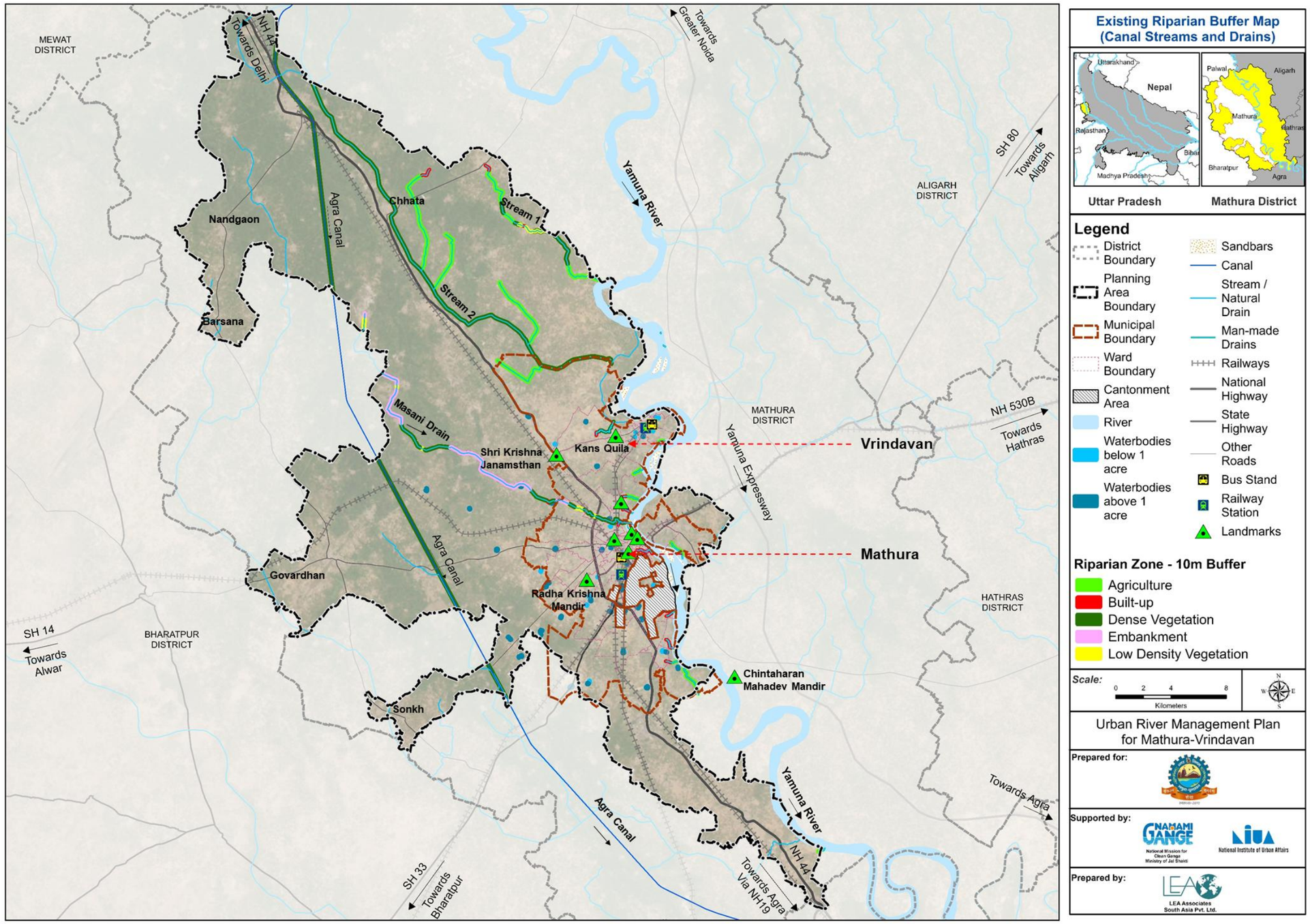
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Source: 1) Admin Boundaries: Mathura-Vrindavan Masterplan 2031; 2) Municipal Boundary: Nagar Nigam Mathura Vrindavan; 3) Transport Network: OSM; 4) Waterbodies: Braj Teerath Vikas Parishad

Map 3-5: Existing Riparian buffer along Yamuna River

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Existing Riparian Buffer Map (Canal Streams and Drains)

Uttar Pradesh | Mathura District

Legend

- District Boundary
- Planning Area Boundary
- Municipal Boundary
- Ward Boundary
- Cantonment Area
- River
- Waterbodies below 1 acre
- Waterbodies above 1 acre
- Sandbars
- Canal
- Stream / Natural Drain
- Man-made Drains
- Railways
- National Highway
- State Highway
- Other Roads
- Bus Stand
- Railway Station
- Landmarks

Riparian Zone - 10m Buffer

- Agriculture
- Built-up
- Dense Vegetation
- Embankment
- Low Density Vegetation

Scale: 0 2 4 8 Kilometers

Urban River Management Plan for Mathura-Vrindavan

Prepared for:

Supported by: NAMAMI GANGE (National Mission for Clean Ganga, Ministry of Jal Shakti) | National Institute of Urban Affairs

Prepared by: LEA Associates South Asia Pvt. Ltd.

Source: 1) Admin Boundaries: Mathura-Vrindavan Masterplan 2031; 2) Municipal Boundary: Nagar Nigam Mathura Vrindavan; 3) Transport Network: OSM; 4) Waterbodies: Braj Teerath Vikas Parishad

Map 3-6: Existing Riparian buffer along Canal/ Steams/ Drain

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3.2.8 Biodiversity

The riparian stretches along the Yamuna River include native species such as neem, peepal, banyan, jamun, kadamba and riparian grasses, which play crucial role in stabilizing riverbanks, filtering surface runoff and harbouring wildlife. The common flora and fauna species in the riparian buffer and river is listed in Table 3-4.

Table 3-4: List of Flora and Fauna Along the Yamuna River

Parameter	River Yamuna (Mathura-Vrindavan stretch)
Riparian Vegetation Composition (Flora)	Diverse native vegetation including grasses, herbs, shrubs and mature trees such as Neem (*Azadirachta indica*), Amaltas (*Cassia fistula Linn.Shisham*), Mango (*Mangifera indica*) and Peepal (*Ficus religiosa*). 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	25 meters. In several stretches, encroached by cultivation and small-scale development, significantly reducing its functional width
Faunal Presence	**Terrestrial Species:** The terrestrial landscape is inhabited by various mammals and wild species like the leopard (*Panthera pardus*), wolf (*Canis lupus*), hyaena (*Hyaena hyaena*), and jungle cat (*Felis chaus*) to herbivores and smaller fauna including the blue bull or nilgai (*Boselaphus tragocamelus*), wild boar (*Sus scrofa cristatus*), chinkara (*Gazella bennettii*), hog deer (*Axis porcinus*), porcupine (*Erethizon dorsatum*), hare (*Lepus ruficaudatus*), rhesus macaque (*Macaca mulatta*), and Hanuman langur (*Presbytis entellus*). **Avian Species**: The avian species featuring resident and migratory waterfowl such as the bar-headed goose (*Anser indicus*), common teal (*Anas crecca*), gadwall (*Anas strepera*), little grebe (*Tachybaptus ruficollis*), heron (*Ardea cinerea*), coot (*Fulica atra*), stork (*Ciconia ciconia*), cattle egret (*Bubulcus ibis*), and flamingo (*Phoenicopterus roseus*). Other terrestrial and game birds include the common peafowl (*Pavo cristatus*), sarus crane (*Grus antigone*), grey partridge (*Perdix perdix*), black partridge (*Melanoperdix niger*), lesser florican (*Sypheotides indicus*), sand grouse (*Pterocles exustus*), common quail (*Coturnix coturnix*), wedge-tailed green pigeon (*Treron phoenicoptera*), rock pigeon (*Columba livia*), griffon vulture (*Gyps fulvus*), Indian cuckoo (*Cuculus micropterus*), Asian koel (*Eudynamys scolopaceus*), mottled wood owl (*Strix ocellata*), and baya weaver (*Ploceus philippinus*). **Aquatic species**: The riverine and wetland environments of the Yamuna basin support aquatic and semi-aquatic fauna, including reptiles like the marsh crocodile (*Crocodylus palustris*), Indian rock python (*Python molurus*), cobra (*Naja naja*), monitor lizard (*Varanus monitor*), oriental garden lizard (*Calotes versicolor*), dhaman or rat snake (*Python mucosus*), wolf snake (*Lycodon aulicus*), water snake (*Natrix piscator*), black-barred snake (*Oligodon arnensis*), and several turtle species such as the pond turtle (*Lissemys punctata*), Indian softshell turtle (*Trionyx gangeticus*), and Yamuna kachhua (*Kachuga tectum*), rohu (*Labeo rohita*), mahseer (*Barbus [Tor] putitora*), lake fish (*Barbus chilinoides*), rishala (*Orcinus sinuatus*), katla or bhakur (*Catla catla*), mrigala or nain (*Cirrhinus cirrhosus*), and freshwater mullet (*Mugil corsula*).



Neem **Amaltas** **Mango** **Peepal**

Picture 3-18: Native species along the River Yamuna and Mathura-Vrindavan city

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3.2.9 Ongoing/Proposed and Approved Projects

The Uttar Pradesh Forest Department has undertaken a sustained plantation drive along canal routes, carried out consecutively from 2013 to 2023. Over this decade-long initiative, a cumulative area of 430 hectares has been brought under plantation.

3.2.10 Institutional Mechanism

Table 3-5: Departments and their roles and Responsibilities for Riparian Buffer

Departments	Roles and Responsibilities
Irrigation Department	Lead agency for riverbank protection, embankment construction and flood mitigation
Nagar Nigam	Responsible for land regulation, solid waste management and informal settlement control along the riverbanks
Forest Department	Custodian of forested riparian zones and biodiversity conservation
Horticulture Department	Maintains city-level greens, biodiversity parks and zoo; contributes to ecological restoration and landscape management along riparian corridors
Tourism Department	Promotes riverfront development, eco-tourism and cultural heritage zones; supports upkeep of public spaces and amenities along riparian stretches to enhance visitor experience and public engagement

3.2.11 Assessment of Riparian Buffer

A major part of the river edge comprises of agricultural fields on both banks and provides opportunity of establishing riparian buffers. Further, riparian buffers with low density vegetation can be densified into healthy plantations. Protection of riparian stretches shall ensure prevention of city growth till the edge of the river.

3.2.12 SWOC Analysis

STRENGTHS	WEAKNESS
• Agra Canal features 69,881.50 meters of dense riparian vegetation along both banks • Western Bank of the Yamuna River retains a robust natural buffer with 3,794 meters of dense vegetation •	• Eastern Bank of the Yamuna River suffers from a critically weak natural buffer, holding only 249 meters of dense vegetation • Built-up development occupies 3,997 hectares within the immediate Yamuna floodplain
OPPORTUNITIES	**CHALLENGES**
• Riparian buffers significantly improve the infiltration of water into the soil, directly addressing the city's lack of active recharge measures	• Loss of native riparian vegetation due to urban expansion and agriculture has diminished the ecological integrity of the river corridor. • High anthropogenic pressure from religious, tourism, and recreational activities, particularly around major ghats, restricts the establishment and protection of vegetated buffer zones.

3.2.13 URM_{index} score

This indicator provides a quantitative assessment of the total length of riparian zones along riverbanks within the city's jurisdiction. The analysis can be effectively conducted using satellite imagery. For the purpose of this assessment, only riparian buffers with a width exceeding 7.5 meters will be considered.

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$$\text{Riparian Buffer Factor} = \frac{\text{Total Length of Riparian stretch (Within City limits)}}{\text{Total Length of the river edge in the city}} \times 100$$

Calculations

Yamuna River	Length of Riparian Buffer (In mts.)	Percentage
Western bank	3794	11.8
Eastern Bank	249	0.7

According to the Urban River Management framework, the city's riparian buffer score is 6.25. It has been assessed < 30. Thus, the city is assigned a score of 1.

3.3 Climate Change Impact on Mathura- Vrindavan's River and Waterbody Systems

According to the Uttar Pradesh State Climate Change Action Plan (2014), climate projections indicate a substantial change in the state's rainfall and temperature regime:

- **Annual Rainfall:** Projected 15–20% increase relative to the baseline by 2050, rising to a 25–35% increase by 2080.
- **Temperature:** Projected ~2.0°C increase by 2050, rising to ~4.5°C by 2080.

These projected changes indicate that climate change is likely to become an increasingly important factor influencing the hydrological, ecological, and environmental resilience of the Mathura-Vrindavan twin-city system—centered around the **Yamuna River basin**, its low-lying floodplains (*Khādars*), and the urban network of traditional waterbodies (*Kunds*, *Talabs*, and *Pokharas*).

Changes in rainfall intensity and duration may increase surface runoff, peak river discharge, and flood inundation along the Yamuna floodplain. The combined influence of climatic and anthropogenic factors—exacerbated by massive floating pilgrim populations—may result in higher flood depths, prolonged waterlogging, disruption of civic infrastructure, and increased pressure on historic drainage corridors (*pauranik nallas*).

The projected increase in temperature and alterations in seasonal rainfall patterns will also impact groundwater recharge, riverine ecosystems, aquatic biodiversity, and the ecological functioning of heritage *Kunds*. These impacts are further intensified by existing localized pressures such as rapid urban spread, floodplain encroachment, land-use transformation, inadequately regulated pilgrimage infrastructure, untreated sewage discharge, and solid waste dumping.

Key Climate-Related Impacts on Mathura-Vrindavan's Water Environment

- **Increased Flooding and Urban Waterlogging:** Intense, short-duration rainfall combined with high upstream discharges from the Yamuna basin (influenced by barrage releases upstream) increases flood risks along low-lying ghats and urban wards. High-density pilgrimage zones and low-lying floodplain settlements in both Mathura and Vrindavan are particularly vulnerable to localized submergence.
- **Groundwater Recharge and Depletion:** Rainfall variability combined with high surface runoff reduces effective infiltration and natural recharge. This impact is severe in heavily paved, urbanized pockets and historic temple zones where high imperviousness prevents rainwater percolation, worsening the existing groundwater quality and salinity challenges in the region.

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- **Riparian Ecosystems and Floodplain (*Khādar*) Degradation:** Alterations in Yamuna's flow regimes, riverbank erosion, and rising temperatures degrade the fragile floodplain ecosystems (*Khādars*) and riparian vegetation. Encroachment onto natural floodplains severely compromises the river's capacity to absorb flood surges.
- **Aquatic Biodiversity:** Rising water temperatures, reduced lean-season environmental flows (e-flows), and high pollution loads exert severe ecological stress on native fish species, turtles, and aquatic flora in the Yamuna River and connected wetland habitats.
- **Heritage Waterbodies (*Kunds* and *Pokharas*):** Historic waterbodies and sacred *Kunds* have suffered from fragmentation, siltation, and direct sewage ingress. Elevated temperatures and changing rainfall patterns disrupt their fragile hydrological balance, accelerating evaporation rates and destroying their historic function as urban flood retention basins and local micro-climate buffers.
- **Water Quality and Eutrophication:** Existing water quality stressors—including the discharge of untreated domestic sewage, floating plastic waste, and agricultural runoff—will be severely aggravated by higher temperatures and reduced stream flows during dry periods. This significantly heightens the risk of toxic algal blooms and severe eutrophication in stagnant stretches of the Yamuna and localized *Kunds*.
- **Drainage and Stormwater Capacity Limits:** Extreme rainfall events frequently exceed the design capacity of Mathura-Vrindavan's municipal drainage network, especially where drains are undersized, silted, or choked with solid waste. This results in severe surface flooding across core commercial areas, access corridors to major temples, and low-lying residential neighborhoods.
- **River and Wetland System Resilience:** The compounding effects of climate variability, flooding, seasonal pilgrim spikes, and land-use shifts degrade the natural absorptive capacity of the Yamuna River system. The loss of historic wetlands and natural drainage channels limits the landscape's capacity to buffer extreme climate events.

Implications for a Climate-Resilient URMP

The interaction between climate change, hydrological variability, and existing anthropogenic and tourism pressures highlights the critical need to integrate climate resilience into urban river basin and water management in Mathura-Vrindavan. Proposed interventions must move beyond conventional concrete drainage expansion and adopt an integrated approach that combines flood risk management, floodplain zone protection, restoration and eco-remediation of sacred *Kunds*, riparian buffer restoration along the Yamuna, and climate-responsive stormwater management.

3.4 Activity Mapping

Activities identified along the Yamuna River are bifurcated into pointed sources (such as Drain outlets and Sewage outfalls) and non-point sources (agriculture runoff, religious activities and solid waste dumping), which have been undertaken through physical and satellite survey (refer Table 3-3). The sources of physical infrastructure are discussed in chapter 4 and the remaining non-point sources observed are discussed in this section. Table 3-3 provides a detail over view of these identified sources and their specific impacts on the river system.

Table 3-6: Point and Non- point sources along the Yamuna River

Types of Sources	Details
I. Point Sources	
Sewage/drain outfalls	
Industrial discharge Point	No industrial discharge observed during field survey and stakeholder consultations for the URMP. The Yamuna Action Plan,

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Types of Sources	Details
	2019 had also stated that the effluent from textile units is treated in the CETP and then discharged in Masani and Ambakhar drains (refer Section 5.2.4).
II. Non-Point Sources	
Solid waste dumping Zones	Domestic, religious and cow- dung dumping in various locations in Yamuna River
Agricultural runoff areas	Agricultural runoff leads to the direct discharge of pesticides into the river
Religious activities discharge points (e.g., floral offerings)	Religious dumping is observed along the ghats

Activities within the municipal limits along Yamuna River in Mathura- Vrindavan includes religious rituals at ghats, tourism and recreation such as boat rides and heritage walks, commercial vending, cremation practices, small-scale urban agriculture and wildlife/ecotourism. In the outer areas within the planning area, the river supports larger-scale agriculture, riparian ecology with native vegetation, fishing livelihoods, pastoral grazing and local religious establishments.

3.4.1 Riverfront development

There are total of 39 ghats along the western bank of Yamuna River, of which 14 ghats are located in Vrindavan and 25 ghats in Mathura. The overall observations as per the site visit are as follows:

Water Pollution: Water quality across several ghats in both Mathura and Vrindavan is highly affected by improper solid waste disposal and the discharge of partially treated or untreated effluents.

Infrastructure & Materials: Most ghats are constructed in brick masonry, sandstone or cement. Keshi Ghat stands out for its intricately carved stone steps as a culturally appropriate example.

Waste & Ritual Management: Waste management practices are inadequate across most ghats. Garbage bins, changing rooms and organized disposal systems are either absent or insufficient. Festival ritual waste remains largely unmanaged.

Amenity Provision: Ghats across both the cities lack essential amenities such as toilets and seating facilities.

The ghats serve wide range of functions such as bathing, religious rituals, aarti and boating. The infrastructure assessment of the prominent ghats in Mathura and Vrindavan are discussed in detail below.

Mathura Ghats

Mathura, has 25 ghats spread along the western bank of the Yamuna River. Vishram ghat and Bengali ghat are the most prominent ghats in Mathura city. The assessment has been carried out for 22 ghats in the Table 3-7 given below:

Table 3-7: Infrastructure Assessment of Major Ghats in Mathura

S. No	Ghat Name	Primary Use	Aarti	Toilets	Boats	Lighting
Pucca Ghats						
1	Vishram Ghat	Bathing, Worship, Parikrama start	✓	✓	✓	✓
2	Dashashwamedh Ghat	Bathing, Religious	✗	✗	✓	✓
3	Manikarnika Ghat	Bathing, Religious	✗	✗	✓	✓
4	Chakratirtha Ghat	Bathing, Religious	✗	✗	✓	✓
5	Ram Ghat	Bathing	✗	✗	✓	✓

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S. No	Ghat Name	Primary Use	Aarti	Toilets	Boats	Lighting
6	Prayag Ghat	Bathing, Religious	✗	✗	~	~
7	Saptrishi Ghat	Bathing	✗	✗		✓
8	Surya Ghat	Bathing	✗	✗	✓	✓
9	Bengali Ghat	Bathing	✓	~	✓	✓
10	Yamuna Ghat	Bathing, Ritual	~	~	✓	✓
11	Gau Ghat	Bathing	✗	✗	✓	~
12	Mashani Shamshan Ghat	Cremation	✗	✗	✓	✓
13	Dhruva Ghat	Bathing, Religious	✗	✗	✗	~
Semi-Pucca Ghats						
14	Krishnaganga Ghat	Bathing	✗	✗	✗	✗
15	Swami Ghat	Bathing	✗	✗	✗	✓
16	Sakarqee Ghat	Bathing	✗	✗	✓	✓
17	Sant Ghat	Bathing	✗	✗	✗	✓
18	Sati Ghat	Bathing, Religious	✗	✗	✓	✓
19	Raja Ghat	Bathing	✗	✗	✗	✓
20	Dauji Ghat	Bathing	✗	✗	✓	✓
21	Shyam Ghat	Bathing, Religious	✗	✗	✗	✓
Kutcha Ghats						
22	Asikunda Ghat	Bathing	✗	✗	✗	✗
✓ = Present / Available ✗ = Absent / Not available ~ = Partial / Seasonal / Under development						

Source: Consultant's analysis

Vrindavan Ghats

Vrindavan, comprises of 14 ghats along the Yamuna riverbank. These ghats are deeply embedded in Vaishnava devotional traditions and serve as important centres for Aarti, bathing, boating and pilgrimage. The assessment has been carried out for all the 14 ghats, which is detailed in Table 3-8 below:

Table 3-8: Infrastructure Assessment of Ghats in Vrindavan

S. No	Ghat Name	Primary Use	Aarti	Toilets	Boats	Lighting
Pucca Ghats						
1	Keshi Ghat	Bathing	✓	✓	✓	✓
2	Vihar Ghat	Bathing, Worship, Parikrama start	✗	✗	✓	✓
3	Bhramar Ghat	Bathing, Religious	✗	✗	✓	✓
4	Surya Ghat	Bathing, Religious	✗	✗	✓	✓
5	Jugal Ghat	Bathing, Religious	✗	✗	✓	✓
6	Shingarvat Ghat	Bathing	✗	✗	~	~
7	Cheer Ghat	Bathing, Religious	✗	✗		✓

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S. No	Ghat Name	Primary Use	Aarti	Toilets	Boats	Lighting
8	Jagannath Ghat	Bathing	✗	✗	✓	✓
9	Tatia Sthal Ghat	Bathing	✓	~	✓	✓
Semi-Pucca Ghats						
10	Sunrakh Ghat	Bathing	✗	✗	✗	✗
11	Kalideh Ghat	Bathing	✗	✗	✗	✓
12	Pani Ghat	Bathing	✗	✗	✓	✓
13	Chamunda Ghat	Bathing	✗	✗	✗	✓
14	Bhaura Ghat	Bathing, Religious	✗	✗	✓	✓
✓ = Present / Available ✗ = Absent / Not available ~ = Partial / Seasonal / Under development						

Source: Site Observation and Consultant's analysis

3.4.2 Ongoing/ Proposed/ Approved Projects

Project Name	Brief description	Implementing Agency	Project Status
30 km Yamuna Riverfront (Mathura 2031 Master Plan)	30 km promenade along Yamuna with ghats, parks, cycling tracks and recreational zones. Located within Raya Urban Centre (11,653 hectares). Includes hotels, resorts, cultural complexes and shopping zones.	UP Govt. / MVDA	Approved

3.4.3 Assessment to develop eco – friendly riverfront projects

Mathura–Vrindavan's riverfront holds immense spiritual significance, yet remains underutilized due to severe infrastructure deficits and unmanaged waste. The majority of ghats face acute deficits in basic infrastructure such as toilets, lighting, waste disposal and Aarti facilities, compounded by solid waste dumping, unmanaged ritual waste and encroachments. The 2024 redevelopment announcement for Vishram Ghat signals growing governmental intent, but comprehensive upgradation of all 21 ghats remains an urgent need.

3.4.4 SWOC Analysis

STRENGTHS	WEAKNESS
• Rich cultural and religious heritage of ghats such as Vishram Ghat and Keshi Ghat offers a strong foundation for community-driven eco-restoration. • Rituals like Yamuna Aarti and festivals foster strong public participation which leverages stewardship and awareness campaigns. • Presence of supporting religious infrastructure, temples, Ashrams, Dharmshalas and semi-permanent stalls in proximity to major ghats	• Water quality at multiple ghats adversely affected by untreated / partially treated effluent discharge from surrounding areas. • Boating services absent or underdeveloped at most ghats, limiting tourism potential. • Most ghats lack basic amenities: no public toilets, no changing rooms, inadequate lighting and absent safety railings. • Lack of permeable surfaces as the ghats are constructed with hard sandstone and concrete, limiting groundwater recharge and increasing surface runoff.
OPPORTUNITIES	**CHALLENGES**
• Kutcha and Semi-pucca ghats offer an opportunity for eco-sensitive and culturally informed development, integrating riparian	• Yamuna remains at CPCB Category D (very poor) unfit for bathing or drinking. NGT has issued notices to Centre and UP Govt. in 2026.

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STRENGTHS	WEAKNESS
vegetation, permeable surfaces and green ghat frameworks. • Scope for linking cultural heritage with sustainability by developing guided eco-walking trails, interpretive signage, green corridors and public amenities.	• Balancing large-scale pilgrimage footfall with environmental sustainability and water quality management. • Encroachment removal, vendor regulation and enforcement of waste management norms require sustained administrative will and community engagement.

3.4.5 URM_{index} Score

The riverfront score is determined by adding the points assigned to various features listed in Table 3-9, based on their implementation within the city. The score is assessed based on developments along the ghats of Yamuna River in Mathura and Vrindavan.

Table 3-9: Calculation of Eco-friendly riverfront

Sl. No.	Desirable feature	Eco-Friendly Riverfront Points	Points based on current situation	On-site Observations
1	The riverfront project is a source of revenue for the ULB	15	10	Revenue is generated from parking facilities and commercial stalls at major ghats such as Vishram Ghat (Mathura) and Keshi Ghat (Vrindavan), as well as from festival-based temporary activities.
2	The riverfront project supports commercial activities like shops, stalls, etc.	15	15	Vishram Ghat, Keshi Ghat, Bengali Ghat and Shingar Ghat support commercial activities including boating, puja stalls, flower sellers and prasad shops.
3	The riverfront project has a footfall of more than 100 people/day	10	10	There is no official footfall data for ghats. As per consultations, Vishram Ghat and Keshi Ghat receive high daily footfall (500+ persons/day), rising to several thousand during festivals such as Janmashtami and Holi. Most other ghats exceed 100 persons/day during regular religious activities.
4	The riverfront project is listed as an attraction spot on travel-related websites	15	15	Yes, the major ghats i.e., Vishram Ghat (Mathura) and Keshi Ghat (Vrindavan) are prominently listed on tourism websites, travel apps and pilgrimage circuit guides.
5	The riverfront project has good waste management facilities	15	0	Solid waste/ littering was observed in all the ghats.
6	The riverfront project is made up of predominantly natural material	10	0	None of the ghats are made up of natural material. The pucca ghats are made of sandstone.
7	The riverfront project has soft landscaping elements	10	0	None the ghats have soft landscaping elements and comprises of hard paving materials such as sandstone/ concrete.
8	The riverfront project does not	10	10	The ghats does not block the natural path of the river.

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Sl. No.	Desirable feature	Eco-Friendly Riverfront Points	Points based on current situation	On-site Observations
	block the natural path of the river			
	Total	**100**	**60**	

According to the Urban River Management Framework, the eco-friendly riverfront points has been calculated as 60 which corresponds to a rating of 60-79. Thus, the eco-friendly riverfront score is 4.

3.4.6 Economic activity

- **Boating:** While its role in large-scale navigation has declined, the river continues to support short-distance boating and daily movement along and across Yamuna River. Presently, boats operate regularly from key points such as Keshi ghat, Bhramar Ghat, Shingar ghat in Vrindavan and Vishram Ghat and Bengali ghat in Mathura for recreational purposes.

Boating is a privately managed economic activity, organised through a union of boat operators. Around 400 petrol boats are registered under a scheme launched by the District Magistrate, with a rotational system where 200 boats operate in one day and 200 in the next, ensuring equitable livelihood opportunities. Boating activity generates revenues of ₹1,000–1,500 on normal days and ₹2,000–2,500 during peak pilgrimage seasons. Strict safety regulations have been enforced recently with maximum number of passengers in a boat limited to 20, compulsory life jackets. Boats are prohibited from operating during the rainy season. In addition to petrol boats, there are about 100 manual boats that continues to serve pilgrims and visitors, offering a more traditional experience.



Picture 3-19: Boating activities along the ghats

- **Agriculture**: Seasonal agriculture, including vegetable cultivation and horticulture, is practiced along the Yamuna riverbanks in the peri-urban areas of Mathura and Vrindavan during the river's recession. Major crops such as vegetables, fruits and flowers are grown, serving both temple offerings and supporting local livelihoods.
- **Informal shops/kiosks, street vendors:** Vending and informal retail activities are an integral part of the riverfront economy in the city. Along major ghats such as Vishram Ghat, Keshi Ghat and Bengali Ghat, street vendors, kiosks and small stalls provide pilgrims and visitors with offerings, snacks, refreshments and souvenirs. The Nagar Nigam has formally registered these vendors and allocated dedicated vending zones and spaces to ensure orderly operations, accessibility and reduced congestion. At larger ghats, vendors are located directly on the riverfront steps, while at more constrained ghats, kiosks are located along approach roads and adjoining lanes, to maintain ghat accessibility. This regulated vending system sustains livelihoods, supports the pilgrimage economy and enhances visitor convenience.

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- **Dhobi Ghat:** A dhobi ghat is located adjacent to Vrindavan ghat Intermediate Pumping Station (IPS), which is used for washing clothes. The used water from this Dhobi ghat directly discharges into the Yamuna River, contributing to the river's water pollution.
- **Parking facility:** Parking facilities around the Yamuna riverfront in Mathura–Vrindavan are an essential support service for pilgrimage tourism. With heavy visitor inflows to major ghats such as Vishram Ghat, Keshi Ghat and Bengali Ghat, designated parking areas have been created along approach roads and adjoining lanes to manage congestion. These facilities are managed by the Nagar Nigam Mathura–Vrindavan, which oversees allocation, regulation and fee collection. During peak festival seasons, temporary extensions and traffic diversions are also coordinated by the municipal authorities in collaboration with local police to ensure smooth movement**.**

3.4.7 Ongoing /Approved /Proposed Project

Project Name	Description	Implementing Agency	Status
Vrindavan-to-Gokul Solar Boat Waterway (22 km)	22 km solar-powered boat waterway connecting Vrindavan, Mathura and Gokul with 11 jetties. Only solar/battery-operated boats permitted. Green pilgrimage tourism model. Tendering completed April 2025.	IWAI / MVDA / UPBTVP / Local Bodies	Approved

3.4.8 Institutional Mechanism

Department	Roles and Responsibilities
Mathura-Vrindavan Nagar Nigam	Responsible for the maintenance of public amenities and sanitation.
Irrigation Department	Regulates floodplain use and implements infrastructure projects that support agriculture and flood control
District Agriculture Department	Oversee crop planning, soil health management and farmer welfare schemes for cultivators
Tourism Department of Uttar Pradesh	Undertake riverfront management in Mathura-Vrindavan by coordinating the upkeep, development and promotion of ghats
UP Braj Teerath Vikas Parishad	Conserve and promote heritage sites across the Braj region, including the Yamuna ghats

3.4.9 Assessment of Leverage the Economic Potential of River

Mathura–Vrindavan riverfront economy leverages heritage-linked activities to sustain livelihoods and tourism growth. Boating remains a major source of income, with registered boat operators' association ensuring equitable opportunities and seasonal revenue peaks. Seasonal agriculture along the Yamuna floodplains supports temple offerings and local livelihoods, while vending zones and kiosks provide regulated spaces for pilgrims and vendors, enhancing convenience and order. Parking facilities managed by the Nagar Nigam further support pilgrimage inflows. However, on the other hand, pollution from the Dhobi Ghat undermines ecological sustainability, agriculture is vulnerable to river recession cycles and governance roles, though defined, show overlaps that may weaken accountability. Overall, the riverfront economy demonstrates strong economic leverage through cultural heritage and regulated services, but requires environmental safeguards, streamlined governance and infrastructure upgrades to maximize its potential.

3.4.10 SWOC Analysis

STRENGTHS	WEAKNESS
• Presence of River Yamuna is vital not only culturally and ecologically but also serves as the economic lifeline of the city.	• Economic activities on ghats remain largely informal and seasonal, with limited structured facilities for pilgrims or tourists.

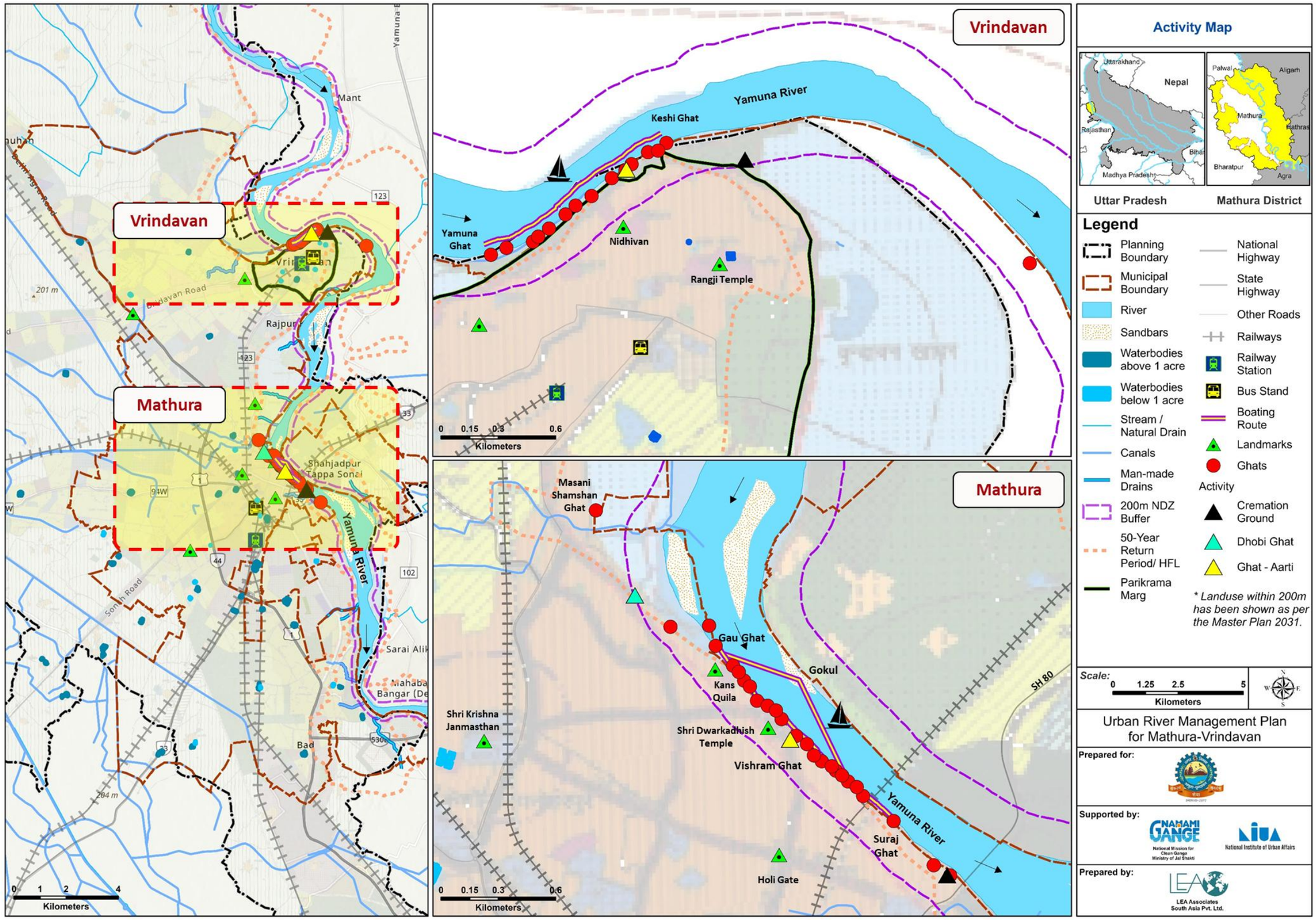
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STRENGTHS	WEAKNESS
• Semi-permanent stalls and local markets at ghats support micro-enterprises. • Water transport continues to serve local mobility and trade. • Major temples (Krishna Janmabhoomi Temple, Banke Bihari Temple and ISKCON Temple) and ghats (Vishram Ghat and Keshi Ghat) attract millions of pilgrims annually, reinforcing the city's identity as one of the pilgrimage destinations. • Historic ghats (Vishram Ghat, Keshi Ghat, Shingar Ghat and Bengali Ghat) serve as vibrant hubs for rituals, festivals and community gatherings. • Fertile alluvial plains along the Yamuna support cultivation of wheat, paddy, pulses and oilseeds, sustaining local livelihoods.	• Agriculture along floodplains is limited and vulnerable to seasonal fluctuations. • Economic activity peaks during festivals, with low engagement during off-season periods. • Municipal revenue from ghat-based commerce is limited, as all the stalls and shops operate informally without paying rent or contributing to local revenue.
OPPORTUNITIES	**CHALLENGES**
• Development of eco-tourism and cultural circuits • Create formal marketplaces and enterprise zones linked to river festivals and pilgrim circuits. • Strengthening water transport by promoting regulated boating and ferry services for both pilgrims and locals.	• Degraded river water quality limits the potential for sustainable river-based tourism, recreational activities, and cultural events. • Frequent flooding and seasonal water level fluctuations damage riverfront infrastructure, disrupt commercial activities, and increase investment risks in low-lying areas. • Unregulated religious and tourism-related activities, including informal vending and temporary structures, lead to congestion, poor waste management, and degradation of the riverfront environment. • Inadequate sanitation and solid waste management infrastructure results in littering and pollution, adversely affecting the aesthetic appeal and economic value of the river corridor. • Limited riverfront amenities and public infrastructure, such as pedestrian pathways, jetties, public utilities, and organized vending zones, reduce the potential for tourism-driven economic growth.

3.4.11 URM_{index} score

The river plays a crucial role in supporting local economic activities, with religious tourism serving as a primary contributor. Based on field verification, the following key uses identified are: River supports livelihoods of farmers; and religious & cultural tourism (i.e., particularly at Vishram Ghat, Keshi Ghat, Shingar Ghat and other pilgrimage ghats across both cities). As a result, the river has been assigned an economy score of 4, indicating it supports two economic uses. Sustainable management and strict regulatory oversight are essential to balance economic benefits with environmental preservation, ensuring long-term ecological health of the river and its dependent communities.

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Source: 1) Admin Boundaries, HFL: Mathura-Vrindavan Masterplan 2031; 2) Municipal Boundary: Nagar Nigam Mathura Vrindavan; 3) Transport Network: OSM; 4) Consultant Analysis; 5) Waterbodies: Braj Teerath Vikas Parishad

Map 3-7: Activity Mapping (Economic Activity) of Mathura-Vrindavan city

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3.5 Mapping of Flood Plain

Mathura-Vrindavan experiences fluvial flooding during monsoon season, primarily due to the overflow of Yamuna River. The floodplain zone assessment for the river has been conducted in compliance with NGT directives, wherein, the area up to 200 meters shall be the prohibited area in the plain terrain. Demarcation of flood lines along the river as per the Technical Guidelines on Flood Plain Zoning 2025, is yet to be undertaken by the Irrigation Department.

3.5.1 Applicable Guidelines for Floodplain Management

State policies, NGT orders and guidelines are crucial for regulating floodplain management and environmental protection. Various river related policies and guidelines applicable in the state of Uttar Pradesh is presented in Table 3-10.

Table 3-10: Summary of river-related policies and guidelines in Uttar Pradesh

Policy/ Regulation/ Act/ NGT Order	Brief
NGT Guidelines	NGT guidelines for rivers focus on pollution control, water quality and environmental flow restoration and has directed the Central Pollution Control Board (CPCB) to develop specific action plans. Key action areas include: **River restoration and pollution control:** Enhancing river flow through rainwater harvesting and watershed management. Regulating and enforcing pollution standards and setting limits for discharges. Implementing action plans for polluted stretches, constituting River Rejuvenation Committees (RRCs), maintaining a minimum environmental flow (e-flow) of 15-20% in rivers mandates specific water quality standards and no-development zones around water bodies and drains. The CPCB's "Indicative Guidelines for Restoration of Water Bodies" provides details on how to implement these plans, including assessment of pollution sources like sewage and industrial effluent **Biodiversity and floodplains:** NGT order from May 14, 2019, directed the CPCB to formulate guidelines for setting up Biodiversity Parks in river floodplains, including River Ganga and its Tributaries. The document "Guidelines for Setting up of Biodiversity Parks in Floodplains of Rivers of India" is a product of this directive. **Sustainable sand mining:** sustainable sand mining management, focusing on mapping resources, identifying sites and monitoring extraction to protect the river's physical and ecological health. **Sewage treatment and effluent standards:** construction and operationalization of Sewage Treatment Plants (STPs). Specific effluent parameters of treated effluents from STPs to meet prescribed standards **Urban river planning:** Zoning for plain areas (prohibited- 200mts, restricted- 201-500mts and regulated zones- beyond that), river front development and planning strategies for water conservation and development. The MoHUA has published "River Centric Urban Planning Guidelines" that provide a framework for managing and planning urban rivers.

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Policy/ Regulation/ Act/ NGT Order	Brief
National Disaster Management Guidelines - Management of Floods, 2008	There guidelines prescribe land utilization guidelines for river flood plain stretches under flood frequencies of 10, 25 and 100-year return periods. These stretches have been defined as Priority 1 (farthest flood line from river), Priority 2 (intermediate flood line) and Priority 3 (closest flood line from river) respectively.
Ground Water Management, Rain Water Harvesting and Recharge Policy	Focuses on aquifer-based groundwater management, restoration of over-exploited blocks and river basin/watershed strategy for recharge and conservation.
Uttar Pradesh State Water Policy, 2020	Establishes comprehensive water resource management, emphasizes river corridor conservation, minimum ecological flows, disaster response, water quality and community involvement.
UP Water Management and Regulatory Commission Act	Sets up a regulatory commission for sustainable water resource allocation, use monitoring, aquifer management, equitable rates and quality control of river water.
CPCB "Guidelines for Reuse of Treated Sewage in Reference to Item of Circular Economy"	The guideline is issued by the Central Pollution Control Board (CPCB) to promote sustainable reuse of treated sewage within the framework of a circular economy, treating sewage not as waste, but as a resource for water-stressed sectors. Facilitate reuse of treated sewage in various sectors (e.g., agriculture, industry, urban uses).

Source: Compiled and assessed by consultants from various Government Websites

Mathura-Vrindavan City has partially established a framework for flood line regulation, wherein, 200 m green buffer has been marked along Yamuna River in the master plan. However, as per the Technical Guidelines on floodplain zoning 2025, the flood lines for 10- year, 25- year and 100-year return period is yet to be demarcated. Thus, the Directives of the Water Management Commission are not implemented and aquifer extraction is not monitored. Furthermore, treated sewage reuse, as prescribed by CPCB guidelines, is minimal, and bioremediation of drains has not been adopted as an interim measure. These gaps show the absence of a comprehensive floodplain management strategy and increase ecological risks and flood vulnerability.

As per the Masterplan 2031 (Chapter 10, Section 10.2.15.1) under River centric town planning guidelines, the active flood zone is defined as the high flood line (HFL). This line is determined by the river's course or between two embankments or between two roads which act as embankments on either side of the river. The high flood line/ active flood zone shall be defined as the 50 years return period. Development and construction restrictions are to be enforced by the authorized authority on both banks, ensuring that prohibited areas are not less than the active flood zone. Depending on local surface conditions, high- and medium-impact flood zones in plains may extend 1–3 km wide, based on the river's width. To maintain ecological balance and protect flood plains, Mathura-Vrindavan Master Plan 2031 outlines strict regulations, development controls and strategies around the floodplain, which are as follows:

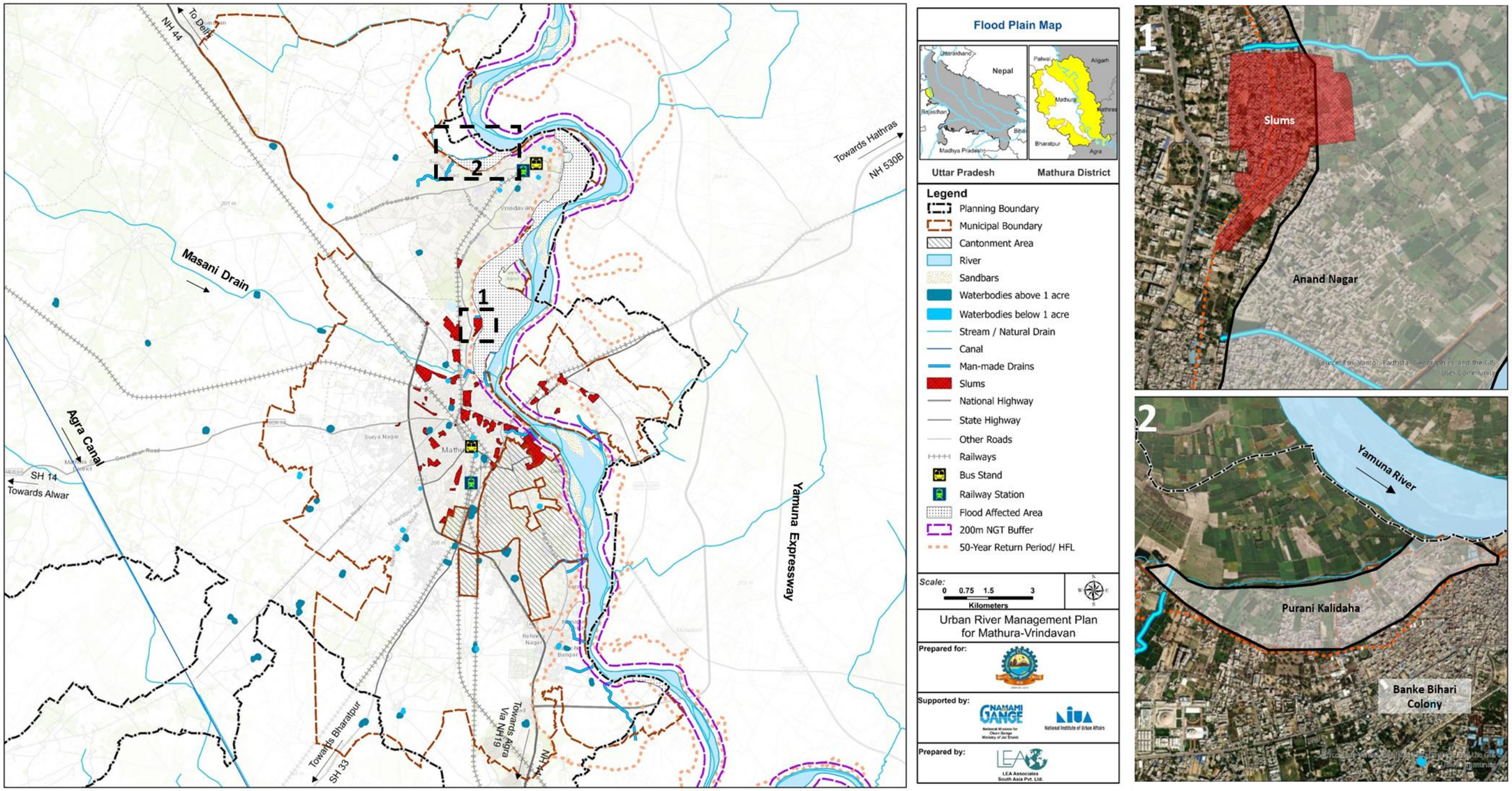
Regulation	Provision
River Bank Buffer	200 m green belt from river bank 'no development permitted'
HFL Area	No new land use proposed within HFL boundary (50-year flood data)
Prohibition Zone Width	1–3 km in plains, depending on river width
Pucca Construction	Prohibited in flood zone / river-centric development area
Permitted Uses	Parks, gardens, crematoriums, parking, permeable pathways only
Prohibited Uses	Residential, hospitals, emergency facilities and hazardous storage
Surface Material	Permeable/semi-permeable blocks are mandated for any paths
Special Permission	Open theatre, water tourism only by the designated authority

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The irrigation department has demarcated and notified the HFL or 50-year-return period line. The department has surveyed and delineated the HFL and placed boundary pillars marking its extent. However, demarcation of 5-year, 25-years and 100-years flood return period, as mandated under the Technical Guidelines on Flood Plain Zoning 2025, is yet to be undertaken by the Irrigation Department.

In alignment with NGT guidelines and the HFL, the Consultant has attempted a preliminary demarcation of flood lines as per the coordinates provided by Irrigation department (Refer Map 3-8).

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Source: 1) Admin Boundaries, HFL, Flood Affected Area: Mathura-Vrindavan Masterplan 2031; 2) Municipal Boundary: Nagar Nigam Mathura Vrindavan; 3) Transport Network: OSM; 4) Consultant Analysis; 5) Waterbodies: Braj Teerath Vikas Parishad

Map 3-8 Floodplain Map Mathura-Vrindavan City

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3.5.2 Action plan for Restoration of Polluted Stretch of River Yamuna

The Action Plan for Restoration of Polluted Stretch of River Yamuna (Asgarpur to Etawah & Shahpur to Prayagraj) provides a restoration and monitoring framework aimed at reducing organic loading and achieving bathing water quality standards. The plan emphasizes the interception and diversion (I&D) of major domestic and industrial drains, upgrading sewage treatment plant (STP) capabilities, managing municipal solid waste (MSW) and bio-medical waste, and monitoring industrial effluents from key sectors (such as textiles, slaughterhouses, and electroplating). Mathura falls under the Asgarpur to Etawah stretch. Based on the Action Plan for the Yamuna River, the specific gaps and issues identified for Mathura include:

- **Inadequate Sewage Treatment & Interception**: A significant gap remains between total domestic sewage generation and actual treatment capacity in Mathura, with major drains continuing to discharge untreated or partially treated sewage into the Yamuna due to incomplete household sewer connections and interception infrastructure.
- **CETP Under-utilization and Upgradation Delays**: The Common Effluent Treatment Plant (CETP) at Mathura operates at only 3.25 MLD against its total installed capacity of 6.5 MLD (a 50% under-utilization gap) due to the closure of several textile/printing units and awaits complete technical and operational upgradation.
- **Municipal Solid Waste (MSW) Infrastructure Deficits**: Mathura lacks adequate, fully operational processing and sanitary landfill facilities to handle daily municipal solid waste, resulting in an unmanaged processing gap and unscientific dumping near urban drainage catchment areas.
- **Groundwater Over-Exploitation**: Catchment areas and development blocks in the Mathura district (such as Baldeo) are categorized as 'Over-extracted', experiencing severe groundwater depletion due to heavy abstraction without proportional artificial recharge mechanisms.

Convergence with the Yamuna Action Plan: Of the 68 action points in the Action Plan, 63 are applicable fully or partially to Mathura-Vrindavan. Each action point has been mapped to the corresponding URMP intervention or recommendation in the YAP–URMP Convergence Matrix Annexure 12.

3.6 Flooding

Mathura-Vrindavan is vulnerable mostly due to fluvial than pluvial flooding. Fluvial flooding arises from the swelling of the Yamuna River, which flows through the city. During the monsoon season, heavy upstream rainfall and releases from upstream barrages causes the river to overflow, inundating low-lying areas, ghats and adjoining settlements. Pluvial flooding is caused by intense local rainfall overwhelming urban drainage systems.

3.6.1 Fluvial Flooding:

The areas affected by fluvial flooding in the Mathura-Vrindavan city are mainly the 20 wards which are located along the western bank of Yamuna River. Further, when the river swells, stormwater drains and small nallahs that normally discharge into the river experience reverse flow, pushing water back into the city (Refer Map 3-9).

3.6.2 Pluvial Flooding:

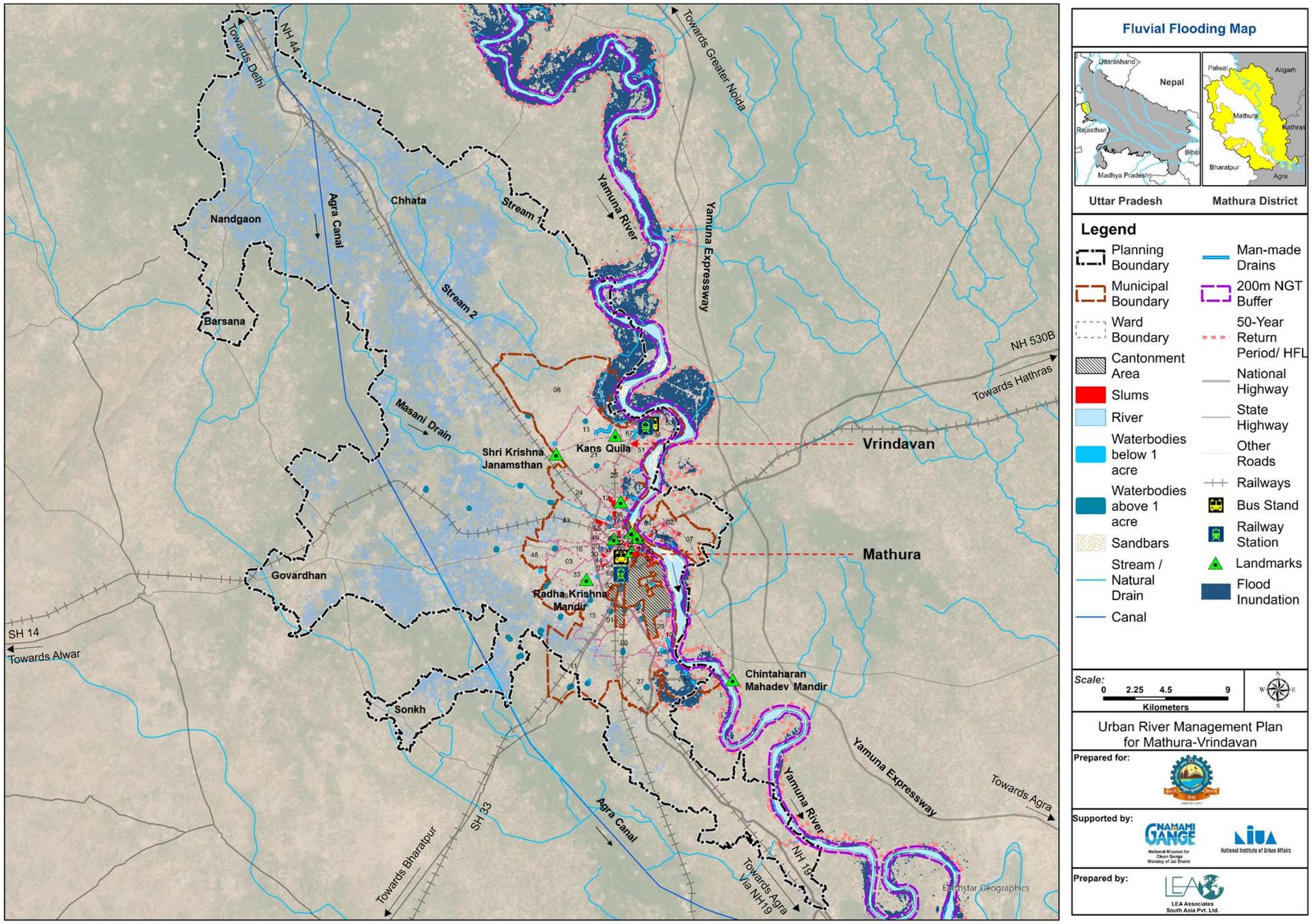
Pluvial flooding in Mathura-Vrindavan city occurs when intense rainfall overwhelms the stormwater drainage system, leading to widespread waterlogging across low-lying urban pockets. Settlements in

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ward nos. 8, 11, 15, 24, 29, 41, 43, 45, 48 and 59 located near Shantanu Bihar Pond, Surya Kund, Hanuman Bagichi and various other ponds 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 (Refer Map 3-10).

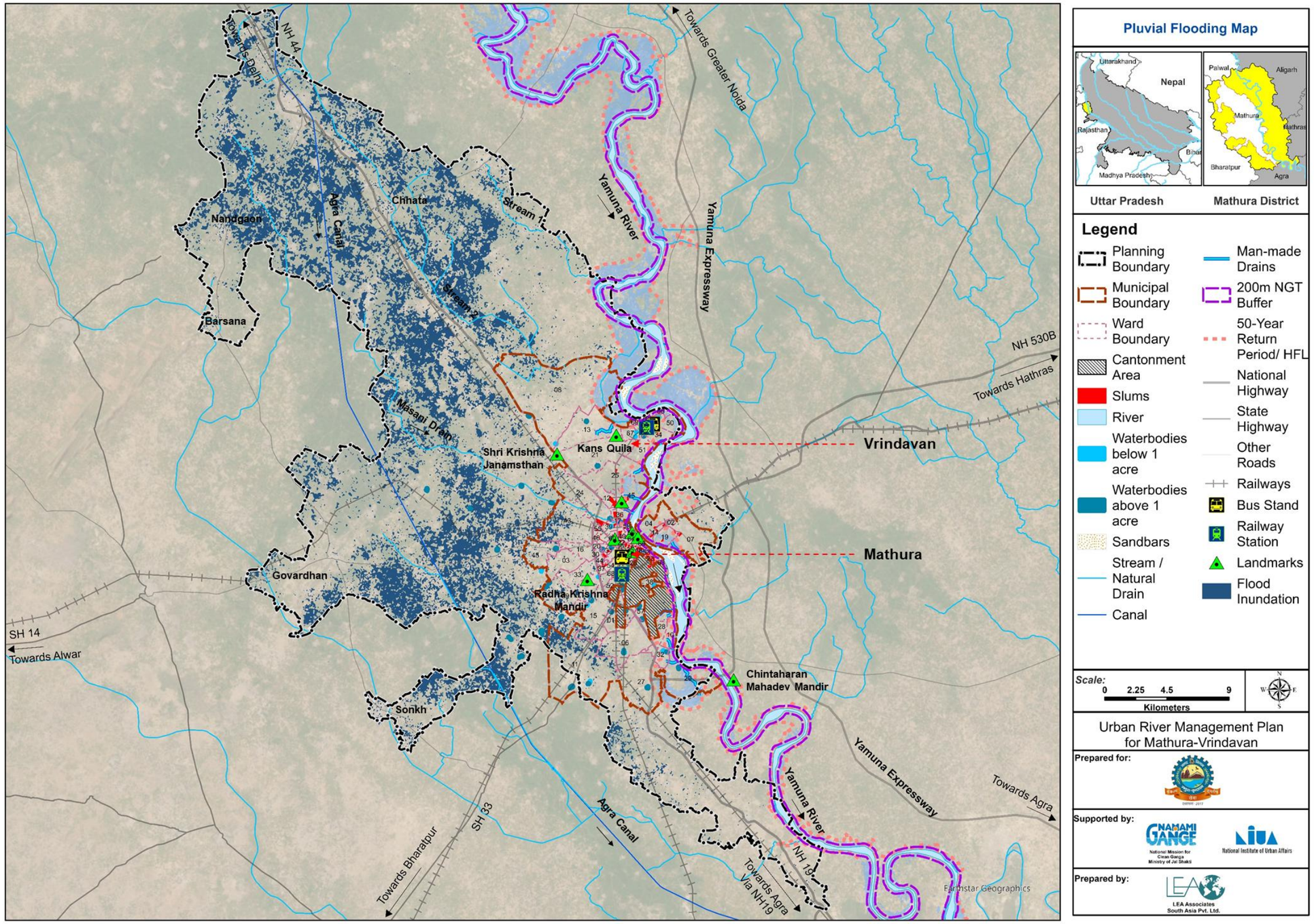
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Source: 1) Admin Boundaries, HFL: Mathura-Vrindavan Masterplan 2031; 2) Municipal Boundary: Nagar Nigam Mathura Vrindavan; 3) Flood Inundation Data: Sentinel-1 SAR GRD; 4) Transport Network: OSM; 5) Waterbodies: Braj Teerath Vikas Parishad

Map 3-9: Fluvial Flooding map Mathura-Vrindavan city

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Pluvial Flooding Map

Uttar Pradesh | Mathura District

Legend

- Planning Boundary
- Municipal Boundary
- Ward Boundary
- Cantonment Area
- Slums
- River
- Waterbodies below 1 acre
- Waterbodies above 1 acre
- Sandbars
- Stream / Natural Drain
- Canal
- Man-made Drains
- 200m NGT Buffer
- 50-Year Return Period/ HFL
- National Highway
- State Highway
- Other Roads
- Railways
- Bus Stand
- Railway Station
- Landmarks
- Flood Inundation

Scale: 0 2.25 4.5 9 Kilometers

Urban River Management Plan for Mathura-Vrindavan

Prepared for:

Supported by: NAMAMI GANGE (National Mission for Clean Ganga, Ministry of Jal Shakti); National Institute of Urban Affairs

Prepared by: LEA Associates South Asia Pvt. Ltd.

Source: 1) Admin Boundaries, HFL: Mathura-Vrindavan Masterplan 2031; 2) Municipal Boundary: Nagar Nigam Mathura Vrindavan; 3) Flood Inundation Data: Sentinel-1 SAR GRD; 4) Transport Network: OSM; 5) Waterbodies: Braj Teerath Vikas Parishad

Map 3-10: Pluvial Flooding map Mathura-Vrindavan city

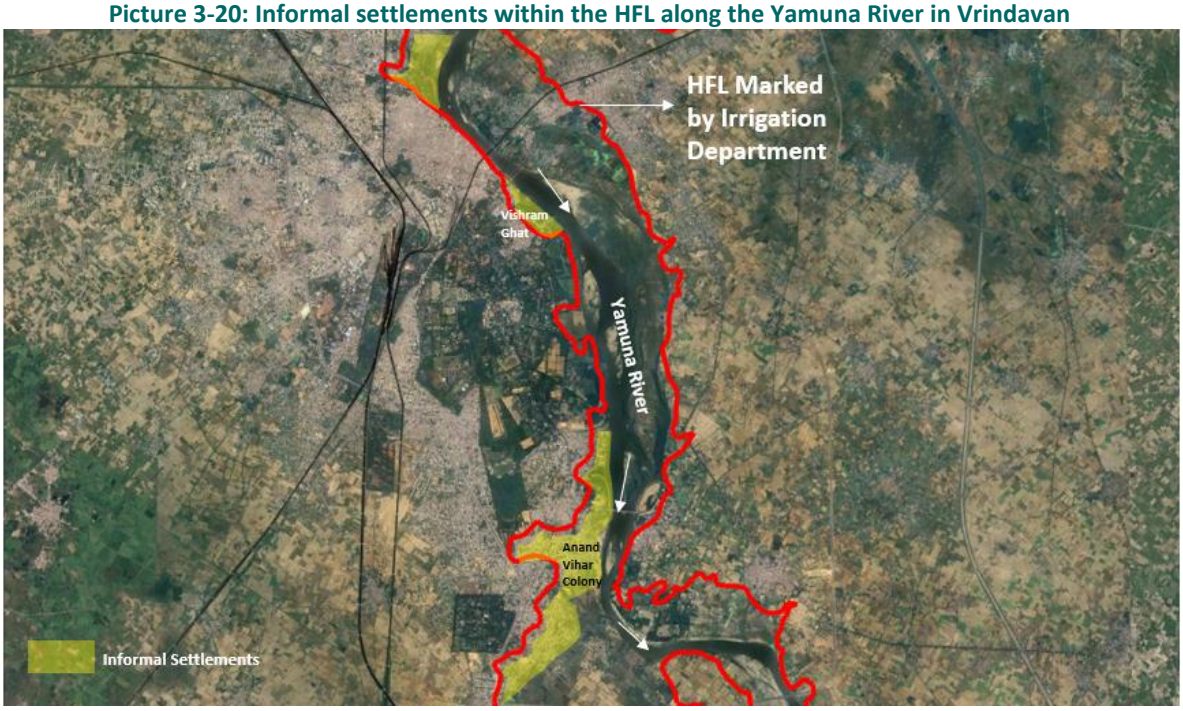
Areas of concern within flood plain

The major areas of concern in the Mathura-Vrindavan city, according to the HFL and observations during site visits, are as follows:

- **Informal Settlements:** The presence of settlements along the riverbank is observed within the HFL. These settlements occupy the flood prone zone, constricting the intended protective belt and intensifying flood risk for adjacent communities.

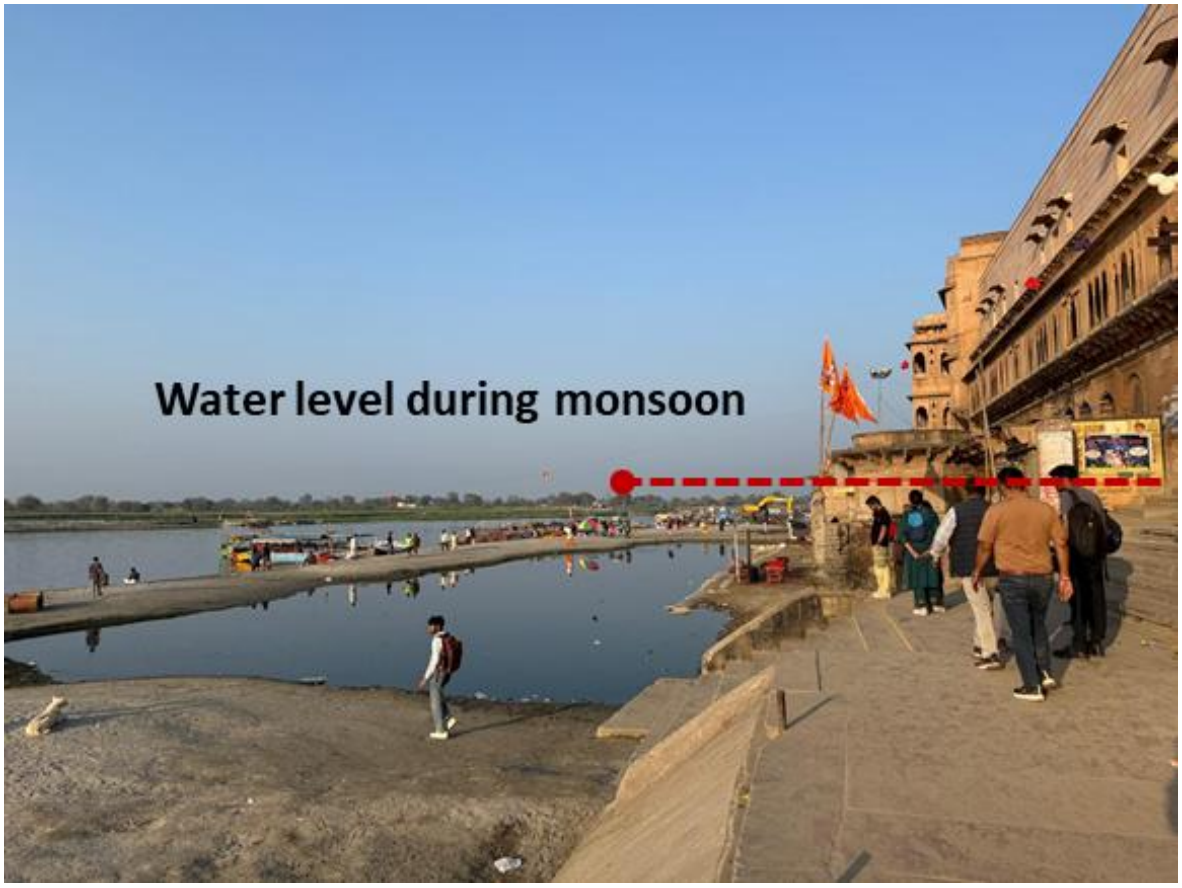


Picture 3-20: Informal settlements within the HFL along the Yamuna River in Vrindavan



Picture 3-21 : Informal settlements within the HFL along the Yamuna River in Mathura

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Picture 3-22: Water level during monsoon season

- **Critical Infrastructure:** The under construction 13 MLD STP at Vrindavan is located approximately 0.85 km from the Yamuna River bank. The site falls within the High Flood Line (HFL), thereby placing the facility inside the active floodplain zone. The STP is vulnerable to inundation during high flood events, which may disrupt treatment processes and damage infrastructure. Floodwaters can cause untreated or partially treated sewage to mix with river water, leading to serious ecological and public health hazards. Access roads, pumping stations and electrical systems are at risk of submergence, affecting plant operability (Refer Picture 3-20)

3.6.3 Ongoing/ Proposed/ Approved Projects

Currently, there is no ongoing, proposed or approved flood protection and mitigation projects outlined by the Irrigation Department.

3.6.4 Institutional Mechanism

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

Table 3-11: Roles and responsibilities of government agencies in flood protection management for Mathura-Vrindavan City

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

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3.6.5 Overall Assessment of Flood Plain

The assessment shows that while monitoring of river morphology and floodplain mapping in Mathura-Vrindavan has major gaps in enforcing regulations and managing waste and drainage. The Yamuna River stretch has been undergoing constant changes through erosion and unstable banks, threatening nearby settlements, ghats and agricultural land and highlighting the vulnerability of the river system. Unregulated settlements, waste dumping and poor drainage have led to flooding risks, urban ecology conflicts and environmental decline, as seen in recent floods breaching danger levels. At the same time, opportunities lie in enforcing the Mathura-Vrindavan Master Plan 2031's green belt provisions, adopting floodplain zoning as per NGT guidelines and upgrading waste and drainage systems. These steps can stabilize banks, cut flood risks and protect the river's ecological functions. Stronger enforcement and sustainable planning remain critical to ensuring long-term resilience and balanced urban river coexistence.

3.6.6 SWOC Analysis

Strengths	Weakness
• HFL boundary has been formally demarcated and notified by the Irrigation Department based on 50-year return period data. • Master Plan 2031 includes specific floodplain regulations — 200 m river bank buffer, development controls and permitted/prohibited use lists.	• The High Flood Level (HFL) has not been delineated in the Mathura–Vrindavan Master Plan 2031 or any other available planning or technical document. • Weak enforcement of floodplain regulations and land-use zoning has encouraged encroachments. • Lateral erosion and bank undercutting threaten urban edges, ghats and settlements, causing land loss and structural risks.
Opportunities	**Challenges**
• Floodplain zoning into prohibited, regulatory and warning zones, in line with NGT norms, provides an opportunity for guiding regulated urban development.	• Enforcement gaps in implementing no-construction zones and green-belt restoration undermine Master Plan regulations. • Climate change-driven rainfall variability and potential increase in extreme floods may accelerate morphological changes beyond traditional hydrological cycles.

3.6.7 URM_{INDEX} Score

Status of various desirable features of a well-managed and regulated flood plain in the city are presented in the Table 3-12 below. Ideally, cities should strive to meet all the desirable features.

Table 3-12: Floodplain Management Score

S.no.	Desirable Feature	Floodplain Management Points	Points based on Current Situation	Remarks
1	Floodplain boundaries clearly demarcated	15	8	Floodplain boundaries has been demarcated in the form of HFL/ 50-year return period. However, the flood plain zones as per the Technical Guidelines is yet to be demarcated.
2	Floodplain boundaries protected through embankments, roads, or other means	5	1	Yes, the floodplain boundaries are protected by ghat embankments (approx. 20% of the total length of river within municipal area)

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S.no.	Desirable Feature	Floodplain Management Points	Points based on Current Situation	Remarks
3	Demarcation of no development zone adjacent to the river in the active floodplain	5	5	'No development zone' has been demarcated in the Masterplan.
4	Strict enforcement in no development zone	10	0	Strict enforcement in 'no development zone' was not observed. There are scattered and dense settlements along the river stretch
5	Updated database of existing land use in floodplain available	10	0	Updated database of existing land use in floodplain not available
6	Master Plan has clearly indicated permissible and non-permissible activities in the floodplain/river zone	15	15	Yes, the Master Plan 2031 has clearly indicated permissible and non-permissible activities in the river zone
7	All regulations in the Master Plan are enforced (10 points if at least 50% of the regulations are enforced)	15 (10)	0	There is no regulation about the flood plains in the master plan. Only Flood prone area is identified in the Master Plan.
8	Presence of river friendly landscaping (e.g., constructed wetlands, bioswales, etc.)	5	0	Presently, there is no presence of river-friendly landscaping.
9	Strict monitoring mechanism in place	5	0	No strict monitoring mechanism in place.
10	No solid waste dumping on riverbanks	10	0	Solid waste is present along the river in various stretches like Keshi, Vishram ghat
11	Only organic farming practiced in river zone	5	0	Farming is practiced along the river with the use of fertilizers.
	Total		**29**	

According to the Urban River Management Framework, the total floodplain score based on current situation has been estimated to be 29. This corresponds to a rating of 1 out of 5, inadequate management and the urgent requirement to reinforce regulations and measures for effective floodplain management in the city.

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RIVER-SENSITIVE BEHAVIOR AMONG CITIZENS & TO ENGAGE CITIZENS IN RIVER MANAGEMENT ACTIVITIES



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4 RIVER-SENSITIVE BEHAVIOR AMONG CITIZENS & TO ENGAGE CITIZENS IN RIVER MANAGEMENT ACTIVITIES

4.1 River Sensitive Behaviour among Citizens

Creating a river-sensitive society requires behavioural 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.

4.1.1 Overview of IEC Activities of the Nagar Nigam Mathura-Vrindavan:

During the financial year 2025–26, NNMV in collaboration with Nature Green NGO conducted a total of 43 distinct IEC activities spanning a wide spectrum from street plays and school competitions to large-scale sanitation drives and festival-linked awareness events. Each activity was designed with a specific target audience in mind and deployed dedicated teams of trained IEC personnel. The activities collectively covered residential localities, commercial hubs, schools and colleges, public ghats, community open spaces and religious congregation points. No particular activity related to drain clean-up has been undertaken.

Each activity was facilitated by a dedicated team, typically 14 members and in certain focused activities, 5 to 8 members from the IEC wing of the Nagar Nigam. The activities are categorized into nine thematic clusters, given in the table below:

Table 4-1: List of IEC Activities undertaken by Nagar Nigam

Thematic Category	Nature of Activities	No. of Activities
Waste Management & Segregation	Source segregation, composting, RRR, GVP beautification	3
Youth Engagement	School competitions, wall paintings, National Youth Day, Children's Day	4
Plastic Pollution Control	SUP ban drives, PUMA, plastic rallies, paper bag promotion	7
Community Mobilization	Nukkad Nataks, Nukkad Sabhas, Safai Mitra Samman, Swachh Yoddhas	5
Swachhata Campaigns	Large-scale cleanliness drives, pledges, ward competitions, marathons	6
Sanitation & Hygiene	Toilet campaigns, Vishwa Shauchalay Diwas, disease prevention	4
Eco-Friendly & Green Initiatives	Zero-waste events, eco-festivals, Arpan Kalash, Environment Day	4
Women Empowerment & Sanitation	International Women's Day, Mission Shakti, Mahilao ka Yogdaan	3
Special Events & Observances	Festival-linked IEC (Janmashtami, Holi, Republic Day, Raksha Bandhan)	7
Total Activities		**43**

1. Category-wise analysis of IEC Activities:

- Swachhta Campaigns: Under the Swachh Bharat Mission - Urban (SBM-U 2.0), 14 team orgnaised six structured IEC activities designed to build public awareness, enhance community hygiene, and drive urban cleanliness. This comprehensive suite of initiatives included the Swacchata Hi Sewa Activity, Swachh Ward Pratiyogita, Swachhhata Abhiyan, 156 Ghante Mahasafai Abhiyaan, Swacchotsav Event with the Mayor, and dedicated Cleanup Drives at Ghats. To turn these activities into sustained community action, citizens across residential and commercial localities were

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actively mobilized through mass participation drives, public pledges, and inter-ward competitions. These interactive formats, alongside high-visibility civic leadership engagement from municipal authorities, fostered a strong sense of collective ownership over neighbourhood cleanliness and public space maintenance (Refer Annexure 15).

- Building on this civic engagement, the campaigns translated awareness into tangible environmental improvements through high-impact physical interventions. Key activities delivered visible on-ground results, ranging from Clean Toilets and CTU transformations, greenery drives, and intensive 156-hour continuous sanitation marathons to targeted clean-up drives along riverbank ghats to preserve local waterbody hygiene.
- Waste Management & Segregation: Residents were engaged through door-to-door campaigns and community demonstrations on how to segregate wet, dry and hazardous waste at the household level. The source segregation and home composting drive included hands-on demonstrations to encourage residents to convert kitchen waste into compost, reducing landfill burden. Garbage Vulnerable Point (GVP) Spot Beautification involved citizens in transforming unsightly waste hotspots into attractive community spaces, generating civic pride. Reduce, Reuse and Recycle (RRR) of waste awareness activities educated the public, particularly shop owners and market vendors, on the economic and environmental value of reducing, reusing and recycling waste.

Table 4-2; List of IEC Activities on Waste Management & Segregation

S.No.	Activity Name	Target Audience	Description	Scheme	Team
1	Source Segregation and Home Composting Awareness Activity	Residential Areas	Awareness drive for Source Segregation & Home Composting under SBM 2.0	SBM-U 2.0	14
2	GVP Spot Beautification	Public Areas	Promote responsible waste management and civic awareness by transforming waste-sensitive hotspots through clean-up		8
3	RRR Related Awareness Activity	Public Areas	Spread awareness about the RRR concept by promoting practices focused on waste reduction, reuse and recycling		14

Plastic Pollution Control: Citizens were engaged through a layered strategy combining shock-awareness (plastic pollution rallies, Plastic Pollution Free Day), commitment (Pledge and Signature Campaign for PUMA), alternative promotion (Paper Bag Day, Plastic Bag Free Day) and systemic change (PUMA with RRR Centres) (Refer Annexure 16).

Community Mobilisation: Street plays (Nukkad Nataks), public discussions (Nukkad Sabhas and recognition events that bring together diverse community stakeholders, sanitation workers, ward volunteers and general citizens to foster collective ownership of cleanliness.

Street plays (Nukkad Nataks) primarily focus on the single-use plastic ban and source segregation were performed at high-footfall commercial and residential locations, using humour and drama to convey key messages in an accessible and memorable format. Nukkad Sabhas (open public discussions) allowed IEC teams to directly address questions and dispel myths about waste management, creating two-way dialogue.

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Table 4-3: List of IEC Activities on Community Mobilization

S. No.	Activity Name	Target Audience	Description (Brief)	Scheme	Team
1	Wall Painting with Students	Commercial/Residential	Cultivate a sense of cleanliness among people, inspired by school children under SBM 2.0	SBM-U 2.0	14
2	Nukkad Natak on SUP Ban and Source Segregation		Inspire responsible waste management among people through engaging, humorous and thought-provoking plays under SBM 2.0		
3	Nukkad Sabha Activity	Residential Areas	Educate citizens on waste management, impacts of plastic pollution and eco-friendly alternatives.		5
4	Safai Mitra Samman	Commercial/Residential	Appreciate the efforts of sanitation workers and inspire them to perform their duties with greater commitment.		14
5	Swachh Vatavaran Protsahan Samiti	Residential Areas	Ward-level meetings with 'Swachh Yoddhas' were organized to discuss and resolve sanitation-related issues under SBM 2.0		

- **Sanitation & Hygiene:**

Targeted campaigns promoting toilet usage, ODF behaviour and overall public hygiene aligned with SBM 2.0 ODF+ and ODF++ targets.

Table 4-4: List of IEC Activities on Sanitation & Hygiene

S.No.	Activity Name	Target Audience	Description	Scheme	Team
1	Clean Toilet Campaign	Toilets/Public Areas	Raise public awareness on the proper usage of toilets and the importance of maintaining cleanliness and hygiene.	SBM-U 2.0	14
2	Vishwa Shauchalay Diwas Activity	Toilets/Public Areas	Encourage public awareness and responsible behaviour towards cleanliness, helping eliminate open defecation.		
3	Safai Apnao Beemari Bhagao	Residential Areas	Adopt proper waste management practices to keep homes and surroundings clean, ensuring a healthier and disease-free environment.		
4	Paint My Toilet Campaign	Toilets/Public Areas	Promoting awareness about the cleanliness and beautification of toilets through informative and creative paintings.		

Eco-Friendly & Green Initiatives: Citizens were encouraged to reimagine their relationship with religious and festive practices through a sustainability lens. The Arpan Kalash campaign at ghats and temples engaged devotees in preventing river pollution by providing dedicated urns for floral and organic offerings. Zero-Waste Events for Festivals demonstrated that celebrations can be joyful and environmentally responsible simultaneously. World Environment Day was observed with community

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clean-up and greening drives. Eco-Friendly Festival campaigns promoted the use of biodegradable decorations, natural colours and minimal-waste practices during major festivals.

Table 4-5: List of IEC Activities on Eco-Friendly & Green Initiatives

S.No.	Activity Name	Target Audience	Description (Brief)	Scheme	Team
1	Zero Waste Events for Festivals and Programmes	Public Areas	Strengthen waste management practices and promote eco-friendly products by raising awareness about zero-waste events	SBM-U 2.0	8
2	Arpan Kalash Awareness	Commercial/Residential	To prevent water pollution, an awareness campaign was launched encouraging devotees to place worship materials		14
3	Eco-Friendly Festivals	Public Areas	Awareness was spread among citizens to celebrate festivals in a green and eco-friendly manner under SBM 2.0		
4	World Environment Day	Public Areas	Special sanitation drives and green initiatives were undertaken to encourage environmental protection under SBM 2.0		

- **Special Events:**

IEC activities conducted on national days, religious festival and civic occasions, leveraging high public footfall at events such as Janmashtami, Holi, Raksha Bandhan and Republic Day to maximise outreach (Refer Annexure 17).



Picture 4-1: IEC activities by Nagar Nigam Mathura-Vrindavan

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4.1.2 Overall Assessment of River Sensitive behaviour among citizens and engage Citizens

The IEC activities conducted by Nagar Nigam Mathura-Vrindavan during FY 2025–26 reflect a comprehensive, citizen-centric approach to driving behavioural change in sanitation and waste management. All 43 activities were implemented under the Swachh Bharat Mission (Urban) 2.0, demonstrating strong programmatic coherence and institutional compliance with the national mandate. The activities collectively reached a diverse range of target audiences from school children and college students to shop owners, pilgrims, women's groups, sanitation workers and general residents.

4.1.3 SWOC Analysis

Strengths	Weakness
• 43 activities across 9 themes, comprehensive, not a single-issue campaign. • Active NGO support, particularly from organizations such as Friends of Vrindavan and Braj Foundation, strengthens community mobilization and citizen-led conservation initiatives along the Yamuna. • Engagement of schools and colleges through drawing, rangoli, debate competitions and eco-awareness programs fosters youth participation and intergenerational learning on river conservation.	• Most IEC efforts remain centred on solid waste management and general sanitation, with limited focus on direct Yamuna River conservation, pollution pathways and ecological health. • Campaigns are largely event-based and short-term, concentrated around major religious festivals, lacking continuity and failing to generate lasting behavioural change between events. • Limited river-specific activities as compared to the number of general cleanliness drives. • The large transient population of pilgrims and tourists presents a significant challenge, as awareness efforts primarily target residents while the floating population contributing substantially to ghat pollution remains largely unaddressed. • Temple trusts and religious institutions, despite their enormous influence over daily ghat activities and pilgrim behaviour, remain insufficiently integrated into structured river conservation and IEC programs.
Opportunities	**Challenges**
• Launch dedicated river-centric IEC campaigns focused on Yamuna ecology, pollution sources, used water impacts, biodiversity and sustainable water use. • Building NGO, temple trust and SHG capacity for eco-tourism, afforestation, biodiversity monitoring and riverbank plantation along the Yamuna can enhance livelihood linkages with conservation. • Integration of digital tools and citizen portals such as My Bharat and SBM apps for real-time citizen participation, ghat monitoring and pollution reporting. • Establishing student eco-clubs and Yamuna River clubs in schools and colleges along the Yamuna corridor to institutionalize sustained youth engagement in river stewardship. • Framing Yamuna conservation as a religious and cultural duty (dharma) in collaboration with religious leaders, saints and temple	• Without sustained efforts, citizens and pilgrims may view Yamuna management solely as a government responsibility, weakening collective ownership and community stewardship of the river. • Unregulated religious practices such as idol immersion, floral offerings, ritual waste disposal and mass bathing during festivals continue to stress the Yamuna ecosystem and counteract awareness gains. • Solid waste dumping by tourists, street vendors and local traders along ghats risks continuously undoing the progress made through cleanliness and awareness drives. • Seasonal reduction in Yamuna water levels — exacerbated by upstream diversions — limits community interaction with the river, weakening public awareness of water quality deterioration and long-term ecosystem degradation.

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	authorities to deepen community ownership beyond government-led programs.	

4.1.4 URM_{INDEX} Score

The indicator which measures the processes followed by the city in order to sensitize citizens about the river-related issues and challenges and its scoring are as under:

Table 4-6: Calculation of Citizen Sensitization points

Sl. No.	Desirable Feature	Citizen sensitization points	Points based on current situation	Observation
1	Dedicated Information, Education and Communication (IEC) programme for the river-related aspects	20	10	No dedicated IEC programs for river-related aspects. However, river related clean up drives are conducted but in small scale.
2	River related sensitization is part of existing citizen awareness raising programmes	15	5	Very less activities conducted related to river clean-up drives
3	Presence of a dedicated website for river-related aspects	5	0	No dedicated website exists for river-related aspects
4	Use of traditional sensitization media (e.g., hoardings, murals, competitions, radio)	10	10	Use of posters, graphics and competitions by the MC and DGC has been observed.
5	Use of social media for river-related sensitization	10	5	Social media is not used for river-related sensitization by the Nagar Nigam. However, the social media is extensively used by District Ganga Committee for river management.
6	A dedicated river day for the city	10	0	No dedicated river day for the city is celebrated.
7	Earmarked budget for citizen sensitization	15	0	No budget is earmarked for citizen sensitization, the IEC activities are conducted under SBM.
8	Sensitization of school children through special events	10	5	Limited events or programs have been planned to sensitise school children.
	Total	100	35	

As per the URMP Framework, Mathura-Vrindavan has achieved a citizen sensitization score of 35, which falls under sensitization score 3. This indicates that the city needs to organise more citizen and river-related awareness programmes, with particular focus on Yamuna River health and conservation.

4.1.5 URM_{INDEX} Score

As per the URMP framework, the city is engaging its citizens in river-related activities through 2 modalities out of 5, i.e., (i) participation of citizens in river clean-up activities and (ii) CSR funds invested in river-related projects. Since there are two modalities of citizen engagement, the citizen engagement score is 4.

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PHYSICAL INFRASTRUCTURE



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5 PHYSICAL INFRASTRUCTURE

5.1 Urban Water Management

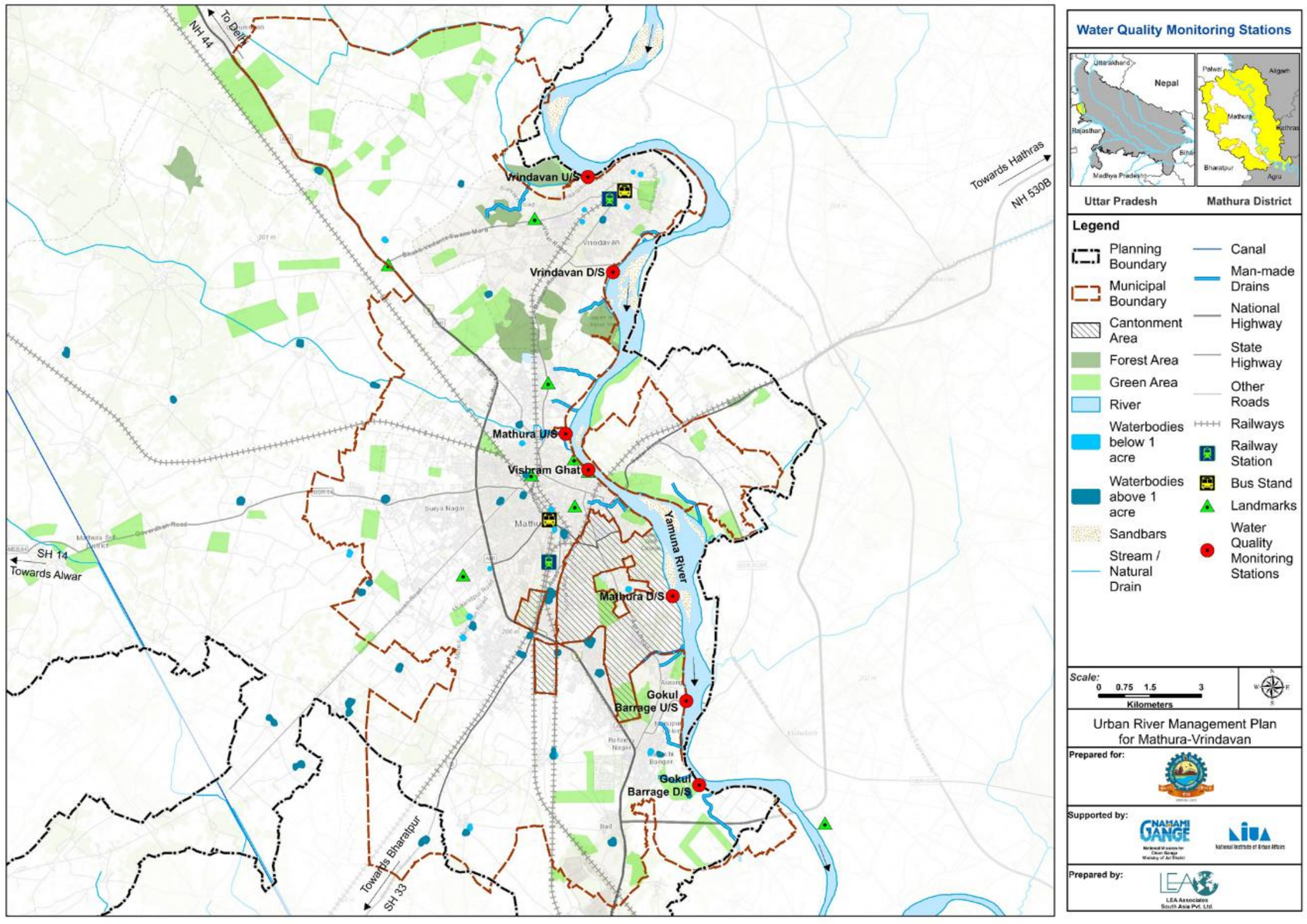
The city relies on both ground and surface water to meet the domestic, commercial and tourism needs.

5.1.1 Surface water

Mathura–Vrindavan receives its surface water supply from the River Ganga through an intake system located near Bulandshahr. Approximately 25 MLD water is drawn, then treated at the primary treatment facility located at the source and conveyed to Mathura, where it undergoes sedimentation before distribution across the city.

Surface water for the city is not drawn from Yamuna River as its quality is poor. The designated best-use classification of river water has been assessed with reference to the water quality criteria prescribed by the Central Pollution Control Board (CPCB), as detailed in Annexure 13.

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Source: 1) Admin Boundaries: Mathura-Vrindavan Masterplan 2031; 2) Municipal Boundary: Nagar Nigam Mathura Vrindavan; 3) Transport Network: OSM; 4) Waterbodies: Braj Teerth Vikas Parishad

Map 5-1: Water quality monitoring station (DO and faecal Coliform)

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Table 5-1: Classification of Yamuna River Water Quality (Parameter-wise Evaluation)

Station	pH	BOD (mg/L)	COD (mg/L)	Total Coliform	CPCB Class
U/S Vrindavan, Mathura	7.8	11	52	47,000	D
D/S Vrindavan, Mathura	8.1	12	68	58,000	
U/S Mathura	8.1	13.8	60	70,000	
Vishram Ghat, Mathura	7.9	13	48	63,000	
D/S Mathura	7.7	13.4	68	84,000	
U/S Gokul Barrage	8	14.8	52	70,000	
D/S Gokul Barrage	7.9	15	64	94,000	

Source: SPCB, August 2025

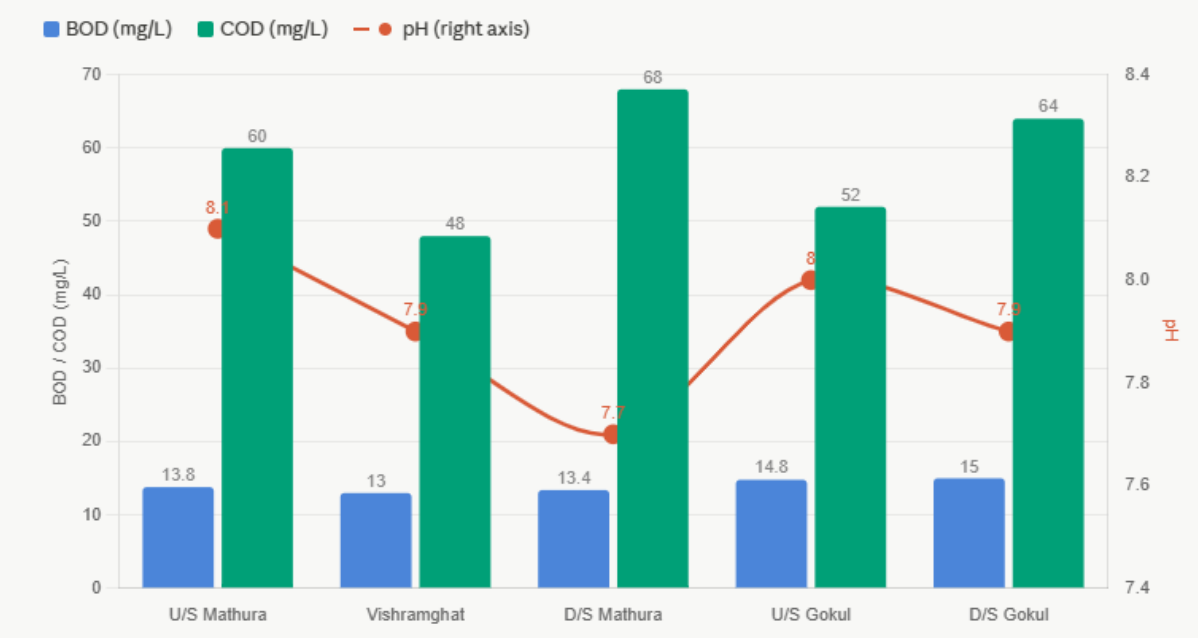


Figure 5-1: Yamuna River Water Quality at monitoring locations

The above table indicates that there is a significant increase in the total coliform levels after the river passes through the Mathura-Vrindavan stretch.

5.1.2 Groundwater

As per the Jal Kal department, 65 MLD of water is extracted through 430 tube wells to augment the surface water supply. The ground water is chlorinated and then supplied through pipelines.

Mathura's total annual groundwater recharge is about 35,598 ham (100%). After accounting for natural discharge, the extractable resource is 34,097 ham (96%). Current extraction is 6,842 ham (19.9%), of which irrigation uses the largest share (around 72%), domestic use accounts for 27% and industrial use is negligible (<1%). This leaves about 27,255 ham (80.1%) available for future use.

According to the Data Computation Methodology used for groundwater assessment, units are categorized based on the percentage of extraction:

Table 5-2: Groundwater Extraction Status Classification Based on Stage of Extraction (%)

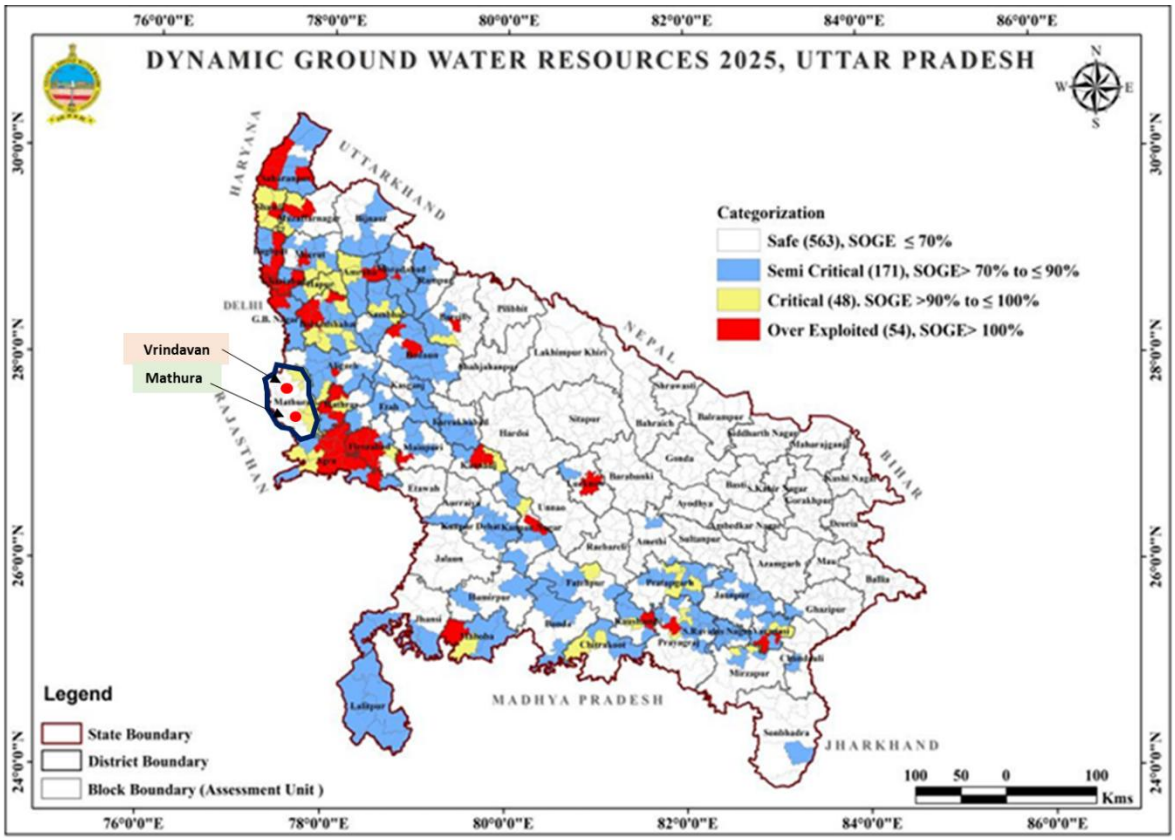
Stage of Extraction (%)	Categorization
0 – ≤ 70	Safe
> 70 – ≤ 90	Semi-Critical

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Stage of Extraction (%)	Categorization
> 90 – ≤ 100	Critical
> 100	Over-Exploited

Source: CGWB - Dynamic Ground Water Resources of India, 2025

Hence, as per the Dynamic Ground Water Resources of Uttar Pradesh, 2025, the overall stage of extraction in the district is 70.94%, which is considered safe.



Map 5-2: Categorization of Assessment Units (Block & Urban area) for Ground Water Extraction in Uttar Pradesh

Source: CGWB - Dynamic Ground Water Resources of Uttar Pradesh, 2025

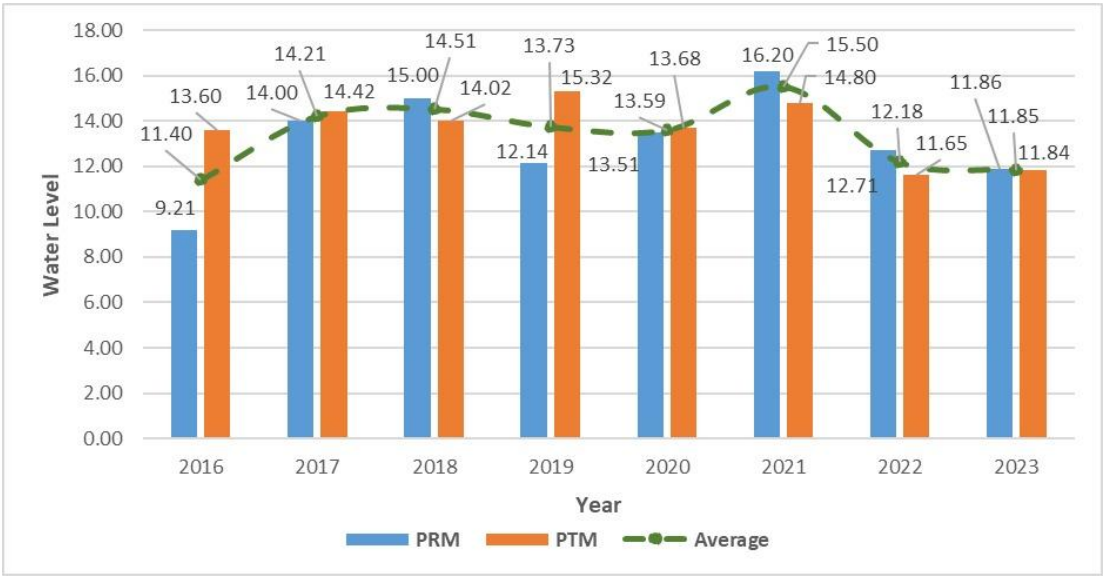


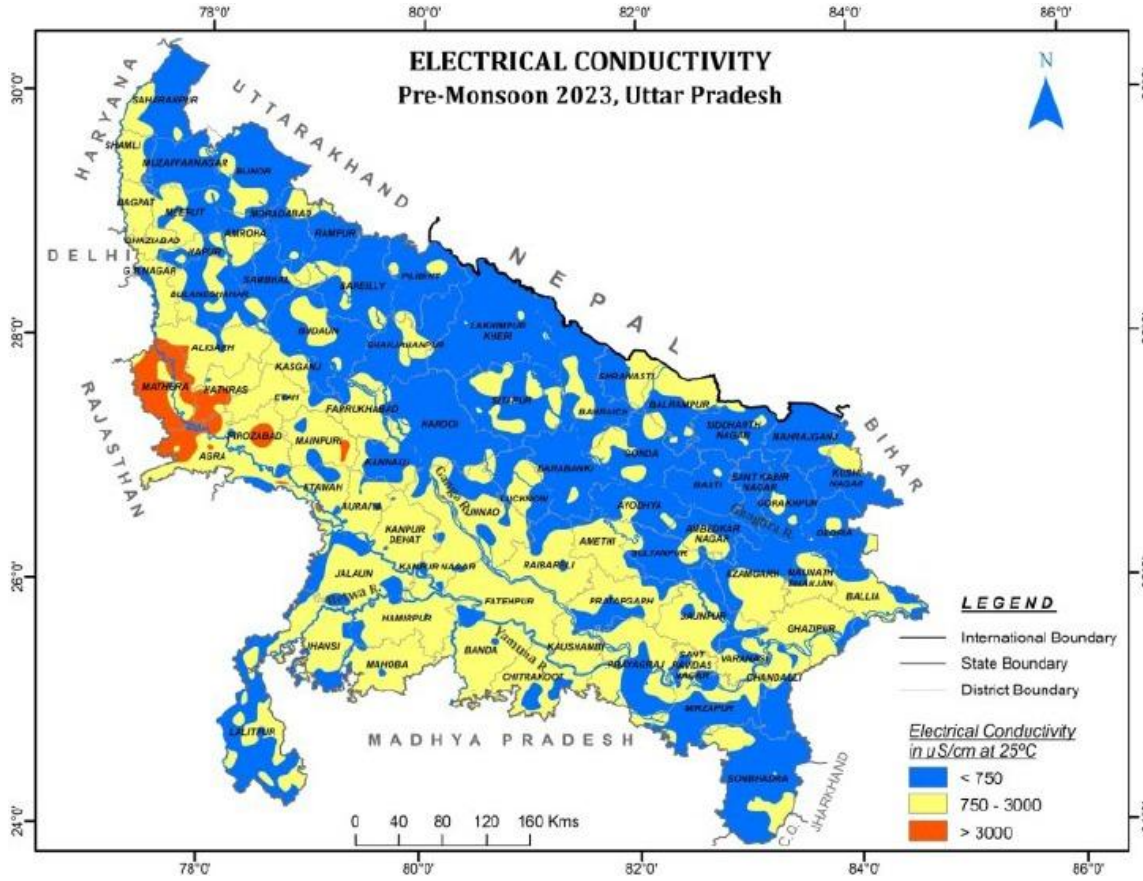
Figure 5-2: Ground Water Level of Mathura-Vrindavan City (2016-2023)

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Source: Jal Jeevan Mission website (https://jjm.up.gov.in/GroundWater/URBAN_RURAL_AREA_WATER_LEVEL_Block_Graph?AreaType=U&DistrictId=470&DistrictName=Mathura&P1=City)

Groundwater levels in the urban area of Mathura-Vrindavan were analysed using monitoring data from multiple hydrograph stations maintained under the Jal Jeevan Mission, Government of Uttar Pradesh. A drop in the average depth of water table is observed from 9 mbgl to 11 mbgl from 2016 to 2023.

Groundwater Quality: Geologically, the deeper aquifers in the central alluvial plains of this region are inherently saline. Extensive canal irrigation under semi-arid conditions further accelerates evapotranspiration, thereby exacerbating both soil and groundwater salinity. Pre-monsoon Electrical Conductivity (EC) map of UP 2023 indicates high EC reading for Mathura-Vrindavan area implying that the ground water is highly saline and brackish (Refer Map 5-3). In addition to salinity, surveys conducted by the Central Ground Water Board (CGWB) have reported sporadic occurrences of trace elements such as Fluoride, Iron, Manganese and Uranium in unconfined aquifers, often exceeding permissible limits.



Map 5-3: Electrical Conductivity Map of Uttar Pradesh

Source: National Ground Water Monitoring Program for Pre-Monsoon 2023, CGWB

5.1.3 Water supply

As stated earlier, the city relies on both surface and groundwater. The overall water demand of the city is 146 MLD (Refer Table 5-3), of which 65 MLD is sourced through tube wells, 25 MLD from surface water and the remaining from private sources. Accounting for system losses of approximately 15%, the total water demand at the source is calculated to be 168 MLD as on 2025. It is estimated that by the year 2051, the overall water demand shall rise up to 346 MLD.

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Table 5-3: Water demand Projections of Mathura-Vrindavan

Year	2025	2031	2041	2051
Population	9,30,088	10,98,048	14,59,086	19,21,506
Water Demand @ 150 Lpcd (in MLD)	140	165	219	288
Floating Population	1,40,443	1,65,805	2,20,322	2,90,147
Water Demand @ 45 Lpcd (in MLD)	6	7	10	13
Total Water Demand (in MLD)	146	172	229	301
Water demand at source (15% Losses)	168	198	263	346

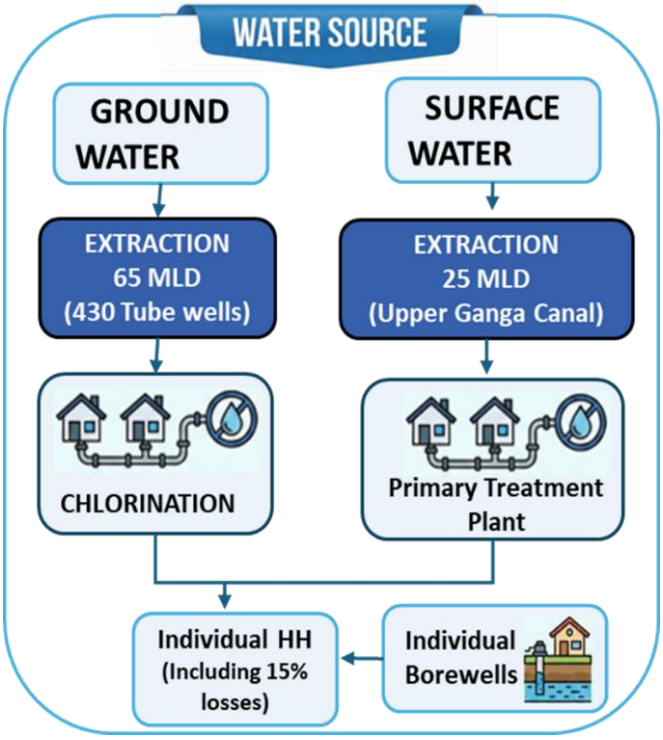


Figure 5-3: Water Source of Mathura- Vrindavan city

Due to insufficient municipal supply, reliance on decentralized private extraction still remains significant, highlighting a critical gap between demand and supply.

5.1.4 Institutional Mechanism

Departments	Role and Responsibilities
Jal Kal Department	Responsible for day-to-day operation and maintenance of water supply systems.
Jal Nigam	Responsible for planning, designing and executing major water supply and sewerage schemes.

5.1.5 SWOC Analysis

Strength	Weakness
• The city utilizes a mix of surface water (Ganga Canal) and groundwater (tube wells), providing a multi-source supply strategy. • The city falls within the Safe category.	• Local groundwater is highly saline/brackish. It contains -Fluoride, Iron, Manganese, Uranium • Infrastructure Inefficiency: The system faces a 15% distribution loss.

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Strength	Weakness
	• Municipal supply is currently insufficient, leading to a heavy reliance on decentralized, private water extraction. • Despite a "safe" overall extraction percentage for the district, urban monitoring stations show a localized drop in the water table from 9 mbgl to 11 mbgl.
Opportunities	**Challenges**
• Implementing water conservation strategies for both the permanent population and the significant "floating" population. • there is an opportunity to modernize the grid, integrate smart metering, and minimize system losses.	• The poor quality of the Yamuna River (Class D standards with high Coliform levels) prevents it from being utilized. • The inherent salinity of deeper aquifers, combined with semi-arid conditions and high evapotranspiration, makes sustainable groundwater management difficult.

5.2 Used Water Management

5.2.1 Sewage Generation and Coverage

Mathura-Vrindavan presently generates approximately 117 MLD of sewage, which is expected to increase to 241 MLD by the year 2051. (Refer Table 5-4).

Table 5-4: Water demand and Sewage generation projections of Mathura-Vrindavan for residential and floating population

Year	2025	2031	2041	2051
Total Population	10,70,531	12,63,853	16,79,408	22,11,653
Total Water Demand	**146**	**172**	**229**	**301**
Sewage Generated (In MLD)	**117**	**138**	**183**	**241**

Note: As per CPHEEO manual, floating population has been considered as 15% on the residential population mentioned in section 2.2.2.

The breakup of treatment/non-treatment of 117 MLD sewage generated is as follows (Refer Figure 5-4):

- 26 MLD flows through sewer network to various STPs
- 53 MLD diverted from nallahs to various STPs
- 29 MLD flows into the Yamuna River through untapped & partially tapped drains
- 9 MLD flows into ponds within the city

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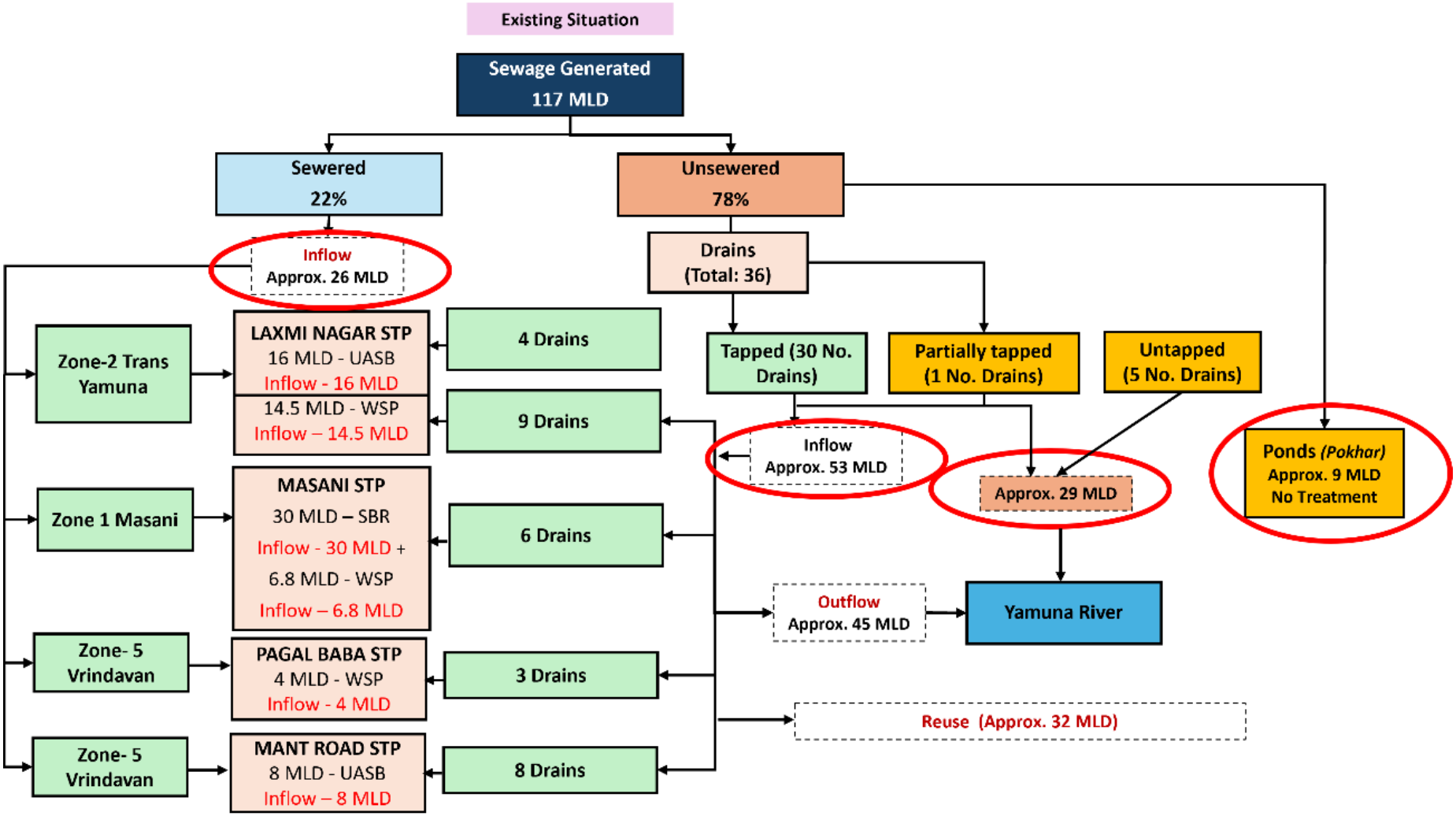


Figure 5-4: Existing sewerage situation of Mathura-Vrindavan city

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Sewerage zones: The city is divided into the following five sewerage zones as follows:

Zone 1: Masani

Zone 2: Trans Yamuna

Zone 3: Koyla Alipur

Zone 4: Masoom Nagar

Zone 5: Vrindavan

As per Jal Nigam (Urban), the sewage network extends 360 Km and serves 45,065 households across all zones. Approximately 26 MLD flows in from the sewered zones into four operational STPs (Refer Map 5-4). Within the 5 Sewage zones, 78% of the sewage (91 MLD) is carried through open drains, of which 53 MLD flows into various STPs of the city.

Sewerage Treatment: Mathura-Vrindavan is presently served by four sewage treatment plants (STPs) with a combined installed capacity of 79.3 MLD. Of these, two STPs are located in Mathura. Each STP complex in Mathura comprises two units. The details of the 4 STPs are mentioned in Table 5-5 below.

Table 5-5: Inflow and outflow of STPs

SL. No.	STP Name	Capacity of the STP (in MLD)	Technology	Inflow (in MLD)	Outflow (in MLD)	Outfall Location
Mathura						
1.	Laxmi Nagar STP	16	Up flow Anaerobic Sludge Blanket (UASB) with a 20 MLD tertiary treatment facility is integrated with this plant	30.5	30.5	Yamuna River through drain
		14.5	Waste Stabilization Pond (WSP)			
2.	Masani STP	30	Sequencing Batch Reactor (SBR)	36.8	36	Yamuna River through drain
		6.8	Waste Stabilization Pond (WSP)			
Vrindavan						
3.	Pagal Baba STP	4	Waste Stabilization Pond (WSP)	4	4	Yamuna River through drain
4.	Mant Road STP	8	Up flow Anaerobic Sludge Blanket (UASB)	8	6	Yamuna River through drain
	Total	**79.3**		**79.3**	**76.5**	

Source: UP Jal Nigam

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Picture 5-1: 14.5 MLD STP – WSP Technology



Picture 5-2: 8 MLD STP – UASB Technology



Picture 5-3: 16 MLD STP – UASB Technology

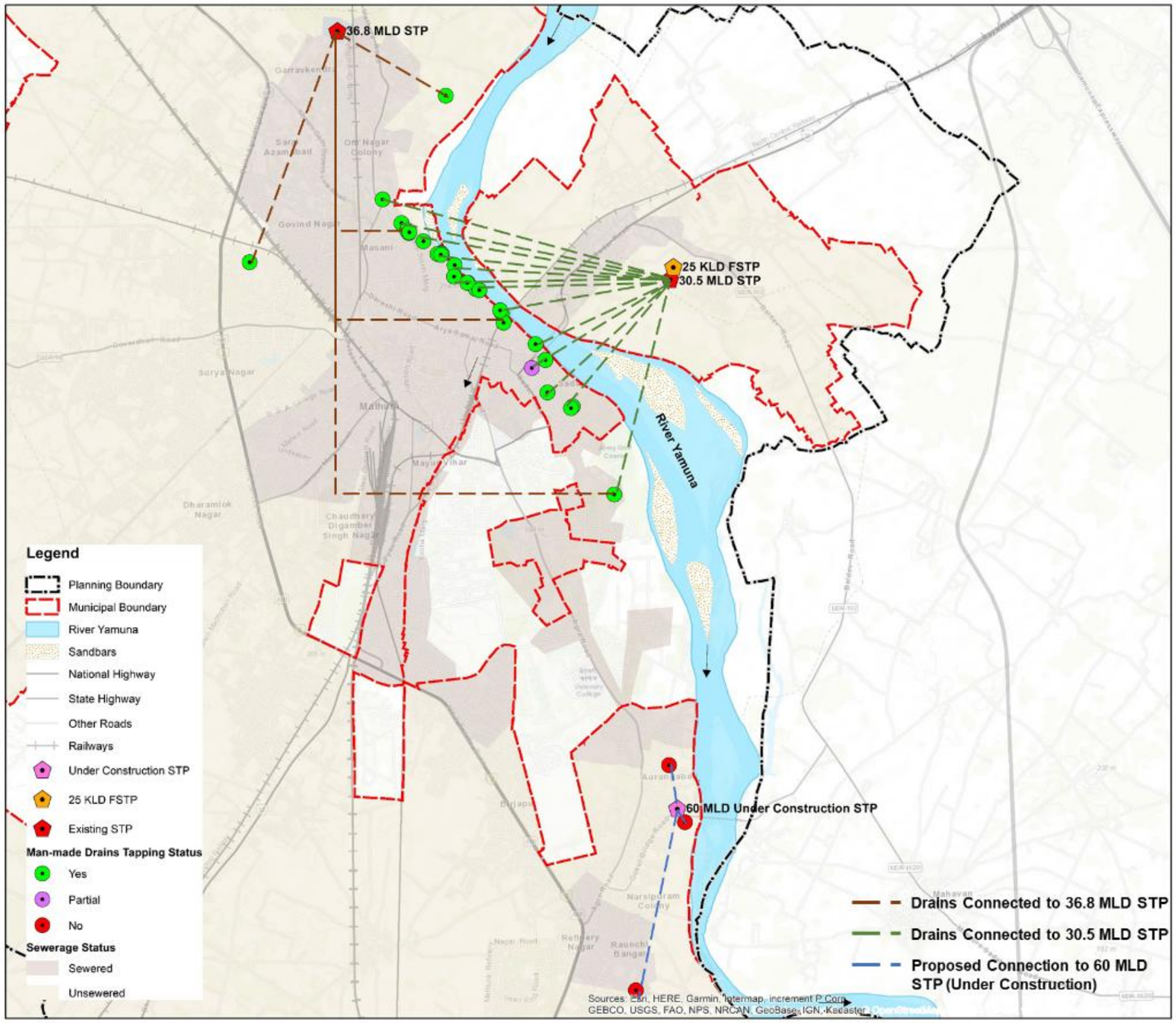


Picture 5-4: 4 MLD STP – WSP Technology

Gap assessment as per projected population:

Year	2025	2031	2041	2051
Sewage generated	117	138	183	241
STP installed capacity	79.3	152.3	-	-
Gap	**37.7**	**+14.3**	-	-

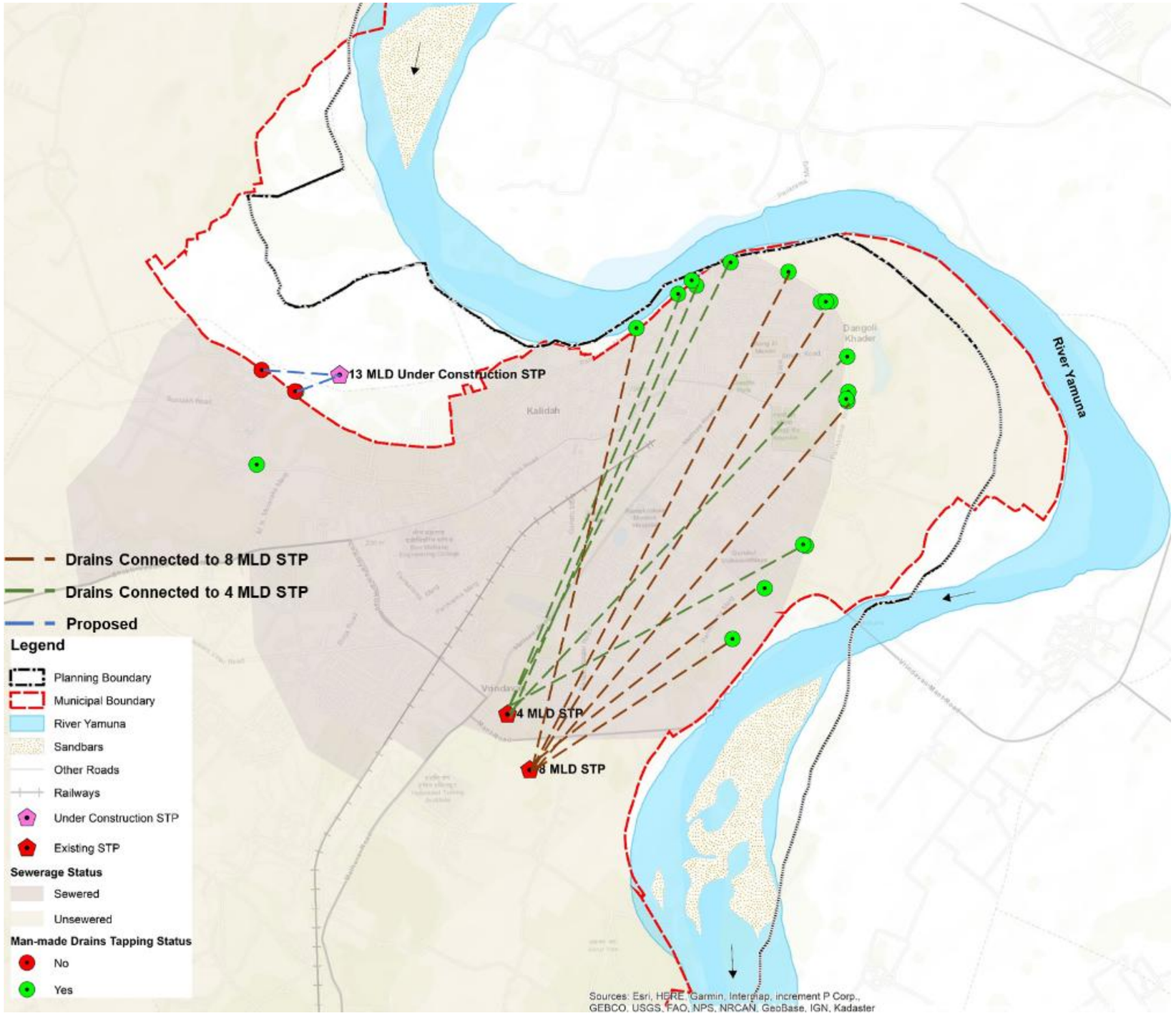
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Source: Consultant Analysis

Map 5-4: Drains connected to different STPs in Mathura

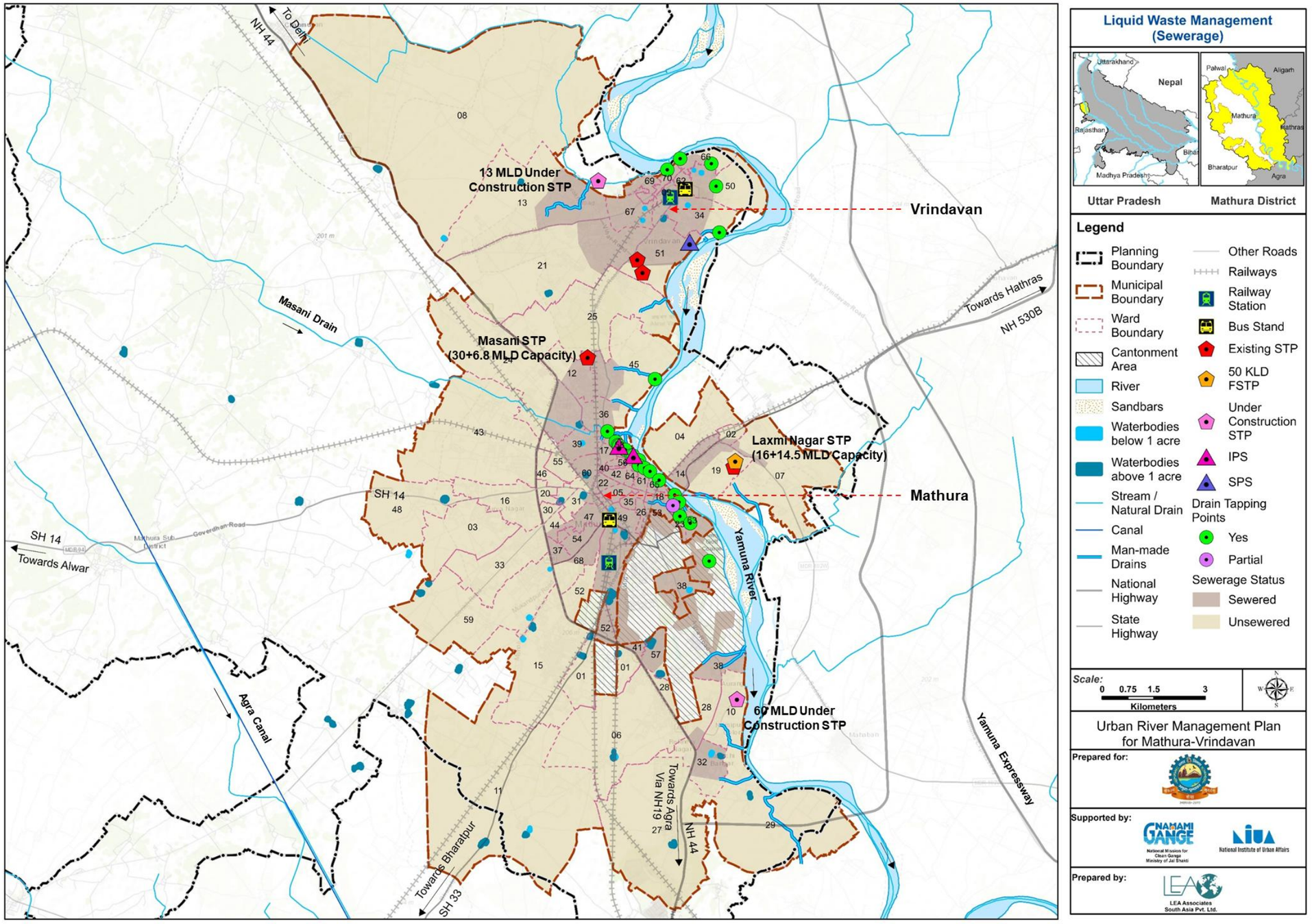
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Source: Consultant Analysis

Map 5-5: Drains connected to different STPs in Vrindavan

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Source: 1) Admin Boundaries: Mathura-Vrindavan Masterplan 2031; 2) Municipal Boundary: Nagar Nigam Mathura Vrindavan; 3) Transport Network: OSM; 4) Consultant Analysis; 5) Waterbodies: Braj Teerth Vikas Parishad

Map 5-6: Liquid Waste Management (Sewerage) in Mathura- Vrindavan

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5.2.2 On-site sanitation:



Containment: Approximately 78% household do not have access to sewer lines and rely on onsite sanitation.

Storage: Faecal sludge generation from unsewered households is approximately 188.08 KLD.

Transport: The collection and conveyance of faecal sludge is managed by Nagar Nigam Mathura-Vrindavan through a fleet of 28 de-sludging vehicles of 3000 Liters capacity each. The vehicles are deployed across the city to empty septic tanks and it transport the faecal sludge to the 50 KLD co-treatment plant at Laxmi Nagar STP. Furthermore, while there is an excessive number of desludging vehicles operating in the city relative to established standards, residents opt for private operators who charge ₹1200 per trip rather than the municipal service, which costs ₹3500 per trip.

Treatment: The city faces significant infrastructure and operational challenges, with only a 50 KLD co-treatment facility at the Laxmi Nagar STP, resulting in an estimated treatment capacity deficit of 138.08 KLD.

Reuse: The treated sludge is then transported to the Solid Waste Management plant located adjacent to the co-treatment facility, where it is further processed and sold to farmers as manure.

5.2.3 Used Water in Drains:

There are 36 major drains of which 30 are fully tapped,1 is partially tapped and 5 are untapped. (Details of all the 36 drains is attached in Annexure 14).

Tapped: 30 tapped drains and 1 partially tapped drain contributes, approximately 53 MLD inflow to the STPs.

Untapped: 5 untapped drains and 1 partially tapped contributes to direct discharge of approximately 29 MLD used water into Yamuna River (see Table 5-6) below.

Dissolved Oxygen (DO) concentrations recorded at five drains during the site visits ranged from 2 to 5 mg/L (Refer Table 5-6), indicating moderate biological stress caused by organic pollution. While the drains have not reached septic conditions, the low DO levels reflect degraded water quality and reduced ecological health

Table 5-6: DO levels of untapped Water Drains

Sl. No	Name of Drain	Partially Tapped / Untapped	DO Level – Locations	Minimum value (mg/L)	Maximum value (mg/L)
1	Ambhakar Drain	Partially tapped	27.495484, 77.693481	2.2	3.6
2	Kala Pathar Drain	Untapped	27.423424, 77.704891	3.4	5.5
3	Aurangabad downstream Drain	Untapped	27.442691, 77.711705	2.9	5.2
4	Aurangabad upstream Drain	Untapped	27.449313, 77.09802	2.2	5.4
5	Chaitanya Vihar Drain	Untapped	27.58158, 77.667895	2.9	4.5
6	Sunrakh Drain	Untapped	27.580233, 77.670161	1.9	4.2

Source: Site Observations

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Picture 5-5: Ambhakar Drain



Picture 5-6: Chaitanya Vihar Drain



Picture 5-7: Sunrakh Drain

Cleaning Mechanism

At interception screen bars are installed to segregate solid waste from the used water. The waste is manually removed from the screen bars and collected outside the drain. Then Nagar Nigam collects the waste and is transported to trenching ground for final disposal.

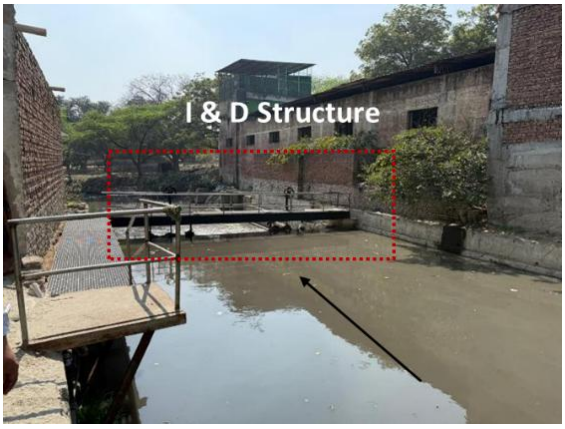
Site Observation

As per the list provided by Jal Nigam, Mathura–Vrindavan has 36 drains, of which 5 remain untapped and 1 drain (Ambhakhar drain) is partially tapped. However, during the site visit it was observed that the Masani drain, originally constructed as an irrigation canal, now carries both Yamuna water and untreated sewage, and overflows directly into the Yamuna River. DO levels at 5 drains observed during site visit ranged from 2 mbgl to 5 mbgl (Refer Table 5-7). This indicates that the water is a transactional stage which though not completely septic is under biological stress due to pollution.

At Vishram Ghat, the manhole pumping station conveying used water to the sewer network is not equipped with an automated pumping system. Consequently, when the pump is not operated manually, untreated used water overflows from the manhole and is discharged directly into the Yamuna River.



Picture 5-8: Manhole at Vishram Ghat



Picture 5-9: Overflow of Masani Drain

Ponds: The villages that are recently included within municipal limits largely lack formal sewerage infrastructure. These villages generate approximately 9 MLD used water. In the absence of ewer network, household used water is discharged directly into the nearby local ponds (*Pokhars).* Further, septic tanks in these areas frequently overflow and their effluent too drains directly into the Pokhars (Refer **Picture 5-10** and **Picture 5-11**). Table 5-7 presents DO levels of 11 ponds observed during site visits. DO values ranging from 2 to 4 mg/L indicates that the water bodies too are under biological stress due to pollution.

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Table 5-7: DO level of ponds of Mathura-Vrindavan

Sl. No	Name	DO reading (4 mg/l)
1	Indal Kund	1.4
2	Shiv Mandir Pond	Inaccessible pond
3	Jaipur Mandir lake	2.2
4	Matovan pond	2.4
5	Bagel Bagichi	2.2
6	Savri masjid pond	2.4
7	Nauaon Badi Pokhar	3.6
8	Dampier Nagar Pokhar	2.5
9	Maa Chamunda temple pond	2.4
10	Hanuman Bagichi	2.9
11	Ramtal Kund	3.9
12	Balbhdra Kund	Inaccessible pond
13	Shantanu Bihar mandir kund	2.3



Picture 5-10: Balbhadra kund



Picture 5-11: shiv mandir pond

5.2.4 Industrial Effluent Discharge

Mathura has a textile printing cluster (saree washing, dyeing and printing units) at UPSIDC Industrial Area, served by a Common Effluent Treatment Plant (CETP) of 6.5 MLD installed capacity operated by an SPV. The Action Plan for Restoration of Polluted Stretch of River Yamuna (UPPCB, 2019) had reported treated effluent from 47 industries into the Masani drain and 31 industries into the Ambakhar drain, and discharge of the CETP's treated effluent into the Ambakhar drain.

This has been verified from Stakeholder consultation and field observation that no untreated industrial effluent is discharged into the city drains or the Yamuna River.

5.2.5 Ongoing/Proposed/Approved Projects

Project	Brief description	Implementing Agency
Ongoing Projects		
Vrindavan: **13 MLD STP**	Planned to treat used water from the two currently untapped drains, Chaitanya Vihar and Sunrakh. It will also cater to the sewage generated from Zone 5, Vrindavan. SBR technology	Jal Nigam
Mathura: **60 MLD STP**	SBR technology Planned to cater to the Aurangabad upstream, Aurangabad downstream drains and sewage zone 3 Koyla Alipur.	Jal Nigam

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Project	Brief description	Implementing Agency
Ongoing Projects		
	• An ongoing pilot initiative is testing IIT-developed technology within the 14.5 MLD WSP-based STP. This intervention is expected to significantly improve the quality of treated effluent, thereby strengthening the plant's overall performance and compliance with discharge standards. • As per the stakeholder consultation: a. Jal Nigam (Rural) is replacing the 16 MLD UASB unit at Lakshmi Nagar with an SBR-based plant b. Jal Nigam (Urban) is upgrading the 6.8 MLD facility at Masani STP Complex to SBR technology. c. Mant Road STP facility is being upgraded from conventional treatment technology to an SBR-based system d. Pagal Baba STP (WSP) is being upgraded to SBR	

5.2.6 Overall assessment

The city currently operates 4 STPs with a combined capacity of 79.3 MLD. The city has a sewer network of 360km, while the rest of the city relies on septic tanks and soak pits. There are 36 drains in the city, of which 6 remain fully or partially untapped, collectively releasing approximately 29 MLD of raw sewage into the Yamuna. To cater this gap, the city has two under-construction STPs with a combined capacity of 73 MLD.

5.2.7 Institutional Mechanism

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

5.2.8 SWOC Analysis

Strength	Weakness
• 360 km sewer network is already in place, serving over 45,000 households • two major STPs (13 MLD and 60 MLD) under construction to bridge the treatment gap • dedicated system exists for unsewered areas, utilizing a fleet of 28 de-sludging vehicles and a co-treatment plant (50 KLD) • 30 out of 36 major drains fully tapped and Interception screen bars are installed at various points to remove solid waste	• 117 MLD of sewage generated and only 79.3 MLD of installed treatment capacity. • 78% of households lack direct sewer connections and rely on onsite systems • 29 MLD of raw sewage is discharged directly into the Yamuna untapped • manhole pumping station at Vishram Ghat, lacks automation, leading to frequent sewage overflows into the river. • Villages recently merged into the municipal limit lack sewer lines, causing used water and septic tank overflows to contaminate local ponds • Masani drain, originally designed as an irrigation canal, has been co-opted to carry untreated sewage
Opportunities	**Challenges**
• Ongoing construction of 73 MLD of new STP capacity is projected to eliminate the treatment gap by 2031 • Current FSSM program successfully converts treated faecal sludge into manure for farmers • Converting open drains (which carry 78% of the city's sewage) into closed conduits	• Extending the formal sewer network to 78% of households is a capital-intensive and time-consuming challenge, especially in newly merged municipal areas. • System suffers from the dual burden of mixed municipal waste (plastics, silt, organic matter)

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• Installing automated pumping systems at key locations like Vishram Ghat • Masani drain provides a high-priority opportunity for rehabilitation	and dairy waste (cow dung), which physically clog drains • Diverse nature of city settlements makes it difficult to maintain a uniform drainage network

5.3 Solid Waste Management

5.3.1 Waste Generation, Collection and Process of Conveyance

Mathura-Vrindavan city generates approximately 480 tonnes of solid waste daily. The city has implemented a two-bin segregation initiative aimed at promoting source-level separation of wet and dry waste. However, participation remains limited, with only approximately 17% of households actively segregating waste at the source.

Door-to-door collection services operate across 100% of households spanning 70 wards, supported by a fleet of 342 collection vehicles that include 15 E-rickshaws, 209 Tippers, 26 manual rickshaws, 14 wheelbarrows and 78 Secondary vehicles. This diverse fleet ensures flexibility and accessibility in waste collection, addressing the varied settlement patterns. The collected waste is efficiently aggregated at six strategically located secondary collection centres, facilitating streamlined transportation to designated processing plants.

5.3.2 Waste Disposal Mechanism

The city operates a solid waste management plant that currently contains around 2.62 lakh tonnes of legacy waste, of which about 30% has been remediated, with the remainder under process. The solid waste dump site is located approximately 1.3 km from the Yamuna River. The facility houses a MRF with a capacity of 300 TPD, compost pits for wet waste, eight incinerators with a capacity of 25 TPD each and a Construction & Demolition (C&D) waste plant with a capacity of 50 TPD. Furthermore, there are 6 decentralized MRF centres of a total installed capacity of 30 TPD within the municipal limits.



Picture 5-12: Distance of Solid waste processing site from Yamuna River

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5.3.3 Solid Waste Issues

Solid waste dumping along the nallahs and riverbed: In Mathura-Vrindavan, disposal of solid waste along the banks of Yamuna River and into adjoining drains remains a critical concern. Many of these drains ultimately discharge into the river, carrying with them untreated sewage as well as mixed municipal waste such as plastics, silt and organic matter. This not only disrupts the smooth flow of drains and heightens the risk of waterlogging but also leads to further deterioration of river water quality (Refer to Picture 5-13,Picture 5-14,Picture 5-15).

5.3.4 Religious Waste

Religious waste in Mathura-Vrindavan arises from ritual practices such as floral offerings at temples and the immersion of idols in the Yamuna River. While these traditions hold deep cultural and spiritual significance, they contribute to organic and non-biodegradable waste streams, affecting river ecology and heritage precincts.

5.3.5 Dairy Waste

Mathura–Vrindavan generates approximately 150 tonnes of cow dung per day, yet no organized collection system exists under the Nagar Nigam. Field observations indicate that much of this waste is washed directly into drains, with the dairy adjacent to Masani SPS contributing significantly to the Kishan Ganga and Octroi Post nallah. At present, there is no processing facility within municipal limits to treat this waste. The absence of structured management reflects a systemic gap across the waste chain, resulting in environmental degradation and missed opportunities for sustainable waste-to-resource solutions. Discharges from dairies, including cow dung and wash water entering drains, exacerbate urban sanitation challenges by clogging drainage systems, generating foul odours, causing localized waterlogging, and ultimately flowing untreated into the Yamuna River, thereby intensifying organic pollution."



Picture 5-13: Floral offerings accumulated along ghats



Picture 5-14: Solid waste accumulated at Sunrakh drain

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Picture 5-15: Cow dung waste at Octroi post nallah

5.3.6 Institutional Mechanism

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

5.3.7 SWOC Analysis

Strength	Weakness
• City achieves 100% door-to-door collection coverage across all 70 wards • A fleet of 342 vehicles (including E-rickshaws, tippers, and secondary vehicles) allows for effective waste collection • Active remediation of 2.62 lakh tonnes of legacy waste is underway	• Despite the initiative for two-bin systems, actual adoption is poor, with only 17% of households segregating waste at the source. • No organized collection or processing system for the 400 tonnes of cow dung generated daily • Solid waste dump site is located only 1.3 km from the Yamuna River, posing a long-term risk of leachate or runoff contamination. • Waste disposal (including plastic, silt, and dairy waste) leads to recurring issues like waterlogging, foul odors, and severe degradation of river water quality
Opportunities	**Challenges**
• The high volume of daily cow dung (400 tonnes) represents a massive untapped opportunity for bio-energy (biogas) or high-quality compost production. • Implementing specialized collection and processing streams for floral/religious waste at ghats • Converting open drains (which carry 78% of the city's sewage) into closed conduits	• Cultural practice of immersing idols and offering flowers, combined with the discharge of mixed municipal waste into drains, directly harms the Yamuna's ecology.

5.3.8 Overall Assessment of Physical Infrastructure:

Sewerage and Liquid Waste Management:

- Installed STP capacity is 79.3 MLD, while sewage generation is 122 MLD — leaving 42.7 MLD untreated.

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- Heavy reliance on WSP and UASB technologies, which may not consistently meet discharge standards compared to advanced processes like SBR.
- 42.7 MLD of untreated sewage is discharged directly into the Yamuna, raising concerns about river pollution and ecological health.
- 28 vehicles with 3,000 L capacity each (≈168 KL/day) are insufficient compared to the scale of septic tank reliance.
- Only 28 MLD is reused for agriculture and 4 MLD supplied to IOCL reuse potential remains underexploited.
- Faecal Sludge and Septage Management (FSSM):
- The city generates 188.08 KLD faecal sludge, but only 50 KLD treatment capacity exists at the co-treatment facility in Laxmi Nagar STP, leaving a gap of 138.08 KLD.

Solid Waste Management:

Indiscriminate dumping of diary waste and cow dung in the drains contributes directly to river pollution.

5.3.9 URM_{INDEX} Score

Only DO has been used to measure the effective implementation of this objective because DO is a core parameter for biodiversity to thrive, which is an overall vision of this element of the URMP.

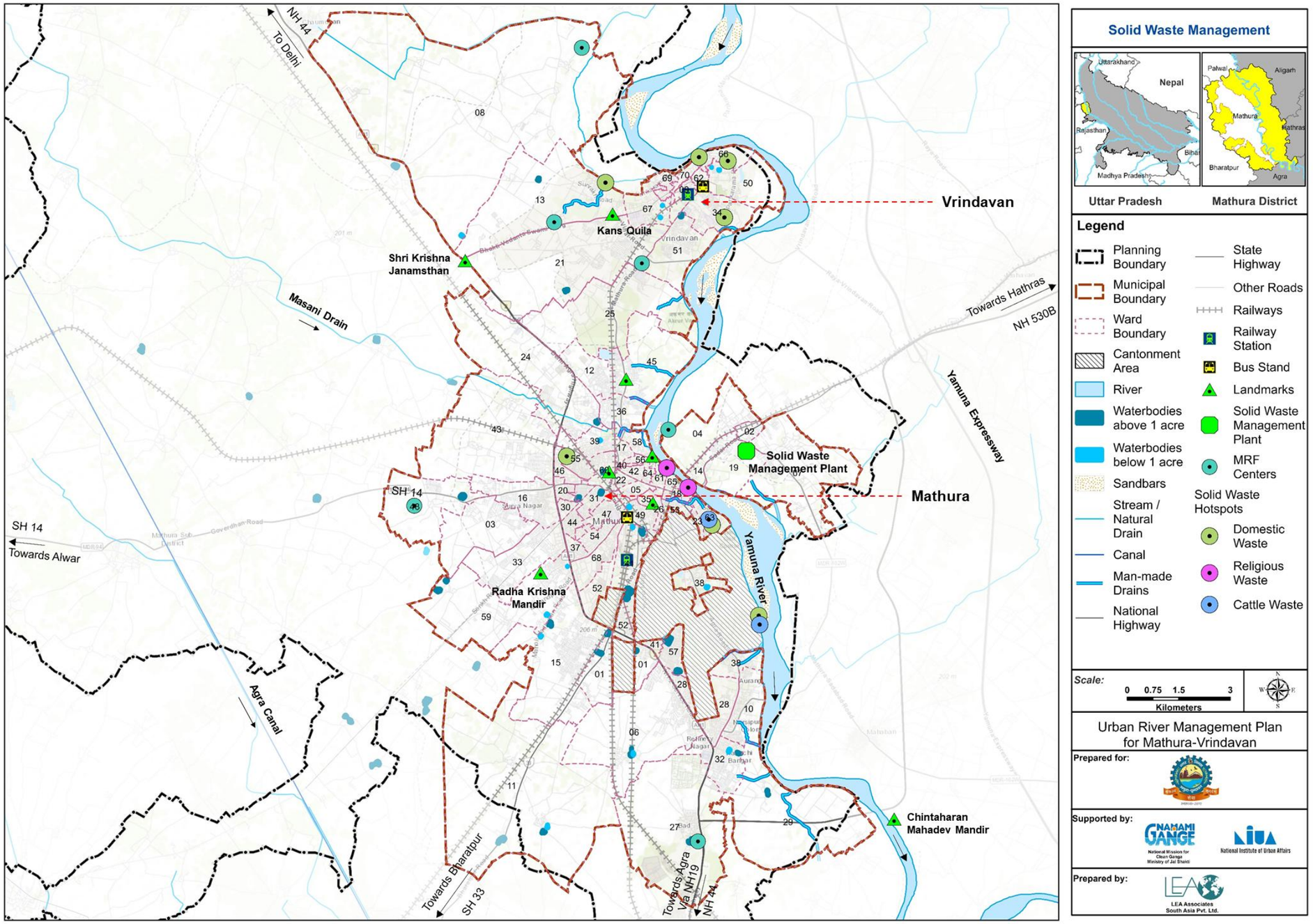
$$\text{Net DO} = \frac{\text{DO outlet} - \text{DO inlet X 100}}{\text{DO inlet}}$$

At the inlet point of Yamuna River located at Bhijoli khadar village upstream of Vrindavan, the Dissolved Oxygen (DO) levels ranged from a minimum of 6.4 mg/L to a maximum of 7.7 mg/L, with an average DO level of 7.05 mg/L.

At the outlet point of the Yamuna River at Churmura Yamuna Bridge the Dissolved Oxygen (DO) levels were observed to be relatively high, ranging from a. minimum of 5.3 mg/L to a maximum of 6.4 mg/L, with an average value of 5.8 mg/L.

Since the Net DO < -10, the net DO score is 1 indicating very poor water quality conditions with respect to dissolved oxygen.

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Source: 1) Admin Boundaries: Mathura-Vrindavan Masterplan 2031; 2) Municipal Boundary: Nagar Nigam Mathura Vrindavan; 3) Transport Network: OSM; 4) Consultant Analysis; 5) Waterbodies: Braj Teerath Vikas Parishad

Map 5-7: Solid Waste Management in Mathura Vrindavan

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5.4 Reuse of Treated Water

5.4.1 Applicable guidelines and policies

India has progressively strengthened its regulatory and institutional framework for used water management to address rising urban water demand, deteriorating freshwater availability and increasing pollution of rivers and waterbodies. Over the past five decades, a series of policies, environmental acts and mission-driven programmes have been introduced to promote used water treatment, safe discharge and sector-wise reuse.

Table 5-8: Applicable Guidelines and Policies for reuse of treated water

Sl. No.	Policy / Act	Nodal Agency/ Key Institutions	Key Provisions Related to used water Treatment & Reuse	Implementing Agency (City Level)
1	**The Water (Prevention and Control of Pollution) Act, 1974**	State: Uttar Pradesh Pollution Control Board (UPPCB)	Mandates prevention and control of water pollution mandates the Central Pollution Control Board (CPCB) and State Pollution Control Boards (SPCBs) for regulating and enforcing pollution control measures, including those related to used water treatment and reuse. These bodies have the authority to set standards, issue guidelines and monitor compliance with respect to the quality of treated used water.	Mathura-Vrindavan Nagar Nigam for local enforcement
2	**National Environment Policy (NEP), 2006**	State: Uttar Pradesh Pollution Control Board (UPPCB)	Guides environmental management and sustainable development, emphasizes the implementation of projects through public agencies as well as public– private partnerships for treatment, reuse and recycle, where applicable, of sewage and used water from municipal and industrial sources before their final discharge into water bodies. The Ministry of Environment, Forest and Climate Change (MoEFCC) is the nodal agency responsible for national environment policy, Ministry of Agriculture and Farmers Welfare (MoAFW), Ministry of Power, Central Public Health and Environment Engineering Organization (CPHEEO) and National Green Tribunal (NGT) are also the other organizations involved in setting regulations for reuse of water at a national level, in aspects under their jurisdiction. Specifically, the following national programmes/policies have provided city-level directions,	Mathura-Vrindavan Nagar Nigam for local enforcement
3.	**National Water Mission**	State: UP Jal Nigam, UPPCB	Promotes recycling of used water in order to meet a significant portion of the urban water needs. Strategy 4.2 mentions incentivizing the recycling of water, including used water. The Central Water Commission, National Institute	Mathura-Vrindavan Nagar Nigam

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Sl. No.	Policy / Act	Nodal Agency/ Key Institutions	Key Provisions Related to used water Treatment & Reuse	Implementing Agency (City Level)
			of Hydrology and Central Ground Water Board are the organizations involved.	
4.	**The Environment Protection Act, 1986:**	State: UPPCB	This comprehensive legislation aims to protect and improve the environment and prevent and control environmental pollution. While the Act does not specifically address the reuse of treated water, it provides a framework for environmental regulation that indirectly supports and influences reuse practices. The Act along with its subsequent amendments and rules, establishes effluent discharge standards that entities must comply with when releasing treated used water into the environment. These standards specify permissible limits for various parameters, including Biochemical Oxygen Demand (BOD), Chemical Oxygen Demand (COD), Total Suspended Solids (TSS) and pH levels, to ensure that the discharged water does not harm aquatic ecosystems or public health. Central Pollution Control Board (CPCB) and State Pollution Control Boards (SPCBs) are entrusted with the responsibility of monitoring.	Mathura-Vrindavan Nagar Nigam for compliance monitoring
5.	**Swachh Bharat Mission (SBM) 2.0, 2011**	State: UP Dept. of Urban Development	This mission aims to ensure that no untreated used water is discharged into the environment, all used water is safely contained, transported and treated, along with maximum reuse of treated used water in all cities that have a population of less than 0.01 million. The mission also aims to work on reuse policies with the states and organize trainings and capacity building programmes for ULBs on solid and liquid waste management. The mission recommends the utilization of used water as much as is feasible, but not less than 20 per cent.	Mathura-Vrindavan Nagar Nigam
6.	**Atal Mission for Rejuvenation and Urban Transformation (AMRUT) 2.0, 2021**	State: UP Housing & Urban Planning Dept.	The mission mandates that all cities with a population of more than 0.01 million recycle their used water to meet 20 per cent of the city's water demand and 40 per cent of the industrial water demand at the state level.	Mathura-Vrindavan Nagar Nigam
7.	**National Framework on Safe Reuse of Treated Used water, 2022**	State: UPPCB, UP Jal Nigam	the framework acts as a guiding document for states to formulate their reuse water policies and implement the same in a time-bound manner. A draft policy template has also been developed as part of the framework to aid in the preparation of a reuse policy by the respective state governments.	Mathura-Vrindavan Nagar Nigam
8.	**National guideline on the reuse of**	State: UPPCB, Jal Nigam	Emphasizes sectoral prioritization of the reuse of treated used water along with certain standards.	Mathura-Vrindavan Nagar Nigam

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Sl. No.	Policy / Act	Nodal Agency/ Key Institutions	Key Provisions Related to used water Treatment & Reuse	Implementing Agency (City Level)
	treated sewage (used water) in February, 2024			
9.	**The Draft Uttar Pradesh Used Water Reuse Policy**	State: UP Housing & Urban Planning Dept., UPPCB	Emphasizes treated used water as a valuable water resource and mandates its integration into ULB-level planning and budgeting (Section 8.4.1). It prioritizes reuse in non-potable sectors such as urban forestry, agriculture (non-food crops), industrial use, transport and waterbody rejuvenation (Sections 8.1, 11.1, 12.1 and 13.1–13.3). Additionally, the policy directs ULBs to develop city-level reuse plans and implement pricing, monitoring and infrastructure for reuse through PPP or decentralized systems (Sections 8.2, 8.4, 14, 19).	Mathura-Vrindavan Nagar Nigam

Source: Compiled from various government sources by consultant

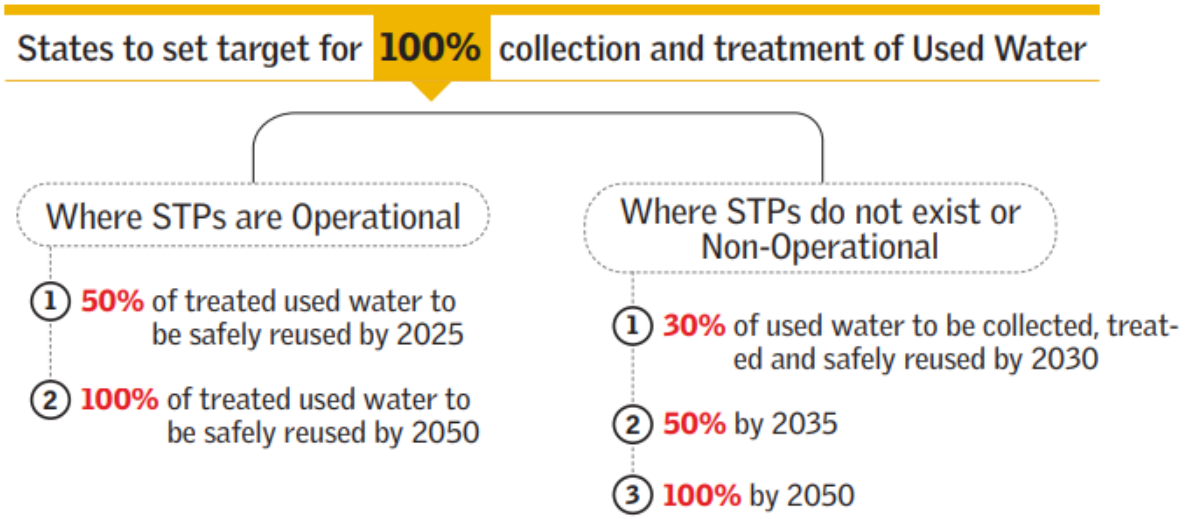
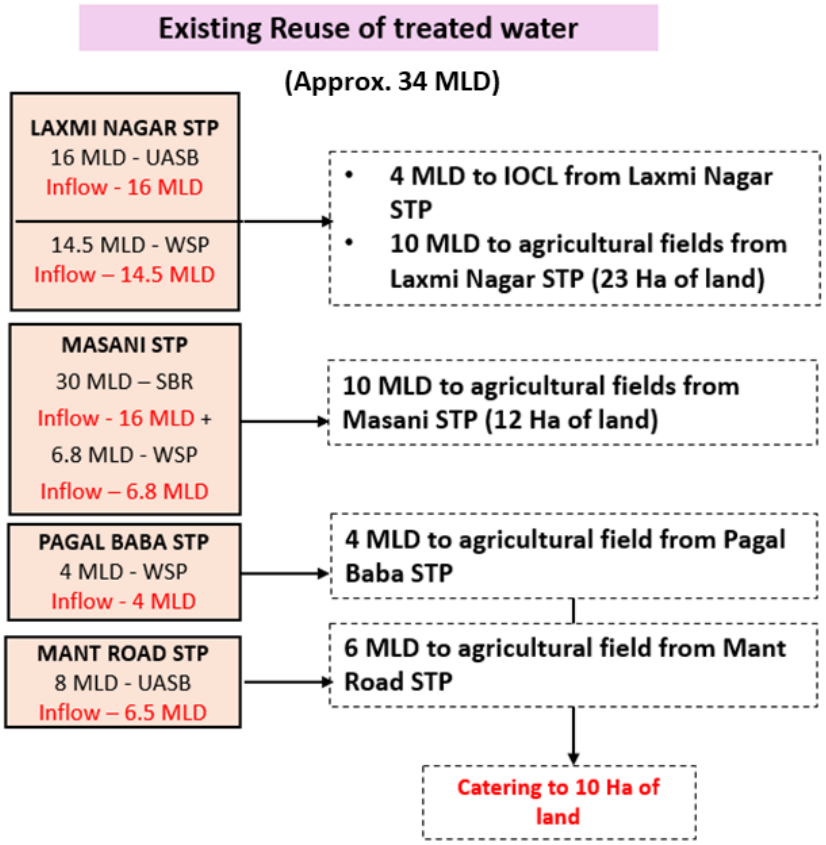


Figure 5-5: Targets in National Framework on safe reuse of treated water issued by NMCG, 2022

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5.4.2 Quantity and quality of treated used water in the city



The city has an available quantity of treated used water of approximately 78 MLD as shown in Table 5-9. The treated water quality of three STPs meets the CPCB standards enforced under the Water (Prevention and Control of Pollution) Act, 1974 and the Environment Protection Act, 1986. However, COD, BOD and TSS levels at the 14 MLD STP exceed the prescribed permissible limits. Detailed water quality results for the treated used water are provided in Table 5-9.

Table 5-9: Quality of Treated used Water

S. No	Parameter	Units	Permissible Limits as per CPCB Standards*	Outlet quality of STP					
				30 MLD	6.8 MLD (B)	14.5 MLD	16 MLD	4 MLD	8 MLD
1.	pH	-	<8.5	7.81	7.81	7.91	7.81	7.54	7.80
2.	Chemical oxygen demand	mg/l	<250	72	136	240	280	116	128
3.	Biological Oxygen demand	mg/L	<30	22	28	54	54	28	24.6
4.	Total Suspended solids	mg/L	10	23	45	68	78	38	42
5.	Faecal Coliform	< 1000, Maximum 10,000 per 100 ml	1000	220	140	350	140	84	-

**Note: Permissible limits as per CPCB Standards is for safe effluent discharge and non-potable reuse.*

Source: Jal Nigam, Mathura-Vrindavan

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The table evaluates treated effluent quality from six STPs of varying capacities against CPCB permissible standards. pH values across all six plants ranged between 7.54 and 7.91, remaining within the permissible limit of 8.5, making it the only parameter where universal compliance was achieved. Faecal Coliform levels were also largely within the prescribed limit of 1,000 MPN per 100 ml across most plants, with no data available for the 8 MLD plant.

However, non-compliance was recorded across the remaining parameters. COD exceeded the permissible limit of 250 mg/l at the 16 MLD plant (280 mg/l), while BOD surpassed the 30 mg/L threshold at the 14.5 MLD and 16 MLD plants, both recording 54 mg/L. Most critically, Total Suspended Solids exceeded the permissible limit of 10 mg/L at all six STPs, with values ranging from 23 mg/L to 78 mg/L, indicating a systemic failure in solids removal across all plants. Overall, the data points to significant treatment deficiencies, necessitating process upgradation and stricter operational monitoring to meet CPCB discharge standards.

5.4.3 Existing reuse of treated used water

Out of this volume, Laxmi Nagar STP—comprising a 16 MLD UASB technology plant and a 14.5 MLD WSP facility—supplies 4 MLD of treated effluent to IOCL and redirects 10 MLD to irrigate 23 hectares of agricultural land. Masani STP, which incorporates a 30 MLD SBR system with 16 MLD inflow alongside a 6.8 MLD WSP facility, contributes 10 MLD toward irrigating 12 hectares of agricultural fields. The remaining volume is supplied by Vrindavan facilities, where Pagal Baba STP (4 MLD WSP capacity) provides 4 MLD and Mant Road STP (8 MLD UASB capacity with 6.5 MLD inflow) contributes 6 MLD. Combined, the treated flows from Pagal Baba STP and Mant Road STP provide a collective 10 MLD to cater to an additional 10 hectares of agricultural land. In total, 30 MLD of the reused water serves agricultural irrigation across 45 hectares of land, while 4 MLD supports industrial reuse at IOCL.

5.4.4 Institutional Mechanism

Departments	Role and Responsibilities
Uttar Pradesh Jal Nigam	Authority in charge of project design, planning and implementation of sewerage projects and operations.
Nagar Nigam Mathura Vrindavan	Maintenance of stormwater drains and sewer lines

5.4.5 URM_{Index} Score

This indicator measures the amount of treated used water that the city is able to use for various uses.

Used water reuse factor =

$$\frac{\text{Used water reused annually}}{\text{Used water generated annually}} * 100$$

$$\frac{28105}{42705} * 100$$

$$= 65.81$$

The baseline used water reuse score for Mathura- Vrindavan is 4 since used water reuse factor is 65.81.

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5.4.6 SWOC analysis

Strengths	Weakness
• 77–78 MLD of treated outflow currently available. • City already practices multi-sectoral reuse, including industrial use (IOCL), agriculture, and Yamuna ecological flow.	• All STPs exceed the permissible limit for Total Suspended Solids (TSS) • Due to poor effluent quality, the city is unable to fulfil its contractual agreement to supply 20 MLD of treated water to IOCL, currently delivering only 4 MLD. • 26–27 MLD of sewage is discharged directly into the Yamuna without any treatment, severely degrading river water quality
Opportunities	**Challenges**
• Utilizing PPP (Public-Private Partnership) models and city-level reuse plans to attract investment for process upgrades • Implementing formal recharge projects using treated effluent could help stabilize the water table	• Lack of active recharge measures creates a long-term sustainability risk. • Salinity and high evapotranspiration rates make sustainable recharge and water management difficult

5.5 Good Quality Return Flow

In Mathura-Vrindavan, good quality return flow occurs through two primary pathways — surface flow and subsurface flow through groundwater recharge and discharge. Effective management of these pathways ensures that treated used water and natural infiltration contribute positively to the river's ecological health, maintaining both water quality and sustainable hydrological balance between the city and the Yamuna River.

5.5.1 Urban water balance

- **Water Supply** from Surface and Ground Water
- **Surface water:** As per consultation with the Jal Kal Department, 25 MLD water is extracted for urban use from Upper Ganga Canal from Bulandshahr.
- **Groundwater:** Groundwater is the major source of water supply for the city. 65 MLD is extracted to meet the requirements of the existing population, including the floating population as per the Jal Kal Department. The city has 430 operational tube wells covering all 70 wards under Nagar Nigam. Together with the surface water contribution, the combined supply of 90 MLD is distributed to the households.

5.5.2 Good Quality Return Flow

The city generates a total of 117 MLD of sewage, of which 79 MLD is treated by four STPs with a combined capacity of 79.3 MLD. The treated effluent outflow from these plants is about 77 MLD after accounting for a 1% reduction due to sludge, biosolids and evaporation losses. The remaining 38 MLD of sewage remains untreated and is discharged through drains directly into the Yamuna River.

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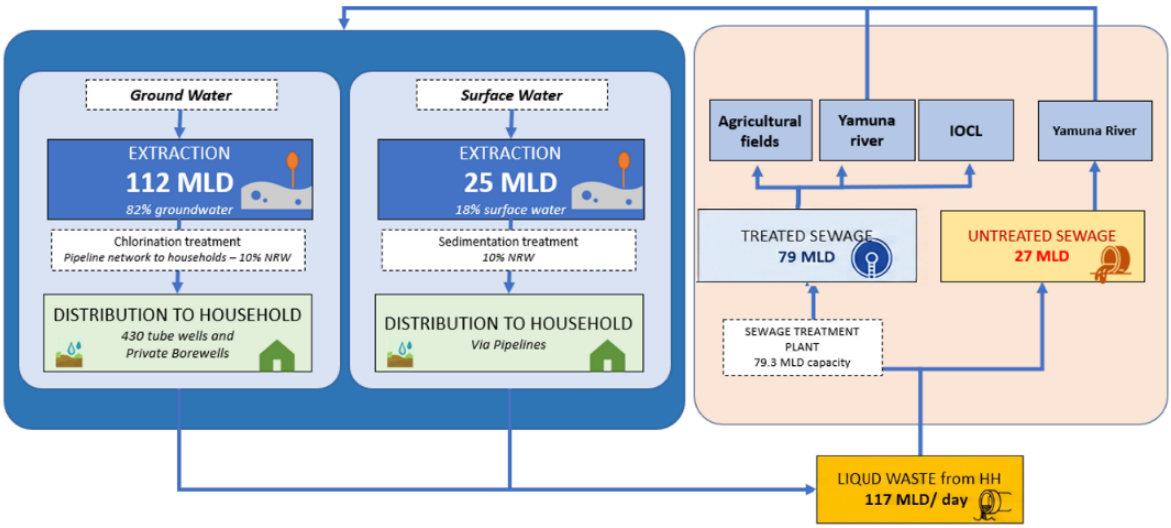


Figure 5-6: Flow diagram of urban water balance

5.5.3 On-going/Proposed/Approved projects

Currently, there are no formal groundwater recharge or related activities implemented.

5.5.4 Overall Assessment of Good Quality Return Flow

Mathura Vrindavan's water supply relies predominantly on groundwater (65 MLD), supplemented by 25 MLD from River Ganga. The city generates 117 MLD of sewage, but only 79 MLD is treated, leaving 38 MLD discharged untreated into the Yamuna. Key issues include over-dependence on groundwater, lack of recharge measures and untreated used water inflows to the river. The outcome highlights the urgent need for projects on artificial groundwater recharge, full treatment and reuse of sewage and diversification of surface water sources to secure sustainable urban water management and improve the quality of return flows to the Yamuna.

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SWOC ANALYSIS AND URM INDEXING OF THE CITY



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6 SWOC ANALYSIS AND URM INDEXING OF THE CITY

6.1 SWOC Analysis

Based on the baseline assessment of Mathura-Vrindavan city, various issues and gaps have been identified. The overall SWOC analysis is presented below:

Objectives	Focus Area	Strength	Weakness	Opportunities	Challenges
Ensure effective regulation of activities in floodplain	Floodplains	HFL boundary has been formally demarcated and notified by the Irrigation Department based on 50-year return period data; Master Plan 2031 includes 200 m river bank buffer	Weak enforcement of floodplain regulations and land-use; Lateral erosion and bank undercutting threaten urban edges, ghats and settlements	Floodplain zoning into prohibited, regulatory and warning zones, in line with NGT norms	Climate change-driven rainfall variability and potential increase in extreme floods
Keep the river free from pollution	Water Supply	city utilizes a mix of surface water (Ganga Canal) and groundwater (tube wells), providing a multi-source supply strategy; City falls within the Safe category	Local groundwater is highly saline/brackish; Municipal supply is insufficient, leading reliance on private water extraction; water table is dropping from 9 mbgl to 11 mbgl (2016-2023)	Implementing water conservation strategies for both the permanent population and the significant "floating" population; integrate smart metering	poor quality of the Yamuna River prevents it from being utilized; high evapotranspiration, makes sustainable groundwater management difficult
	Sewerage	sewer network is already in place, serving over 45,000 households; dedicated system exists for unsewered areas, utilizing a fleet of 28 de-sludging vehicle	117 MLD of sewage generated and only 79.3 MLD of installed treatment capacity; manhole pumping station at Vishram Ghat, lacks automation; Villages recently merged into the municipal limit lack sewer lines	current FSSM program successfully converts treated faecal sludge into manure for farmers; Converting open drains (which carry 78% of the city's sewage) into closed conduits	Extending the formal sewer network to 78% of households is a capital-intensive and time-consuming challenge
	Storm water Drains	30 out of 36 major drains fully tapped and Interception screen bars are installed	Masani drain, originally designed as an irrigation canal, has been co-opted to carry untreated sewage	Installing automated pumping systems at key locations like Vishram Ghat; Masani drain provides a high-priority	diverse nature of city settlements makes it difficult to maintain a uniform drainage network

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Objectives	Focus Area	Strength	Weakness	Opportunities	Challenges
				opportunity for rehabilitation	
	Solid waste	City achieves 100% door-to-door collection coverage; Active remediation of 2.62 lakh tonnes of legacy waste is underway	17% of households segregating waste at the source; no organized collection or processing system of cow dung; solid waste dump site is located only 1.3 km from the Yamuna River,	cow dung (400 tonnes) represents a massive untapped opportunity for bio-energy; Implementing specialized collection and processing streams for floral/religious waste at ghats	cultural practice of immersing idols and offering flowers, directly harms the Yamuna's ecology
Rejuvenate Waterbodies and Wetlands	Water bodies	City has kunds which historically served as natural detention basins and social/cultural hubs	ponds suffer from the discharge of untreated used water from nearby households and solid waste dumping	Restoring the historic kunds offers the dual benefit of improving urban aesthetics and creating recreational spaces; small-scale, decentralized treatment systems at the entry points	
Enhance the riparian buffer along river banks	Riparian buffer	Agra Canal features 69,881.50 meters of dense riparian vegetation along both banks, Western Bank of the Yamuna River retains a robust natural buffer with 3,794 meters of dense vegetation	Agricultural land dominates 69.9% of the Yamuna River banks (1,7476 m on the Western Bank and 16,861 m on the Eastern Bank)		
Adopt increased reuse of treated used water	Reuse of treated water	77–78 MLD of treated outflow currently available; City already practices multi-sectoral reuse	all STPs exceed the permissible limit for TSS; city is unable to fulfill its contractual agreement to supply 20 MLD of treated water to IOCL	Implementing formal recharge projects using treated effluent could help stabilize the water table	Lack of active recharge measures creates a long-term sustainability risk; Salinity and high evapotranspiration rates make sustainable recharge and water management difficult

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Objectives	Focus Area	Strength	Weakness	Opportunities	Challenges
Ensure maximum quality return flow from the city into the river	Return flow		29 MLD of sewage is discharged directly into the Yamuna without any treatment		
Develop eco-friendly riverfront projects	Eco-friendly riverfront	Rich cultural and religious heritage of ghats; Presence of supporting religious infrastructure, temples, Ashrams, Dharmshalas and semi-permanent stalls in proximity to major ghats	Boating services absent or underdeveloped at most ghats; Most ghats lack basic amenities: no public toilets, no changing rooms, inadequate lighting and absent safety railings; Lack of permeable surfaces as the ghats are constructed with hard sandstone and concrete	Kutcha and Semi-pucca ghats offer an opportunity for eco-sensitive and culturally informed development; linking cultural heritage with sustainability by developing guided eco-walking trails, interpretive signage green corridors etc.	Yamuna remains at CPCB Category D (very poor) unfit for bathing or drinking
Leverage on the economic potential of the river	Economic potential	Semi-permanent stalls and local markets at ghats support micro-enterprises; Water transport continues to serve local mobility and trade; Historic ghats serve as vibrant hubs for rituals, festivals	Economic activities on ghats remain largely informal and seasonal; Municipal revenue from ghat-based commerce is limited	Development of eco-tourism and cultural circuits; Create formal marketplaces and enterprise zones linked to river festivals and pilgrim circuits	
Inculcate river-sensitive behaviour among citizens in river management activities	River-sensitive behaviour	43 activities across 9 themes to inculcate river sensitive behavior; Active NGO support, particularly from organizations; Engagement of schools and colleges through drawing, rangoli, debate competitions etc.	Most IEC efforts remain centered on solid waste management and general sanitation, with limited focus on direct Yamuna River conservation; Campaigns are largely event-based and short-term; awareness efforts primarily target residents while the floating population largely	Launch dedicated river-centric IEC campaigns; Establishing student eco-clubs and Yamuna River clubs in schools and colleges; Framing Yamuna conservation as a religious and cultural duty	Unregulated religious practices such as idol immersion, floral offerings, ritual waste disposal; Seasonal reduction in Yamuna water levels- weakening public awareness

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Objectives	Focus Area	Strength	Weakness	Opportunities	Challenges
			remains unaddressed.		

6.2 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 URMindex 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}. Mathura-Vrindavan's URM_{index} score 2.56 reflects the elementary level of urban river management across the ten URMP objectives. This score shall improve upon implementation of the proposed interventions. The figure below shows the current status of the city against each objective of urban river management.

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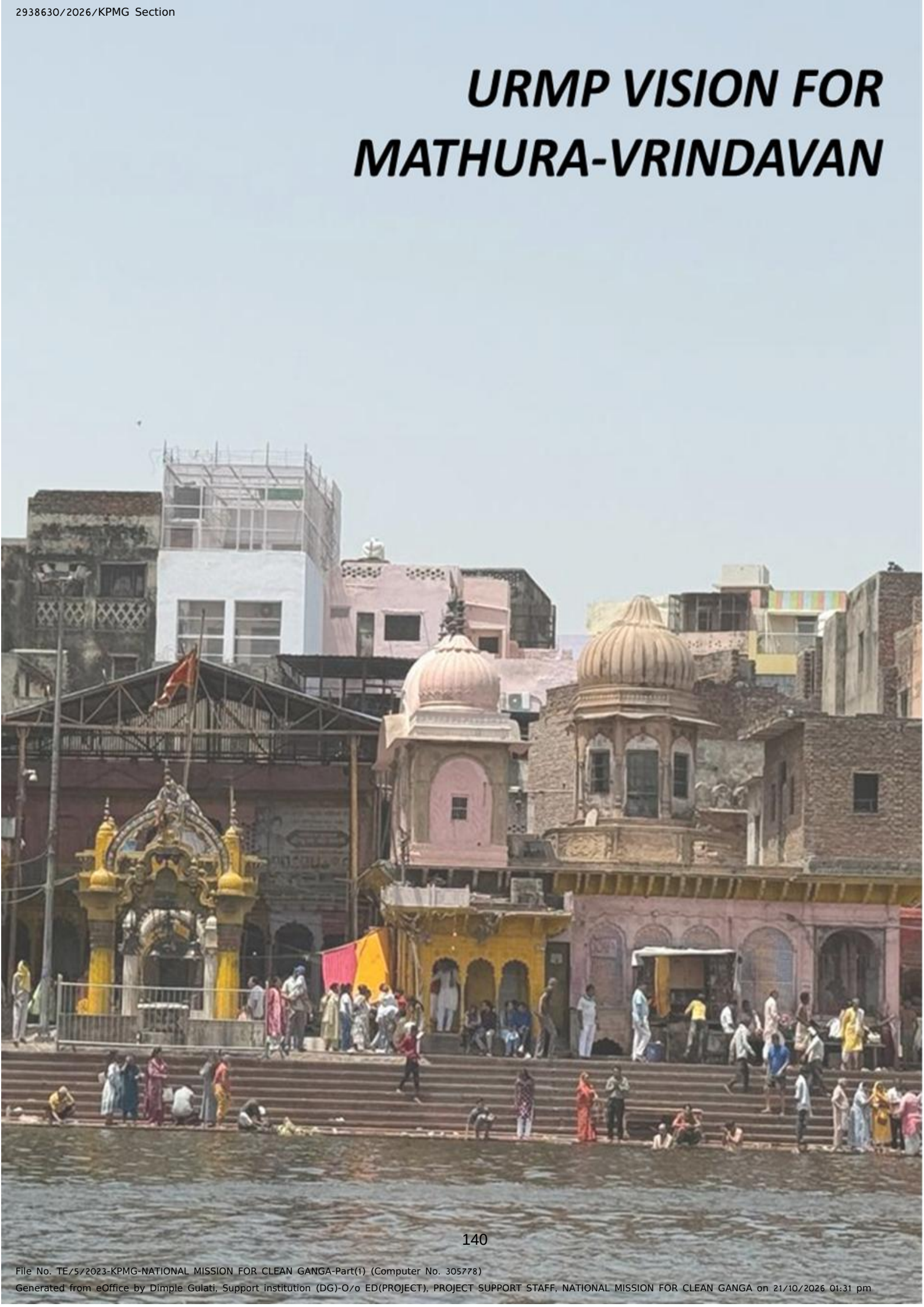
S. No.	URMP Objective	Current status	Priority in URMP	Remarks	URM Index Score
1	Regulation of activities in floodplain	★		HFL/50 year return period is notified by the irrigation Department. Lateral erosion and bank undercutting threaten urban edges, Ghats and settlements, causing land loss	1/5
2	Pollution free River	⚠		City falls within the Safe category and utilizes water from the Ganga canal and tube wells. River Yamuna water falls in the category D. City is generating 117 MLD sewage and treatment capacity is 79.3 MLD Only 17% of households segregated waste at the source Villages recently merged into the municipal limit lack sewer lines	1/5
3	Rejuvenate Water bodies and wetlands	⚠		Kunds in the city historically served as natural detention basins and social/cultural hubs, currently ponds suffers nitrated water discharge and solid waste from the near by households.	1/5
4	Enhance Riparian buffer	★		Western bank of Yamuna river has dense vegetation whereas eastern bank has weak dense vegetation	1/5
5	Increased use of treated wastewater	★		77–78 MLD of treated outflow is available and City practices multi-sectoral reuse (IOCL), agriculture, and Yamuna River) city is unable to fulfill its contractual agreement to supply treated water to IOCL	4/5
7	Eco friendly Riverfront projects	★		City practices multi- sectoral reuse (IOCL, agriculture and remaining is discharged into Yamuna river)	4/5
8	Leveraging on economic potential of the river	★		Water transport continues to serve local mobility and trade Water activities on Ghats are informal and commerce is limited	4/5
9	River Sensitive behaviour among citizens	★★		Active NGO support, particularly from organizations; active engagement of the schools and colleges through various competitions. Unregulated religious practices such as idol immersion, floral offerings, ritual waste disposal Awareness efforts primarily target residents	3/5
10	Engage citizens in River Management Activities	⚠			4/5

★ Acceptable ★★ Excellent ⚠ Needs Improvement Very High High Low

Table 6-1: Prioritization Matrix

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URMP VISION FOR MATHURA-VRINDAVAN



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7 URMP VISION FOR MATHURA- VRINDAVAN

Vision: A Sacred and Living Mathura–Vrindavan – Harmonizing the Holy Yamuna with the City's Spiritual Heritage through, Ecological Restoration, and River-Sensitive Urban Growth.

7.1 URMP Vision

The Urban River Management Plan (URMP) for Mathura-Vrindavan has been developed through extensive consultations with the Multi-Stakeholder Working Group (MSWG), convened under the leadership of the District Magistrate. The MSWG discussions provided a platform to align ecological priorities with social, cultural, and spiritual needs. This participatory process ensured that the vision reflects both technical assessments and community aspirations, positioning the Yamuna River as a living system central to the region's resilience, cultural heritage, and identity.

The URMP envisions Mathura-Vrindavan as a resilient, sacred river city where the Yamuna River is repositioned as a vital urban and ecological asset. To translate this overarching vision into actionable strategic goals, the vision is structured across key intervention pillars:

- **Capitalizing on Existing Blue-Green Infrastructure:** Protecting low-lying floodplains (*Khādars*), delineating flood zones through Blue Line demarcation, and integrating natural wetland features with urban land-use planning to buffer seasonal flood surges.
- **Restoring Sacred Waterbodies (*Kunds*) & Drainage Corridors:** Rejuvenating historic, interconnected *Kunds*, *Pokharas*, and traditional drainage corridors (*pauranik nallas*) to enhance localized flood retention, ground recharge, and urban heat mitigation.
- **Reducing the Impact of used water & Waste Infrastructure:** Preventing River degradation through complete interception and diversion (I&D) of municipal drains, upgrading sewage treatment capacity, managing floating debris, and enforcing zero raw-sewage discharge into the Yamuna.
- **Fostering a Circular Economy & Sustainable Livelihoods:** Promoting resource recovery initiatives, converting temple flower offerings (*nirmalya*) and organic bio-waste into compost or bio-products, and generating green local livelihoods tied to eco-tourism.
- **Rehabilitating Riverfronts & Enhancing Ecological Buffers:** Restoring degraded riverbanks and heritage *ghats* using bio-engineering stabilization techniques, establishing native riparian greenbelts, and protecting aquatic habitats.
- **Strengthening Community Stewardship & Pilgrim Engagement:** Promoting public-river connections through organized riverfront stewardship programs, environmental awareness drives, and sustainable management of high-footfall pilgrimage events (*mela* seasons).

To ensure these actions are location-specific, flood-safe, and culturally appropriate rather than applying a uniform design, the entire stretch of the Yamuna River within the Mathura-Vrindavan Municipal limits has been divided into three distinct spatial corridors:

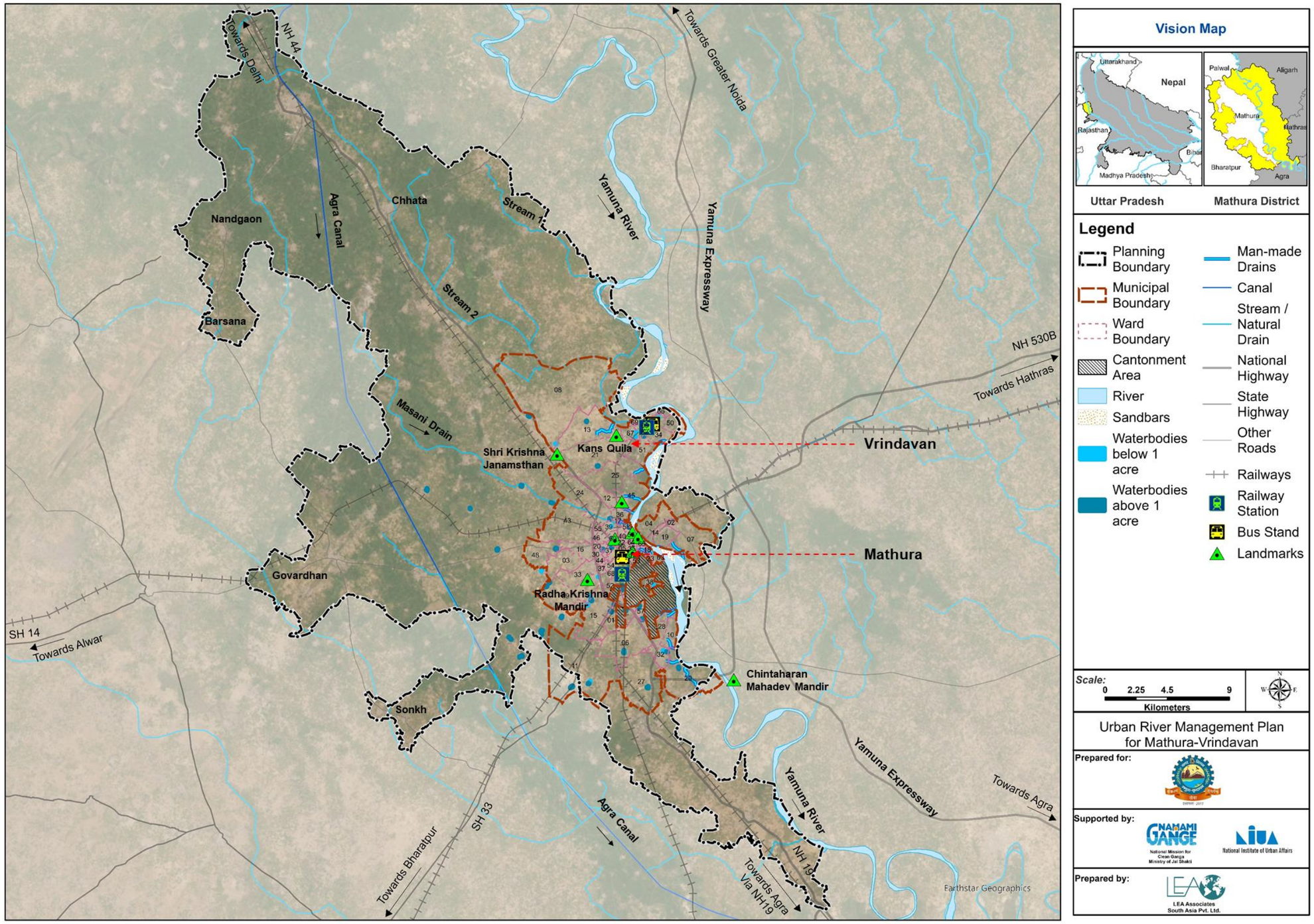
- **Stretch A: Upstream Yamuna / Vrindavan Heritage Corridor** – Focused on heritage *ghat* preservation, pilgrim movement management, bio-remediation of temple-adjacent drains, and low-impact eco-tourism.
- **Stretch B: Mid-Stream Yamuna / Mathura Core Urban Corridor** – Directed at intensive municipal drain interception, dense urban flood mitigation, riverfront stabilization, and public space rejuvenation.
- **Stretch C: Downstream Yamuna / Industrial & Floodplain Buffer Zone** – Prioritizing heavy floodplain protection (*Khādar* preservation), riparian buffer plantation, industrial effluent monitoring, and wetland conservation

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Table 7-1: Zoning & Vision Framework Strategies/Action Plan

Stretches	Location	Key Elements for vision	Theme	Key Strategies / Action Plan
Stretch A: Upstream Yamuna / Vrindavan Heritage Corridor	Northern Municipal Limit to Keshi Ghat / Vrindavan Bypass Bridge	Sacred ghat restoration & heritage conservation, Eco-friendly pilgrim movement networks	Pilgrimage, Eco-Heritage & Civic Recreation	• **Bio-Diversity Park & Heritage Restoration:** Transform small parks near northern bounds into formal Bio-Diversity Parks for ecology education and restore heritage ghats with structured live hedges and functional safety barriers. • **Drain Interception0p & Bio-Remediation:** Implement phytoremediation and bio-filtration beds along major drains to treat organic waste before river entry. • **Pilgrim Eco-Corridors:** Develop eco-friendly pedestrian walkways using permeable pavers to link major temple circuits to the riverfront, promoting natural groundwater infiltration.
Stretch B: Mid-Stream Yamuna / Mathura Core Urban Corridor	Vrindavan Bypass Bridge to Vishram Ghat / Mathura Rail-Road Bridges	Active cultural waterfront, pollution abatement, non-motorized pedestrian riverfront	Active Cultural Interface, Infrastructure & Sewage Management	• **Dewats & Sewage Management:** Deploy DEWATS units and comprehensive interception and diversion (I&D) systems at major urban drain outlets (such as Masani drain) to capture untreated municipal runoff. • **Dedicated Community Ghats & Amenity Upgrades:** Modernize central riverfronts like Vishram Ghat with dedicated ritual bathing areas, structured steps, and bio-waste collection kiosks for floral offerings to prevent debris accumulation. • **Pedestrian Infrastructure:** Construct permeable pedestrian walkways connecting key bridges and ghats to promote non-motorized movement and riverfront accessibility.
Stretch C: Downstream Yamuna / Industrial & Buffer Zone	Mathura Rail-Road Bridges to Southern Municipal Boundary	Demarcated river corridor, soil stabilization,	Ecological Restoration, Floodplain Safety & Resource Recovery	• **Blue Line Demarcation:** Officially delineate the "Blue Line" (1-in-25-year flood event horizon) to strictly prohibit permanent concrete construction within high-risk flood zones. • **Bio-Engineering Interventions:** Pocket plant soil-binding vegetation (such as Vetiver grass and Bamboo) and retrofit existing embankments with soft-greening solutions to mitigate bank erosion. • **Solid Waste & Resource Recovery:** Deploy floating trash barriers (booms) to capture floating plastics before the river exits municipal bounds, and integrate waste-to-energy/bio-CNG processing for dairy and market organic waste.

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Legend

- Planning Boundary
- Municipal Boundary
- Ward Boundary
- Cantonment Area
- River
- Sandbars
- Waterbodies below 1 acre
- Waterbodies above 1 acre
- Man-made Drains
- Canal
- Stream / Natural Drain
- National Highway
- State Highway
- Other Roads
- Railways
- Railway Station
- Bus Stand
- Landmarks

Scale: 0 2.25 4.5 9 Kilometers

Urban River Management Plan for Mathura-Vrindavan

Prepared for:

Supported by: Namami Gange, National Mission for Clean Ganga, Ministry of Jal Shakti; National Institute of Urban Affairs

Prepared by: LEA Associates South Asia Pvt. Ltd.

Source: 1) Admin Boundaries: Mathura-Vrindavan Masterplan 2031; 2) Municipal Boundary: Nagar Nigam Mathura Vrindavan; 3) Transport Network: OSM; 4) Waterbodies: Braj Teerath Vikas Parishad

Map 7-1: Riverfront Zoning of Yamuna River in Mathura- Vrindavan City

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URMP INTERVENTIONS



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8 URMP INTERVENTIONS

8.1 Objective 1: Ensure Effective Regulation of Activities in Floodplain

Objective 1 strengthens the Mathura-Vrindavan Master Plan 2031 by integrating flood-resilient land use, river-centric planning and groundwater sustainability. Key measures include delineation of flood lines, updated building bye-laws aligned with 2025 floodplain zoning guidelines, designation of riparian buffers and ecological corridors, preparation of a city-wide recharge map and comprehensive hydrological studies of Yamuna River in the city. Together, these interventions reduce disaster risks, safeguard communities and infrastructure, conserve water systems and ensure balanced, climate-resilient urban growth.

8.1.1 Recommendation 1: Inclusion of flood-lines in the Mathura-Vrindavan Master Plan, 2031

The demarcation of HFL, which is taken as a 50-year return period along the Yamuna River within the Mathura-Vrindavan planning area is already being included in the Masterplan 2031. These flood lines provide a foundation for identifying vulnerable zones and regulating development activities in the floodplain.

1. Floodplain Demarcation and Regulation

The Yamuna River flows through Mathura-Vrindavan, making floodplain management a crucial aspect of urban planning. The Master Plan must integrate flood-line demarcation to safeguard the city against recurring floods.

- **Technical guidelines**: Delineate the *1 in 5-year, 1 in 25-year* and *1 in 100-year flood lines flood return period* following Central Water Commission guidelines to identify frequently inundated areas.
- **Development control**: Enforce strict regulations on land use within flood zones to prevent encroachment and minimize disaster risks.

2. Riparian Buffer and Ecological Safeguards

Maintaining ecological balance along the Yamuna River and its tributaries is essential for long-term sustainability. The Master Plan should highlight riparian buffers to protect river health.

- **Riparian buffer zones**: Establish buffer zones along rivers and streams to reduce erosion, filter pollutants and preserve biodiversity.
- **Stream regulation**: Map all streams in the planning area and regulate development around them to prevent ecological degradation.

8.1.2 Recommendation 2: Suggestions and recommendations for the Subsequent Mathura-Vrindavan Master Plan

As mentioned in section 3 (ecological profile) and 4 (physical infrastructure) above, the following gaps have been identified with respect to inclusion of river-centric planning measures in the Master Plan 2031:

- Lacks floodplain governance and ecological management.
- Technical Guidelines on Flood Plain Zoning 2025 is not incorporated,

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- Irrigation Department is yet to demarcate the mandatory 5-year, 25-year, and 100-year flood return periods.
- These missing regulatory and operational layers heighten urban flood risk, expose the Yamuna's ecosystem to uncontrolled pollution, and highlight the urgent need for a multi-tiered, climate-resilient planning model.

To address these regulatory, hydrological and ecological shortfalls, a comprehensive restructuring of the floodplain and water resource strategy within the Mathura-Vrindavan Master Plan, 2031 is required. The key recommendations across floodplain zoning, riparian buffer protocols, wetland protection, monitoring mechanisms, and rainwater recharge policies are given in Table 8-1.

Table 8-1: Proposed River-centric development inclusions in the Mathura- Vrindavan Master Plan 2031

Sl. no.	Aspects	Section Name & Reference in Master Plan	Current Vision	Recommendation	Rationale/Justification
1	Floodplain Zoning & River Buffers	Chapter 12: Section 12.3 (blue green Infrastructure) & Section 10.2.15 (River-centric planning)	• Yamuna river: Proposes a 200-meter green buffer where new construction is prohibited, and building height is restricted to 11m. • Canals/ drains/ ponds: Proposes a 7.5 -meter green buffer.	• 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). • Physical demarcation of the notified flood lines with pillars at suitable intervals along the river by the Irrigation Department. • Incorporate GIS-based flood hazard mapping. • Define regulatory zones (prohibited, restricted, regulated use) within floodplains. • Explicitly map ecological corridor connecting forests and river systems, integrating them into the zoning framework • Removal of illegal encroachments and constructions within the floodplain, with rehabilitation of informal settlements located within the HFL (refer Pictures 3-20 and 3-21), through the District Level Committee headed by the District Magistrate. • Prohibition of illegal river-bed mining and diversion of the river stream within	Provides scientific delineation of flood-prone areas along Rivers and streams.

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Sl. no.	Aspects	Section Name & Reference in Master Plan	Current Vision	Recommendation	Rationale/Justification
				the city stretch, enforced by the District Administration, Mining Department and Irrigation Department.	
2	Riparian Buffer along river/streams	Chapter 10: Section 10.3.6 (blue green Infrastructure)	Proposes a 200-meter green buffer where new construction is prohibited, and 7.5 m buffer along canals/ drains/ ponds	• No multi-zone riparian buffer or bio-engineering guidance • 30 meters of riparian buffer should be mandate along the River Yamuna. • Integrate Regional basin/watershed level Ecologically Sensitive Zones (ESZ) into the Master Plan	Introduce multi-zone riparian buffers and treat feeder drains as extensions of floodplains
3	Protection of Wetlands & Waterbodies	Ch. 10 – Section 10.2.15 River-Centric Urban Planning	Ponds /Reservoirs: Proposes a 7.5-meter green strip for water bodies larger than 1 acre in urban areas and 15 m outside the urban area	• Waterbodies and wetlands shall be considered as eco-sensitive zone • Development of baseline data and catchment integration study	Conduct baseline inventory, hydrological & ecological assessment of wetlands and waterbodies; integrate findings into zoning
4	Monitoring & Adaptive Flood Management	-	No floodplain-specific monitoring framework	• Establish GIS-based floodplain monitoring, 5-year review of flood lines and zoning • Mandate Zero Liquid Discharge (ZLD) for industries and reuse treated used water	Adaptive, climate-resilient river management
5	Rainwater Harvesting	Chapter 5: Section 5.2.3 (Rainwater Harvesting Policy)	Rainwater harvesting is mandatory on plots of 300 sq. m. and above and in all local body/government buildings as per prescribed standards.	• Mandate that at least 30% of each plot in large developments remains open and permeable (unpaved).	Current RWH policies focus on structural pits but miss the ecological need to keep large tracts of soil unpaved for natural percolation, which is more effective for preventing urban runoff and recharging aquifers.

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8.2 Objective 2: Keep the river free from pollution

Objective 2 interventions focus on preventing liquid and solid waste pollution in the Yamuna River, its tributaries and associated nallahs. In Mathura-Vrindavan, untreated sewage discharged through minor nallahs is the primary source of liquid waste pollution, while the indiscriminate dumping of municipal solid waste into streams, nallah and along canal banks is a major source of solid waste pollution. These practices degrade water quality and riverine ecology, necessitating interventions such as interception and treatment of sewage from nallah along with improved solid waste management practices.

8.2.1 Intervention 1: Constructing a Riser type trash on 5 Nallahs in the city

As highlighted in Section 5.2, the 5 nallahs (i.e., Masani nallah, Ambhakhar nallah, Sunrakh nallah, Chaitanya Vihar nallah and Kala Pathar nallah) primarily carry used water but also receive high volumes of solid waste. This persistent waste accumulation restricts natural hydrological flow and creates severe public health concerns and unhygienic conditions in adjacent urban areas. The manual removal of accumulated waste is labour-intensive and exposes workers to significant health risks. Although municipal authorities conduct periodic dredging and clean-up operations, which are temporary in nature. During intense rainfall events, the accumulated solid waste is washed downstream, resulting in the direct discharge of untreated debris into the Yamuna River.



Ambhakhar Drain



Chaitanya Vihar Nallah (Sunrakh) - 2



Chaitanya Vihar Nallah (Sunrakh) -1

Picture 8-1: Solid waste accumulated at Various Nallahs in the city

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Proposed Intervention

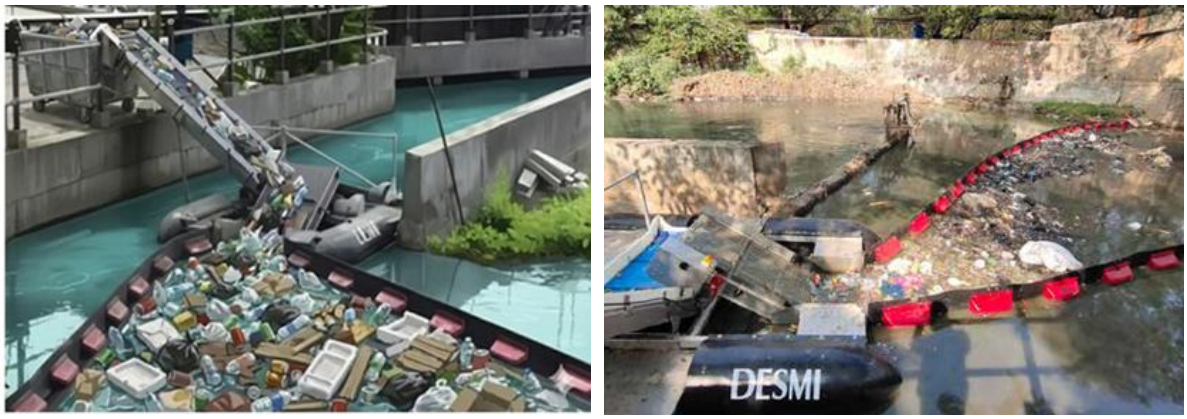
To address these challenges, Riser-type Trash Trap systems are proposed to be installed at all the 5 Nallahs mentioned above. Each system integrates a Floating Boom Barrier, Mechanical Screen and Belt Conveyor to intercept, trap and transport solid waste out of the nallahs.

A floating boom barrier installed directly across the nallah intercepts floating debris, which a mechanical screen guides to a conveyor belt transferring it to a raised platform for collection. For Masani, Ambhkhar and Kala Pathar floating boom barrier positioned before the I&D structure captures waste early, directing it to a mechanical screen and conveyor belt that lifts it to beside area for collection.

In all the 5 nallahs, waste collected on the platforms is loaded into trolleys and transported to designated Solid Waste Processing Units or disposal facilities. This setup prevents accumulation and choking, reduces manual removal or intervention and ensures continuous mechanized transfer with smooth used water flow. This mechanized approach ensures continuous removal of debris, reduces manual handling and improves sanitation. The specifications of the components are mentioned in table.

Table 8-2: Proposed Components in the nallah and the details

Component	Details
Floating Boom Barrier	• Positioned across the nallah to intercept floating waste. • Built with HDPE floats, anchored to withstand flow velocity. • Guides waste toward the mechanical screen.
Mechanical Screen	• Installed downstream of the boom barrier to capture solid waste. • Vertical stainless steel bars trap solid waste while allowing water to pass. • Inclined design reduces clogging and ensures efficient capture
Belt Conveyor System	• Positioned behind the screen. • Motorized conveyor lifts trapped waste and transfers it to collection trolleys. • Designed for 2–3 tons/day capacity, matching observed waste inflow.



Picture 8-2: Conceptual arrangement of Riser-type Trash Trap systems (floating boom barrier, mechanical screen and belt conveyor)

CASE STUDY 1: HUSSAIN SAGAR LAKE, HYDERABAD

The floating trash barrier system at the mouth of Picket Nallah is designed to intercept plastics, thermocol and other debris before they enter Hussain Sagar Lake. The barrier guides waste into collection cages, which are periodically lifted and transferred to GHMC facilities for proper disposal. To ensure compliance, CCTV monitoring and challan enforcement are integrated into the system. Technically, the intervention uses HDPE floating booms with anchoring, supported by crane-based debris removal cages in a modular, easy-maintenance design that adheres to CPCB standards for urban waterbodies. This setup significantly reduces floating waste inflow, enhances the lake's aesthetics and water quality and lowers the desilting load and cleaning requirements, thereby contributing to sustainable urban water management.

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Picture 8-3: Floating barrier before entering to Hussain Sagar Lake

Source: Floating Barriers: River Boom and Bio-barriers

Block Cost Estimate:

Sl. No	Components	Unit	Dimension / Quantity	Unit Rate (₹ Rupees)	Block Cost (₹ lakhs)	Reference
1	Floating Trash Barrier (HDPE boom with anchoring) & Collection Cage (Mechanical Screen cage with crane hooks)	No.	5	95,00,000	475.00	Market Price (DESMI EnviRo-Care)
Total					**475.00**	

Implementation Framework

Responsible agency:
NNMV,
Support: Jal nigam Dept

Estimated budget:
₹ 475 Lakh

Timeline:
Short term
0.75 - 1 years

Funding sources:
Namami Gange

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8.2.2 Intervention 2: Implementation of Integrated Dung Waste Management for Bio-CNG Recovery in Mathura-Vrindavan

As highlighted in Section 5.3.5, dung waste in Mathura-Vrindavan is one of the sources for pollution affecting urban sanitation and drainage systems. With approximately 10,000 bovines (cows and buffaloes), unmanaged disposal of dung contributes significantly to solid waste loads. At present, dung is largely washed into nallahs, reducing sewage treatment efficiency and creating environmental hazards. This unmanaged system leaves considerable potential for resource recovery untapped.

Proposed Intervention:

To establish a municipal-scale waste-to-energy initiative that converts cattle dung into Bio-CNG, integrated with existing infrastructure and new facility development. By combining anaerobic digestion, gas upgrading and compression technologies, the project will reduce methane emissions, generate clean fuel and improve sanitation. The initiative will be designed under a DBFO (Design–Build–Finance–Operate) concession model with government and private sector collaboration.

1. **Dung generation:** Based on the stakeholder's consultation, Mathura-Vrindavan has approx. 10,000 bovines (cows and buffaloes), as per CPCB (Guidelines for Environmental Management of Dairy Farms and Gaushalas) each animal produces approximately 15 kg dung/day and the total dung generated approximately 150 tons per day. Currently, none is collected and treated.
2. **Collection System:** Dung collection will follow a door-to-door strategy across all wards.
    - Core wards will use handcarts, e-rickshaws and bins for narrow, dense areas.
    - Peri-urban wards will use mini-tractors and motorized trolleys for mixed-density zones.
    - Outer wards will use bulk tractors with hydraulic trailers for large cattle cluster
    - Covered community bins of 500–1000 liters will be placed at junctions and farms, emptied twice daily. Partnerships with gaushalas and cattle owners will provide on-site tanks, compost return and farmer incentives. GPS tracking, mobile app logging and ward-level dashboards will ensure accountability and efficiency.

CASE STUDY 2: INDORE BIO-CNG PLANT

Indore, Madhya Pradesh, set up Asia's largest Bio-CNG plant under the GOBARdhan initiative to manage animal waste and organic residues. The goal was to reduce pollution, recover resources and support circular economy objectives.

Collection: Dung and organic waste are collected from dairies, gaushalas, households and markets using segregated bins and vehicles. Partnerships with cattle owners ensure steady supply.

Transfer & Treatment: Waste is aggregated at transfer stations, processed into slurry and treated in anaerobic digesters (CSTR technology). Biogas is upgraded through PSA technology, compressed at 200–250 bar and bottled as Bio-CNG. The leftover digestate is converted into compost.

Resource Recovery:

- Bio-CNG: Approx. 17,000 kg/day, used in city buses and industries.
- Compost: Approx. 100 tones/day, supplied to farmers.
- Revenue: Approx. 30–40 crore annually through fuel, compost and carbon credits.

Outcomes:

- Prevents untreated dung from entering drains and rivers.
- Reduces methane emissions and supports renewable energy targets.
- Generates jobs and promotes sustainable agriculture.

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3. **Transfer station:** The collected dung will be aggregated at transfer stations before treatment. The area requirement is estimated at 30 square meters per ton per day, which means that for 150 TPD, approximately 4,500 square meters will be required.

This can be achieved through the three recommended station types mentioned below:

- Small (3–5 TPD): 400–600 sqm
- Medium (10–20 TPD): 1000–2000 sqm
- Large (>50 TPD): 1–2 hectares

CASE STUDY 3: PUNE'S INTEGRATED BIOGAS FACILITY USED DECENTRALIZED TRANSFER STATIONS

- Pune Municipal Corporation (PMC) generates over 2,100 tonnes of municipal solid waste (MSW) daily, of which nearly 45–50% comprises organic wet waste. Historically, transporting unsegregated or bulk organic waste over long distances to centralized landfill sites in outer peri-urban zones resulted in severe logistics bottlenecks. The long-haul transit increased municipal fuel consumption, elevated fleet maintenance costs, exacerbated urban traffic congestion, and triggered frequent local resistance at peripheral dump sites.
- To overcome these logistical inefficiencies, PMC—in partnership with informal sector waste pickers (SWaCH) and private operators—transitioned toward a decentralized solid waste management (SWM) framework. The primary goal was to process organic waste close to its point of generation using localized bio-methanation infrastructure coupled with streamlined waste transfer nodes. (CSE Report, 2025)

4. **Treatment Facility:** Establish a new 150 TPD Bio-CNG plant at a designated site (to be identified by Nagar Nigam Mathura–Vrindavan). As per the consultant's observation, the suggested site is the Laxmi Nagar STP complex, adjacent to the Solid waste processing site, where the land of the existing 14.5 MLD WSP unit will be cleared after the commissioning of the new STP.

    - **Technology:** Anaerobic digestion (CSTR), gas upgradation via PSA, compression and bottling at 200–250 bar (PESO norms).
    - **Land requirement:** 7-8 acres.

CASE STUDY 4: GHAZIABAD'S DECENTRALIZED DUNG-BASED BIOGAS

Ghaziabad's face significant challenges from the unmanaged disposal of cattle dung originating from local dairies and livestock clusters. This high-moisture organic mass was dumped into open drains and natural nallahs or mixed into municipal solid waste streams destined for city landfills. This practice caused severe drainage blockages, exacerbated urban flooding risks, released substantial fugitive methane emissions, and placed an unsustainable logistics burden on municipal transport systems.

Implementation & System Design:

- To intercept this waste stream at the source, Ghaziabad integrated a network of decentralized, dung-based bio-methanation units positioned directly near major cattle clusters and gaushalas. The operational workflow consists of:

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- Localized Sourcing: Direct collection of fresh cattle manure from nearby dairy farms, diverting hundreds of metric tons of organic waste daily.
- Anaerobic Digestion: Compact bio-digesters break down the organic feedstock in oxygen-free environments to optimize methane yields.
- Energy & Byproduct Processing: Raw biogas is captured and purified into clean fuel to replace conventional LPG and CNG for thermal and energy applications, while the liquid digestate is processed into organic bio-fertilizer.

Outcomes

- The implementation achieved key operational and environmental milestones:
- Landfill & Infrastructure Relief: Significantly reduced bulk organic volume routed to municipal landfills and eliminated waste-induced clogging in urban drainage networks.
- Clean Energy Generation: Provided a decentralized, self-sustaining source of green fuel for local use, offsetting fossil fuel consumption.
- Methane Mitigation & Circular Economy: Captured high-potency greenhouse gas emissions at the source while producing nutrient-rich bio-fertilizer to enrich regional soils.

(Source: IJIRT Case Study, 2025)

5. Resource Recovery & Revenue:

- Projected Recovery: Bio-CNG: 5,000-8,000 kg/day, annual revenue approx. 25–40 crore (at 50-55 per kg under SATAT scheme; higher if sold at 100 per kg locally).
- Compost: approx. 80-100 TPD digestate, 3-4 crore annually.
- Carbon Credits: Approx. 15-20 lakh annually.

CASE STUDY 5: NAGPUR'S INTEGRATED WASTE-TO-ENERGY MODEL

Nagpur faced dual municipal challenges: managing over 1,100 metric tons of daily municipal solid waste (MSW) and handling massive volumes of unorganized cattle dung from urban dairies (gawlis) and peri-urban livestock clusters. Traditionally, unmanaged cattle dung was discharged directly into open drains and natural waterbodies—severely choking hydraulic infrastructure, polluting local water systems while organic MSW dominated municipal landfill space, generating methane emissions and landfill leachate.

Implementation & Operational Framework

- To resolve these twin waste liabilities, the city implemented an integrated Waste-to-Energy (WtE) model that co-processes cattle dung alongside organic municipal waste streams within a unified circular recovery framework:
- Co-Digestion Strategy: The facility combines high-moisture, microbe-rich cattle dung with segregated organic MSW (food waste and agricultural residues). Co-digestion balances the carbon-to-nitrogen (C:N) ratio, significantly accelerating microbial digestion rates and enhancing overall methane yield compared to single-feedstock processing.
- Bio-CNG & Compressed Bio-Gas (CBG) Upgradation: The generated biogas is scrubbed, purified, and compressed into automotive-grade Bio-CNG (CBG), which is injected into commercial supply chains or used to fuel municipal vehicle fleets and public transit buses.
- Organic Fertilizer Recovery: The remaining liquid digestate undergoes solid-liquid separation and drying to produce high-grade organic manure and liquid bio-fertilizer, replacing chemical inputs in nearby agricultural belts.

Outcomes

- Under the GOBARdhan and Sujal Swachh Bharat initiatives, this integrated model achieved substantial operational and financial success:
- Strong Revenue Potential & Circular Economy: Transformed waste streams into profitable revenue channels through the commercial sale of Bio-CNG to fuel stations/industries and organic fertilizer to farmers, creating a financially viable, self-sustaining municipal model.
- Landfill Diversion & Infrastructure Protection: Diverted significant organic tonnages away from city landfills and prevented cattle dung from clogging municipal drainage networks and rivers.

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- Environmental & Climate Resilience: Drastically reduced greenhouse gas (GHG) emissions through methane capture and provided a scalable blueprint for circular urban waste management across Tier-1 and Tier-2 Indian cities

(Ministry of Jal Shakti, 2024)

6. Project framework:

- Model: DBFO concession with government support through schemes/programmers.
- Private Partner Role: Build, operate and maintain the plant, manage logistics and earn revenue from Bio-CNG and compost sales.
- Government Role: Provide land, policy support and integration with national waste-to-wealth initiatives.

Block Cost Estimate:

Sl. No	Components	Unit	Dimension / Quantity	Unit Rate (₹ Rupees)	Block Cost (₹ lakhs)	Reference
Feedstock Collection System						
1	Bins for Dung Collection (1000 litres)	No.	250	1,000	2.50	GeM Portal
2	E-rickshaw/e-cart dung collection vehicles	No.	100	1,50,000	150.00	UP Jal Nigam SBM-Urban tenders (2025–26)
3	Mini Electric tractors with trailers	No.	20	8,50,000	170.00	GeM Portal
4	GPS tracking in vehicles	No.	120	1,000	1.20	market price is 8000 to 10000 INR per vehicle
Total A					**323.70**	
Transfer Stations – decentralized aggregation (small, medium, large)						
1	Small aggregation centres, 3–5 TPD	sq.mt.	6000	3,500	210.00	UP PWD SOR 2025-26 (civil works)
2	Medium aggregation centres, 6–10 TPD					
Total B					**210.00**	
150 TPD Bio-CNG plant						
1	Compressed Biogas (CBG) facility - Anaerobic Digestion Plant	TPD	150	32,40,000	4,860.00	Advisory on CBG Plants Based on Municipal Solid Waste
2	Gas Upgradation & Compression	TPD	150	8,00,000	1,200.00	
Total C					**6,060.00**	
Total (A+B+C)					**6,593.70**	
O&M for 5 years @ 10%					**659.37**	
Grand Total					**7,253.07**	

**Above costing is prepared using CPWD/PWD Schedule of Rates for civil works, CPCB dung waste management guidelines and benchmarked case studies of Bio-CNG projects. Quantities (units, sqm, TPD) are derived from dung generation norms and facility sizing standards.*

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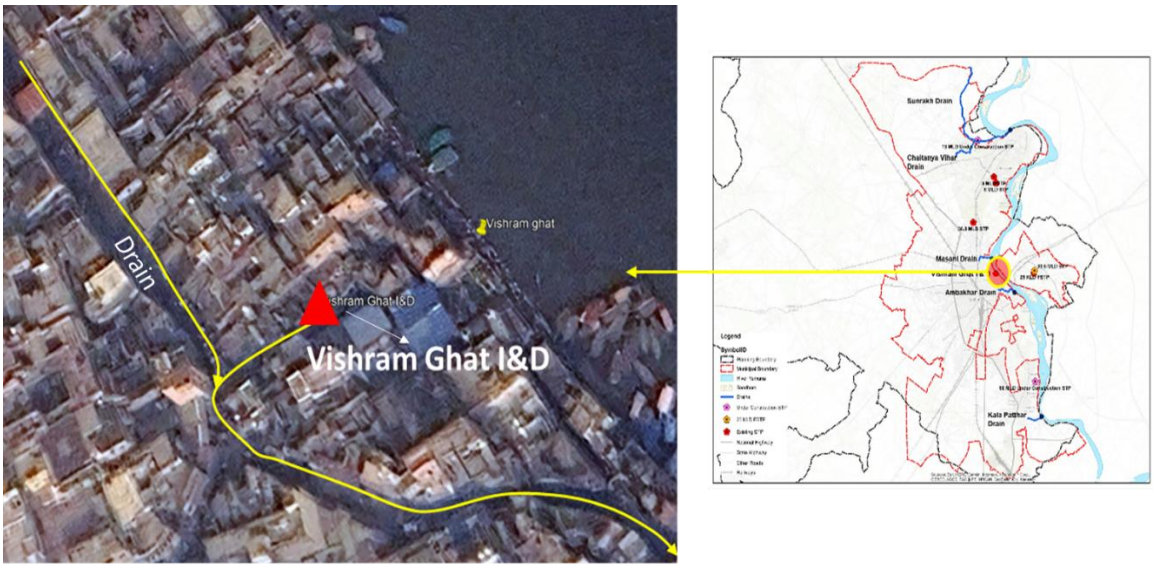
Implementation framwork

Responsible agency: NNMV	**Estimated budget:** ₹ 7253 Lakh
Timeline: Short term 0.75 - 1 years	**Funding sources:** Municipal Budget, SATAT Scheme and MNRE Waste-to-Energy Programme

8.2.3 Intervention 3: Installation of an automated pump at Vishram Ghat I&D

As outlined in Section 5.2.2, untreated sewage overflows into the Yamuna River through the manhole whenever the pump remains switched off. Despite the presence of a sewer line, the untreated used water bypasses the system and directly enters the river, thereby degrading its ecological health and water quality.

The pump is installed inside the chamber and is designed to redirect water back to the access road. However, the pump currently operates manually and is often managed by nearby shopkeepers. This lack of automation results in frequent overflow incidents, posing risks to both river health and public sanitation.



Picture 8-4: Vishram ghat I &D

Proposed Intervention

To address the overflow issue at Vishram Ghat, installing an automatic submersible pump is a practical intervention.

Technical Components

Automatic Submersible Pump

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- Capacity: 2–3 HP depending on sewage load.
- Material: Stainless steel or cast iron for durability.
- Discharge range: 300-400 LPM (liters per minute).

Automatic Pump Starter

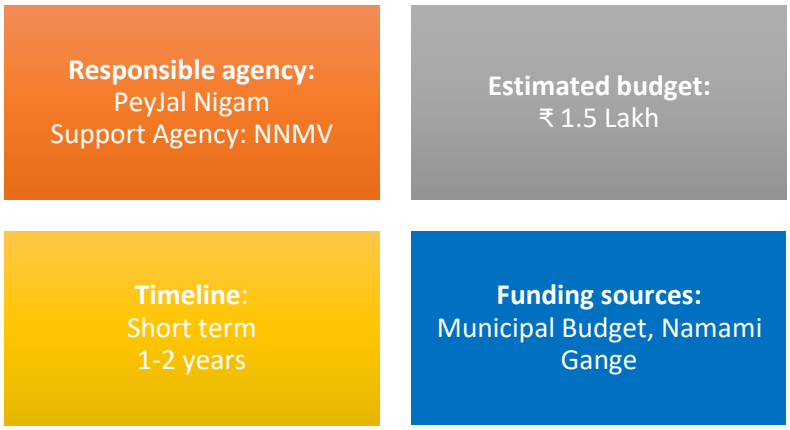
- Built-in water level controller (auto ON/OFF).
- Digital LED display for voltage/current monitoring.
- Over/under voltage protection.
- Auto & manual modes for flexibility.

Block Cost Estimate:

Sl. No	Components	Unit	Dimension / Quantity	Unit Rate (₹ Rupees)	Block Cost (₹ lakhs)	Reference
1	Automatic submersible sewage pump (3HP, non-clog, SS/CI, approx. 300-400 LPM, suitable head)	Lumpsum	1	70,000	0.70	Market rate
2	Automatic starter/control panel (Auto/manual mode, level controller, overload, phase/voltage protection, digital display)	Lumpsum	1	15,000	0.15	
3	Level sensors/float switches (High-level and low-level automatic operation)	Lumpsum	1	8,000	0.08	
4	Rising/discharge pipe (Approx. 65–80 mm dia. GI/HDPE pipe with fittings)	Lumpsum	1	15,000	0.15	
5	Electrical cabling (Submersible cable, approx. 20–30 m including termination)	Lumpsum	1	12,000	0.12	
6	Installation, testing & commissioning	Lumpsum	1	20,000	0.20	
Total					**1.40**	
Contingency @ 10 %					0.14	
Grand Total					**1.54**	

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Implementation Framework:



8.2.4 Intervention 4: Integrated Co-Treatment Strategy for City-Wide Faecal Sludge Management

As outlined in Section 5.2.2, in Mathura-Vrindavan, 78% of households rely on on-site sanitation (OSS) systems. Used water is conveyed through the drainage network, while faecal sludge generation across the city is estimated at approximately 188.08 KLD. Despite a fleet of 28 de-sludging vehicles, only 4-5 operate regularly, discharging into the existing 50 KLD co-treatment facility at the 14.5 MLD Laxmi Nagar STP. 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

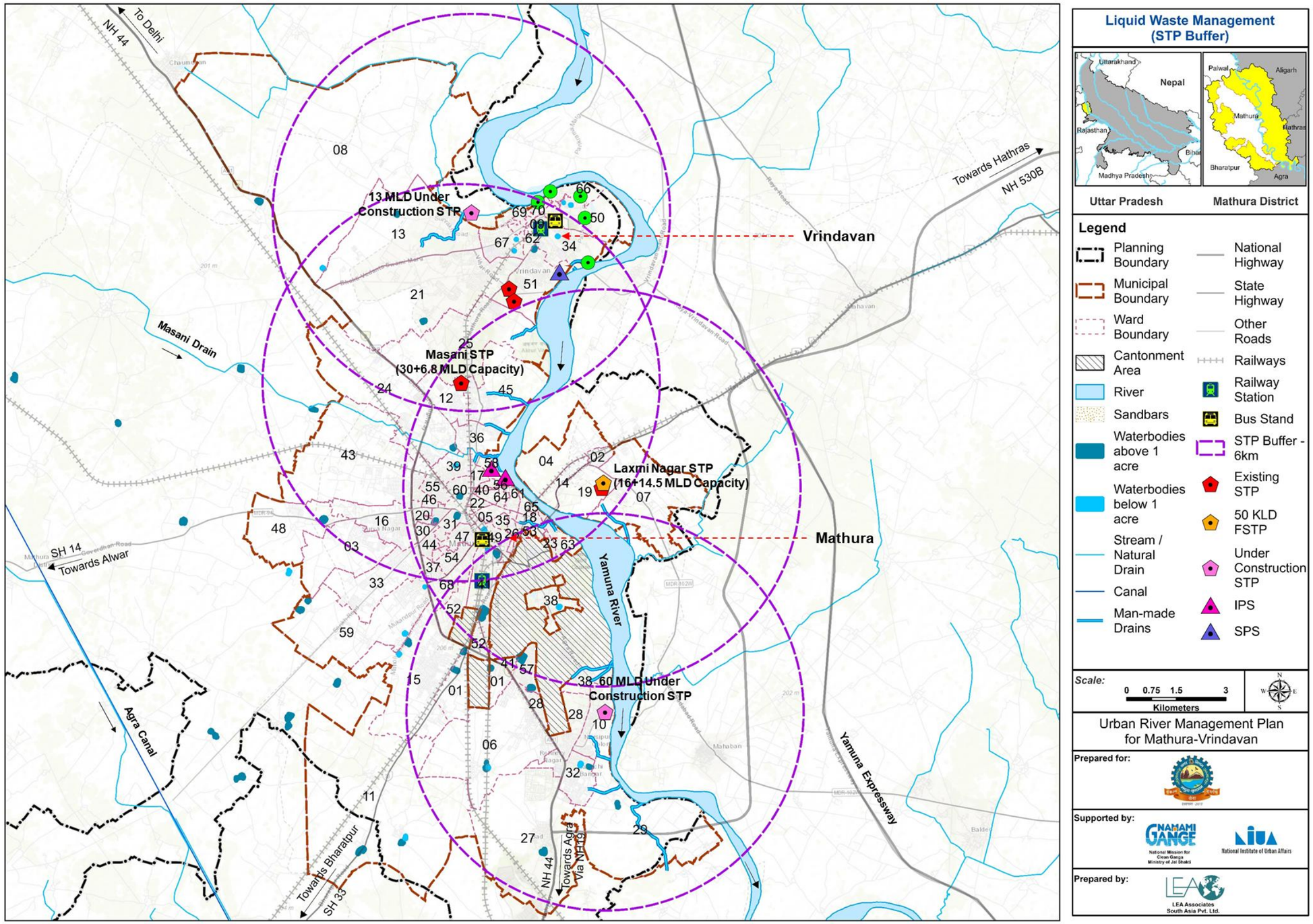
To address these challenges, a comprehensive co-treatment strategy is proposed. This approach integrates existing and proposed sewage treatment infrastructure to expand capacity and ensure city-wide coverage. Two 50 KLD and one 70 KLD co-treatment plants will be established:

- 50 KLD co-treatment plant at 13 MLD under construction STP near Saubhri Kund, Vrindavan;
- 50 KLD co-treatment plant at 36.8 MLD Masani STP, Mathura
- 70 KLD co-treatment plant at under construction at 60 MLD STP near Gokul Barrage

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

The strategic distribution of sewage and faecal sludge treatment facilities along the Yamuna River corridor establishes an integrated, city-wide operational framework (Refer Map 8-1). The 6 km delineation around all existing, under-construction, and proposed STP and FSTP along the river axis to optimize accessibility and transport efficiency. Under this allocation, the Northern Zone (Vrindavan) is anchored by the 13 MLD under-construction STP near Saubhri Kund, while the high-density Central Zone (Mathura Core) is serviced by the 36.8 MLD Masani STP, 16 MLD STP, and 4 MLD STP facilities. The Eastern Trans-Yamuna Zone is covered by the 14.5 MLD Laxmi Nagar STP, 30 MLD STP, and 25 KLD FSTP, whereas the Southern Zone is secured by the 60 MLD under-construction STP near Gokul Barrage. The proposed network significantly reduces vehicle haulage distances, eliminates illegal dumping into open drains, and establishes full spatial equity in faecal sludge management across the entire Mathura-Vrindavan urban agglomeration.

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Liquid Waste Management (STP Buffer)

Uttar Pradesh | Mathura District

Legend

- Planning Boundary
- Municipal Boundary
- Ward Boundary
- Cantonment Area
- River
- Sandbars
- Waterbodies above 1 acre
- Waterbodies below 1 acre
- Stream / Natural Drain
- Canal
- Man-made Drains
- National Highway
- State Highway
- Other Roads
- Railways
- Railway Station
- Bus Stand
- STP Buffer - 6km
- Existing STP
- 50 KLD FSTP
- Under Construction STP
- IPS
- SPS

Scale: 0 0.75 1.5 3 Kilometers

Urban River Management Plan for Mathura-Vrindavan

Prepared for:

Supported by: Namami Gange (National Mission for Clean Ganga, Ministry of Jal Shakti); National Institute of Urban Affairs

Prepared by: LEA Associates South Asia Pvt. Ltd.

Source: 1) Admin Boundaries: Mathura-Vrindavan Masterplan 2031; 2) Municipal Boundary: Nagar Nigam Mathura Vrindavan; 3) Transport Network: OSM; 4) Consultant Analysis; 5) Waterbodies: Braj Teerath Vikas Parishad

Map 8-1: City- vide coverage of existing physical infrastructure (sewerage)

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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 8-1).

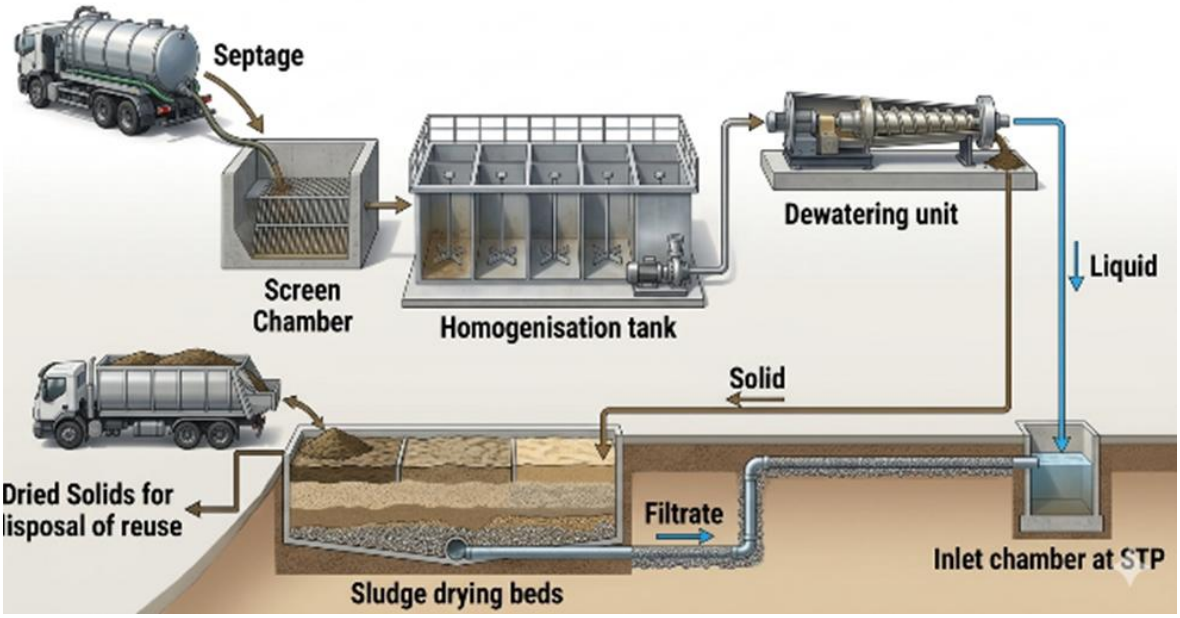


Figure 8-1: Process flow diagram of co-treatment units

By establishing two 50 KLD and one 70 KLD co-treatment facilities as a single integrated intervention, Mathura-Vrindavan will achieve city-wide coverage of faecal sludge management. The intervention expands treatment capacity to match the 220 KLD faecal sludge load, eliminates unsafe disposal into drains and agricultural lands and strengthens collection efficiency.

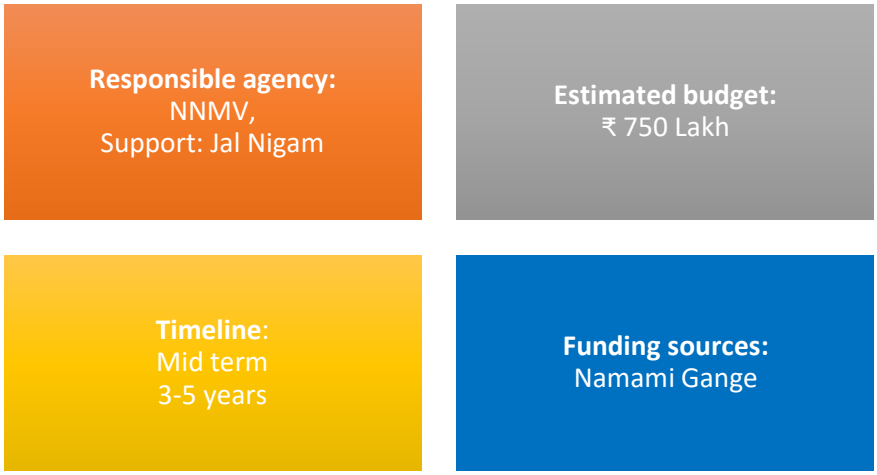
This unified strategy leverages existing and proposed STP infrastructure, minimizes land and capital requirements and ensures safe, sustainable faecal sludge management. It will significantly improve environmental outcomes, reduce public health risks and align Mathura-Vrindavan's sanitation framework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

Block Cost Estimate:

Sl. No	Components	Unit	Dimension / Quantity	Unit Rate (₹ Rupees)	Block Cost (₹ lakhs)	Reference
1	50 KLD co-treatment plant at 13 MLD under construction STP near Saubhri Kund, Vrindavan	Lumpsum	1	2,50,00,000	250.00	Haldwani-Kathgodam DPR document
2	50 KLD co-treatment plant at 36.8 MLD Masani STP, Mathura	Lumpsum	1	2,50,00,000	250.00	Haldwani-Kathgodam DPR document
3	70 KLD co-treatment plant at under construction at 60 MLD STP near Gokul Barrage	Lumpsum	1	2,50,00,000	250.00	Haldwani-Kathgodam DPR document
Total					**750.00**	

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Implementation Framework:



8.2.5 Intervention 5: Preparation of Comprehensive Faecal Sludge and Septage Management (FSSM) Plan with Structured Containment, Scheduled Desludging, Decentralized Treatment and Institutional Reforms

Mathura-Vrindavan is experiencing rapid urban growth alongside high seasonal tourist influx. At present, approximately 78% of households (1,43,451 households) do not have access to sewer lines and depend on onsite sanitation systems (OSS) such as septic tanks and soak pits. Faecal sludge generation from these unsewered households is estimated at approximately 188.08 KLD.

The current sanitation service chain exhibits major operational, capacity, and tariff disparities across containment, emptying, transport, treatment, and reuse. This proposal outlines interventions to establish a safe, regulated, and sustainable FSSM framework for the city. Specific baseline parameters and gaps identified are as follows;

- **Containment:** Approx. 1,43,451 of households' lack sewer connections and rely on onsite sanitation systems.
- **Emptying:** Desludging is demand-based with no scheduled system.
- **Transport:** 28 vehicles (government-owned) vehicles operate without GPS tracking; risk of unmonitored dumping and limited number of trips.
- **Treatment:** Underutilization of 50kLD co-treatment facility and with a gap of approx. 138.08 kLD.
- **Reuse:** Treated sludge from the co-treatment facility is transported to the adjacent Solid Waste Management (SWM) plant, where it is further processed into manure and sold to local farmers.

Proposed Intervention

To address gaps in the onsite sanitation value chain, Mathura-Vrindavan must adopt a structured FSSM Plan as a strategic roadmap. This ensures safe management of human waste across the entire sanitation chain: containment, emptying, transport, treatment, and reuse/disposal. The plan is structured on national guidelines and SOPs while advancing toward a circular water economy. Interventions combine baseline findings with mandated best practices to ensure technical compliance, environmental safety, market harmonization, and institutional accountability.

Intervention in Detail

A. User Interface & Containment

- **Digital Audit & Registry:** A comprehensive field audit of Mathura-Vrindavan's 1,43,451 unsewered households (78%) will be conducted using tools like SaniTab. Each onsite sanitation system will be

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geotagged to record septic tank dimensions, operational status, last emptying date, and road width accessibility for vacuum trucks. This will create a centralized digital registry with a GIS-linked municipal dashboard for oversight.

- **Design & Retrofitting:** Municipal authorities will enforce CPHEEO and IS:2470 standards, requiring watertight tanks with proper baffles and vent pipes. Substandard facilities (e.g., single unlined pits, leaking tanks) will be retrofitted into compliant twin-pit systems or standardized septic tanks.
- **Regulatory Integration:** Containment standards will be legally integrated into building plan approvals and occupancy certification processes, embedding sanitation compliance directly into the municipal building code.

CASE STUDY 6: INCLUSION OF STANDARD SEPTIC TANK DESIGN AND INSPECTION UNDER BUILDING RULES IN TAMIL NADU

Tamil Nadu integrated standardized septic tank designs into its 2019 building rules to address the high dependency of urban households on on-site sanitation. The intervention streamlines the approval process by requiring specific technical dimensions and leverages digital tools, such as geo-tagged photographs, to verify construction quality. By bridging critical information and implementation gaps, this state-wide approach ensures adherence to safety standards and offers a highly replicable model for other regions.

Source: *FSSM Service Business Models by NITI AAYOG - https://www.niti.gov.in/sites/default/files/2021-08/NITI-NFSSM-Alliance-Report-for-digital.pdf*



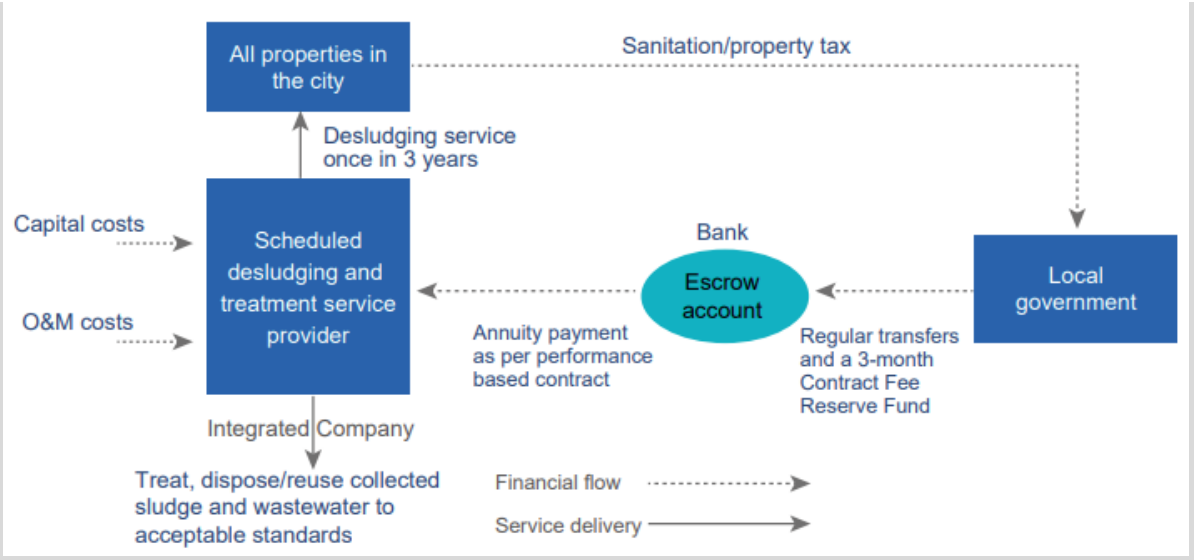
B. Emptying (Collection)

- **Scheduled Desludging & Tariff Rationalization:** The city will transition from an unregulated, market-skewed emptying practice to a systematic 3-year scheduled desludging cycle. To address the significant pricing discrepancy (where municipal services cost ₹3,500 per trip while private operators charge ₹1,200 per trip), Nagar Nigam Mathura-Vrindavan will establish a rationalized, uniform tariff structure alongside empanelment and licensing for private operators.
- **Fleet Optimization & Licensing:** Based on standardized performance metrics (5 trips/day per vehicle), approximately 13 vehicles of 3,000L capacity are required to meet regular demand. The city's current municipal fleet of 28 vehicles will be optimized and rationalized. Private operators will be integrated under mandatory municipal licensing, annual registration, and performance-based operational frameworks.
- **Safety Enforcement:** Strict enforcement of the Manual Scavenging Act 2013 will be mandated across all municipal and private operators, requiring 100% mechanized extraction and mandatory Personal Protective Equipment (PPE) for sanitation workers.

CASE STUDY 7: SCHEDULED DESLUDGING THROUGH PPP WITH A PERFORMANCE LINKED ANNUITY MODEL IN WAI, SINNAR, MAHARASHTRA

Wai and Sinnar pioneered a proactive "scheduled desludging" model in India, shifting from emergency cleaning to a regular three-year municipal service for every property. This Public-Private Partnership uses a performance-linked annuity model funded by a small annual sanitation tax, making the service inclusive and affordable for all. By leveraging digital monitoring and universal coverage, these cities achieved ODF++ status and successfully addressed the environmental risks of untreated human waste.

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C. Transport (Conveyance)

- **Licensing & Oversight:** All private and municipal desludging vehicles operating within Mathura-Vrindavan will be legally required to register and obtain annual operating licenses from the ULB to ensure service accountability and safety compliance under SBM norms.
- **Designated Transit Corridors:** Licensed vehicles will follow strictly designated transit routes from households to authorized disposal and treatment facilities (e.g., Laxmi Nagar STP co-treatment facility and future decentralized treatment units). Unauthorized mid-route dumping will be strictly penalized under municipal bylaws.
- **Real-Time Fleet Tracking:** The entire operational fleet will be equipped with GPS/SaniTrack systems integrated into the centralized municipal control room dashboard and mobile application for real-time monitoring and trip verification.
- **Digital Manifest System:** A digital manifest system will be introduced, requiring digital sign-offs from property owners upon service completion via a mobile app, directly logging trip completion to ensure transparent service delivery.

CASE STUDY 8: DIGITAL TECHNOLOGY IN FSSM OPERATIONS IN MAHARASHTRA

Maharashtra pioneered a digital monitoring suite—SaniTab, SaniTrack and SanQ—to manage city-wide sanitation services through real-time data and automated registries. These tools allow city managers to track every stage of human waste management, from household collection to final treatment, ensuring full accountability and preventing illegal dumping. By replacing manual logs with digital signatures and performance-linked payments, the state has established a transparent and efficient model that is now being replicated across India.

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D. Treatment

- **Immediate / Short-Term Mitigation:** To utilize existing infrastructure and immediately address the treatment gap, faecal sludge will be processed through the operational 50 KLD co-treatment plant located at the 14.5 MLD Laxmi Nagar STP in the Eastern Trans-Yamuna Zone.
- **Short-to-Medium Term Co-Treatment Expansion:** To expand capacity across major urban hubs and reduce vehicle haulage distances, three new co-treatment facilities totaling 170 KLD will be established:
  - A 50 KLD co-treatment plant integrated with the 36.8 MLD Masani STP to serve the high-density Central Zone (Mathura Core).
  - A 50 KLD co-treatment plant integrated with the under-construction 13 MLD STP near Saubhri Kund to serve the Northern Zone (Vrindavan).
  - A 70 KLD co-treatment plant integrated with the under-construction 60 MLD STP near Gokul Barrage to serve the Southern Zone.
- **Long-Term Integrated Zonal Infrastructure:** Mathura-Vrindavan will establish a fully integrated, city-wide operational framework anchored along the Yamuna River corridor with a 6 km service delineation around treatment sites. This exceeds the current daily generation of 188.08 KLD, completely eliminating the treatment deficit, minimizing transport distances, preventing illegal dumping, and achieving total spatial equity across all catchments.

E. Reuse and Resource Recovery

- **Co-Composting & Biosolids Yield:** Dried faecal sludge processed at the co-treatment facility will be blended and co-composted with municipal solid waste at the adjacent Solid Waste Management (SWM) plant. Based on treatment parameters, an expected organic fertilizer / bio-solids yield of 30% of TSS will generate approximately **1692.72 kg/day (Dry)** of organic soil conditioner. This nutrient-rich manure will be sold to local farmers as a sustainable alternative to chemical fertilizers.
- **Effluent Water Reuse:** The co-treatment process will achieve a 75% liquid recovery rate, providing approximately **141.06 m3/day** of treated effluent water. This recycled water will be utilized for urban forestry, park landscaping, and operational plant maintenance, aligning with circular economy and urban water resilience goals.
- **Market Linkages & Offtake Partnerships:** Formalize distribution networks with local farmers, agricultural nurseries, and city authorities. Establish MoUs with municipal horticulture, forestry, and agriculture departments to ensure steady demand and institutionalized off-take of biosolids.

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- **Quality & Safety Compliance:** Ensure all processed organic manure and recycled effluent strictly adhere to Fertilizer Control Order (FCO) and WHO guidelines regarding pathogen reduction, chemical safety, and heavy metal limits prior to market distribution.

CASE STUDY 9: REUSE AND RESOURCE RECOVERY AT WAI AND SINNAR FSTP

Wai and Sinnar transformed their Faecal Sludge Treatment Plants into "resource centers" by reusing treated used water and solids for on-site landscaping and urban forestry. This circular economy model addresses water scarcity and adds aesthetic value to sanitation infrastructure while generating livelihood opportunities through Women's Self-Help Groups. By shifting the perspective of waste as a valuable resource, these cities serve as a national blueprint for sustainable reuse and community-led resource recovery.



Source: *FSSM Service Business Models by NITI AAYOG - https://www.niti.gov.in/sites/default/files/2021-08/NITI-NFSSM-Alliance-Report-for-digital.pdf*

F. Institutional Framework

- **Operator Licensing & Tipping Fees:** The Urban Local Body (ULB) will issue annual operating licenses to private desludging providers at a nominal fee (e.g., ₹1,000/year) and a regulated tipping fee (e.g., ₹100/load) will be collected at treatment sites to ensure accountability and financial transparency as per the NITI Aayog report on "Service & Business Models: Faecal Sludge and Septage".
- **Municipal Bye-Laws:** City-level bye-laws will mandate periodic desludging cycles and establish penal provisions for households and operators violating safe disposal standards. This legal framework ensures compliance and strengthens enforcement.
- **Financial Sustainability**: A dedicated Sanitation Tax or service fee will be integrated into the municipal property tax module. Collections will be pooled into a revolving FSSM fund to underwrite ongoing operation and maintenance costs for co-treatment facility units. Tariff restructuring will ensure sustainable financial autonomy for the system.

G. Monitoring and Awareness

- **Digital Manifest System:** Implement a mobile application workflow (integrated with SaniTrack) where households digitally sign off upon service completion, automatically logging compliance records and triggering verified payments.
- **Behavior Change Campaigns:** Launch localized IEC/BCC campaigns (such as the "Malasur" framework) to educate citizens on the public health benefits of adhering to regular 3-year septic tank cleaning schedules.
- **Grievance Redressal (S-Line):** Establish a dedicated Sanitation Helpline ("S-Line") enabling citizens to easily book scheduled desludging services, report unserviced areas, or raise operational complaints.

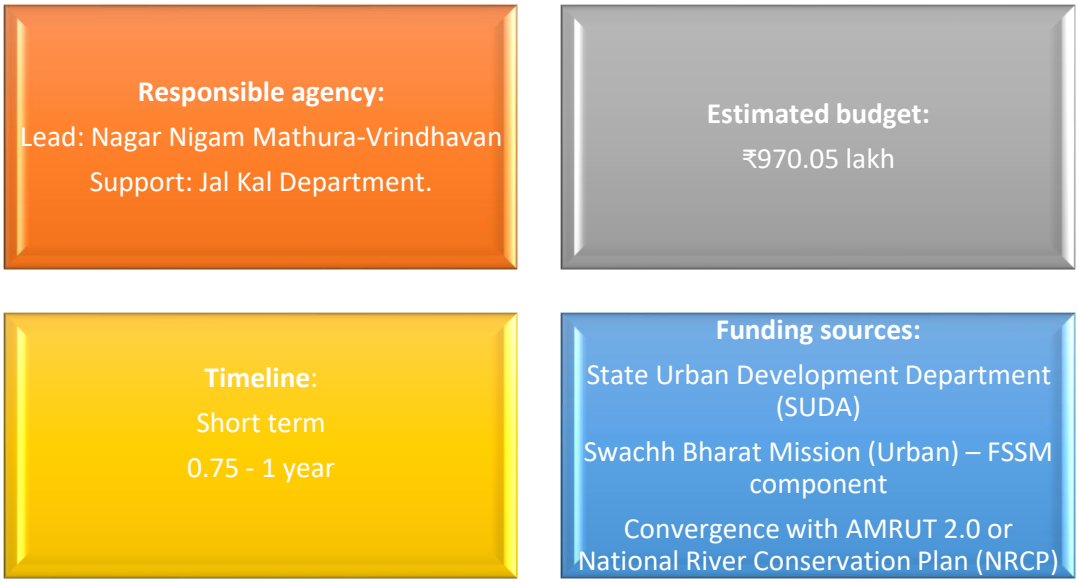
The draft scope of work for preparation of FSSM plan is at Annexure 18.

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Block cost Estimate:

Sl. No	Components	Unit	Dimension / Quantity	Unit Rate (₹ Rupees)	Block Cost (₹ lakhs)	Reference
Component 1: Preparation of Faecal and Septage Management Plan						
1	Preparation of Faecal and Septage Management Plan	Lumpsum	1	50,00,000	50.00	As per URMP Ayodhya, 2023
Component 2: Tentative DPRs Cost under Management Plan						
1	**User Interface**					
	Dashboard database creation (GIS + surveys + real-time IoT integration, SCADA, AI analytics)	Lumpsum	1	2,00,00,000	200.00	Market rate - 1.5 to 2 crore including operation and maintenance of 5 years
2	**Containment**					
	Primary surveys & Geo tagging	No.	1,43,451	500	717.25	
3	**Transport**					
	GPS Tracker for Desludging Vehicles	No.	28	10,000	2.80	market price is 8000 to 10000 INR per vehicle
	Total				**970.05**	

Implementation Framework

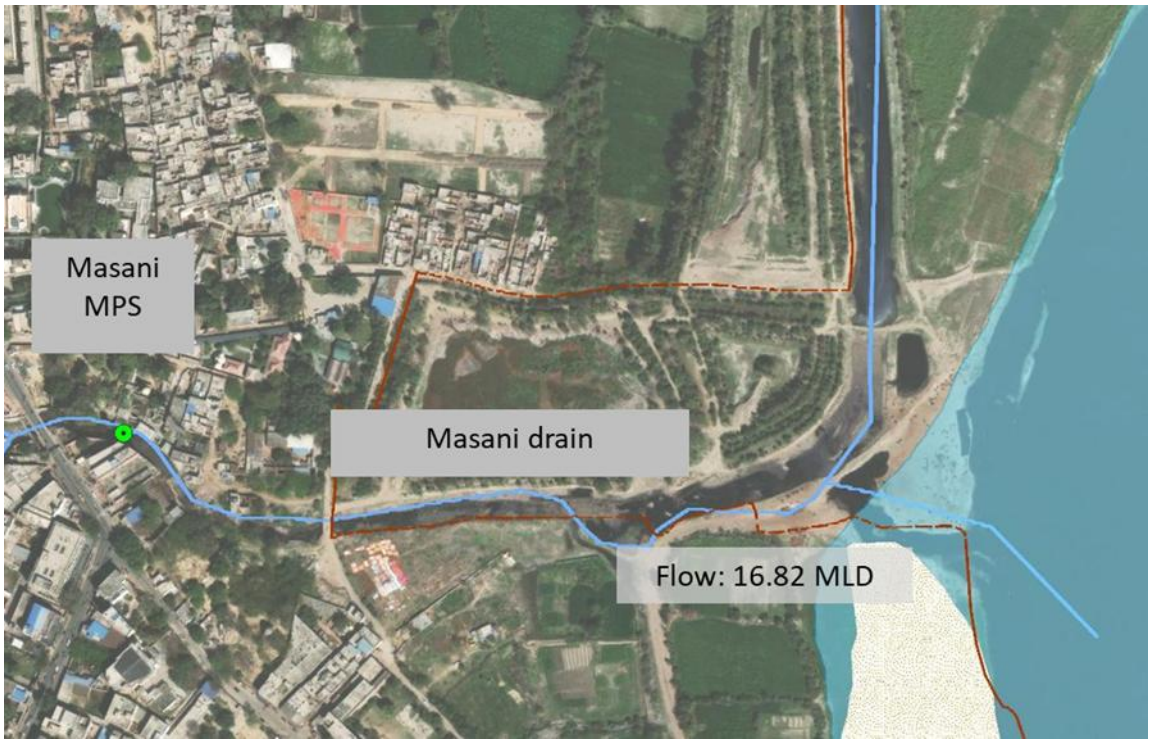


8.2.6 Recommendation 3: Preventing Untreated Sewage Discharge into the Yamuna River from Masani Drain

As observed during the site assessment (Section 5.2.1), the Masani Drain receives flows from the escape channel of the Rawal Canal, resulting in the mixing of canal water with sewage before reaching the Masani Main Pumping Station (MPS). The combined flow frequently exceeds the hydraulic capacity of the existing pumping and treatment infrastructure, causing excess discharge to overflow directly into the Yamuna River. Although a portion of the flow is intercepted at the Masani MPS and conveyed to the Masani Sewage Treatment Plant (STP) for treatment, the remaining untreated flow bypasses the system and enters the river. Consequently, the existing arrangement is only partially

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effective in controlling pollution and continues to adversely affect the water quality and ecological health of the Yamuna.



Picture 8-5: Sewage inflow of Masani Drain in Yamuna River

Proposed Recommendations

Regulation of Rawal Canal Inflows: To enhance the effectiveness of the sewerage system and reduce avoidable hydraulic loading, inflows from the Rawal Canal escape channel should be regulated so that only sewage reaches the Masani MPS, while canal water is diverted separately. The current practice of allowing canal water to mix with sewage unnecessarily increases flow volumes, reduces treatment efficiency through dilution, and contributes to untreated overflows into the Yamuna River. This intervention can be implemented through the following measures:

- **Hydraulic separation:** Installation of diversion structures, sluice gates, or similar hydraulic controls to prevent canal water from entering the Masani Drain.
- **Flow regulation infrastructure:** Provision of automated regulators or gated control structures at the canal escape point to manage discharge volumes based on operational requirements.
- **Monitoring and real-time control:** Deployment of flow monitoring sensors and telemetry systems to continuously track canal discharges and support effective operational management.
- **Improved system performance:** Excluding canal water from the sewerage network will reduce pumping requirements, improve treatment plant efficiency, optimize infrastructure utilization, and minimize the occurrence of untreated used water overflows.
- **Interception of used water at source:** Used water currently entering the Rawal Canal should be intercepted and managed, preventing its downstream entry into the drain. The mixing of domestic sewage with the fresh water adversely affects biological treatment processes at the Masani STP, leading to reduced treatment efficiency and potential non-compliance with discharge standards. untreated used water to be treated and managed in accordance with applicable environmental regulations prior to discharge. Source-level control of used water will:
  - Prevent contamination of streams.

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- Improve the operational performance and treatment efficiency of the Masani STP.
- Reduce stress on pumping and treatment infrastructure.
- Facilitate compliance with prescribed treated used water quality standards.
- Contribute to the long-term protection and restoration of the Yamuna River ecosystem.

8.2.7 Recommendation 4: Capacity Enhancement of STPs

The sewage treatment infrastructure in Mathura-Vrindavan is undergoing significant technological upgrades, primarily transitioning from UASB and WSP systems to SBR technology (refer table 5-5 and Section 5.2.5). In view of ongoing urban expansion (refer map 2-8) and the anticipated increase in sewage generation, capacity augmentation may be considered at the DPR stage to ensure long-term adequacy of treatment infrastructure. Accordingly, a review of the treatment capacities of individual STPs is presented below, identifying locations where capacity augmentation may be warranted and others where provisions for future expansion may be considered.

- Laxmi Nagar STP Complex (30.5 MLD): The complex presently comprises a 16 MLD UASB-based STP and a 14.5 MLD WSP-based STP. Jal Nigam (Rural) is replacing the 16 MLD UASB unit with an SBR-based plant (refer Section 5.2.5). To provide flexibility for accommodating future increases in used water generation, the feasibility of incorporating provisions for capacity augmentation may be examined during the DPR stage.
- Masani STP Complex (36.8 MLD): The complex includes a 6.8 MLD WSP-based STP and a 30 MLD SBR-based unit. Jal Nigam (Urban) is upgrading the 6.8 MLD facility to SBR technology (refer Section 5.2.5). As a long-term planning measure, provisions for future expansion may be considered during the DPR stage to address potential increases in treatment demand over the planning horizon.
- Pagal Baba STP (4 MLD): The existing WSP-based plant is being upgraded to a 4 MLD SBR-based facility (refer Table 5-5). The STP currently receives relatively high flows. Further, following the formation of Mathura-Vrindavan Nagar Nigam in 2017, the expansion of municipal limits has brought additional areas under its jurisdiction, which is expected to increase used water generation within the catchment. Accordingly, enhancement of the treatment capacity from 4 MLD to 8 MLD is recommended to accommodate the projected increase in load and maintain adequate treatment performance.
- Mant Road STP (8 MLD): This facility is being upgraded from conventional treatment technology to an SBR-based system (refer Section 5.2.5). The STP is already operating under relatively high flow conditions. In addition, the expansion of Mathura-Vrindavan Nagar Nigam limits and ongoing development within the service area are expected to increase used water generation over time. Therefore, enhancement of the treatment capacity from 8 MLD to 16 MLD is recommended to ensure sufficient treatment capacity for future requirements.

In addition to capacity augmentation, the following operational measures are recommended for all existing and under-construction STPs and co-treatment units:

- **Tertiary treatment and disinfection:** Treated effluent quality (Table 5-9) shows TSS above the prescribed limit at all six STPs and BOD/COD exceedance at the 14.5 MLD and 16 MLD units. Tertiary filtration and disinfection should be provided so that the effluent meets discharge norms and is fit for reuse.
- **Online monitoring:** Online Continuous Effluent Monitoring System (OCEMS) for flow, pH, BOD, COD and TSS, and CCTV cameras at all STPs and co-treatment units with connectivity to UPPCB/CPCB servers, to be made part of the SBR upgradation contracts.

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- **Statutory compliance:** All STPs and co-treatment units to hold valid Consent to Establish/Operate and authorisation from UPPCB, with the status reviewed quarterly by the District Ganga Committee.

8.2.8 Recommendation 5: Strengthening Solid Waste Management Compliance along the River

The city achieves 100% door-to-door collection, but only about 17% of households segregate waste at source, and solid waste, floral offerings and dung continue to reach the nallahs and ghats (Section 5.3). The following measures complement Interventions 1, 2, 18 and 19:

- **No-dumping zone:** Mapping of dumping hotspots within 500 m of the river banks and nallahs, CCTV surveillance and penalties under the SWM byelaws; prohibition of C&D waste dumping on the floodplain and ghats, linked to the 50 TPD C&D plant.
- **Bulk generators and floral waste:** Temples, ashrams, dharamshalas, hotels, Mandi and institutions to comply with the SWM Rules, 2016 through on-site composting and disposal of recyclables through registered recyclers, with dedicated collection and processing of floral waste (nirmalya) into compost or incense.
- **Processing capacity and legacy waste:** Assessment of the operational status of the MRF, compost units and incinerators against the 480 TPD generation, upgradation of non-complying units, and completion of legacy waste remediation (2.62 lakh tonnes) within a fixed timeline.
- **Compliance and revenue:** CCTV at the SWM plant, C&D plant and legacy waste site with access to UPPCB; valid consent and authorisation from UPPCB; and revenue from sale of compost and RDF.
- **Source segregation:** Progressive increase in source segregation from the present 17%, supported by Intervention 18.

8.2.9 Recommendation 6: Eco-friendly Idol Immersion and River Surface Cleaning

- **Artificial immersion ponds:** Lined artificial ponds at identified locations in Mathura and Vrindavan during major festivals, with collection of immersion material and proper disposal of sludge and effluent, complementing Interventions 11 and 14.
- **River surface cleaning:** Boat-mounted trash skimmers along the ghat stretches of Mathura and Vrindavan for removal of floating waste and algal growth, with involvement of boatmen and the local community.

8.2.10 Recommendation 7: Integrated Pilgrimage Waste Management and Riverbank Protection Strategy for Chintaharan Mahadev Temple

The Chintaharan Mahadev Temple, located along the Yamuna River corridor near Mahavan and situated on the 84 Kos Braj Parikrama Marg, a circuit of approximately 250 km, serves as an important pilgrimage halt that attracts a substantial influx of devotees during annual parikrama cycles and major religious events. Owing to its location on the riverbank and away from the main urban center, the area experiences significant pressure on sanitation and waste management infrastructure during peak pilgrimage periods. Temporary vendor kiosks, food stalls, pilgrim shelters, and congregation spaces generate considerable quantities of solid waste, including single-use plastic packaging, disposable utensils, water bottles, and organic religious offerings (nirmalya). In the absence of adequate waste collection and sanitation facilities, waste is often discarded along roadside margins, open spaces, and riverbank areas, resulting in litter accumulation and potential pollution of the Yamuna River.

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Additionally, wastewater generated from temporary sanitation facilities, bathing areas, and food stalls may infiltrate the soil or flow untreated into the surrounding environment, posing risks to river water quality and the ecological integrity of the floodplain.

To address these environmental concerns and safeguard the Yamuna River corridor, the following are recommended under the URMP framework:

A. Solid Waste Management & Parikrama Route

I. Deployment of Segregated Waste Collection Infrastructure: The Uttar Pradesh Braj Teerth Vikas Parishad (UPBTVP), in coordination with the Mathura-Vrindavan Nagar Nigam (MVMC), should install durable, colour-coded four-stream bin systems (green for wet waste, blue for dry recyclable waste, red for sanitary waste and black for special care waste), as mandated by the Solid Waste Management Rules, 2026, at regular intervals along the temple approach road, pilgrimage congregation areas, vendor clusters, and key locations along the 84 Kos Braj Parikrama route.

II. Dedicated Waste Collection and Transportation System: A scheduled waste collection mechanism should be implemented during pilgrimage periods through deployment of municipal collection vehicles and sanitation staff to ensure timely removal of waste from bins, vendor areas, and temporary shelters, thereby preventing overflow and indiscriminate dumping.

III. Seasonal Pilgrimage Waste Management Plan: A special sanitation management protocol should be activated during peak parikrama and festival periods, including temporary augmentation of waste bins, sanitation personnel, collection vehicles, and awareness volunteers to manage the seasonal surge in waste generation.

IV. Regulation of Temporary Vendors and Ban on Single-Use Plastics: All temporary vendors operating during pilgrimage events should be registered and required to comply with the Plastic Waste Management Rules, 2016 (as amended) and the nationwide prohibition on identified single-use plastic items effective 1 July 2022, including the use of biodegradable alternatives such as leaf plates (pattals), clay cups (kulhads), and paper packaging. Compliance should be monitored jointly by local authorities and temple management.

V. Identification of Designated Vending Zones: Temporary vending activities should be consolidated within designated vending clusters equipped with shared waste collection facilities, drinking water points and sanitation infrastructure. This will facilitate efficient waste collection and minimize littering along the pilgrimage route.

VI. Organic Waste and Nirmalya Management: Dedicated facilities for collection and composting of flowers, leaves and other biodegradable religious offerings should be established near the temple precinct. Compost generated may be utilized for landscaping and plantation activities within the surrounding area.

B. Liquid Waste & Sanitation Management

I. Provision of Portable Sanitation Facilities: Mobile toilets, handwashing stations, and temporary sanitation facilities should be deployed during major pilgrimage events to discourage open defecation and uncontrolled wastewater discharge.

II. Safe Collection and Disposal of Wastewater: Wastewater generated from temporary sanitation facilities, food stalls, and shelters should be collected through holding tanks and periodically removed by desludging operators authorised by MVMC, for conveyance to a designated septage or faecal sludge treatment facility. Direct discharge into open land, drains, or the Yamuna River should be strictly prohibited.

C. Riverbank Protection and Floodplain Conservation

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I. Riverbank Waste Prevention Measures: Temporary litter traps, waste interception barriers and designated waste collection points should be installed at locations where surface runoff from the temple and congregation areas may carry waste towards the Yamuna River.

II. Establishment of a River Protection Buffer Zone: A regulated buffer zone should be maintained in conformity with the Yamuna floodplain demarcation notified for Mathura district in January 2025, within which waste-generating activities, temporary waste storage, debris dumping and unauthorized vending are prohibited, consistent with the directions of the National Green Tribunal dated 13 January 2015 and its order dated 28 September 2020 in Original Application No. 6/2012 (Manoj Mishra v. Union of India) barring construction and dumping in the demarcated floodplain.

D. Awareness and Community Participation

I. Pilgrim Awareness and Behavioural Change Campaigns: Temple authorities, local governing bodies and community organizations should undertake awareness campaigns promoting responsible waste disposal and river conservation through signage, public announcements, volunteer engagement, and "Clean Parikrama, Clean Yamuna" initiatives during pilgrimage seasons.

8.3 Objective 3: Rejuvenate Waterbodies and Wetlands in Mathura-Vrindavan

As mentioned in Section 3.2.1, NNMV encompasses 15 waterbodies, exceeding 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.

8.3.1 Intervention 6: To create water body Database at city level

While Mathura-Vrindavan'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 comprehensive city-level waterbody database for Mathura-Vrindavan, serving as a centralized digital repository of all waterbodies within the 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 Mathura-Vrindavan Waterbody Database will be guided by the Urban Water Body Diagnostic Tool (UWBDT)[4] 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

[4] https://uwdtool.in/ ; https://nmcg.nic.in/writereaddata/fileupload/56_Urban-Water-Body-Diagnostic-Tool-Manual.pdf

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structures and risk exposure. Adoption of this framework will ensure systematic evaluation, evidence-based decision-making and long-term rejuvenation strategies for Mathura-Vrindavan's urban waterbodies.

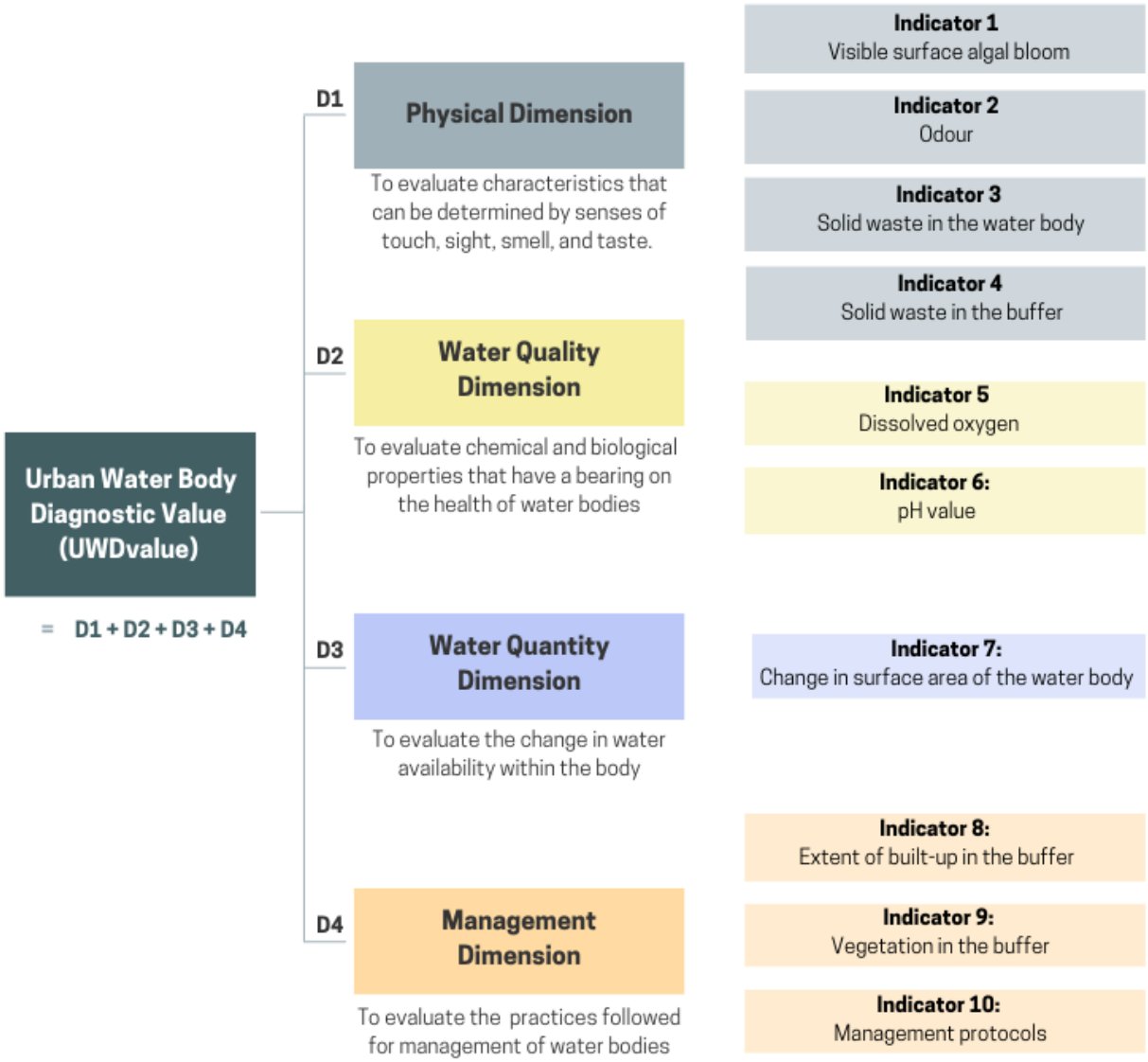


Figure 8-2:Urban Waterbody Diagnostic Key Parameters

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

Table 8-3: Components for creating 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:

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Stages	Actions to be taken
	• 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

City-scale contextualization of key components for creating the database of waterbodies in Mathura-Vrindavan city.

Table 8-4: Key components for creating the database of waterbodies in Mathura- Vrindavan city

Stage	Actions at City Scale	Technical Justification	Tools / Technologies
Data Collection	Geo-referenced mapping of 15 waterbodies Ownership & administrative details Encroachment & land-use status Hydrological connectivity with Yamuna River Water quality & pollution sources Flooding/waterlogging history	Establishes a baseline inventory of all assets. Captures degradation factors affecting water quality and storage.	GIS mapping, municipal records, field surveys
Database Integration	Consolidate data into a GIS-enabled repository Apply NIUA's UWBDT framework for standardized assessment Integrate Sajra records with Master Plan 2031 mandates (9-m green belt for >1 acre, 5–15 m buffer for others) Enable centralized access for municipal departments	Creates a standardized, citywide database linking ecological, hydrological and governance dimensions. Ensures compliance with Master Plan 2031 safeguards.	C-WIN dashboard, LAMAS AI mapping, FluxGen IoT monitoring (quarterly health report cards)
Application & Outcomes	Monitoring: Regular surveys, pollution tracking, siltation checks Planning: Integrate waterbodies into land-use and stormwater strategies Enforcement: Encroachment removal, used water diversion, buffer zone compliance Citizen engagement: QR-coded boards, grievance reporting	Enables proactive management of waterbodies, strengthens flood resilience and restores ecological services.	Municipal dashboard, mobile apps, ward-level reporting
Citywide Outcomes	Transparent inventory of 15 waterbodies Improved groundwater recharge and flood moderation Enhanced ecological balance and microclimate regulation Replicable model for Smart Cities/AMRUT	Positions Mathura-Vrindavan as a pilot city for integrated urban water management (IUWM).	Standardized data framework, replication blueprint

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CASE STUDY 10: GWALIOR CITY WATER INFORMATION NETWORK (CWIN)

Background: Rapid urbanisation and climate stress in Gwalior (population ~1.9 million) created severe water security challenges. Local lakes like Motijheel and Janak Taal faced pollution and drying risks. Data on water supply, drainage and used water was scattered across departments, limiting effective planning.

Initiative: In July 2023, NIUA (MoHUA) and UNESCO launched a pilot project to build a City Water Information Network (CWIN) Dashboard – India's first integrated urban water management platform.

Methodology:

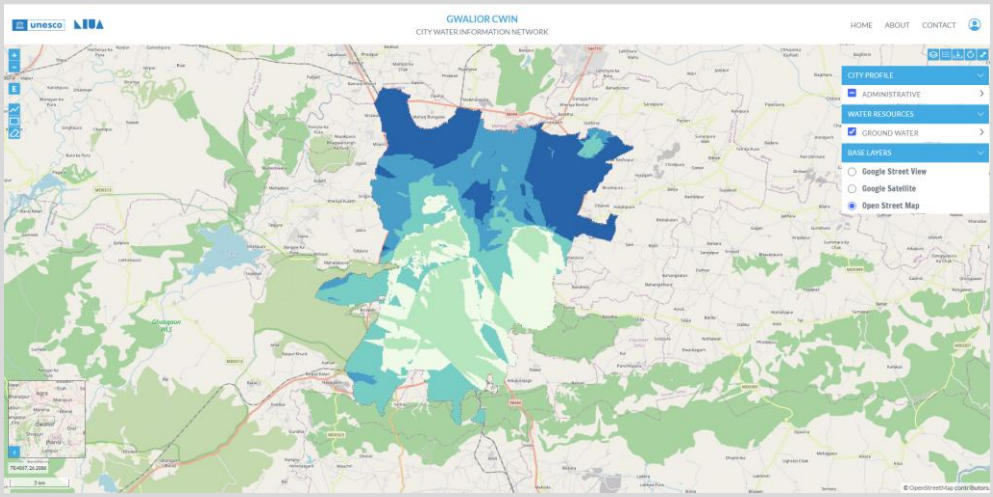
- Formed a cross-departmental alliance (Nagar Nigam, Smart City, Water Resources, PHED).
- Integrated records on water resources, supply, used water and stormwater.
- Applied GIS mapping to overlay master plan data with natural topography.

Features:

- Centralized database of water resources and infrastructure.
- Real-time visualization of water flows and risks.
- Flood risk mapping for vulnerable neighbourhoods.
- Reuse planning for treated used water and recharge zones.

Impact:

- Shifted municipal operations from reactive to proactive.
- Enabled climate-resilient investments in conservation and flood control.
- Created a replicable model for other Indian cities under Smart Cities and AMRUT.



Block Cost Estimate:

Sl. No	Components	Unit	Dimension / Quantity	Unit Rate (in Rupees)	Block Cost (₹ in lakhs)	Reference
1	Creation of Waterbody database	Lump sum	1	50,00,000	50.00	Costing is based on NIUA's CWIN Gwalior citywide integrated water dashboard scope, Bhopal Municipal Corporation's GIS asset survey tender value and Survey of India geospatial pricing for digital vector data.
Total					**50.00**	

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Implementation Framework

Responsible agency: NNMV, MVDA, UPPCB	**Estimated budget:** ₹ 50 lakhs
Timeline: Short term 0.75 - 1 Years	**Funding sources:** Municipal Budget, UP Urban Development funds, 15th Finance Commission - Tied Grants (Water & Sanitation)

8.3.2 Recommendation 8: Restoration of Urban Ponds for Groundwater Resilience and Ecological Renewal

Mathura–Vrindavan's physical setting is defined by its semi-critical groundwater status, flat alluvial topography and seasonal backflow from the Yamuna River, which makes the twin cities particularly vulnerable to localized flooding and prolonged waterlogging during monsoon months. Unlike regions facing groundwater depletion, Mathura-Vrindavan's principal challenge lies in managing excess stormwater and sewage inflows rather than recharge enhancement. Historically, urban ponds, kunds and floodplain wetlands functioned as natural detention basins, absorbing peak monsoon flows and gradually releasing water once river levels receded. The degradation and encroachment of these systems have directly contributed to increased flooding intensity and duration in low-lying wards and heritage precincts.

In the context of increasing rainfall variability and climate change impacts, systematic rejuvenation of urban waterbodies is essential to restore their role as stormwater holding, flood moderation and ecological assets, while ensuring long-term sustainability and public value.

Recommendation

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, out of 15 ponds, 14 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 how composite values were derived is provided in Annexure 19 and the detailed pond-wise scoring is in Annexure 20 Based on composite scores, ponds have been categorized into priorities as presented in Table 8-5.

Table 8-5: Prioritization of Waterbodies in Mathura-Vrindavan

Priority	Focus	Number of Ponds	Key Issues Addressed
Priority A	Drainage & Sanitation-first	11	Raw sewage inflows, solid waste, low DO and sanitation

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Priority	Focus	Number of Ponds	Key Issues Addressed
Priority B	Stormwater retention basins for flood moderation and climate resilience	0	Flooding and Waterlogging issues
Priority C	Recreation & Amenity Upgrades	3	None currently qualify; potential post-sanitation

Based on composite scores, spatial location and functional potential, waterbodies were categorised into intervention priorities. This data-driven approach ensures that limited municipal resources are allocated to waterbodies offering the highest flood-mitigation and resilience benefits, while preventing premature or inappropriate beautification.

Strategic Categorisation of Urban Waterbodies

Urban waterbodies in Mathura-Vrindavan are categorised into the following intervention priorities:

- Priority A: Drainage and sanitation-first waterbodies
- Priority B: Stormwater retention basins for flood moderation and climate resilience
- Priority C: Recreation and amenity-oriented waterbodies (post-stabilisation)

This phased approach ensures that pollution control and hydrological stabilisation precede recharge, recreational, or aesthetic interventions, thereby avoiding maladaptive investments.

Priority A: Drainage and Sanitation-First Waterbodies

Characteristics: Priority A waterbodies are severely degraded and typically exhibit:

- Multiple untreated used waters and drain inlets
- Heavy solid waste dumping
- Low or critically depleted dissolved oxygen levels
- High encroachment pressure and degraded buffers

Such ponds currently function as oxidation tanks or waste sinks and are unsuitable for flood moderation, recharge, or recreational use until sanitation issues are resolved.

Implementation Measures for Priority A

- Interception and Diversion (I&D) Drains: Construction of peripheral drains to divert untreated used water away from ponds and towards existing or proposed treatment facilities.
- Decentralised Used water Treatment: Installation of Phytorid wetlands or DEWATS using gravel beds and native macrophytes (vetiver, canna, reeds) to treat minor inflows.
- Solid Waste Management: Removal of accumulated waste, installation of bamboo or eco-fencing along at least 70–80% of the periphery, and provision of signage to prevent re-dumping.
- Aquatic Weed Management: Manual removal of invasive species and introduction of floating wetlands to improve dissolved oxygen levels.
- Buffer Zone Protection: Establishment of a minimum 4.5–9 m vegetated buffer to prevent further encroachment and filter runoff.

Interventions under this priority are sanitation-led and must be completed before any further functional upgrades are considered.

Priority B: Stormwater Retention Basins (Flood Moderation & Climate Resilience)

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Characteristics: Priority B waterbodies typically demonstrate:

- Natural or semi-natural soil beds suitable for temporary surface water detention
- Moderate accessibility and limited built-edge development
- Location within flood-prone wards, low-lying bowls, or peri-urban runoff accumulation zones
- Limited used water inflows that do not compromise detention capacity

These ponds are unsuitable for recharge-centric interventions due to Mathura-Vrindavan's high groundwater table but are critical for attenuating peak monsoon runoff.

Implementation Measures for Priority B

- Enhancement of Stormwater Holding Capacity: Selected ponds shall be selectively deepened to enhance storage volume. Deepening shall be restricted to 40–60% of pond area, achieving depths of 3.0–3.5 m, while retaining shallow ecological zones. Excavated silt shall be reused for embankment strengthening and buffer landscaping.
- Sedimentation Basins at Inlets: Sedimentation basins covering 5–10% of inflow areas shall be constructed using stone bunds and vegetated traps to prevent silt accumulation and loss of storage capacity.
- Controlled Release Structures: Sluice gates or orifice-controlled outlets shall be installed to regulate discharge during and after rainfall events. Overflow weirs shall ensure safe passage of excess water during extreme rainfall. Retention periods of 24–72 hours shall be maintained based on downstream river levels.
- Embankment Strengthening: Stone pitching up to 0.6–0.9 m height, geo-textile reinforcement where required, and gentle inner slopes (1:2 to 1:3) shall be provided to prevent erosion and breach.
- Vegetated Buffer Zones: A vegetated buffer of 4.5–9 m shall be maintained using native grasses, vetiver, bamboo, and shade trees to filter runoff and enhance microclimatic cooling.

Priority C: Recreation and Amenity-Oriented Waterbodies

Priority C waterbodies are those where sanitation and hydrological stability have been achieved and which exhibit:

- Good accessibility
- Cultural or community significance
- Stable water quality
- Surrounding residential or institutional land use

Implementation Measures for Priority C

- Limited Ghats and Pathways: Development along 15–20% of the periphery using stone or bamboo decking.
- Aeration Infrastructure: Installation of solar-powered aeration fountains to improve dissolved oxygen and aesthetics.
- Lighting and Safety: Solar lighting and recycled signage for safe public use.
- Cultural Activity Zones: Designated seasonal platforms for Chhath and community events (10–15% of periphery).

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- Enhanced Green Belt: Planting of native flowering and shade trees to strengthen the ecological buffer.

Interventions shall be implemented in a phased and coordinated manner:

- Phase I (Short Term): Sanitation, solid waste removal, inlet management, and encroachment control
- Phase II (Medium Term): Stormwater detention enhancement, embankment strengthening, and buffer development
- Phase III (Long Term): Recreation and amenity upgrades for eligible waterbodies

In addition, the following measures are recommended in convergence with the Yamuna Action Plan:

- Extension of the city waterbody database (Intervention 5) to all waterbodies and wetlands within 2 km of the Yamuna, with geo-referencing of their zone of influence and catchment.
- Inventory and revival of historic wells and kunds where hydrogeological conditions permit. Given the high-water table and saline groundwater in parts of the city, recharge measures should be site-specific and based on water-quality testing.

8.3.3 Intervention 7: Rejuvenation of Dampier Nagar Pokhar as a Blue-Green Community Recreation & Seasonal Wetland Park

Dampier Nagar Pokhar is an existing pond landscape located within a dense urban neighbourhood and adjoining the Malihura–Aligarh Road, with the railway corridor forming important element of its wider context. The site is presently characterized by the existing water body, peripheral vegetation, informal/unpaved edges and surrounding residential development. The Proposed Intervention seeks to transform this underutilized urban water landscape into an accessible, nature-based recreational space while retaining its seasonal water-retention function.



Picture 8-6: Proposed site of Dampier Nagar Pokhar

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During stakeholder consultation, it was informed that the site is under Railway ownership. Historically, used water from nearby settlements and commercial areas was discharged into the site. This condition has since been resolved: the Railway has constructed an open drain and connected the used water outlets of the surrounding settlements and commercial areas to the existing sewerage system to the north. Consequently, used water is no longer being discharged into pond area. The earlier practice of maintaining water in the pond through an existing tube well has also ceased, as the tube well is currently non-functional. This creates an opportunity to reposition the site as a clean, seasonally functioning urban wetland and recreational landscape.

Proposed Intervention

The concept responds directly to the expressed desire of local residents for a recreational space. The proposed plan adopts a seasonal floodable park approach, where the low-lying central portion functions as a floodable landscape during the monsoon and becomes usable open space during the dry period. Rather than relying on artificial tube well filling, the proposal allows the site to respond naturally to seasonal rainfall and water accumulation. The central floodable lawn/pond depression is therefore retained as the ecological and visual heart of the park.

The landscape is organized around two complementary character zones:

1. A seasonal floodable lawn/wetland zone and
2. Recreational landscape areas around the perimeter.

A continuous walking track provides an accessible recreational loop around the site, while stepped grass seating/viewing areas create opportunities for informal gathering and visual appreciation of the seasonal water landscape. Children's nature-play areas are positioned within the greener peripheral portions of the site, providing play opportunities integrated with the natural landscape rather than conventional hard-play infrastructure.

The existing vegetation is strengthened through native tree and shrub planting, creating a green perimeter buffer between the park and surrounding roads and settlements. Dense shade planting, timber pergolas with climbing native species, and perimeter bioswale/native planting areas enhance shade, biodiversity, visual screening and stormwater management. Existing trees and shrub buffers are retained wherever possible, minimizing disturbance to the established landscape character.

Access and circulation are supported through a defined park entry, permeable multi-use paving and walking surfaces, allowing the park to remain functional while reducing excessive hard paving. Basic public amenities—including solar-powered lighting, drinking-water facilities, waste and recycling bins, interpretation/signage and public amenity buildings—are incorporated near the entry and activity areas to support safe and inclusive use.

Overall, the proposal aims to develop site as a community-oriented blue-green recreational asset, combining water-sensitive landscape design, ecological enhancement and everyday recreation. The central seasonal water/floodable landscape preserves the site's inherent hydrological character, while the surrounding shaded paths, nature-play spaces, seating and native planting create a welcoming public park. The intervention therefore converts an underutilized and historically water-logged site into a resilient recreational landscape that can accommodate monsoon water retention while providing valuable usable open space during the dry season.

The Block Cost of **Proposed Intervention** is estimated approximately INR 500 Lakhs or say INR 5 Crore.

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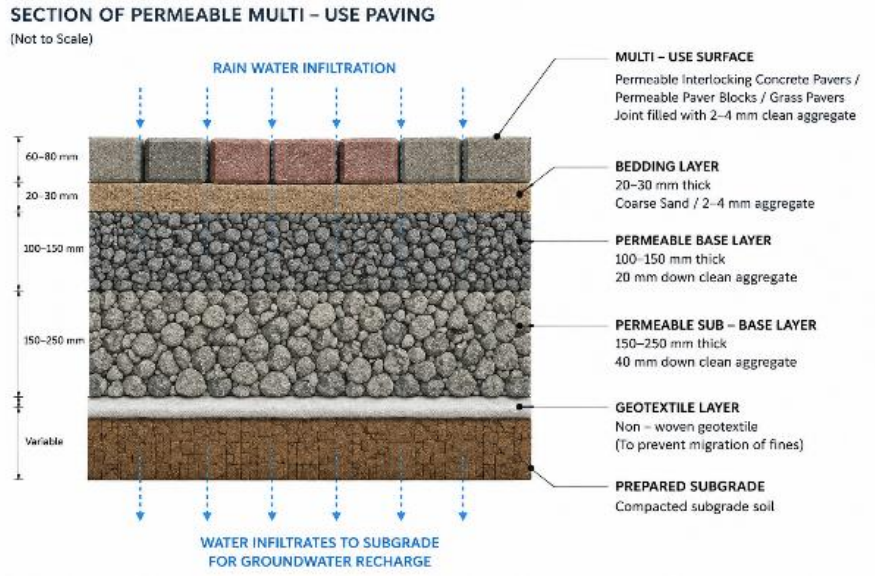










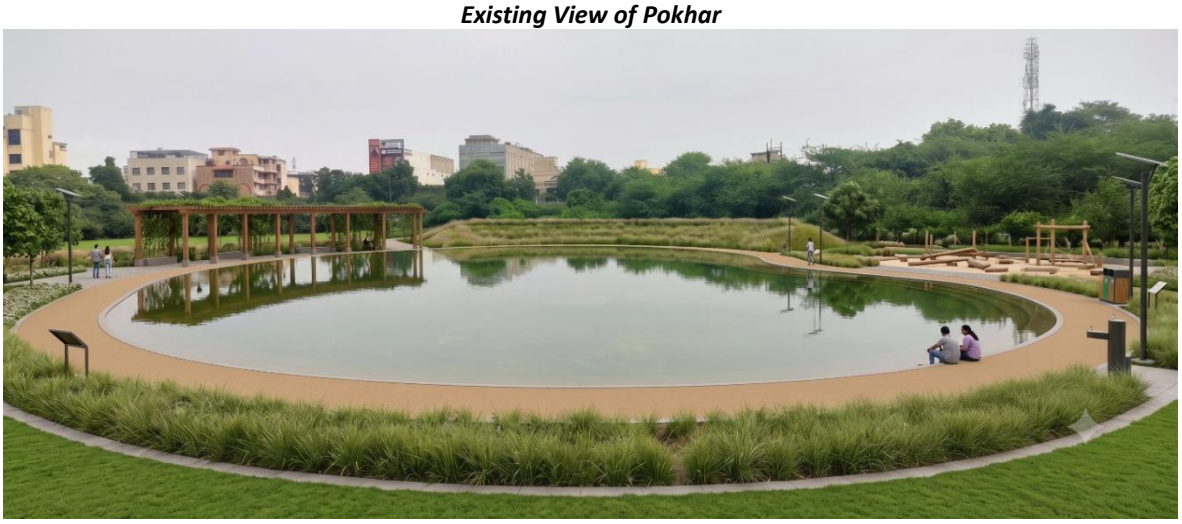


Picture 8-7: 3D views of Proposed Conceptual Plan

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Existing View of Pokhar



Proposed View of Pokhar during season season



Proposed View of Pokhar during dry season

Picture 8-8: Existing and Proposed view of Dampier Nagar Pokhar

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Picture 8-9: Proposed conceptual plan of Dampier Nagar Pokhar

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Block Cost Estimate:

Sl. No	Components	Unit	Dimension / Quantity	Unit Rate (₹ Rupees)	Block Cost (₹ lakhs)	Reference
1.	Site clearance, grading and initial earthwork	sq.m	50000	35	17.50	CPWD DSR 2023 – earthwork/site preparation
2.	Seasonal floodable lawn / graded landscape basin	sq.m	20000	350	70.00	CPWD Horticulture DSR + landscape earthwork benchmark
3.	Permeable multi-use paving	sq.m	2000	2,100	42.00	CPWD DSR 2023; paver-block material benchmark (Central Public Works Department)
4.	Permeable walking track, approx. 2.5 m wide	r.m	720	2,500	18.00	CPWD DSR 2023 + landscape path construction
5.	Native shade trees including pit, manure, planting & establishment	Nos.	375	6,500	24.38	CPWD Horticulture & Landscaping DSR
6.	Native shrubs, groundcover & landscape planting	sq.m	7500	400	30.00	CPWD Horticulture DSR
7.	Perimeter native buffer planting & bioswale	r.m	1200	900	10.80	CPWD Horticulture DSR + nature-based drainage allowance
8.	Timber/steel pergolas with climbing native plants	Nos.	2.4	5,00,000	12.00	Composite rate; CPWD civil/structural works + recent park tender benchmark
9.	Park seating / benches	Nos.	18	18,000	3.24	Government Park furniture market benchmark
10.	Children's nature-play areas with equipment & safety surface	LS	1	15,00,000	15.00	market study
11.	Stepped grass viewing platform / amphitheatre	sq.m	500	2,000	10.00	CPWD DSR 2023 composite civil/landscape rate
12.	Western/main park entrance, entry path & gateway	LS	1	9,00,000	9.00	CPWD DSR 2023 + landscape entrance composite
13.	Solar-powered LED park lights	Nos.	22	65,000	14.30	Bihar government solar-light benchmark; ₹57,284/unit documented in recent Bihar work, rounded upward for 2026 planning (Tenderkart)
14.	Drinking-water fountains	Nos.	2	75,000	1.50	CPWD plumbing/electrical rates + market benchmark

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Sl. No	Components	Unit	Dimension / Quantity	Unit Rate (₹ Rupees)	Block Cost (₹ lakhs)	Reference
15.	Waste & recycling bins	Sets	12	12,000	1.44	Government Park furniture/municipal procurement benchmark
16.	Public amenity/toilet buildings	sq.m	80	35,000	28.00	CPWD DSR 2023 building works, including services/finishes allowance
17.	Solar-powered interpretation/site signage	Nos.	4	25,000	1.00	Composite signage/electrical market rate
18.	Irrigation and water-supply system	LS	1	12,00,000	12.00	CPWD plumbing/horticulture works + landscape irrigation benchmark
19.	Internal electrical distribution and connections	LS	1	10,00,000	10.00	CPWD Electrical DSR / composite allowance
20.	Minor drainage, culverts and surface-water connections	r.m	500	3,500	17.50	CPWD DSR 2023 drainage/civil works
21.	Additional Park furniture/miscellaneous site elements	LS	1	10,00,000	10.00	
Total					357.66	
GST @ 18%					64.38	
Total					422.03	
Consultancy (2%)					8.44	
Contingency @ 10%					42.20	
Grand Total					**472.68**	

Implementation Framework

Responsible agency:
NNMV, MVDA

Estimated budget:
₹ 472 lakhs

Timeline:
Medium term
3-5 Years

Funding sources:
UP Urban Development Funds, Municipal Budget, 15th Finance Commission Grants)

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8.4 Objective 4 Enhance riparian buffer

Riparian stretches comprising vegetated strips alongside rivers and natural drains are essential "living infrastructure" in cities because they perform critical services that cannot be provided by concrete edges. These include:

Flood Control: Riparian stretches absorb excess rainwater and slow down runoff, preventing downstream flooding.

Water Purification: The soil and roots filter out toxic urban pollutants and sediments before they reach the river.

Climate Regulation: They cool the surrounding area thereby combating "Urban Heat Island" effect.

Biodiversity and Recreation: They serve as the primary corridors for wildlife movement and provide valuable green space for human mental health and recreation.

The riparian stretches on both banks of Yamuna River was analyzed and differentiated between low-density and healthy vegetation stretches. Interventions have been proposed for restoration of low-density stretches whereas conservation and preservation has been recommended for the relatively healthy stretches in the following paragraphs.

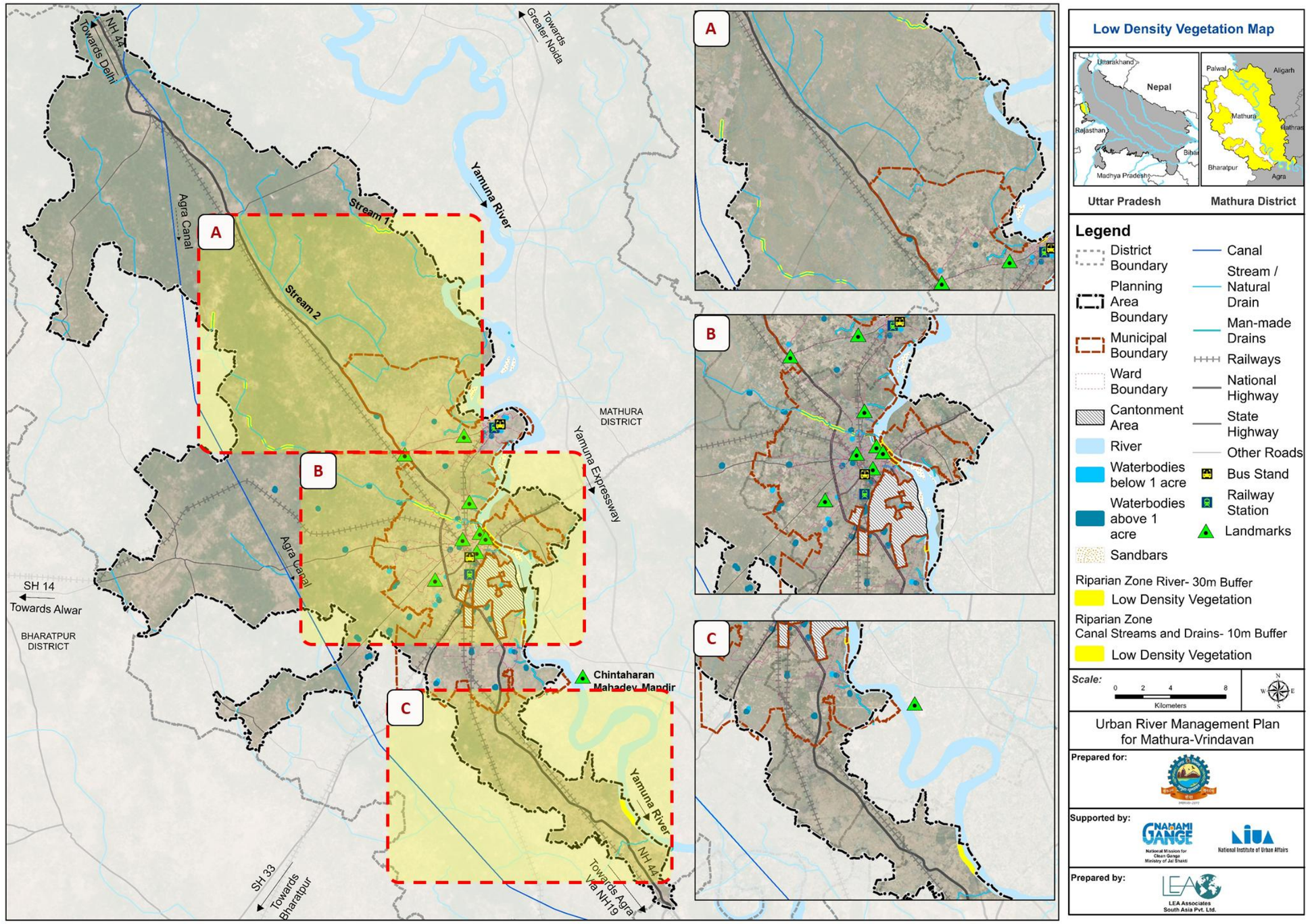


Picture 8-10: low- density Riparian stretches along Yamuna River

8.4.1 Intervention 8: Restoration of low density vegetated riparian stretches

Low density vegetated riparian stretches were observed along the Yamuna River, streams, Masani drain and man-made drains as shown in Picture 8-10, Map 3-5 & Map 3-6. The total length of the low density vegetated riparian stretch along Yamuna River is 5,256 m. These stretches have been (refer Map 8-2), for targeted restoration under the three-Zone Buffer Strategy, proposed on both banks. This approach systematically restores vegetation in layers based on proximity to the river channel, ensuring that ecological and hydraulic functions are strengthened in a coordinated manner.

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Source: 1) Admin Boundaries: Mathura-Vrindavan Masterplan 2031; 2) Municipal Boundary: Nagar Nigam Mathura Vrindavan; 3) Transport Network: OSM; 4) Waterbodies: Braj Teearth Vikas Parishad

Map 8-2: Existing Low-Density Vegetation in Mathura- Vrindavan

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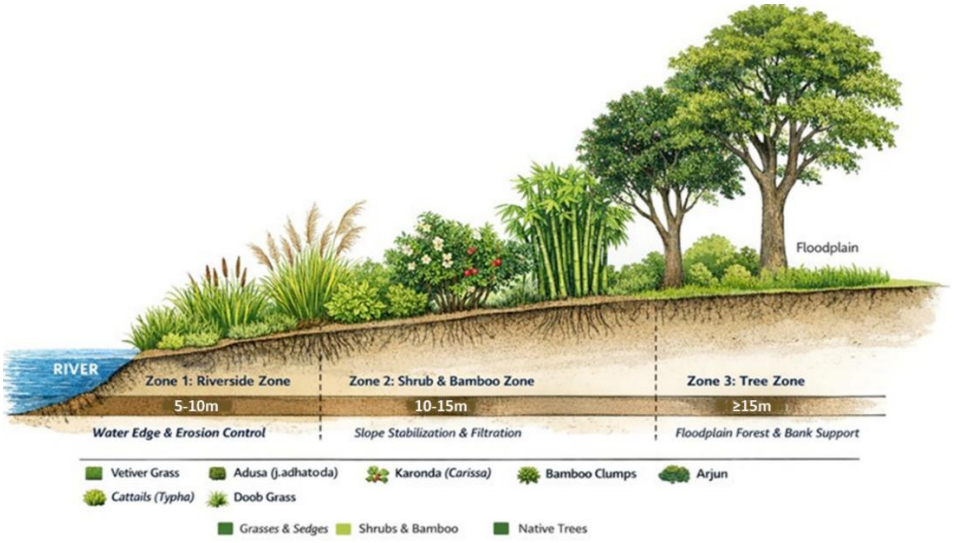
Proposed key actions for restoration

The proposed riparian restoration interventions on the Yamuna River focus on bio-engineering based riverbank stabilization, establishment of a multi-zone riparian buffer and enhancement of native vegetation to improve ecological integrity and flood resilience. Measures such as vetiver and grass plantations, bamboo clumps and live staking are proposed to stabilize eroding banks while avoiding hard engineering wherever feasible.

Components	Key Actions/ Species	Expected Outcome
1. Stabilize Eroding Riverbanks (Bio-engineering)	Vetiver, kans grass, bamboo clumps, live staking, brushwood check structures; avoid concrete where not required	Reduced erosion, bank stability, safer flood margins
2. Establish Three-Zone Riparian Buffer	Zone-1 grasses & sedges, Zone-2 shrubs/small trees, Zone-3 native trees	Reduced nutrient runoff, pesticide interception, flood energy dissipation Biodiversity enhancement, long-term riparian stability
3. Pollution Source Management (Agro & Domestic)	Vegetated filter strips, compost pits, controlled fertilizer use awareness	Reduced nutrient & pesticide loading
5. Replacement of invasive species by Native Species Integration	**Recommended native species (site-suitable):** • Anisomeles indica (Lamiaceae) • Leucas aspera • Achyranthes aspera • Saccharum spontaneum **Implementation notes:** • Gradual removal of invasive plants to avoid exposed bare soil • Sequential planting during pre-monsoon/monsoon • Periodic weed control and survival monitoring	Restoration of native riparian habitat and biodiversity. Gradual suppression of invasive species through healthy native cover. Lower maintenance requirement over time due to self-sustaining native vegetation.

Multi-zonal approach for riparian stretches design:

A 30m wide riparian buffer zone from the edge of river is proposed to be implemented in the identified stretches. The buffer will have three zones as shown in Picture 8-11.



Picture 8-11: Section of the Proposed riparian stretch along eastern and western bank of the Yamuna River

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Zone wise proposed species and its ecological benefits

The riparian buffer is structured into functional zones, with species selected based on hydrological tolerance, rooting depth and ecological performance. Zone-specific plantings are intended to optimize bank stabilization, nutrient filtration and habitat functioning across the river corridor. The native plant species recommended for each riparian zone are summarized in the table below.

Zone	Width	Vegetation Type	Proposed Species with Ecological Benefits
Inner Zone Closest to water (stream edge)	5–10 m	Dense grasses & sedges (soil binding, scour resistance)	**Vetiveria zizanoides (Vetiver):** Extremely strong root network (3–4 m deep), excellent erosion control, traps sediments, absorbs nitrates & phosphates, tolerates flooding and pollutants **Saccharum spontaneum (Kans):** Binds loose alluvial soils, stabilizes sand bars, reduces bank erosion, provides habitat for birds and insects **Cynodon dactylon (Doob grass):** Dense mat, reduces erosion, absorbs nitrogen & phosphates
Middle Zone Mid-slope bank	10–15 m	Shrubs (stability + habitat)	**Vitex negundo (Nirgundi):** Soil binding, medicinal, mosquito deterrent. **Clerodendrum infortunatum (Karonda):** Pollinator support, erosion control. **Dodonaea viscosa (Vilayati mehndi):** Windbreak, stabilizes slopes. **Cassia fistula (scattered):** Nectar for pollinators, ornamental
Outer Zone Higher bank / upland	≥ 15 m	Deep-rooted native trees (long-term stability)	**Terminalia arjuna (arjun):** Classic river-bank tree, strong roots, micro-climate cooling **Ficus religiosa (peepal**): Keystone species, supports birds & bats **Dalbergia sissoo (Shisham**): Nitrogen enrichment, bank stabilization **Azadirachta indica (neem**): Pest deterrent, shade, air quality

Expected Outcome:

After implementing the proposed zonal riparian intervention, the degraded stretches of Yamuna River will be transformed into a continuous and dense green buffer. Grasses, shrubs and native trees will work together to stabilize the riverbanks, reduce flood impacts and improve water quality. This intervention will also enhance biodiversity along the river corridor. The before and after intervention conditions are illustrated in the pictures below.



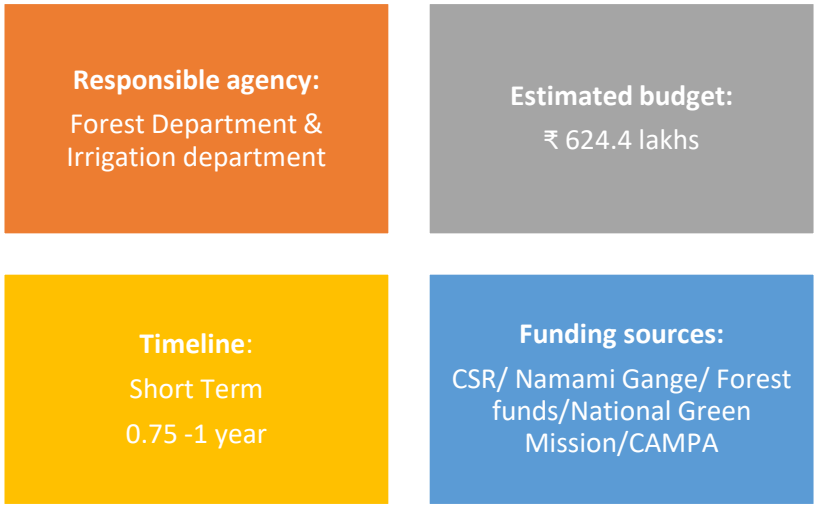
Picture 8-12: Illustration of proposed riparian stretch on Yamuna River

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Block Cost Estimate:

Sl. No	Components	Unit	Dimension / Quantity	Unit Rate (₹ Rupees)	Block Cost (₹ lakhs)	Reference
1	Plantation of Ground covers	Sqmt	52560	200	105.12	Previous Project Experience
2	Plantation of Shrubs	Sqmt	64386	400	257.54	Previous Project Experience
3	Plantation of Trees	Sqmt	26280	600	157.68	Previous Project Experience
Total					520.34	
Contingencies @ 10 %					52.03	
5 years O & M @ 10%					52.03	
Grand Total					**624.41**	

Implementation Framework



The implementation of the riparian buffer restoration along the Yamuna River will be guided by a clearly defined management framework to ensure effective execution, accountability and resource utilization. Key elements of the framework include:

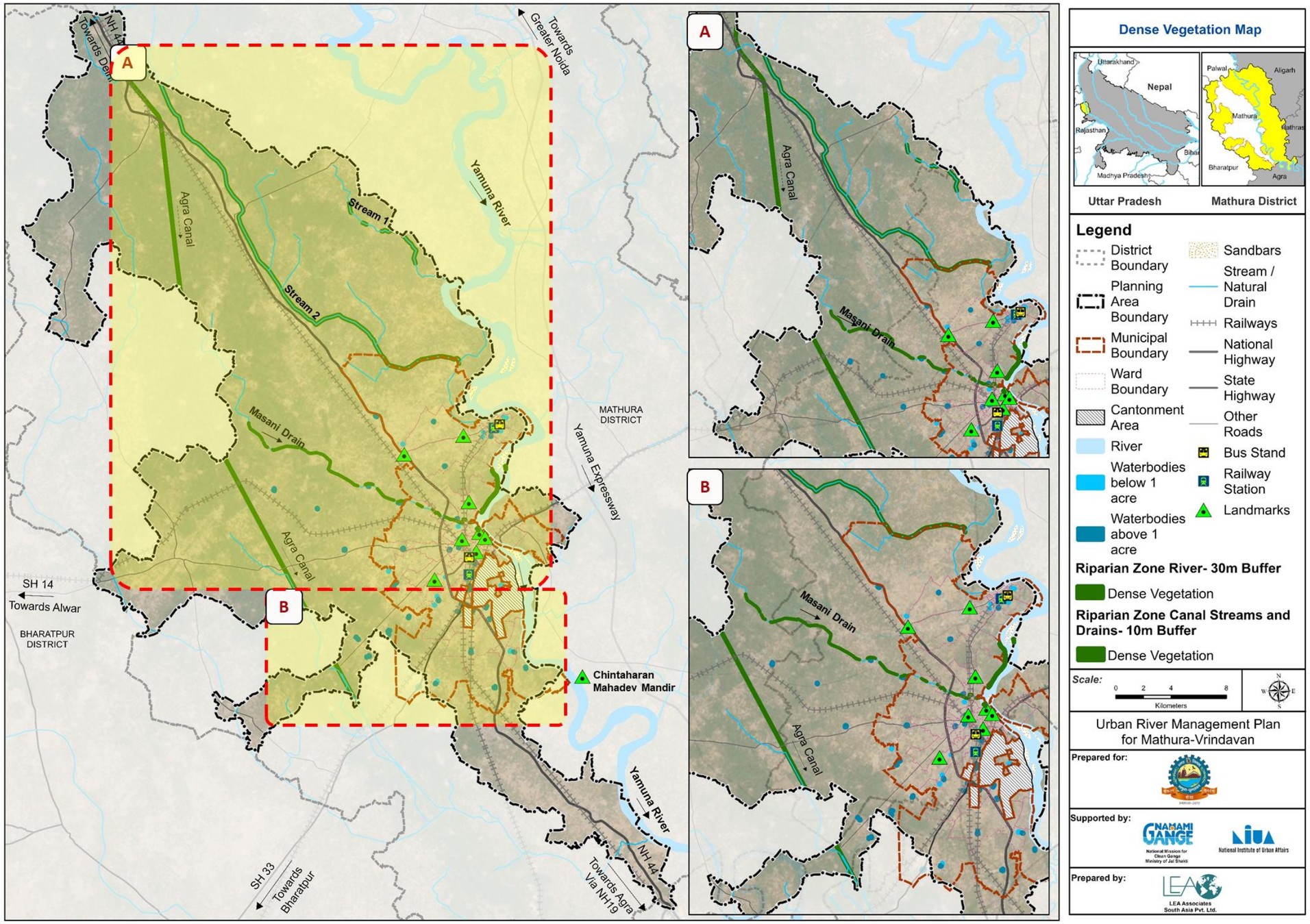
This framework provides a clear and practical approach for restoring low vegetated riparian stretches of the Yamuna River in Mathura- Vrindavan. It defines roles, timelines, costs and funding arrangements to support efficient and sustainable implementation, while ensuring that restoration measures are aligned with local flood conditions, riverbank stability needs and overall river management and environmental objectives.

8.4.2 Recommendation 9: Conservation and Preservation of Natural Dense Riparian Buffer

To protect the undisturbed riparian vegetation highlighted in Map 8-3, conservation measures are recommended for the ecologically intact stretches of the Yamuna River.

These zones provide critical reference conditions (baseline or “benchmark” sites) against which restoration outcomes in degraded reaches can be evaluated and therefore should be protected from clearing, encroachment, grazing and unnecessary disturbance.

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Source: 1) Admin Boundaries: Mathura-Vrindavan Masterplan 2031; 2) Municipal Boundary: Nagar Nigam Mathura Vrindavan; 3) Transport Network: OSM; 4) Waterbodies: Braj Teerath Vikas

Map 8-3: Existing Dense Vegetation Stretches in Mathura- Vrindavan

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The Table 8-6 presents the key management actions proposed for the existing riparian buffer along the Yamuna River. These measures prioritize conservation of healthy stretches, restoration of degraded banks and targeted interventions to maintain ecological stability and long-term river resilience.

Table 8-6: Recommendation for existing riparian stretch conservation and preservation

Well-developed, ecologically functional riparian vegetation that must be preserved in its current state. The key recommended actions are given below:
• Integration of buffer width into flood plain zoning regulations. • Prohibited Permanent construction mining, dumping and river bank encroachment. • Control grazing and fencing in sensitive stretches. • GIS based demarcation and geo fencing of buffer stretches. • Periodic drone and satellite monitoring. • Formation of Community level protection committee. • Penalty, restoration liability and compensatory plantation for violation.

Further, vacant government land in the floodplain should be identified and geo-referenced for development of a biodiversity park and riverine forest with native species, supported by a nursery of native riparian species (Forest Department, Horticulture Department and NNMV).

8.5 Objective 6: Good Quality Return Flow

Maximizing high-quality return flows to the Yamuna River in Mathura-Vrindavan requires moving beyond a predominantly centralized, hard-engineering paradigm toward a more integrated approach that combines spatial planning with nature-based and ecological interventions. The region's unique topographic characteristics, including Mathura's west-to-east gradient and Vrindavan's meandering ridge system, significantly influence drainage patterns. During the monsoon, intense surface runoff results in widespread waterlogging of public spaces while also representing a missed opportunity for groundwater recharge and aquifer replenishment.

8.5.1 Recommendation 10: Transforming Public Parks into Sponge Parks

It is proposed to convert the existing municipal parks in Mathura-Vrindavan into Sponge Parks in a manner that restores their natural hydrological capacity to absorb peak storm loads without significantly affecting daily community use. The parks will integrate sub-surface and nature-based features that blend seamlessly into the active park landscape as follows:

- **Dry Weather / Daily Use:** Open green fields continue functioning as playgrounds (e.g., cricket pitches, football lawns), yoga zones, and community gathering spots. Covered seating, walkways, and play areas remain fully operational.
- **Wet Weather / Monsoon Use:** The same open spaces act as temporary, controlled retention basins. Runoff from surrounding urban roads and temple precincts is directed into the park, where engineered sub-surface layers filter and recharge water into the Yamuna floodplain aquifer, preventing waterlogging in adjacent streets and heritage wards.

The key technical interventions for conversion of public parks into sponge parks are as under:

- **Sunken Multi-Use Grassy Areas (Retention Basins):** Grassy fields are excavated slightly (0.3 to 0.6 meters) to form a gentle basin. During heavy downpours, these temporarily hold excess water, protecting surrounding infrastructure.
- **Bioretention Cells & Rain Gardens:** Strategically placed along park boundaries and low points. These feature dedicated layers of native vegetation, organic mulch, and engineered soil matrices to naturally filter heavy metals and pollutants from road runoff before deep infiltration.

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- **Infiltration Trenches & Bioswales:** Linear, gravel-filled channels cutting along or alongside park footpaths. They slow down rushing storm water and maximize contact with the highly permeable Bhabar gravel layers beneath.
- **Permeable Pathways:** Upgrading existing cracked asphalt or concrete walking tracks with permeable interlocking concrete pavers (PICP) or porous gravel-stabilized pathways, keeping walking routes puddle-free.
- **Step Pools & Sedimentation Stew Pools:** Small, terraced rock basins at major stormwater entry inlets to slow down rushing water and catch heavy silt and trash, keeping the main park areas clean and easy to maintain.



Picture 8-13: Contextual pictures of conversion of a Public Park into Sponge Park

8.6 Objective 7 & 8: Develop Eco-Friendly Riverfronts and Leverage the Economic Potential of the River

The vision for Mathura–Vrindavan's riverfront development is to create a resilient, eco-sensitive and culturally rooted Yamuna riverfront that strengthens the city's religious identity while improving public safety, recreation, tourism and local economic opportunities. Given the profound cultural and spiritual significance of the Yamuna, riverfront development should move beyond conventional beautification and adopt an integrated approach that combines ecological sensitivity, heritage conservation, safe public access and enhanced visitor experience.

The Yamuna riverfront, particularly the historic ghat precincts, represents a major cultural and tourism asset for Mathura–Vrindavan. However, several stretches experience constraints related to limited riverfront width, deteriorated pedestrian surfaces, inadequate edge protection, visual clutter, poor lighting, unorganised waste management, and conflicts between religious activities, pedestrian movement, boating and visitor access. These conditions highlight the need for a context-sensitive approach in which interventions are calibrated to the physical and heritage characteristics of individual ghats rather than adopting a uniform riverfront treatment.

Accordingly, the URMP proposes a combination of targeted riverfront enhancement and heritage-sensitive revitalisation interventions at key ghat locations. At Vishram Ghat, the proposed "Riverfront Renaissance: A Safe, Shaded & Sacred Yamuna Experience" focuses on improving the quality, safety and usability of the riverfront while strengthening its religious and visitor-oriented character. The intervention seeks to create a more comfortable and visually coherent public realm through improved pedestrian movement, shaded spaces, seating, lighting, edge safety, landscape enhancement, visitor amenities and better management of activities along the river edge. The approach aims to enhance

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the experience of pilgrims, residents and tourists while supporting the continued religious use of the ghat.

For narrow historic ghats such as Asikunda Ghat and Yamuna Ghat, where the available riverfront width is limited to approximately 3–5 m, a "Minimum Intervention, Maximum Experience" approach is recommended. The strategy prioritises repair and uniform paving, improved pedestrian circulation, restoration of deteriorated walls, appropriate edge protection, heritage-compatible lighting, rationalisation of utilities and visual clutter, and compact visitor amenities. Blank wall surfaces may be transformed into heritage interpretation and storytelling elements through curated murals, artwork and interpretation panels highlighting the cultural, religious and ecological significance of the Yamuna and Mathura. Lightweight, modular and reversible elements should be preferred, with bulky permanent structures avoided to preserve the historic character and limited physical width of these ghats.

At Keshi Ghat, the proposed "Yamuna Heritage Edge" seeks to integrate riverfront revitalisation, safety and visitor experience enhancement within the historic setting. The intervention should reinforce the visual and cultural identity of the ghat while improving pedestrian accessibility, river-edge safety, lighting, cleanliness, interpretation and visitor amenities. The design should sensitively integrate heritage conservation with contemporary requirements, ensuring that improvements enhance rather than compete with the historic architectural and religious character of the precinct.

Collectively, these interventions position the Yamuna riverfront as a cultural, ecological, recreational and tourism-oriented public asset. Improved visitor infrastructure, heritage interpretation, pedestrian environments, shaded spaces, safe river access and enhanced public-realm quality can increase visitor dwell time and support associated local economic activities, including cultural tourism, boating, traditional commerce, local crafts, food and hospitality services. At the same time, environmentally responsible materials, improved sanitation and drainage, controlled waste generation, appropriate landscape interventions and protection of the river edge will contribute to a more sustainable riverfront environment.

8.6.1 Intervention 9: Vishram Ghat Riverfront Renaissance: A Safe, Shaded & Sacred Yamuna Experience

Vishram Ghat is a major religious and tourism destination on the Yamuna in Mathura and an important part of the city's pilgrimage, riverfront and boating circuit. Its cultural significance and intensive daily use make the safety, functionality and organisation of the river-edge interface a key consideration under URMP.

The existing river edge accommodates ritual bathing, washing, clothes handling, boat boarding and pedestrian movement within a constrained waterfront zone. Informal clothes-drying arrangements, exposed hoses and pipes, temporary objects, limited edge protection and undefined circulation create visual clutter and conflicts between users, boating operations and visitor safety.

The Proposed Intervention seeks to improve safety and visitor experience while retaining the religious, cultural and visual character of the historic ghat. The design prioritises functional segregation, visitor comfort, reversibility and compatibility with the heritage setting.

Existing Condition and Key Issues

- **Un-organized river-edge activities:** Bathing, washing, clothes handling and boat boarding share the same narrow edge, creating user conflicts and movement constraints during peak periods.
- **Unsafe and uncontrolled river access:** Direct entry into the river, without clearly defined access points and continuous edge protection, increases the risk of slips and accidental falls.

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- **Boating–pedestrian conflict:** Boats are positioned immediately along the ghat edge, creating an uncontrolled interface between pedestrians and boat operators.
- **Limited shaded visitor amenity:** The river edge is exposed to strong daytime solar radiation, reducing visitor comfort.
- **Visual and service clutter:** Temporary drying arrangements, pipes, equipment and miscellaneous objects affect the visual quality of the waterfront.
- **Limited wayfinding and safety information:** Clear identification of bathing areas, boarding points, emergency equipment, boating rules and pedestrian routes is required.

Proposed Intervention

The proposal is conceived as a "Safe and Shaded Riverfront Bathing & Boarding Node" integrated with the existing heritage ghat. The intervention is organised into four functional zones:

Zone	Description
Zone A – Existing Heritage Ghat	Retain the historic stone steps, religious activities and visual character with minimum intervention
Zone B – Controlled Bathing Zone	Provide a floating bathing platform connected by an adjustable gangway, with ladders, railings, changing facilities and life-saving equipment
Zone C– Boarding and Viewing Zone	Provide a separate floating deck for boat boarding, visitor waiting and river viewing.
Zone D – Shaded Visitor Zone	Provide a 6 m-high tensile structure over the principal pedestrian/visitor area, with seating, signage and controlled lighting

This zoning separates bathing and boating activities, improves circulation and reduces conflicts along the narrow river edge. The intervention should remain visually subordinate to the historic architecture of Vishram Ghat.

Proposed Components and Design Requirements

i. Floating Bathing Platform: A modular floating platform is proposed to provide a controlled and safer location for ritual bathing

- Approximate size: 12 m × 5 m (60 sqm).
- Modular HDPE/FRP floating system with anti-skid surface and safe, rounded edges.
- SS 304/316 or equivalent corrosion-resistant handrails.
- Anchoring/mooring system suitable for seasonal Yamuna water-level variations.
- Controlled access through the gangway and dedicated bathing ladders.
- Adequate load capacity for simultaneous users.
- Demountable/modular construction to facilitate maintenance and removal during high-flow conditions.
- Viewing Deck and Boarding Point

ii. A separate floating deck is proposed for visitor waiting, river viewing and controlled boat boarding.

- Approximate size: 6 m × 6 m (36 sqm).
- Modular floating construction with anti-skid surface.
- Safety railings on exposed sides and boat mooring/cleat points.
- Controlled connection to the ghat.
- Clear physical and functional separation from the bathing zone.
- Adjustable Gangway

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iii. An articulated gangway will connect the fixed ghat level with the floating facilities and accommodate seasonal water-level fluctuations.

- Anti-skid surface and handrails on both sides.
- Adequate width for two-way pedestrian movement.
- Hinged/adjustable connection with marine-grade fixing hardware.
- Safe gradient wherever technically feasible.

iv. Tensile Shaded Structure

- Approximate covered area: 180 sqm; maximum structural height: 6 m, as indicated in the conceptual proposal.
- PVC-coated polyester/pre-stressed tensile membrane with tubular steel supports.
- Hot-dip galvanised or otherwise suitably protected steel and corrosion-resistant connection hardware.
- Proper anchorage/foundation system.
- UV-resistant and fire-performance-compliant membrane.
- Provision for rainwater drainage.
- Target membrane service life of 10–15 years, subject to manufacturer specifications.
- Safety Railing and Bathing Ladders

v. Continuous corrosion-resistant safety railings should be provided along exposed river edges, floating platforms, gangways and other fall-risk locations. An indicative SS 304 railing height of approximately 1.2 m is proposed.

vi. Bathing ladders with handrails are proposed. Each ladder should provide non-slip treads, rounded edges, corrosion-resistant construction and clearly visible entry/exit points.

vii. River Safety and Emergency Equipment: Emergency stations should be located at strategic, unobstructed and highly visible points and should include, as appropriate:

- Lifebuoy
- Throw rope
- Rescue hook/pole
- Emergency instruction board
- Emergency contact information
- Night-time visibility provisions Lighting
- Signage and Interpretation

viii. Provide a coordinated signage system covering:

- Bathing Area
- Boat Boarding Point
- No Diving
- Use Life-Saving Equipment
- Children Must Be Accompanied
- Boating safety information
- Directional signs
- Heritage interpretation
- Yamuna and environmental awareness

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Block Cost Estimate

Sl. No	Components	Unit	Dimension / Quantity	Unit Rate (₹ Rupees)	Block Cost (₹ lakhs)	Reference
1	Site preparation, cleaning and minor dismantling	sqm	250	450	1.13	CPWD DSR/DAR benchmark; localised budgetary rate
2	40 mm red sandstone paving/replacement flooring over mortar base	sqm	250	1,855	4.64	Recent UP government project analysis using CPWD DSR
3	HDPE modular floating bathing platform including sub-frame, anti-skid deck and anchoring allowance	sqm	200	15,000	30.00	Indian HDPE floating dock/jetty market benchmark; supplier range approximately ₹9,000–₹12,500/sqm, increased for complete installation/anchoring
4	Aluminium/SS gangway with anti-skid deck and handrails	sqm	20	25,000	5.00	Tourism/riverfront DPR benchmark and market composite allowance; final vendor quotation required
5	SS 304 safety railing, approx. 1.2 m high	RM	100	7,500	7.50	CPWD SS 304 railing Ite 10.28;
6	Tensile membrane canopy including steel supports, foundations and fittings; approx. 6 m high	sqm	200	11,741	23.48	Previous Project Experience
7	SS/FRP bathing access ladders with handrails	No.	4	25,000	1.00	Budgetary marine/public-water-edge market allowance
8	Life-saving equipment stations	No.	4	35,000	1.40	Budgetary allowance including lifebuoy, throw line, rescue equipment and signage
9	Mooring cleats/bollards and guide rollers	Set	10	12,000	1.20	Marine fabrication/market allowance
10	Low-glare heritage-compatible LED lighting	No.	18	15,000	2.70	CPWD E&M benchmark with project-specific pole/fixing allowance
11	Electrical distribution, cabling, earthing and control panel	LS	1	2,50,000	2.50	CPWD E&M/market composite allowance
12	Drinking/wash-water point and plumbing	LS	1	1,50,000	1.50	CPWD plumbing/market composite allowance

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Sl. No	Components	Unit	Dimension / Quantity	Unit Rate (₹ Rupees)	Block Cost (₹ lakhs)	Reference
13	Surface drainage/channel improvement	RM	60	2,200	1.32	CPWD civil drainage/market composite allowance
14	Covered segregated waste bins	No.	8	9,000	0.72	Current market allowance
15	Wayfinding, safety and interpretation signage	No.	4	30,000	1.20	Current market allowance
16	Heritage-compatible stone/metal benches	No.	6	20,000	1.20	Current market allowance
17	Edge treatment, painting, sealants and minor finishing	LS	1	2,00,000	2.00	Composite project allowance
				Total	88.48	
				GST @ 18%	15.93	
				Total	**104.41**	
				Consultancy (3%)	3.13	
				Contingency @ 10%	10.44	
				Grand Total	**117.99**	



Picture 8-14: Existing condition and proposed views of Vishram Ghat

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Implementation Framework:



8.6.2 Recommendation 11: Heritage-Sensitive Ghat Revitalization

Given the limited riverfront width of approximately 3-5 m at Asikunda Ghat and Yamuna Ghat, proposed improvements should emphasize minimal and context-sensitive interventions aimed at enhancing pedestrian circulation, safety, aesthetics, and the overall user experience without altering the existing heritage setting.

The existing narrow pedestrian edge should be carefully repaired and uniformly paved using durable, non-slip and heritage-compatible materials, ensuring safe and unobstructed pedestrian movement while retaining the character of the existing ghat. Deteriorated wall surfaces should be restored using appropriate finishes and detailing, with visual enhancements that complement the historic setting. Where blank or visually inactive wall surfaces are available, they may be transformed into heritage interpretation and storytelling elements through curated murals, artwork and interpretive panels depicting the cultural, religious and ecological significance of the Yamuna and Mathura. This approach will enhance the visual quality and visitor experience while reinforcing the cultural identity and heritage character of the ghat.

Key recommendations:

- Improve pedestrian circulation through uniform, obstruction-free and non-slip paving while retaining the maximum feasible clear passage.
- Restore and visually upgrade boundary walls, using compatible finishes and heritage-sensitive detailing.
- Introduce Yamuna and Mathura-Vrindavan themed murals, interpretation panels and storytelling elements to enhance cultural awareness and visitor engagement.
- Provide appropriate edge protection and handrails at vulnerable locations, particularly where the pedestrian path directly abuts the river.
- Introduce low-glare, heritage-compatible lighting to improve night-time safety and enhance the visual character of the ghat.
- Rationalize utilities, temporary installations and visual clutter along the narrow passage.
- Provide compact waste bins and improved drainage without obstructing pedestrian movement.

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- Use consistent signage and wayfinding for safety, heritage interpretation and environmental awareness.
- Avoid bulky permanent structures; where required, use lightweight, modular and reversible elements suitable for the constrained width.

The overall design approach should be “minimum intervention, maximum usability”, transforming the narrow ghat edge into a safe, clean, culturally expressive and visually coherent pedestrian riverfront while preserving its historic character and connection with the Yamuna.



Picture 8-15: Existing condition and proposed views of Asikunda Ghat

8.6.3 Intervention 10: Yamuna Heritage Edge: Integrated Riverfront Revitalization, Safety and Visitor Experience Enhancement at Keshi Ghat

Keshi Ghat, Mathura is an important heritage and religious landmark along the Yamuna and forms a significant component of the city’s pilgrimage and riverfront experience. The existing condition indicates ongoing ghat expansion works, temporary bunding, exposed construction areas and limited visitor amenities. The river edge also lacks a clearly organised interface between bathing, pedestrian movement and boating activities.

The Proposed Intervention aims to transform the ghat into a safe, functional, shaded and visually distinctive riverfront destination, while respecting its religious and historic character.

Proposed Intervention

i. **Ghat and Pedestrian Improvement: The** existing ghat surface should be completed, repaired and finished with durable, non-slip and heritage-compatible paving. Pedestrian routes should remain unobstructed, with appropriate edge protection and handrails at vulnerable locations.

ii. **Organised Bathing and River Access:** Bathing areas should be clearly identified and provided with safe access to the water. Life-saving equipment, handrails and controlled access points should be incorporated at strategic locations.

iii. **Floating Pontoon and Boat Boarding Facility:** A modular floating pontoon/boarding deck with an adjustable gangway is proposed to provide a safer and more organised interface between boats and the ghat. The facility should be demountable and designed to accommodate seasonal variations in Yamuna water levels.

iv. **Visitor Amenities:** Compact changing/privacy rooms should be provided at suitable locations without obstructing the ghat circulation. Seating should be integrated into the design using heritage-compatible materials.

v. **Shade and Landscape**: Existing trees should be retained wherever feasible, supplemented by native, low-maintenance shade trees and appropriately designed tree pits. Planting should improve visitor comfort without blocking important heritage views.

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vi. **Heritage Interpretation and Wall Murals:** Blank and visually deteriorated wall surfaces should be transformed into curated mural and interpretation zones depicting the mythology, history, cultural traditions and ecological significance of the Yamuna. The murals should follow a coordinated artistic language and avoid visual clutter.

vii. **Lighting, Safety and Services:** Provide warm-white, low-glare heritage-compatible lighting, particularly along steps, pedestrian routes, boarding areas and gathering spaces. Utilities should be organised and concealed/rationalised wherever feasible. Covered waste bins, improved drainage and clear safety/wayfinding signage should be provided.

viii. **Design and Management Principle:** All river-edge structures should be lightweight, modular and reversible wherever feasible, with minimum permanent intervention within the active river zone. The design should maintain clear sightlines to the Yamuna and preserve the visual prominence of the historic ghat.



Picture 8-16: Existing condition and proposed views of Keshi Ghat

Block Cost Estimate

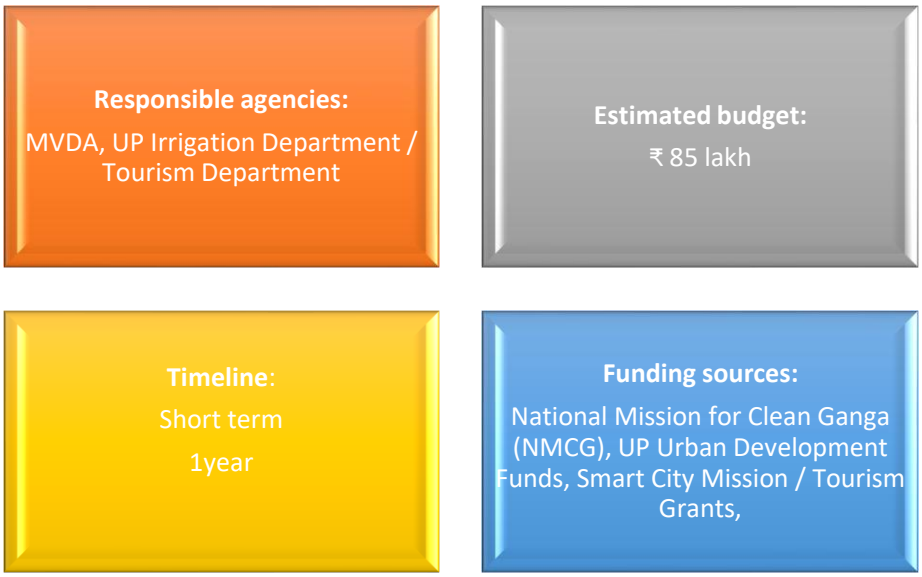
Sl. No	Components	Unit	Dimension / Quantity	Unit Rate (₹ Rupees)	Block Cost (₹ lakhs)	Reference
1	Ghat paving/surface improvement	sqm	500	2,300	11.50	Previous Project Experience
2	Modular floating pontoon/boarding deck	sqm	100	15,000	15.00	HDPE floating dock market benchmark
3	Adjustable gangway with handrails	sqm	15	25,000	3.75	Market-based budgetary allowance
4	SS 304 safety railing	RM	100	7,500	7.50	CPWD SS railing benchmark
5	Changing/privacy cubicles	No.	4	60,000	2.40	Budgetary market allowance
6	Heritage/Yamuna wall murals and interpretation panels	sqm	200	5,000	10.00	Market-based budgetary allowance
7	Native shade trees with tree pits	No.	10	25,000	2.50	Horticulture/landscape market allowance
8	Heritage-compatible LED lighting	No.	20	15,000	3.00	CPWD E&M / market benchmark
9	Life-saving equipment stations	No.	4	35,000	1.40	Budgetary marine/public-water-edge allowance
10	Covered segregated waste bins	No.	10	9,000	0.90	Current market allowance
11	Heritage-compatible benches	No.	5	20,000	1.00	Current market allowance

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Sl. No	Components	Unit	Dimension / Quantity	Unit Rate (₹ Rupees)	Block Cost (₹ lakhs)	Reference
12	Drainage/channel improvement	RM	60	2,200	1.32	CPWD civil/market composite allowance
13	Utility rationalisation and minor services	LS	1	1,50,000	1.50	CPWD/market composite allowance
14	Edge treatment, finishing and minor works	LS	1	2,00,000	2.00	Composite project allowance
Total					63.77	
GST @ 18%					11.48	
Total					75.25	
Consultancy (3%)					2.26	
Contingency @ 10%					7.52	
Grand Total					**85.03**	

The Proposed Intervention will reposition Keshi Ghat as a safe, shaded and culturally expressive riverfront node, integrating heritage interpretation, improved pedestrian infrastructure, organised boating, visitor amenities and landscape enhancement while maintaining the visual and spiritual relationship between the historic ghat and the Yamuna.

Implementation Framework:



8.7 Objective 9: Inculcate river-sensitive behaviour 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 Yamuna River. The detailed interventions are listed in the sections below.

8.7.1 Intervention 11: River Awareness Campaign – "Meri Nadi, Mera Shahar"

The river and streams in Mathura-Vrindavan are not yet fully integrated into the daily consciousness of citizens. Current IEC initiatives primarily focus on general cleanliness under the Swachh Bharat Mission, with minimal focus on river-specific awareness. As a result, several critical gaps have been identified:

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a. Lack of dedicated river-centric IEC infrastructure such as murals, interpretive signage, kiosks and digital platforms.

b. Weak visibility of river heritage and biodiversity in awareness campaigns.

c. Minimal citizen engagement beyond rallies and one-off events, leaving stewardship opportunities untapped.

Proposed Intervention:

- **Radio Jingles:** Develop catchy, multilingual jingles in Hindi to broadcast river conservation messages across local FM channels.
- **Street Plays:** Organize nukkad nataks in markets, colonies and public spaces dramatizing issues like plastic pollution, waste dumping and river health at major junctions.
- **Wall Art Murals**: Commission murals at ghats, bridges and busy public walls depicting river heritage, biodiversity and conservation slogans.
- **Digital Outreach:** Create WhatsApp broadcast groups to share short videos, event updates and citizen pledge campaigns.
- **Community Engagement**: RWAs, shopkeepers and NGOs will be mobilized to co-host events, ensuring broad participation.
- **Monitoring:** Campaign reach will be tracked through participation counts, social media engagement and feedback surveys.

Frequency: The campaign will be conducted on a quarterly basis, ensuring regular outreach and sustained engagement throughout the year.

Block Cost Estimate:

Sl. No	Components	Content/Number	Unit Rate	Total Cost		Remarks	Duration (Months)
				in ₹ Rupees	in ₹ lakhs		
A	Street Plays (Nukkad Natak)	10 plays annually	20,000	2,00,000	2.00	15–20 (actors, coordinators)	12
B	Wall Art Murals & Interpretive Signage	10 murals	30,000	3,00,000	4.00	At major ghats	12–18
		5 interpretive signage boards	20,000	1,00,000			
C	Digital Outreach Setup	2 Radio jingles in Hindi & English languages (Production + Initial Airtime)	1,00,000	2,00,000	2.00	initial FM broadcast package ₹1.0 lakh	3–6
		10 short videos for broadcasting in social media	25,000	2,50,000	2.50	3 min short-video by content creator	
D	Community Engagement Workshops	4 workshops	50,000	2,00,000	2.00	(Venue, materials, facilitation)	Quaterly
E	Monitoring & Feedback Tools		50,000	1,50,000	1.50	Baseline survey; quarterly feedback; analytics setup	12

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Sl. No	Components	Content/Number	Unit Rate	Total Cost		Remarks	Duration (Months)
				in ₹ Rupees	in ₹ lakhs		
	Total				14.00		12
	Contingency (10%)	—			1.40		12
	Total				**15.40**		

Implementation Framework:



8.7.2 Intervention 12: Distribution of Biodegradable Kits at Major Ghats

Along the Yamuna River near Keshi Ghat and Vishram Ghat ritual activities such as Ritual bathing, Deepadan and Aartis 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**: SHGs shall be trained to prepare eco-friendly ritual kits comprising fresh flowers, tulsi leaves, diyas, cotton wicks, natural incense and other locally accepted ritual materials packaged in biodegradable or compostable containers. The contents of the kits shall be developed in consultation with temple committees and priests to ensure cultural acceptability and encourage widespread adoption.
- **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.

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Block cost estimate:

Sl. No	Component	Number of people/ staffs to be engaged	Rate / Unit	Cost (₹ Lakhs)	Remarks
1	Kit Preparation (SHG-led)	~250 kits	20 per kit	5000	
2	Distribution Channels Setup	10-12 stall operators at ghats, festival congregation points, vendor selling points stalls near temples	Lump sum	1	Stalls at high-footfall sites ensure accessibility. Costs cover kiosks, logistics and seasonal operation during festivals
3	Katha vachak and IEC campaigns	6–8	2,000–3,000	0.8–1.0	Priests are cultural influencers; advocacy drives during rituals ensure behavioural change. Reduced cost by leveraging existing temple committees instead of new campaigns
4	Monitoring & Feedback			1.2–1.5	Monitoring tied to festivals; quarterly audits track kit usage and awareness impact. Ensures accountability and adaptive management
				3.25	
	Contingency	–	–	2	
	Total			5.25	

Location	Number of Locations	Standard Kit Allocation per Location	Total Biodegradable Kits Required
Yamuna Ghats	21 Ghats	2–5 kits (based on footfall)	65 – 75
Major Temple Complexes	2 Major Sites	10–15 kits	25 – 30
Intermediate/Parikrama Temples	~25 Temples	3–5 kits	75 – 100
Sacred Kunds	14 Kunds	2 kits	28 – 30
Parikrama Path Entry/Exit Hubs	5 Key Junctions	4–6 kits	20 – 25
Total Requirement			260

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Implementation Framework:

Responsible agencies: NNMV; **Supporting Agencies:** Temple committees, SHGs, NGOs	**Estimated budget:** ₹ 5.25 lakh
Timeline: Short term 0.1-0.5 year	1. Municipal budget 2. CSR (local businesses, flower vendors) 3. Temple trusts & SHG cost-sharing 4. IEC support (Namami

8.7.3 Intervention 13: Installation of interpretive signages and boards

Mathura-Vrindavan continues to face ecological stress from solid waste dumping, used 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, behavioural change in Mathura-Vrindavan 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:** The Multilingual boards shall be placed at strategic public locations like- Keshi ghat, Vishram ghat and Bengali ghat 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 behaviour.
- **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.

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Picture 8-1: A concept design of Behavioral Science Design and River ecology Awareness board

Block cost estimate:

Part A

Sl. No	Components	Content/ Number	Unit Rate	Amount (₹ Lakhs)	Duration of Task	Number of people/ staffs to be engaged	Remarks
1	Interpretive Sign Boards (Multilingual)	26	25000	6.5	4–5 months	6–8	A) Consideration for Number: - installation at 26 strategic locations B) Unit Rate: 25000/- includes the following: i) labour ii) material Considered material for signage boards: Durable, weather-resistant material
2	Content Development (Design + Messaging)	Lump sum (annual refresh of slogans, visuals, narratives)	–	2	2–3 months	6–8	Covers content research, graphic design, community and printing masters. Cultural experts and local schools co-

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Sl. No	Components	Content/ Number	Unit Rate	Amount (₹ Lakhs)	Duration of Task	Number of people/ staffs to be engaged	Remarks
							create content ensuring ecological and heritage accuracy
3	Installation & Logistics (Boards + RCC Base)	Lump sum	–	2.6	2–3 months	8–10	Includes loading/unloading, RCC base concreting at ghat/ponds, iron frame at nallahs
4	Community Co-design Workshops	2 workshops	28000	0.5	3–4 months	5–8	Ensures cultural resonance; communities shape language, symbols, narratives
5	Maintenance & Quarterly Review	Lump sum (quarterly cleaning, repainting, monitoring)	20,000 per quarter	0.2	Yearly		Regular upkeep sustains visibility and relevance
	Total Cost			11.8			
6	Contingency Fund	Lump sum	–	1.18	–	–	Covers unforeseen costs (damage, festival surges, urgent repairs)
	Total			12.98			

Part B- Recurring Cost

Sl. No	Component	Revised Details	Frequency	Annual (Lakhs)	Rationale
1	Content refresh & updates	26 boards refreshed @ ₹6,000 + 26 boards cleaned @ ₹400 each	Annual	1,66,400	Only high-footfall boards refreshed; templates reused

Part C- Fabrication & Materials

- MS Sheet (14 gauge, ~1.6 mm thickness) – durable, rust-resistant, suitable for outdoor use.
- Iron frame with welding – provides structural stability.
- RCC/concrete base – seepage-proof foundation for installation at ghats, ponds and nallahs.
- Protective enamel paint / powder coating – weather-resistant finish to withstand monsoon and sun exposure

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Implementation Framework:

Responsible agencies: District Ganga Committee, NNMV	**Estimated budget:** ₹ 12.9 lakhs
Timeline: Short term 0.1-0.5 year	**Funding sources:** **IEC Budget:** NNMV & Namami Gange, **CSR Funds**

8.7.4 Intervention 14: River Storytelling Corners for community-led narratives and cultural connection

Cultural and heritage connections to rivers in Mathura-Vrindavan remain underutilized in IEC activities. Current campaigns emphasize cleanliness but neglect emotional and historical ties. As a result, several critical gaps have been identified:

a. Lack of platforms for cultural and biodiversity storytelling to highlight river heritage
b. Absence of interactive community spaces (story circles, heritage boards) at ghats.
c. Minimal involvement of elders, students and cultural groups in river awareness, limiting intergenerational learning.

Proposed Intervention:

- **Story Circles & river heritage board:** Host weekly storytelling sessions at ghats and parks led by historians, elders and other community people at ghats majorly and in major temples. Install illustrated panels at ghats narrating myths, local histories, biodiversity facts and folk tales.
- **Cultural Performances:** Collaborate with local groups to perform traditional songs, poems and folk narratives about rivers at ghats during evenings were high flow of visitors.
- **Digital story walls:** Install QR codes boards linking to audio/video recordings at storytelling corners with heritage stories, biodiversity facts and legends accessible via mobile devices.
- **Digital Archiving:** Record and preserve stories in audio/video format for wider dissemination.
- **Community Engagement:** RWAs, schools and NGOs to be involved in curating and presenting stories.
- **River Story Festivals:** Organise annual events showcasing plays, folk dance and exhibition on river heritage.
- **Training Story Facilitators and Workshops for Teachers:** Train local youth and cultural groups to moderate storytelling circles. Equip educators with river heritage modules to integrate into school curricula.

Frequency: The storytelling sessions will be held bi-monthly, ensuring regular cultural engagement and continuity throughout the year.

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Block Cost Estimate:

Sl. No	Components	Content/Number	Unit Rate	Total Cost		Remarks	Duration (Months)
				in ₹ Rupees	in ₹ lakhs		
A	**Story Circles Setup**	5 ghats + 5 temples	75,000	7,50,000	7.50	seating mats, sound system, IEC boards	6–12
B	**Cultural Performance Infrastructure**	4 performances annually	1,00,000	4,00,000	4.00	10–15 (technicians, performers)	12
C	**Digital Story Walls (QR Boards)**	20 QR boards	25,000	5,00,000	5.00	8–10 (IT staff, volunteers)	12
D	**Training Story Facilitators & Teacher Workshops**	4 workshops	50,000	2,00,000	2.00	20–25 (youth, teachers)	Quarterly
	Total				18.50		
	Contingency (10%)	—			1.85		—
	Total Capital Cost (A–H)				**20.35**		
Recurring Annual Costs							
1	**Story Circles**	6 sessions/year	25,000	1,50,000	1.50	20–25 (facilitators, volunteers)	Bi-monthly
2	**Cultural Performances**	4 performances/year	30,000	1,20,000	1.20	15–20 (performers, technicians)	Monthly
3	**Monitoring & Evaluation**	Surveys, participation counts, feedback	80,000	80,000	0.80	6–8 (surveyors, analysts)	Quarterly
	Total Recurring Cost				**3.50**		

Implementation Framework:

Responsible agencies:
NNMV
Supporting Agencies: Religious Boards, SHGs, NGOs

Estimated budget:
₹ 20.35 lakh

Timeline:
Mid term
3-5 Years

Funding sources:
1. SBM(U) and NMCG subsidies
2. CSR funds from local industries/businesses
3. Funding from religious boards & funeral trusts

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8.7.5 Intervention 15: Engaging Temple and Mosque Networks for River Protection

Religious practices along the river in Mathura-Vrindavan often contribute to pollution, particularly through the use of non-biodegradable materials. While priests and imams hold influence within their communities, their active involvement in river stewardship remains limited. The key gaps identified are:

a. Lack of eco-friendly rituals and environmental awareness during religious events.

b. Weak collaboration between religious leaders and municipal authorities.

c. Absence of clean-up drives aligned with festival seasons.

d. Limited use of digital tools for IEC dissemination and citizen engagement.

Proposed Intervention:

- Collaborate with priests, imams and religious leaders to promote eco-conscious rituals during festivals and riverbank ceremonies.
- Facilitate sermons and community talks focused on river cleanliness and the harmful impact of waste dumping.
- Encourage the use of biodegradable offerings and discourage plastic and hazardous waste near riverbanks.
- Coordinate clean-up drive activities before, during and after major religious festivals.
- Adapt successful initiatives such as “Ghat Par Prarthana” under Namami Gange to the local context.

Block Cost Estimate:

Sl. No	Components	Content/Number	Unit Rate	Total Cost		Remarks	Duration (Months)
				in ₹ Rupees	in ₹ lakhs		
1	**Eco-conscious Ritual Promotion**	20 sermons/talks	20,000	4,00,000	4.00	20–25 (religious leaders, IEC staff)	Monthly/ Festival-linked
2	**Biodegradable Offering Advocacy**		2,50,000	2,50,000	2.50	30–40 (SHG women, IEC volunteers)	Quarterly
3	**Clean-up Drives (Festival-linked)**	6 Drives annually	1,00,000	6,00,000	6.00	50–60 (volunteers, sanitation staff)	Pre/post festivals
4	**Digital IEC Dissemination**		1,50,000	1,50,000	1.50	8–10 (content creators, moderators)	Quarterly
5	**Monitoring & Evaluation**		80,000	80,000	0.80	6–8 (surveyors, analysts)	Quarterly
	Total Cost (1–5)				**14.80**		

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Implementation Framework:



8.8 Objective 10: Engage Citizens in River Management Activities

Objective 10 focuses on active citizen participation and structured stewardship of the rivers in Mathura-Vrindavan. 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.

8.8.1 Intervention 16: Formation of River Sabha Committees at City-Level

One of the most pressing environmental challenges in Mathura-Vrindavan is the indiscriminate dumping of solid waste into the city nallahs, which is degrading the water quality and also undermining the ecological health of Yamuna River. 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 with defined roles and responsibilities.
- The committee shall comprise of SHGs, youth leaders, RWAs and ward officials to ensure diverse representation.
- Identify dumping hotspots and nallahs discharging into river,
- 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.

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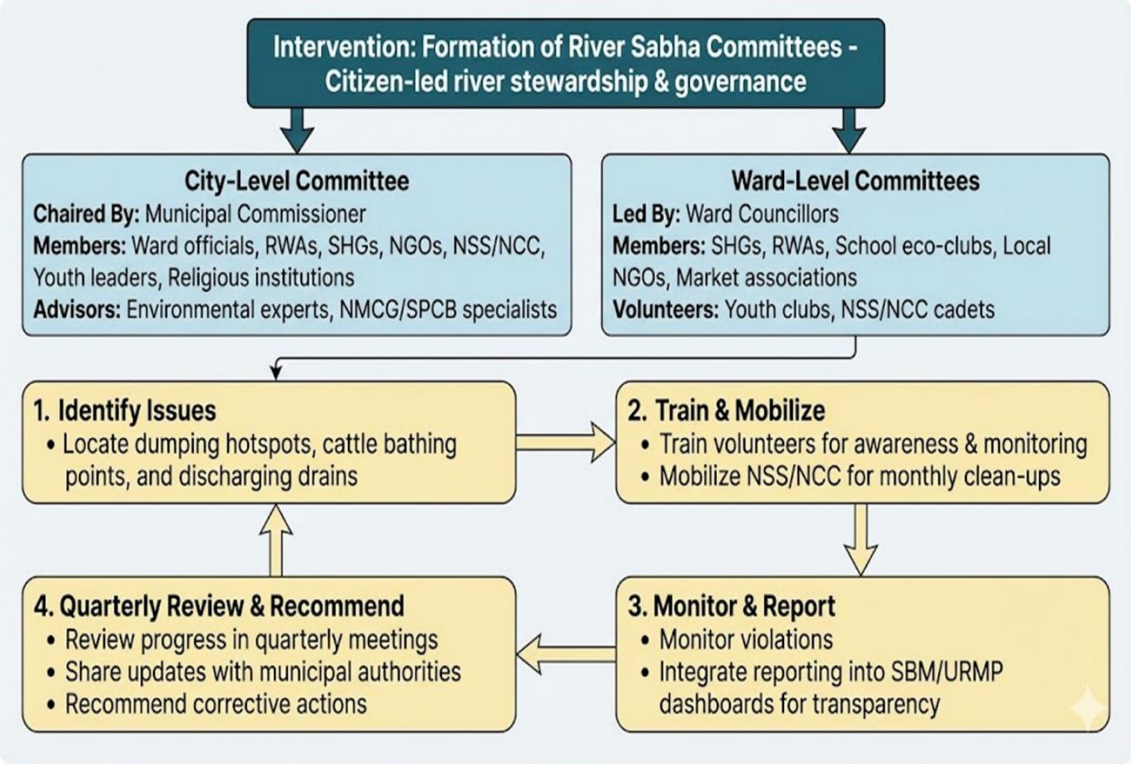


Figure 8-3: Composition of Committee and working model

Block cost Estimate:

Sl. No	Components	Content/Number	Unit Rate	Total Cost		Remarks	Duration (Months)
				in ₹ Rupees	in ₹ lakhs		
A	**Orientation Workshop**	1	75,000	75,000	0.75	70 committee members	6
B	**Training of Volunteers & SHGs**	200 volunteers	3,500	7,00,000	7.00		6–12
C	**Digital Dashboard Integration**		2,50,000	2,50,000	2.50	4-5 (IT staff, trainers)	6
	Total				10.25		
	Contingency (10%)	—			1.03		—
	Total Capital Cost				**11.28**		
Recurring Annual Costs							
1	**Quarterly Committee Meetings**	4 meetings/year	50,000	2,00,000	2.00	70 committee members, facilitators	Quarterly
2	**Awareness Drives & Monitoring**	12 drives/year	50,000	6,00,000	6.00		Monthly
3	**Clean-up Campaigns (Riverbank/Nallahs)**	6 campaigns/year	50,000	3,00,000	3.00		Bi-monthly
4	**Monitoring & Reporting**		1,00,000	1,00,000	1.00	Surveys, violation tracking,	Quarterly

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Sl. No	Components	Content/Number	Unit Rate	Total Cost		Remarks	Duration (Months)
				in ₹ Rupees	in ₹ lakhs		
						dashboard updates	
	Total Recurring Cost (1–4)				**12.00**		

Implementation Framework:

Responsible agencies:
NNMV;
Supporting Agencies: RWAs, SHGs and NGOs

Estimated budget:
₹ 11.28 lakh

Timeline:
Medium term
3-5 years

Funding sources:
Municipal budget, CSR contributions.

8.8.2 Intervention 17: "Yamuna Jal Mahotsav: Organizing Annual River Heritage and Conservation Festival

In Mathura-Vrindavan, there is no dedicated cultural anchor for river awareness. Citizen participation remains sporadic, with limited integration of schools, RWAs and NGOs. The gaps identified are:

a. Absence of a structured "River Day" or annual festival to institutionalize river pride.
b. Citizen participation remains event-driven and irregular, with limited continuity.
c. Weak integration of schools, RWAs and NGOs into cultural programs, reducing visibility and ownership.

To institutionalize river awareness and pride through an annual cultural festival that blends ecology, heritage and community participation. The festival will serve as a flagship event to celebrate Mathura-Vrindavan's River, promote eco-friendly practices and strengthen citizen engagement.

Proposed Intervention:

- Host annual river festival featuring cultural programs, eco-product stalls and exhibitions.
- Organize school debates, poster-making and eco-art competitions on river themes.
- Promote sustainable crafts and goods by local artisans through eco-stalls.
- Conduct guided river walks, folk dances and storytelling sessions highlighting river heritage.
- Publish annual reports documenting participation, ecological pledges and cultural outcomes.
- Engage RWAs, schools, NGOs and religious groups as co-hosts events to ensure inclusivity.

Frequency: The river festival to be celebrated annually highlighting on river conservation and cultural celebration.

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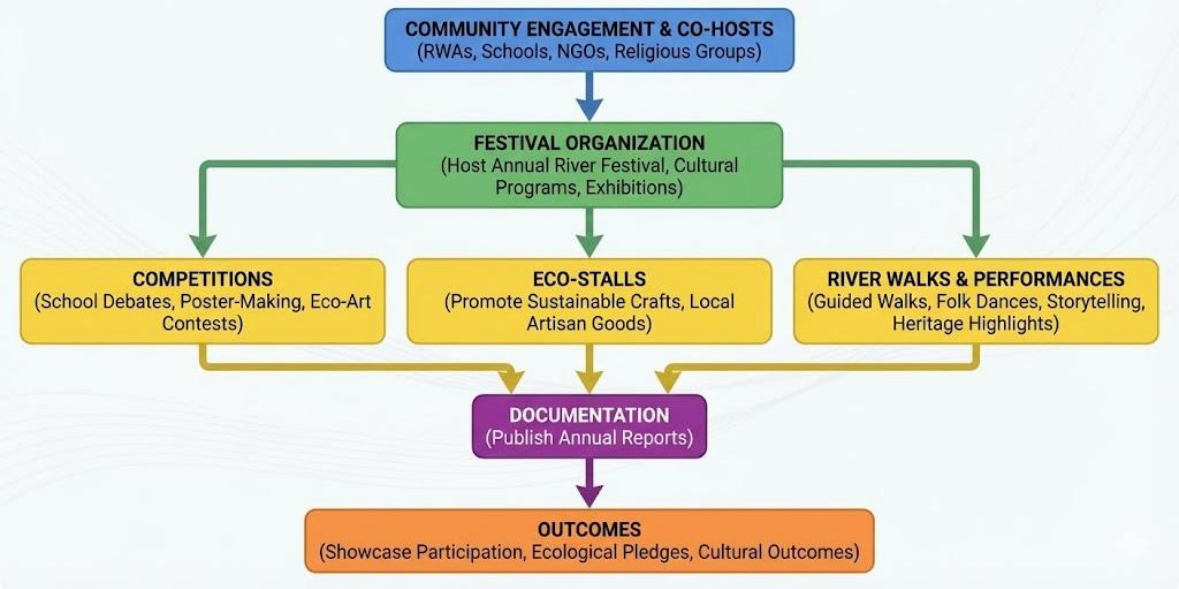


Figure 8-4: Annual River festival Organization and activity flow

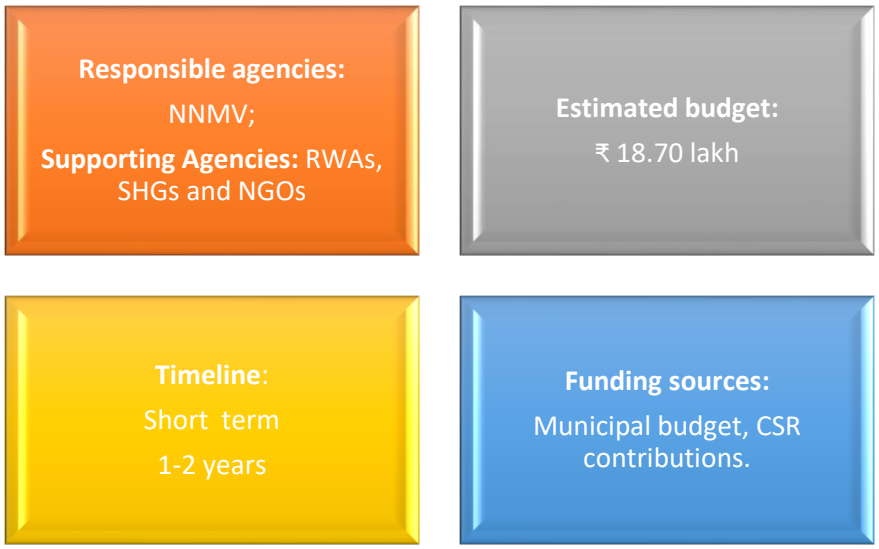
Block Cost Estimate:

Sl. No	Components	Content/Number	Unit Rate	Total Cost		Remarks	Duration (Months)
				in ₹ Rupees	in ₹ lakhs		
A	**Infrastructure Setup**	1-time	6,00,000	6,00,000	6.00	technicians, artisans, stall operators)	6–12
B	**Training of Schools & RWAs**	10 workshops	50,000	5,00,000	5.00	teachers, youth leaders)	6–12
C	**Eco-product & Craft Promotion Setup**	20 artisan kiosks	25,000	5,00,000	5.00	SHG women, artisans)	12
D	**IEC & Branding Materials**		1,00,000	1,00,000	1.00	IEC volunteers, designers)	6
	Total				17.00		
E	**Contingency (10%)**	—			1.70		—
	Total Capital Cost (A–E)				**18.70**		
Recurring Annual Costs							
1	**Cultural Programmes**	10 events	50,000	5,00,000	5.00	performers, facilitators)	Annual
2	**School Competitions**	10 schools	20,000	2,00,000	2.00	teachers, students)	Annual
3	**Eco-stalls & Exhibitions**	20 stalls	15,000	3,00,000	3.00	stall operators, artisans)	Annual
4	**Guided River Walks & Storytelling Sessions**	4 walks + 4 sessions	25,000	2,00,000	2.00	guides, storytellers)	Annual

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Sl. No	Components	Content/Number	Unit Rate	Total Cost		Remarks	Duration (Months)
				in ₹ Rupees	in ₹ lakhs		
5	**Annual Report & Documentation**		80,000	80,000	0.80	writers, editors)	Annual
	Total Recurring Cost (1–5)				**12.80**		

Implementation Framework:



8.8.3 Intervention 18: Introducing Youth Internship Program – "Yamuna Warriors"

College students in Mathura-Vrindavan have limited structured opportunities to engage in river management. While youth participation exists during events, it lacks continuity, skill-building and institutional recognition. The following gaps have been identified:

a. Absence of formal internship or volunteer programs dedicated to river stewardship and solid waste management

b. Limited integration of youth into IEC campaigns and field-based activities.

c. Low visibility and inadequate recognition of youth contributions to river health.

Proposed Intervention:

Launch the "Yamuna Warriors" Internship Program to provide hands-on experience and engage college students in river management activities.

- Offer short-term internships involving IEC campaigns, surveys and awareness drives.
- Offer skill-building opportunities through field experience, data collection and community engagement.
- Recognize contributions with certificates to enhance academic and career profiles.
- Partner with colleges and youth organizations for recruitment and outreach.

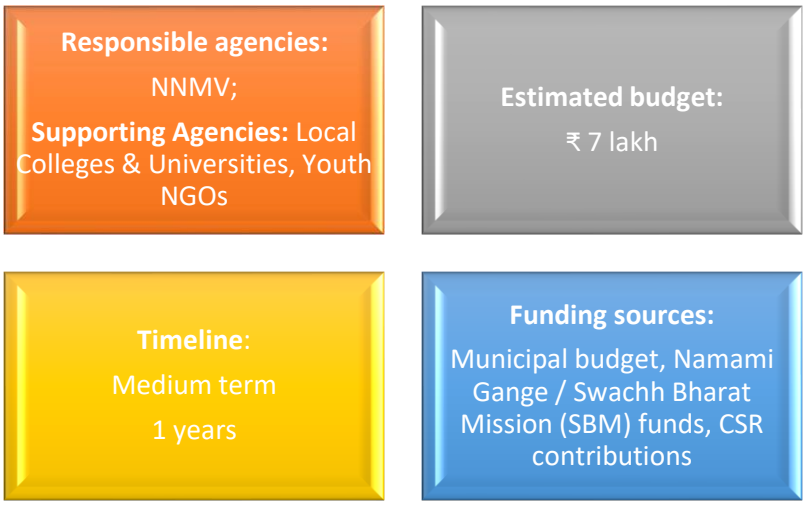
Frequency: Conduct internship program bi-annually, allowing two cohorts per year for sustained engagement and continuous contribution to river health initiatives.

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Block Cost estimate:

Sl. No	Components	Content/Number	Unit Rate	Total Cost		Remarks	Duration (Months)
				in ₹ Rupees	in ₹ lakhs		
1	**Intern Stipends**	100 interns	3,000	3,00,000	3.00	2 cohorts/year × 50 interns each	Bi-annual
2	**Training & Orientation Workshops**	2 workshops/year	50,000	1,00,000	1.00		
3	**Field Activities & IEC Campaigns**		1,00,000	1,00,000	1.00	Awareness drives, surveys, clean-up events; logistics	Bi-annual
4	**Certificates & Recognition Events**		25,000	25,000	0.25	Printing, awards, small felicitation events	Bi-annual
5	**Monitoring & Evaluation**		50,000	50,000	0.50	Surveys, feedback, reporting	Bi-annual
	Total Annual Cost (1–5)				**7.00**		

Implementation Framework:



8.8.4 Intervention 19: Community Composting & Waste Segregation Workshops

Waste segregation and composting practices in Mathura-Vrindavan remain inconsistent. Households and community groups lack practical training and awareness, leading to informal disposal into drains and riverbanks. As a result, several critical gaps have been identified:

a. Limited hands-on training for composting and segregation at the source.

b. Weak engagement of SHGs and RWAs in sustainable waste practices.

c. Absence of community success stories to motivate wider adoption.

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Proposed Intervention:

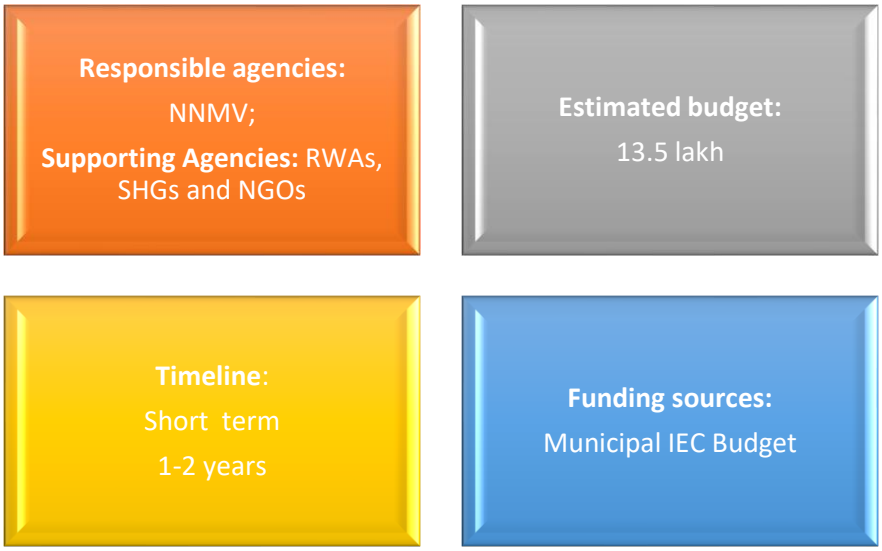
- Conduct hands-on workshops for households on composting organic waste and segregation at source.
- Conduct live training during RWA and SHG meetings.
- Train participants in various composting techniques suitable for home and community setups.
- Educate on reducing waste entering drains through effective segregation.
- Share success stories to motivate wider community adoption.

Block cost estimate:

Sl. No	Components	Content/Number	Unit Rate	Total Cost		Remarks	Duration
				in ₹ Rupees	in ₹ lakhs		
1	Composting Workshops	2 workshops/year	25,000	50,000	0.50	40–50 (trainers, facilitators, volunteers)	
2	Waste Segregation Training	1 sessions/year	15,000	15,000	0.15	30–40 (mobilizers, IEC staff)	
3	IEC Materials & Campaigns		1,20,000	1,20,000	1.20	Posters, flyers, video documentation, case studies	Quarterly
4	Monitoring & Evaluation		80,000	80,000	0.80	Surveys, feedback, reporting	Quarterly
Total Annual Cost (1–4)					**2.65**		
Recurring Annual Costs							
1	Mobilization & Outreach	12 drives/year	25,000	3,00,000	3.00	Banners, loudspeakers, social media campaigns;	Monthly
2	Community-led Clean-up Drives	12 drives/year	50,000	6,00,000	6.00	Logistics, gloves, tools, refreshments;	Monthly
3	Adoption of River Stretches	10 groups	20,000	2,00,000	2.00		Annual
4	Recognition & Incentives		1,00,000	1,00,000	1.00	Eco-leadership badges, certificates, felicitation events	Annual
5	Documentation & Reporting		1,50,000	1,50,000	1.50	Photography, video, before-after records, dashboard integration	Monthly
Total Annual Cost (1–5)					**13.5**		

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Implementation Framework:



8.8.5 Intervention 20: River Clean-Up Drives – "Yamuna Mitra Abhiyan"

Riverbank clean-up activities in Mathura-Vrindavan are currently irregular and largely event-driven. While some drives have been organized under Namami Gange and SBM, they lack continuity, structured citizen ownership and systematic documentation. This has resulted in several critical gaps:

a. Absence of regular, institutionalized clean-up drives along riverbanks and ghats.

b. Limited integration of citizen contributions into municipal reporting systems.

c. Low visibility and recognition of community participation, reducing motivation for sustained involvement.

d. Lack of structured adoption of river stretches by RWAs, schools, or NGOs for long-term stewardship.

Proposed Intervention:

- Use banners, loudspeaker announcements and social media outreach to mobilize citizens for monthly clean-up drives.
- Organize community-led clean-up drives focusing on removing waste from riverbank, ghats and adjacent areas.
- Engage students, RWAs, NGOs and youth clubs as core volunteer groups driving the campaign.
- Encourage RWAs and schools to adopt specific stretches of the riverbank for continuous stewardship.
- Provide eco-leadership badges, certificates and public acknowledgment to active participants.
- Ensure proper segregation and disposal of collected waste through official municipal channels, linked to SBM/URMP dashboards.
- Record and document each drive with before-and-after photos and share results in community meetings to encourage pride and sustained participation.

Frequency: Bi-monthly operational drives.

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Block Cost Estimate:

Sl. No	Components	Content/ Number	Unit Rate	Total Cost		Remarks	Duration (Months)
				in ₹ Rupees	in ₹ lakhs		
1	**Monthly Clean-up Drives**	12	1,25,000	15,00,000	15.00	Gloves, waste bags, protective gear; reduced frequency but impactful	6 months
2	**Special Cleanups Drive**	2	1,25,000	2,50,000	2.50	After Holi and Janmashtami festival	
3	**Monitoring & Reporting**	4	2,50,000	10,00,000	10.00	Approx. 50 volunteers; ensures segregation and reporting via SBM Swachhta App	
4	**Badges & Certificates**	200	150	30,000	0.30		
Total					**19.80**		

Implementation Framework:

Responsible agencies:
District Ganga Committee, Jal Nigam and Local Volunteers.
Supporting Agencies: RWAs, SHGs and NGOs

Estimated budget:
₹ 19.80 lakh

Timeline:
Short term
1-2 years

Funding sources:
1. Municipal IEC budget allocation under SBM(U)
2. CSR funds
3. Community contributions (RWAs)

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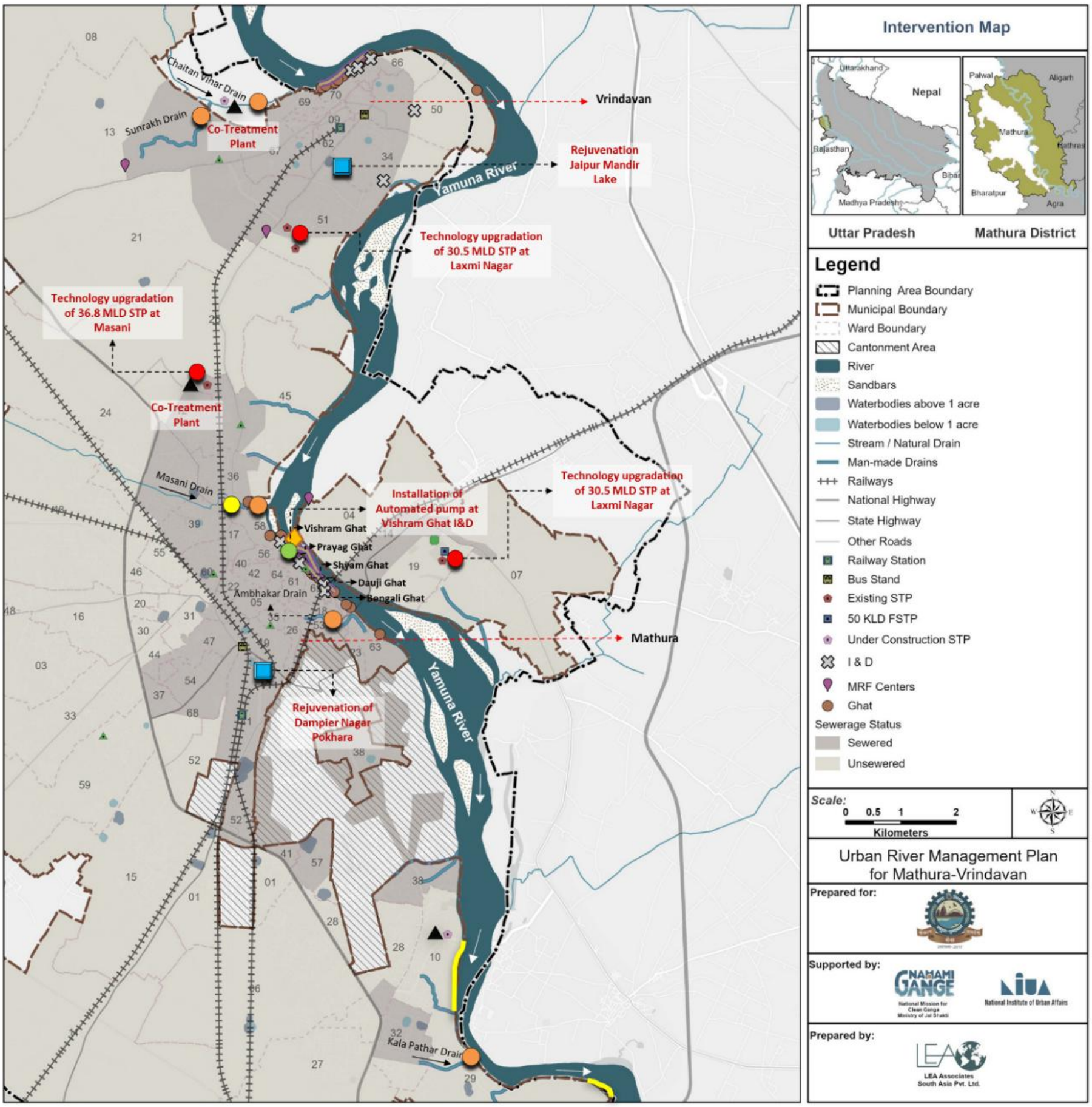
9 CONCLUSION

Mathura-Vrindavan forms a sacred twin-city node situated along the western bank of the Yamuna River in western Uttar Pradesh, within the Taj Trapezium Zone. Covering a planning area of 1,076.36 sq. km with an estimated resident population exceeding 9.3 lakh, the city accommodates a massive floating inflow of over 3.8 crore annual pilgrims. Deeply rooted in Vaishnavite devotional heritage as the birthplace of Lord Krishna, its spatial and cultural framework is anchored by the historic 84-Koss (Chaurasi Kos) Braj Parikrama, an 11-kilometer pilgrimage circuit that closely follows the Yamuna's path through key devotional centers like Vrindavan, Mathura, Gokul, and Govardhan.

The city faces acute environmental and logistical pressures due to rapid urban expansion, unmanaged tourism loads, and altered natural hydrology. Low-lying stretches along the Parikrama Marg and major riverfront ghats experience severe monsoon flood submergence, which frequently disrupts pilgrimage movements and damages historic infrastructure. Furthermore, urban runoff and sewage outfalls have degraded local water quality; all 14 assessed urban waterbodies (kunds) show severe eutrophication with Dissolved Oxygen levels dropping below critical thresholds, while missing functional vegetation buffers along the Yamuna's banks exacerbate erosion and habitat loss.

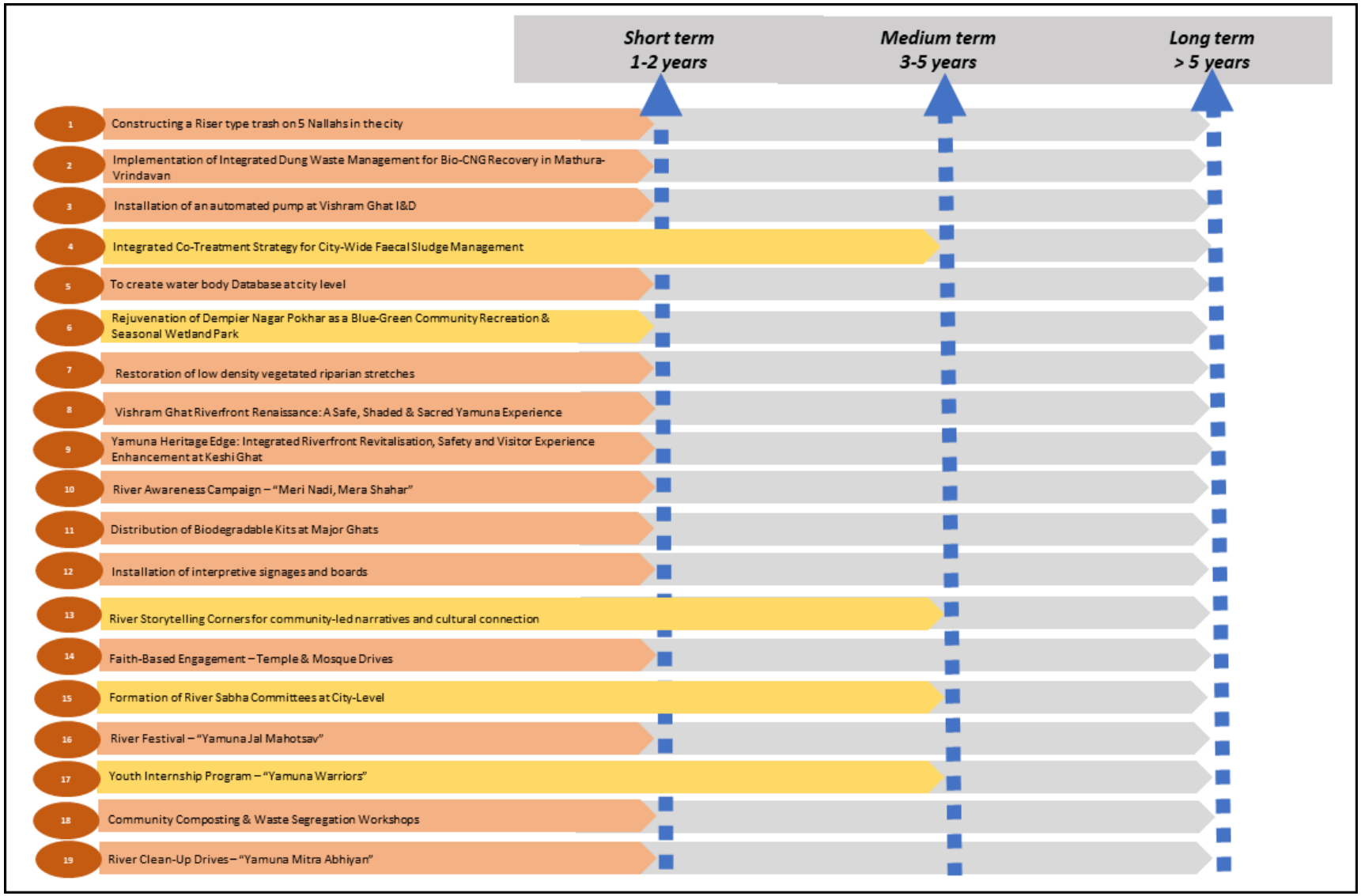
To address these vulnerabilities, a strategic urban river management approach focuses on ecological restoration, civic infrastructure upgrades, and sustainable eco-tourism. Key measures (refer Map 9-1 & Picture 9-1) include enforcing a 200m non-development buffer zone, establishing vegetative filter strips along the riverbank, and installing decentralized used water treatment to rehabilitate degraded kunds. Complementing these ecological actions are the comprehensive upgradation of 21 riverfront ghats, the de-silting and separation of municipal storm drains from sewage, and the introduction of a 22 km solar-powered boat waterway from Vrindavan to Gokul to provide sustainable, low-emission pilgrimage transit. URMP, Mathura- Vrindavan provides a comprehensive pathway by balancing urban development with river conservation in Mathura- Vrindavan. By integrating pollution control, ecological restoration, catchment management, flood resilience and institutional strengthening, the plan aims to secure the long-term health of Yamuna River while enhancing environmental sustainability, water security, disaster resilience, and the overall quality of life for present and future generations.

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Map 9-1: Intervention Map of Mathura- Vrindavan

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Picture 9-1: Prioritization of Interventions in Mathura- Vrindavan

ANNEXURES

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Annexure 1: Steering Committee - Minutes of the Meeting

Minutes of Meeting (MOM)

for

State level Workshop on Preparation of 'Urban River Management Plans (URMP) in Uttar Pradesh

Meeting Date and Time: 3rd May,2025, 11:00 am-2:00 pm
Venue: Swati Conference Hall, Office of Directorate of ULBs,
Gomti Nagar, Lucknow, Uttar Pradesh

1. Participants
   a) Sh. Nalin Kumar Srivastava, Deputy Director General, NMCG
   b) Sh. Anuj Kumar Jha, Director Local Bodies and Secretary, Urban Development Department, Govt. of Uttar Pradesh
   c) Sh. Dheeraj Joshi, Director, NMCG
   d) Sh. Sumit Chakraborty, Urban Lead, NMCG
   e) Sh. Anil Kumar Gupta, Technical Advisor, SMCG-UP
   f) Sh. Mithilesh Mishra, SMCG-UP
   g) Sh. Bipin Kumar Misra IAS, Municipal Commissioner, Shahjahanpur
   h) Sh. Vikas Kumar, Executive Officer, Bijnor
   i) Sh. G. Laal, Executive Officer, Nagar Palika Parishad, Mirzapur
   j) Sh. Avinash Pratap Singh, Asst. Municipal Commissioner, Gorakhpur
   k) Sh. Omesh Kumar, Asst. Engineer, Mathura Vrindavan
   l) Sh. SFA Zaidi, Chief Engineer, Kanpur Nagar Nigam
   m) Sh. Punit Ojha, Chief Engineer, Ayodhya Nagar Nigam
   n) Sh. Uttam Verma, Nodal Officer, Prayagraj URMP
   o) Sh. Rahul Sachdeva, lead, URMP for 60 Ganga basin Cities, NIUA
   p) Ms. Simranpreet Kaur, Urban Environment Specialist, NIUA
   q) Sh. Chandrashekhar Sinha, Team lead, LEA Associates
   r) Additional participants from SMCG, Directorate of ULBs-UP and supporting members with the city representatives

2. Introduction
   The state level meeting focussed on discussing strategies and actions for integrating river-centric approaches into urban planning across selected five cities in Uttar Pradesh – Bijnor, Mathura-Vrindavan, Mirzapur, Gorakhpur and Shahjahanpur. The meeting included senior officials from NMCG (New Delhi), Directorate of ULB (Uttar Pradesh), SMCG (Uttar Pradesh), NIUA (New Delhi) and Commissioners/Eos/Chief Engineers and other officials from the eight cities (including Kanpur, Ayodhya and Prayagraj for which URMPs are already prepared)

3. Discussions and deliberations:

   a) The meeting commenced with introductory remarks by the Deputy Director General, NMCG. He outlined the importance of the URMP initiative in enhancing the ecological, cultural, and infrastructural landscape of river cities. He further underscored the need to promote circular economy principles, with a focus on the reuse of treated used water, improved solid waste management, and river-centric master planning. Advocating the need for stakeholder engagement and convergence of resources from schemes like AMRUT, NMCG, World Bank, and State-level initiatives to support implementation, he emphasized

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on vertical integration of river management plans at various levels; River Basin Management Plan (RBM), District Ganga Plans (DGP) and Urban River Management Plans (URMP).

b) Thereafter NIUA presented the framework for preparing URMPs for the five cities as mentioned above. The importance of context-specific strategies, proactive coordination at city-level, and alignment with existing state and local initiatives undertaken for restoration of river and its ecosystem was highlighted.

c) During the session on city reflections, Commissioners, Executive Officers and Senior representatives from the eight cities shared their progress, challenges, and future plans with respect to rivers and their associated eco-systems within their respective cities.

i. **Sh. Bipin Kumar Misra IAS, Municipal Commissioner- Shahjahanpur** flagged the issue of unregulated sand mining across its two rivers- Garrah & Khanaut, with jurisdiction overlapping between the Municipal Corporation and Development Authority.

ii. **Sh. Vikas Kumar, Executive Officer- Bijnor** highlighted the potential for ecotourism through a Dolphin Safari and outlined the city's unique context as a cane-industry hub. While Bijnor has a functioning 20 KLD FSTP, household-level connectivity to treatment infrastructure remains a gap.

iii. The **Assistant Engineer** from **Mathura-Vrindavan** expressed concern over the discharge of untreated industrial wastewater into the southern Yamuna stretch. The discussion emphasized on the need for decentralized treatment infrastructure and stricter enforcement mechanisms.

iv. **Sh. G. Laal, Executive Officer- Mirzapur**, discussed about challenges related to riverbank erosion, shifting river courses, and flood risks along the Ganga. The city has an operational 38 MLD STP. The discussions focussed on utilizing the treated used water for various uses and adopting a decentralized treatment strategy for optimum utilization.

v. **Sh. Avinash Pratap Singh, Asst. Municipal Commissioner** of **Gorakhpur**, mentioned about substantial efforts undertaken to address urban flooding through early warning systems, weather-based modelling, and digital pump automation. The city has also initiated wetland restoration and is developing a dashboard for monitoring river-related interventions. A proposal for a dedicated “River Cell,” potentially funded by NMCG, was presented as a pilot concept for institutionalizing river-centric planning.

vi. **Sh. SFA Zaidi, Chief Engineer, Kanpur,** discussed his experience from URMP Kanpur, highlighting the first set of interventions proposed for implementation. These include: a) development of GIS based database for 450+ waterbodies across Kanpur city b) An actionable plan for reuse of treated used water, c) Concept development for placemaking along a selected stretch of city’s major drain using nature-based solutions (NbS).

vii. **Sh. Punit Ojha, Chief Engineer, Ayodhya,** shared his experiences from Ayodhya URMP, where one side of the river is completely untouched and has potential of

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floodplain protection and development of riparian buffers. The city also explored the tourism potential while making a river sensitive proposal.

viii. **Sh. Uttam Verma, Environment Officer**, **Prayagraj,** mentioned about comprehensive WaL-URMP approach being followed in Prayagraj URMP.

ix. **Sh. Anil Kumar Gupta, Technical Advisor, SMCG-UP** shared his experience from working the cities of Uttar Pradesh and their state-driven administrative set-up.

d) Keynote Address by **Sh. Anuj Kumar Jha**, **IAS, Director Local Bodies and Secretary, Urban Development Department, Govt. of Uttar Pradesh** reflected on the State's proactive role in enabling institutional mechanisms such as the formation of Multi-Stakeholder Working Groups (MSWGs) in each URMP city. He stressed the importance of building ownership at the district level, proposing that District Magistrates be involved as Chairs of the MSWGs, wherever feasible.

The necessity of grounding planning in practical implementation was highlighted, referring to the observations made under Swachh Survekshan and NGT directives, which indicate the accumulation of waste along riverbanks.

Emphasizing the critical need for both solid and liquid waste management, he called for sincere adoption of URMPs as a survival imperative, not just a planning initiative. The potential for leveraging CSR funding, such as HCL's support for river barriers and simple, cost-effective solutions was also outlined

e) The meeting concluded with vote of thanks from the Director NMCG, wherein NMCG's support for successful URMP rollout in Uttar Pradesh was re-affirmed.

Way Forward:

i. The State of Uttar Pradesh will take a leadership role in advancing the Prime Minister's vision for urban river rejuvenation. A State-level URMP Committee will be established under the chairmanship of the Urban Development Department.
ii. Multi-Stakeholder Working Groups (MSWGs) will be notified in all five pilot cities, keeping the state in loop regarding all communications.
iii. Designated Nodal officers in each city to cooperate with the onboarded consulting agency by NMCG-NIUA: LEA Associates Pvt. Ltd. to initiate comprehensive data collection and documentation of ongoing and proposed initiatives.
iv. Plans will integrate critical elements such as STPs, FSTPs, used water management, and nature-based solutions, including in non-AMRUT towns

Attendance sheet is annexed to this document.

3

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National Institute of Urban Affairs

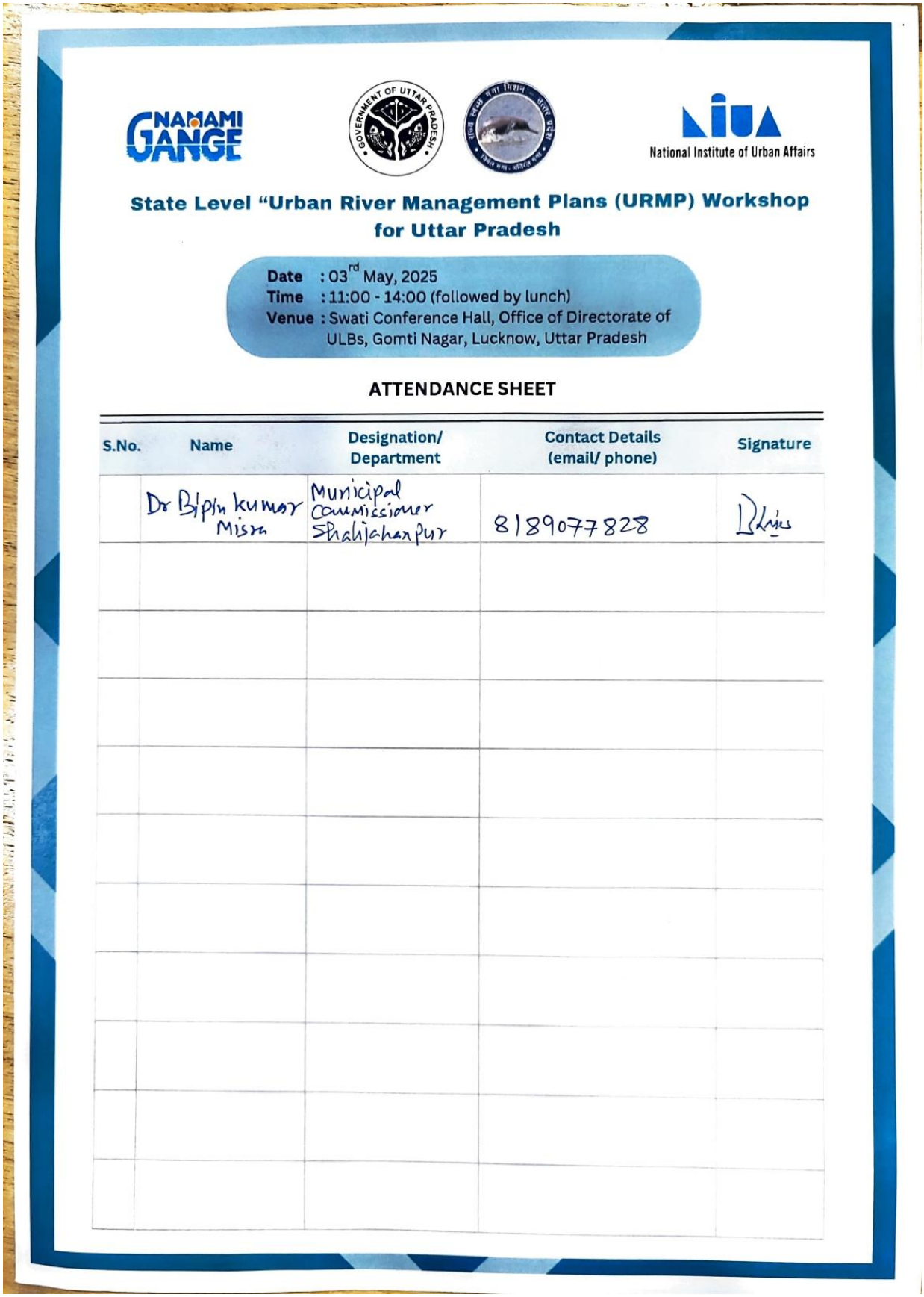
State Level "Urban River Management Plans (URMP) Workshop for Uttar Pradesh

Date : 03rd May, 2025
Time : 11:00 - 14:00 (followed by lunch)
Venue : Swati Conference Hall, Office of Directorate of ULBs, Gomti Nagar, Lucknow, Uttar Pradesh

ATTENDANCE SHEET

S.No.	Name	Designation/ Department	Contact Details (email/ phone)	Signature
1.	Anil Kumar Gupta	Technical Advisor SMCG-UP	ta@smcgup.org anilg421@gmail.com 9412182527	
2.	Uttam Kr Verma	Environmental Engineer, Nagar Nigam Prayagraj	8303701016	
3	S.F.A. Zaidi	C.E. / KNN	9415461593	
4	Komal Singh Dhl	CB. DLB	8199077907	
5.	G. Lal.	E.E. NPP Mirzapur	8189077942	
6	Somesh Kumar	Asst. Engr. (Civil) Nagar Nigam	9897600250 Mathura-Vrindavan	
7	Rahul	"	"	
8	Punit Ojha	C.E. Ayodhya	9415023810	
9	Vikas Kumar	E.O Bijnor	8979079116	
10	Yashwant Kumar	JE(C) Bijnor	9410446057	
11	Om Prakash Ram	AE(W) Mirzapur	7800917032	

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NAMAMI GANGE

National Institute of Urban Affairs

State Level "Urban River Management Plans (URMP) Workshop for Uttar Pradesh

Date : 03rd May, 2025
Time : 11:00 - 14:00 (followed by lunch)
Venue : Swati Conference Hall, Office of Directorate of ULBs, Gomti Nagar, Lucknow, Uttar Pradesh

ATTENDANCE SHEET

S.No.	Name	Designation/ Department	Contact Details (email/ phone)	Signature
	Dr Bipin kumar Misra	Municipal Commissioner Shahjahanpur	8189077828	

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NAMAMI GANGE

National Institute of Urban Affairs

State Level "Urban River Management Plans (URMP) Workshop for Uttar Pradesh

Date : 03rd May, 2025
Time : 11:00 - 14:00 (followed by lunch)
Venue : Swati Conference Hall, Office of Directorate of ULBs, Gomti Nagar, Lucknow, Uttar Pradesh

ATTENDANCE SHEET

S.No.	Name	Designation/ Department	Contact Details (email/ phone)	Signature
	Anuj Kumar Jha	Secretary / Director UDD, UP	Sbmdlb.up@gmail.com	
	Nalin Kumar Srivastava	DDG, NMCG		
	Dheeraj Joshi.	Director, NMCG		
	Mithilesh			
	Neeraj Pandey	Sr Environment Engg	7651976918 see.smcg.up@gmail.com	

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NAMAMI GANGE

National Institute of Urban Affairs

State Level "Urban River Management Plans (URMP) Workshop for Uttar Pradesh

Date : 03rd May, 2025
Time : 11:00 - 14:00 (followed by lunch)
Venue : Swati Conference Hall, Office of Directorate of ULBs, Gomti Nagar, Lucknow, Uttar Pradesh

ATTENDANCE SHEET

S.No.	Name	Designation/ Department	Contact Details (email/ phone)	Signature
1	C S SINHA	LEA Associates.	9910060789	
2	Alok Mishra	LEA Associates	8081654499	
3	Avinash Pratap Singh	SNA Gorakhpur	8810709400	
4	ASHOK KUMAR	EAN NN. GKP	8810709310	
5	S.B.Rai	A.N.A. Nagar Nigam, Ayodhya	7311165818	
6	Pradeep Agnihotri	CB Spl., SBM Directorate, UP	9990100925	

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Annexure 2: District Ganga Committee - Minutes of the Meeting

जिला गंगा समिति, मथुरा की दिनांक 28.08.2025 को जिलाधिकारी, मथुरा की अध्यक्षता में कलैक्ट्रेट सभागार में आयोजित बैठक का कार्यवृत्त

प्रमुख सचिव, नमामि गंगे एवं ग्रामीण जलापूर्ति विभाग/परियोजना निदेशक, राज्य स्वच्छ गंगा मिशन–उ0प्र0, लखनऊ का पत्रांक–194/0245/SMCG/08 दिनांक 07.03.2022 द्वारा यह अपेक्षा की गयी है, कि भारत सरकार के राजपत्र संख्या– 2458 दिनांक 07.10.2016 के अन्तर्गत जिला गंगा समिति के दायित्वों के निर्वहन हेतु महानिदेशक, राष्ट्रीय स्वच्छ गंगा मिशन, नई दिल्ली, भारत सरकार की अध्यक्षता में आयोजित वीडियो कान्फ्रेंसिंग दिनांक 01.04.2022 तथा प्रमुख सचिव, नमामि गंगे एवं ग्रामीण जलापूर्ति विभाग उ0प्र0, लखनऊ की अध्यक्षता में आयोजित वीडियो कान्फ्रेंसिंग दिनांक 30.04.2022 में दिये गये निर्देशों के अनुपालन हेतु अध्यक्ष, जिला गंगा समिति/जिलाधिकारी, मथुरा की अध्यक्षता में जिला गंगा समिति, मथुरा की बैठक का आयोजन दिनांक 28.08.2025 को कलैक्ट्रेट सभागार में किया गया। बैठक में एजेण्डा के अनुरूप चर्चा की गयी। बैठक में जिलाधिकारी, मथुरा द्वारा उपस्थित अधिकारियों/प्रतिनिधियों/नामित सदस्यों से निम्न बिन्दुओं पर समीक्षा की गयी–

- गंगा ग्राम समिति की कार्ययोजना वर्ष 2024–25
- नमामि गंगे से संबधित परियोजनाएं जैसे सीवरेज प्रोजेक्ट्स, घाट एवं किमेटोरिया प्रोजेक्ट्स, जैव विविधता संरक्षण प्रोजेक्ट्स, वनीकरण/रोपण, बायोरेमिडियेशन ट्रीटमेंट ऑफ ड्रेन्स प्रोजेक्ट्स इन यू.एल.बी., सॉलिड वेस्ट मैनेजमेन्ट, वैट लैण्ड कन्जरवेशन/वाटर बाडीज रेस्टोरेशन प्रोजेक्ट्स (नगरीय क्षेत्रों व गंगा ग्रामो में), ऑर्गेनिक फार्मिंग इन गंगा ग्राम एण्ड अदर विलेजेज के कियान्वयन हेतु कार्ययोजना।
- जनपद के अर्थ गंगा एक्शन प्लान की समीक्षा।
- घाटो पर कार्यक्रम का आयोजन कराना।

बिन्दु संख्या 1 जिला गंगा समिति की त्रैमासिक भौतिक एवं वित्तीय प्रगति की समीक्षा के क्रम में पूर्व बैठक में दिये गये निर्देशों की समीक्षा की गयी। पूर्व बैठक में जिलाधिकारी महोदय, मथुरा द्वारा निर्देश दिए गए थेकि सभी गंगा ग्राम समितियों की बैठकों का एजेंडा जिला पंचायतराज अधिकारी अपने स्तर से निर्धारित कर सभी गंगा ग्राम समितियों को उक्त निर्धारित एजेंडा अनुरूप बैठकें आयोजित करने हेतु प्रषित करें तथा गंगा ग्राम समिति की बैठक कराने के पश्चात् 67 गाँवों की संक्षिप्त अनुश्रवण आख्या एवं फोटोयुक्त कार्यवृत्त हर माह प्रभागीय निदेशक सामाजिक वानिकी प्रभाग मथुरा को उपलब्ध करायें। जिलाधिकारी महोदय, मथुरा द्वारा निर्देश दिए गए थे कि बैठक कराने के अतिरिक्त जिला पंचायतराज अधिकारी द्वारा यह सुनिश्चित कर लिया जाये कि सीवेज या सॉलिड वेस्ट से इन 67 गाँवों से यमुना प्रभावित ना हो। समस्त 67 गंगा ग्राम पंचायतो में SLWM का कार्य जल्द से जल्द पूर्ण करा लिया जाए जिसकी सूचना प्रभागीय निदेशक सा0 वा0 वन प्रभाग मथुरा के कार्यालय को देना सुनिश्चित करे।

कार्यालय मुख्य वन संरक्षक, ईको विकास/सदस्य–सचिव, उत्तर प्रदेश राज्य आर्द्रभूमि प्राधिकरण, लखनऊ के पत्र सं0–31/26–11(UPSWA) 2024–25 लखनऊ दिनांक–22.10.2024 के निर्देशानुरूप जनपद मथुरा के समस्त 495 ग्राम पंचायतों में ग्राम आर्द्रभूमि समिति का गठन कराया जा चुका है।

विगत बैठक में महोदय द्वारा जिला पंचायत राज अधिकारी, मथुरा को निर्देशित किया गया कि 67 गाँवों में चल रहे कार्यो का पूर्ण विवरण (प्रति ग्राम पंचायत एक पेज की आख्या) कार्यालय प्रभागीय निदेशक सा0 वा0 वन प्रभाग मथुरा को आगामी बैठक से पूर्व उपलब्ध कराना सुनिश्चित करें। जिला पंचायत राज अधिकारी, मथुरा को महोदय द्वारा निर्देशित किया गया कि गंगा ग्राम, आर्द्रभूमि समिति तथा ग्राम चौपाल का आयोजन पंचायत स्तर पर एक साथ कराया जाए। जिसकी फोटोयुक्त आख्या प्रतिमाह नियमित रूप से प्रभागीय निदेशक सा0 वा0 वन प्रभाग मथुरा को इस आशय से उपलब्ध कराये कि उसको समिति के समक्ष समीक्षा हेतु प्रस्तुत किया जा सकें।

(वांछित कार्यवाही– जिला पंचायतराज अधिकारी, मथुरा)

बिन्दु संख्या 2– बायोरेमिडियेशन ट्रीटमेंट ऑफ ड्रेन्स प्रोजेक्ट्स:–

विगत बैठक में जिलाधिकारी महोदय द्वारा क्षेत्रीय अधिकारी, उ0प्र0 नियंत्रण बोर्ड को निर्देशित किया गया था कि जनपद में सरकारी एवं प्राइवेट स्तर पर कितने एस0टी0पी0 एवं ई0टी0पी0 का संचालन किया जा रहा है। उक्त के सम्बन्ध में भी सर्वे करते हुए रिपोर्ट को आगामी बैठक में प्रस्तुत करना सुनिश्चित किया जाए। जिससे समिति द्वारा उन सभी के प्रदूषण स्तर की जांच समय–समय पर करायी जा सके। साथ ही पूर्व की भांति ही समस्त एस0टी0पी0 की जांच प्रतिमाह कराते हुए रिपोर्ट नियमित रूप से कार्यालय प्रभागीय निदेशक सा0 वा0 वन प्रभाग मथुरा को उपलब्ध कराना सुनिश्चित करें।

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बैठक में ग्राम की Water Body में पानी के गिरने से पहले Water Treatment Chamber के लिए समिति द्वारा ग्राम स्तर पर इसको संचालित करने हेतु गहनता से विचार विमर्श किया गया। प्रोजेक्ट की फंडिग, संचालन एवं लागत पर विचार किया गया। जिसमें जिला पंचायत राज अधिकारी, मथुरा द्वारा ग्राम पंचायत स्तर न्यून लागत पर उक्त प्रोजेक्ट्स का संचालन कराये जाने की इच्छा समिति के समक्ष प्रकट की गयी। जिस पर महोदय द्वारा सहमति देते हुए किसी 01 ग्राम पंचायत में स्थापित करते हुए, उसका संचालन करवाये जाने हेतु जिला पंचायत राज अधिकारी, मथुरा को निर्देशित किया गया। जिस पर महोदय द्वारा कहा गया कि यदि ग्राम पंचायत स्तर पर प्रोजेक्ट का संचालन सफलता पूर्वक कराया गया तो समस्त पंचायतों में भी उक्त प्रोजेक्ट पर विचार किया जाएगा।

(वांछित कार्यवाही– क्षेत्रीय अधिकारी, उ0 प्र0 प्रदूषण नियंत्रण बोर्ड, मथुरा एवं जिला पंचायतराज अधिकारी, मथुरा)

3. **वैट लैण्ड कन्जरवेशन/वाटर बॉडीज रेस्टोरेशन प्रोजेक्ट्स**– उक्त बिन्दु की समीक्षा करते हुए प्रभागीय निदेशक सा0 वा0 वन प्रभाग, मथुरा द्वारा बताया गया कि उनके द्वारा क्षेत्रीय वन अधिकारी, गोवर्धन के साथ एक आदर्श वैटलैण्ड में विकसित करने हेतु नरी सेमरी का निरीक्षण किया गया। जिसके उपरांत प्रभागीय निदेशक द्वारा UPBTVP के पर्यावरण सलाहाकार से उक्त वैटलेंड का विकसित करने हेतु वित्त पोषण हेतु वार्ता की गयी। जिसमें उनके द्वारा बताया गया कि UPBTVP के द्वारा टाटा ग्रुप के साथ ईको–लॉजिकली को विकसित करने हेतु एक लगभग 30 करोड़ का एम0ओ0यू0 हस्ताक्षरीत किया गया है जिसमें नरी सेमरी को भी विकसित करने हेतु चयनित किया गया है। जिसपर टाटा ग्रुप द्वारा उक्त कार्य किया जाना है। तदानुसार उक्त वैटलैंड के स्थान पर गोवर्धन रेंज के आरक्षित वन में स्थित अन्यौर वन ब्लॉक के साथ अन्य स्थलो कों वैटलैंड में विकसित करने हेतु चयनित किया जाएगा।

(वांछित कार्यवाही– प्रभागीय निदेशक, सा0वा0 प्रभाग, मथुरा)

4. **आई0ई0सी0 गतिविधियां** :– समय–समय पर जिला गंगा समिति, मथुरा के द्वारा जन जागरूकता अभियान चलाया जाता है। (वांछित कार्यवाही– समस्त सम्बन्धित विभाग)

बिन्दु संख्या 5 :– जनपद मथुरा में यमुना नदी के घाटों का विकास एवं पुनरोद्धार के कार्य की परियोजनाः– प्रभागीय निदेशक सा0 वा0 वन प्रभाग, मथुरा द्वारा बताया गया कि दिनांक–06.08.2025 को जिलाधिकारी महोदय की अध्यक्षता में उक्त के सम्बन्ध में बैठक का आयोजन किया गया था। जिसमें प्रभागीय निदेशक सा0 वा0 वन प्रभाग मथुरा के कार्यालय पत्रांक– 608/29–5, मथुरा एवं 609/29–5, मथुरा दिनांक–05.08.2025 के द्वारा कुछ बिन्दुओं पर आपत्तियों को समिति के समक्ष प्रस्तुत किया गया था। जिसके क्रम में प्रभागीय निदेशक सा0 वा0 वन प्रभाग मथुरा के कार्यालय पत्रांक– 904/29–5, मथुरा एवं 905/29–5, मथुरा दिनांक–26.08.2025 द्वारा अधिशासी अभियंता, अपर आगरा कैनाल, मथुरा को आपत्तियों के निराकरण कराने हेतु स्मरण पत्र भी प्रेषित किया गया है। जिसमें कार्यवाही अभी तक अपेक्षित है। जिस पर महोदय द्वारा अधिशासी अभियंता, अपर आगरा कैनाल, मथुरा को प्राप्त आपत्तियों का निराकरण आगामी बैठक से पूर्व कराये जाने के लिए निर्देशित किया गया।

(वांछित कार्यवाही– सिंचाई विभाग, मथुरा)

6. अन्य बिन्दु महोदय के निर्देशानुसारः–

1. **Urban River Management Plan बनाने हेतु सम्बन्धित विभागों द्वारा National Institute of Urban Affairs को यथावश्यक सहयोग स्थापित करने हेतुः–**

- National Institute of Urban Affairs की प्रतिनिधि मुग्धा शेखर द्वारा समिति के समक्ष Urban River Management Plan बनाने हेतु आवश्यक सहयोग देने हेतु समस्त समिति के सदस्यगणों से अनुरोध किया गया। जिसमें उनके द्वारा Urban River Management Plan बनाने हेतु नोडल अधिकारी नामित करने का अनुरोध महोदय को किया गया। संयुक्त सचिव, उ0प्र0 शासन के पत्रांक सं0– 3766/नौ–5–2025–37सा/2024 नगर विकास अनुभाग–5, लखनऊ दिनांक– 26.06.2025 को Urban River Management Plan बनाने हेतु निदेशक, नगरीय निकाय निदेशालय, उ0प्र0 को आवश्यक कार्यवाही कराते हुए कृत कार्यवाही से शासन को अवगत कराने हेतु निर्देशित किया गया है। इसी के लिए नगरीय निकाय निदेशालय सेक्टर–7 गोमती नगर विस्तार, लखनऊ की पत्र संख्या–पी०एम०201241 1465/2023 लखनऊः दिनांक 29 मई, 2025 द्वारा श्री कमलजीत सिंह, मुख्य अभियंता, नगरीय निकाय निदेशालय, उत्तर प्रदेश को नोडल अधिकारी नामित

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किया गया है। जनपद गोरखपुर में भी उक्त कार्य के क्रियान्वयन् हेतु नगर आयुक्त, नगर निगम गोरखपुर को सदस्य–सचिव नियुक्त किया गया है। जिसके दृष्टिगत महोदय द्वारा Urban River Management Plan बनाने के जिए समस्त विभागों से समन्वय स्थापित करने हेतु नगर आयुक्त, नगर निगम मथुरा–वृंदावन को नोडल अधिकारी नियुक्त किया गया।

2. मलिहारी कुण्ड के जीर्णोद्धार एवं यमुना नदी में Desilting कराये जाने हेतुः– विशेष आमंत्रित सदस्य श्री जगन्नाथ पोद्दार, निदेशक–फ्रेंड्स ऑफ वृंदावन के द्वारा समिति के समक्ष मलिहारी कुण्ड के जीर्णोद्धार एवं यमुना नदी में Desilting कराये जाने के लिए अपने विचार प्रस्तुत किये गये। जिसमें उनके द्वारा बताया गया कि राधाकुण्ड के निकट गोवर्धन परिक्रमा मार्ग में मलिहारी कुण्ड स्थित है, जो कि बदहाल स्थिति में है एवं लुप्त होने के कगार में है। इसके चारों ओर स्थानीय लोगों ने अतिक्रमण किया हुआ है एवं कुण्ड गन्दगी से अटा पड़ा है। आस पास के लोग उसमें कूड़ा, कचरा एवं डालते हैं। इस कुण्ड का उल्लेख प्राचीन ग्रंथों में भी मिलता है। जिसमे महोदय द्वारा अधिशासी अधिकारी, नगर पंचायत राधाकुण्ड को निर्देशित किया गया कि मलिहारी कुण्ड पर नियमानुसार कुण्ड के संरक्षण हेतु उचित प्रयास करते हुए, बोर्ड इत्यादि की व्यवस्था कराना सुनिश्चित किया जाए।

साथ ही विशेष आमंत्रित सदस्य श्री जगन्नाथ पोद्दार, निदेशक–फ्रेंड्स ऑफ वृंदावन के द्वारा मथुरा से वृंदावन तक यमुना नदी की Desilting कराये जाने का सुझाव देते हुए समिति के समक्ष बताया गया कि यमुना नदी में प्लास्टिक इत्यादि से मुक्त कराने हेतु मथुरा से वृंदावन तक यमुना नदी की Desilting करायी जाए। जिससे यमुना नदी में सतह पर एकत्र हुए प्लास्टिक/कूडें को हटाकर पानी सीधा Ground Level पर जाए। इस पर महोदय द्वारा अधिशासी अभियंता, अपर आगरा कैनाल को उक्त बिन्दु पर नियमानुसार कार्य करने हेतु निर्देशित किया गया।

(वांछित कार्यवाही– नगर पंचायत राधाकुण्ड, एवं सिंचाई विभाग, मथुरा)

7. Points on GDPMS Portal:-GDPMS format

4. Public awareness-

- Public outreach activities undertaken- जिला पंचायतराज अधिकारी, मथुरा द्वारा अवगत कराया गया कि दिनांक 04.11.2023 को यमुना आरती, घाट सफाई इत्यादि कार्यक्रम कराये गये है।
- Ganga Aartis are conducted in the district-जिला पंचायतराज अधिकारी, मथुरा द्वारा अवगत कराया गया कि विश्राम घाट, केसी घाट, ब्रहमांड घाट इत्यादि स्थानों पर नियमित आरती होती है।

2. Preventing Solid waste flowing into River- NAGAR NIGAM & NAGAR PANCHAYAT

- Number of Nalla's in the district flowing into tributaries or Ganga directly- Nalla name, screen installed on Nalla
- Whether regular cleaning/disposal of solid waste undertaken and monitored in all ULBs within the district- जिला पंचायतराज अधिकारी, मथुरा द्वारा अवगत कराया गया कि 67 गंगा ग्राम समिति में से 35 गंगा ग्रामों में SLWM संचालित है।
- Regular cleaning of Ghats is happening/Frequency- जिला पंचायतराज अधिकारी, मथुरा द्वारा अवगत कराया गया कि घाटों का नियमित रूप से सफाई कराई जाती है।
- Involvement of NGOS in recycle of Pooja/Floral waste in the town- जिला कार्यक्रम अधिकारी द्वारा अवगत कराया गया कि वृन्दावन में विधवा आश्रम में फूलों का इस्तेमाल कर अगरबत्ती बनाई जाती है।

3. Afforestation- ALL DEPARTMENT

- Afforestation activities in river bank area- Total river bank area, natural landscape in river bank area, agriculture landscape in river bank area, block plantation in river bank area-Saubhri van block 123hec in Vrindavan done by Forest department, avenue plantation in river bank area.

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4. **Sewerage Treatment Infrastructure Development- NAGAR NIGAM, ROPCB, NP**
   - Tapping of Nalla's- Yes
   - Are all STPs in the district are operational- Yes
   - Sewage treatment plants- Functional
   - Conducted surprise visits to STPs for monitoring operation and management of STP- Yes, monthly
   - Reuse of treated wastewater for different purposes- Yes for farming, plantation and road side dusting
   - Availability of plant for co-treatment of fecal sludge in existing STPs-25KLD

- **Industrial Effluent Monitoring- ROPCB**
  - List of Gross Polluting Industries- Name of industry, sector(tannery,textile,paper,metal,oil,food,other), Presence of STP, Discharging water into local water bodies, river, nalla- Received report of STP from NAGAR NIGAM
  - Whether regular meetings are held with industries- Yes, Quartly
  - Account taken action non-compliant industries- Name of industry, action, notice issue, industry has become compliant

- **Ganga Gram- DPRO**
  - For all villages with population more then 10k if there exists SLWM plan- 35Ganga grams
  - Ganga Aarti are conducted in Ganga grams-Yes
  - Toilets constructed across Ganga Gram near River Ganga- Yes, 100% of Ganga grams declared ODF, toilets constructed in Ganga grams/targets- 28000approx. targets of toilets
- **Biodiversity- DPRO**
  - District biodiversity register created by Biodiversity board in the district-Yes, Biodiversity registers are completed
  - Sighting of Migratory birds- no. of migratory birds-7, Species of migratory birds- Red crested pochards, Ruddy shelduck, Pin tails, Eurastam coots, Bar headed gooso, Painted storks, Cormorants etc.

- **Institutional Development- ALL DEPARTMENT**
  - No. of meetings held of DGC in year 2023- 12 meetings
  - Budget and maintenance of accounts is done- Yes

जिलाधिकारी महोदय द्वारा समस्त विभागों के अधिकारियों को निर्देशित किया गया कि अपने–अपने विभाग से सम्बन्धित कार्यवाही ससमय पूर्ण करते हुए समस्त वांछित कार्यवाही का विवरण माह की 30 तारिख तक अवश्य रूप से प्रभागीय निदेशक, सामाजिक वानिकी प्रभाग, मथुरा के कार्यालय में भेजना सुनिश्चित करें।

(वांछित कार्यवाही– समस्त जिला स्तरीय अधिकारी/विभागाध्यक्ष, मथुरा)

अन्त में बैठक का सधन्यवाद समापन किया गया।

19/25
अध्यक्ष,
जिला गंगा समिति/जिलाधिकारी
मथुरा।

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कार्यालय जिलाधिकारी मथुरा ।

पत्रांक 1074 /29–5(जिला गंगा समिति) मथुरा, दिनांक 4/09/.2025

प्रतिलिपि निम्नलिखित को सूचनार्थ एवं आवश्यक कार्यवाही हेतु प्रेषितः–

1. प्रभागीय निदेशक सामाजिक वानिकी प्रभाग,मथुरा।
2. मुख्य विकास अधिकारी, मथुरा।
3. नगर आयुक्त, मथुरा–वृन्दावन नगर निगम, मथुरा।
4. उपाध्यक्ष, मथुरा–वृन्दावन विकास प्राधिकरण, मथुरा।
5. अपर जिलाधिकारी, वित्त एवं राजस्व/प्रभारी अधिकारी, स्थानीय निकाय, मथुरा।
6. उप मुख्य कार्यपालक अधिकारी, उ0प्र0 ब्रज तीर्थ विकास परिषद, मथुरा।
7. अपर जिलाधिकारी, प्रशासन, मथुरा (नोडल स्थानीय नगरीय निकाय)।
8. उपायुक्त, जिला उद्योग एवं उद्यम प्रोत्साहन केन्द्र, मथुरा।
9. अधिशासी अभियन्ता, प्रान्तीय खण्ड, लो0नि0वि0, मथुरा
10. मुख्य चिकित्सा अधिकारी, मथुरा।
11. अधिशासी अभियन्ता, निर्माण खण्ड उ0प्र0, जल निगम(नगरीय), मथुरा।
12. अधिशासी अभियन्ता, अपर खण्ड आगरा कैनाल, सिंचाई विभाग, मथुरा।
13. जिला पंचायतराज अधिकारी, मथुरा।
14. जिला उद्यान अधिकारी, मथुरा।
15. उप कृषि निदेशक, मथुरा।
16. सहायक निदेशक मत्स्य पालन, मथुरा।
17. जिला विकास अधिकारी, मथुरा।
18. जिला अर्थ एवं संख्याधिकारी, मथुरा।
19. जिला विद्यालय निरीक्षक, मथुरा।
20. क्षेत्रीय अधिकारी, उ0प्र0 प्रदूषण नियंत्रण बोर्ड, मथुरा।
21. बेसिक शिक्षा अधिकारी, मथुरा।
22. जिला पर्यटन अधिकारी, मथुरा।
23. परियोजना प्रबन्धक, यमुना प्रदूषण नियंत्रण इकाई, उ0 प्र0 जल निगम ग्रामीण, आगरा।
24. रामरत अधिशासी अभियन्ता, नगर पंचायत/नगर पालिका, जनपद–मथुरा।
25. जिला नेहरू युवा केन्द्र, मथुरा।
26. प्रान्तीय रक्षा दल अधिकारी, मथुरा।
27. सहायक अभिलेख अधिकारी, मथुरा।
28. उपायुक्त, श्रम एवं रोजगार (मनरेगा), मथुरा।
29. उ0प्र0 राज्य औद्योगिक निगम, आगरा।
30. समस्त उपजिलाधिकारी, मथुरा।
31. जिला सूचना विज्ञान अधिकारी, मथुरा।
32. जिला कार्यक्रम अधिकारी, मथुरा।
33. अधिशासी अभियन्ता, दक्षिणांचल विद्युत वितरण निगम, मथुरा कैन्ट।
34. श्री दिलीप कुमार यादव, (पर्यावरणविद) पुत्र श्री भगवान दास यादव, नि0–गांम व पोस्ट–अडींग, मथुरा।
35. समस्त क्षेत्रीय वन अधिकारी, वन प्रभाग, मथुरा।
36. श्री जगन्नाथ पोददार, विशेष आमंत्रित सदस्य।
37. राष्ट्रीय नगर कार्य संस्थान के प्रतिनिधि सदस्य।

2/9/25

अध्यक्ष,
जिला गंगा समिति/जिलाधिकारी
मथुरा।

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Annexure 3: MSWG Notification

Office of the District Magistrate, Mathura.

Letter No.: 978/रम०वि०/2025 Date: 17/12/25

OFFICE MEMORANDUM

Dear Sir/Madam,

With respect to the Urban River Management Plan (URMP) preparation Mathura-Vrindavan and the meeting held on 14-07-2025, the following departments are now considered to be members of the Mathura-Vrindavan Multi Stakeholder Working Group (MSWG):

S.NO	Officials of Concerned Departments	Role
1	District Magistrate, Mathura	Chairperson
2	CEO, Braj Teerth Vikas Parishad, Mathura-Vrindavan	Member
3	Municipal Commissioner, Nagar Nigam Mathura-Vrindavan	Member /Nodal officer
4	Addi. Dist. Magistrate, Namami Gange/ Rural Mathura	Member
5	Town Planner, Mathura-Vrindavan Development Authority	Member
6	Executive Engineer, Mathura-Vrindavan Development Authority	Member
7	Executive Engineer, Uttar Pradesh Jal Nigam (Urban) Mathura	Member
8	General Manager, Jal Kal, NN, Mathura Vrindavan	Member
9	Executive Engineer, Upper Division, Agra Canal Mathura	Member
10	Executive Engineer, Irrigation and Water Resources Department Mathura	Member
11	Executive Engineer, Uttar Pradesh Ground Water Board Mathura.	Member
12	Regional Officer, Uttar Pradesh Pollution Control Board Mathura	Member
13	Project Manager, Yamuna Pollution Control Unit, U.P. Jal Nigam (Rural) Agra.	Member
14	Divisional Forest Officer, Mathura-Vrindavan Forest Division	Member
15	General Manager, District Industries Centre Mathura	Member
16	Project Officer, Swachh Bharat Mission-Urban	Member
17	Nodal Officer, Mathura -Vrindavan Smart city Nagar Nigam Mathura Vrindavan	Member
18	Naavik Association Mathura	Member
19	DPO, SMCG-UP.	Member

The Minutes of the Meeting held on 14.07.2025 is also enclosed herewith for information and record. The MSWG shall facilitate, discuss and guide the team of LEA Associates South Asia Pvt. Ltd. (LASA), the Consultants appointed for the project with respect to project deliverables preparation under this assignment.

17/12/25
District Magistrate
Mathura

Copy:
1. Above Departments.
2. Sh. Rahul Sachdeva, Team lead, NMCG NIUA 60 URMP Project

District Magistrate
Mathura

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Annexure 4: Draft Minutes of the Meeting (MOM) 2nd MSWG

Minutes of the Meeting (MoM)

of the

Urban River Management Plan (URMP) Multi-Stakeholder Working Group Meeting, Mathura-Vrindavan

Date & Time: 2nd June 2026, 3 pm

Venue: Conference Hall, Collectorate, Mathura-Vrindavan, Uttar Pradesh

1.1 Participants

Enclosed attendance list and meeting notice (refer to Annex-1 and Annex-2)

2. Introduction

The National Institute of Urban Affairs (NIUA) and the National Mission for Clean Ganga (NMCG), with support from the World Bank, are preparing Urban River Management Plans (URMPs) for 60 cities in the Ganga River Basin. The URMP is an integrated approach aimed at sustainably managing the river and its associated elements within a city. This framework helps address river-related challenges by covering the city's environmental, economic, and social aspects.

Over the next two years, the URMP-PMU at NIUA is focused on preparing URMPs for 60 identified Indian cities. In the first phase, 25 cities will be targeted, while the remaining 35 cities will follow in the subsequent phase. The current phase includes five cities in Uttar Pradesh: Shahjahanpur, Gorakhpur, Mirzapur, Mathura-Vrindavan, and Bijnor.

The first URMP Multi-Stakeholder Working Group (MSWG) Meeting for Mathura-Vrindavan was held on July 14, 2025, at the Nagar Nigam Conference Hall in Mathura. The meeting was chaired by Shri Anil Kumar Sagar, Additional Municipal Commissioner, Mathura-Vrindavan.

Subsequently, the 2nd MSWG Meeting was held on June 2, 2026, at the Conference Hall, Collectorate, Mathura. The meeting was chaired by Mr. Jag Pravesh (IAS), Municipal Commissioner, Mathura-Vrindavan, and attended by officials from the Mathura-Vrindavan city and state departments, along with representatives from NIUA and the consultant team, LEA Associates South Asia Pvt. Ltd. (LASA). This was followed by a meeting chaired by Mr. Chandra Prakash Singh, IAS, District Magistrate Mathura in the presence of Dr. Pooja Gupta, IAS, CDO Mathura.

3. Discussions and Deliberations

1. The meeting commenced with an overview of the URMP framework. Ms. Simranpreet Kaur, Sr. Environment Specialist at NIUA, gave a presentation outlining the overall approach being followed for the preparation of URMPs across the selected cities.
2. Mr. Chandra Shekhar Sinha, Team Leader at LEA Associates, and Mr. Kamal Mehandiratta, Urban Environment Expert at LEA Associates, jointly presented the baseline assessment for Mathura-Vrindavan.
3. The presentation highlighted several critical observations, including solid waste dumping and greywater discharge into the Yamuna River, the city's reliance on groundwater, and the absence of 25-year and 100-year return period flood lines. Potential solutions to these issues were presented to gather stakeholder feedback.

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1.1 The Municipal Commissioner conveyed the need to prepare a Terms of Reference (ToR) to guide the Mathura-Vrindavan Development Authority (MVDA) in incorporating these recommendations into the master plan. Specifically, this pertains to the inclusion of 5-year, 25-year, and 100-year flood lines as suggested by the Ministry of Jal Shakti in July 2025.

1.2 The Executive Engineer explained that the water quality of the treated used water from the 30 MLD STP at Masani is significantly impacted by the large volumes of industrial dye discharged into the Masani drain, which increases its COD level.

1.3 In line with the proposals suggested by the consultant team for the Laxmi Nagar 30.5 MLD STP, the Executive Engineer of Jal Nigam reported on an ongoing project by IIT Kanpur to upgrade the existing 14.5 MLD WSP-based STP to 15 MLD, scheduled for commissioning by July 2026. Additionally, he conveyed that the 16 MLD UASB-based STP in the same complex is being replaced with a 16 MLD SBR technology plant.

1.4 The Jal Nigam department informed the group that the 6.8 MLD WSP-based STP at the 36.8 MLD Masani STP Complex is being upgraded to 7 MLD, for which a proposal has already been prepared. Furthermore, the 30 MLD SBR-based STP will be upgraded to meet quality parameters, with the project proposal currently in the pipeline. It was also noted that a zone-wise plan has been developed for the proposed co-treatment plant.

1.5 During the discussion, the Commissioner raised the issue of the Masani drain and requested the LASA team provide actionable proposals that could be taken forward.

1.6 The Municipal Commissioner directed the Secretary of the MVDA to provide the LASA team with the lists and proposals regarding the *kunds* (water bodies) in the city.

1.7 The discussion and deliberations held with DM are as under:

- DM directed that river management planning must not run as an isolated exercise. It must be made a permanent, monthly agenda item in the DGC.
- Critical peripheral locations along the 25 km river stretch, such as Chintaharan Mandir (below Gokul), Vrindavan, and Govardhan was highlighted, noting that pollution and unmanaged growth in peripheral zones directly impact the city, comparing it to how outer areas like Khoda and Loni impact Ghaziabad and Delhi. Thus, it was agreed that Chintaharan Mandir (below Gokul) will be taken-up for suggesting interventions under URMP.
- A proposal to pipingly brand/supply piped water or external Ganga Jal in ghat showers was rejected.
- Consultants were directed to focus on localized, on-site treatment (primary, secondary, or tertiary) of Yamuna River water directly near the ghats and changing rooms.

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1.1 Implement ghat-related improvements, such as providing changing rooms and introducing pontoons for boating.

1.2 Include the implementation of the URMP in the agenda of the District Ganga Committee (DGC) meetings to review its progress on a monthly basis.

1.3 Many of the proposed interventions were accepted by the DM, while a few were suggested for revision. The Consultants were advised to finalise and submit the Urban River Management Plan (URMP) for Mathura-Vrindavan at the earliest, after incorporating the suggestions of DM for discussions further discussion and acceptance of the proposed interventions.

The meeting concluded with a vote of thanks to the Chair and all attendees.



2nd MSWG Meeting held in Mathura on 2nd June 2026

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Attendance sheet of 2nd MSWG meeting held in Mathura-Vrindavan



Second URMP Working Group Meeting for Mathura-Vrindavan, Uttar Pradesh

Registration Sheet

City: Mathura-Vrindavan **Date:** 02-06-2026

S.No	Name	Designation and Organization	E- mail	Contact No	Signature
	Jay Prakash	Mukhya Vikas Adhikari Chhaprauli Baghpat		9634812441	
	Manish Kumar Sharma	Forest Dept, SDO		9458380921	
	Arun Verma	DFO - SMCG-UP		9958580118	
	Ashish Kr. Singh	Secretary, MVDA		9927068702	
	Dr. N. Amod Khurana	G.M. Nagar Nigam		9218996341	
	Shahzeb Iqbal	P.E., UPJN(R) Agra.	pmyamuna@gmail.com	7895150641	
	Shailendra Kumar Singh	RBM SMCG Lucknow		7839427939	
	Rajiv Sharma	Addl. Chief Office DDC Mathura		9557831478	

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National Institute of Urban Affairs

Second URMP Working Group Meeting for Mathura-Vrindavan, Uttar Pradesh

S.No	Name	Designation and Organization	E- mail	Contact No	Signature
	Simranpreet	NIUA		9849474648	
	Jagdish Siddhapura	NIUA		9125364848	
	Divya Kachhwaya	UBA		9877121814	
	Shamistha Dutta Gupta	LASA		9871501428	
	C S Sinha	LASA		9910060789	

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एक कदम स्वच्छता की ओर

कार्यालय : नगर निगम मथुरा–वृन्दावन, मथुरा

पत्र संख्या–1185 / एस0टी0 / 2026 दिनांक–01.06.2026

बैठक सूचना

सेवा में,

1. मुख्य कार्यपालक अधिकारी, बृज तीर्थ परिषद, मथुरा।
2. अपर जिलधिकारी, नमामि गंगे, मथुरा।
3. नगर योजनाकार, मथुरा–वृन्दावन विकास प्राधिकरण।
4. अधिशासी अभियन्ता, मथुरा–वृन्दावन विकास प्राधिकरण।
5. अधिशासी अभियन्ता,निर्माण खण्ड, उ0प्र0 जल निगम(नगरीय), मथुरा।
6. महाप्रबन्धक(जल), जलकल विभाग, नगर निगम मथुरा–वृन्दावन,मथुरा।
7. अधिशासी अभियन्ता, अपर खण्ड आगरा नहर, मथुरा।
8. अधिशासी अभियन्ता, सिंचाई एवं जल संसाधान विभाग, मथुरा।
9. अधिशासी अभियन्ता, उ0प्र0 भू–जल विभाग, मथुरा।
10. क्षेत्रीय अधिकारी, उ0प्र0 प्रदूषण नियन्त्रण बोर्ड, बल्देवपुरी, मथुरा।
11. परियोजना प्रबन्धक, यमुना प्रदूषण नियन्त्रण इकाई, उ0प्र0 जल निगम(ग्रामीण), जीवनी मण्डी आगरा।
12. सम्भागीय वन अधिकरी, वन विभाग, मथुरा।
13. महाप्रबन्धक, जिला उद्योग केन्द्र, मथुरा।
14. परियोजना अधिकारी, स्वच्छ भारत मिशन।
15. मुख्य अभियन्ता, मथुरा–वृन्दावन स्मार्ट सिटी, न0नि0म0वृ0,मथुरा।
16. अध्यक्ष / सचिव, नाविक एसोसिएशन, बंगालीघाट, मथुरा।
17. परियोजना निदेशक, स्टेट मिशन फॉर क्लीन गंगा, उ0प्र जल निगम(ग्रामीण) राणा प्रताप मार्ग, लखनऊ।
18. जिला परियोजना अधिकारी, राज्य स्वच्छ गंगा मिशन, लखनऊ।
19. नाविक एसोसिएशन, मथुरा।

विषयः– **Urban River Management Plan** तैयार किये जाने हेतु दिनांक 02.06.2026 को सायं 03:00 बजे कलेक्ट्रेट सभागार में मीटिंग आहूत किये जाने के सम्बन्ध में।

उपरोक्त विषयक जिलाधिकारी महोदय के कार्यालय पत्र सं0–978 / एस0टी0 / 2025 दिनांक 17.12.2025 का सन्दर्भ ग्रहण करने का कष्ट करें, जिसके माध्यम से जिलाधिकारी महोदय के द्वारा Urban River Management Plan तैयार किये जाने हेतु आपको सदस्य के रूप में नामित किया गया है। उक्त के क्रम मे अद्योस्ताक्षरी की अध्यक्षता मे कलेक्ट्रेट सभागार, मथुरा में दिनांक 02.06.2026 को सांय 03:00 बजे मीटिंग आहूत की गयी है।

अतः उपरोक्त के सम्बन्ध में उक्त बैठक में ससमय प्रतिभाग किये जाने का कष्ट करें।

संलग्नकः उपरोक्तानुसार।

Digitally signed by JAG PRAVESH
Date: 01-06-2026 15:53:57

नगर आयुक्त
नगर निगम मथुरा–वृन्दावन

प्रतिलिपिः–

1. जिलाधिकारी महोदय, जनपद–मथुरा को सादर अवलोकनार्थ।
2. नाजिर, कलेक्ट्रेट मथुरा को मीटिंग हॉल आरक्षित करने हेतु।

नगर आयुक्त
नगर निगम मथुरा–वृन्दावन

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Annexure 5 Details of on-site survey of water bodies

S.no	Name	Presence of solid waste in or around the water body	Discharge of untreated used water in the water body	Presence of a boundary protection around a water body	Visible eutrophication in the water body	Minimum DO (4 mg/l)	Reduction in volume of water from previous year	Situation according to Toposheet
1	**Indal Kund**	Yes	Yes, used water from nearby settlements	No	Yes	Min-1.4 Max- 4.2	Yes, it dries during summer and fills with water during monsoon	Existing
2	**Shiv Mandir Pond**	Yes	Yes, used water from nearby settlements	No	Yes	Could not conduct due to accessibility	Yes, it dries during summer and fills with water during monsoon	Man-Made
3	**Jaipur Mandir lake**	Yes	Yes, used water from nearby settlements	No	Yes	2.2	Yes, it dries during summer and fills with water during monsoon, Cattle bathing	Man-Made
4	**Matovan pond**	Yes	Yes, used water from nearby settlements	No	Yes	3.7	Yes, it dries during summer and fills with water during monsoon	Existing
5	**Bagel Bagichi**	Yes, along with cow dung	Yes, used water from nearby settlements	No	Yes	Min-2.2 Max- 3.9	Yes, it dries during summer and fills with water during monsoon, Near to Jai Gurudev mandir	Existing
6	**Savri masjid pond**	Yes	Yes, used water from nearby settlements	No	Yes	2.4	Yes, it dries during summer and fills with water during monsoon	Existing
7	**Naugaon Badi Pokhar**	Yes	Yes, used water from nearby settlements	No	Yes	3.6 4.2	Yes, it dries during summer and fills with water during monsoon	Existing
8	**Dampier Nagar Pokhar**	No	Yes, used water from nearby	No, surrounded by plantation	Yes	2.5 4.9	Yes, it dries during summer and fills with	Existing

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S.no	Name	Presence of solid waste in or around the water body	Discharge of untreated used water in the water body	Presence of a boundary protection around a water body	Visible eutrophication in the water body	Minimum DO (4 mg/l)	Reduction in volume of water from previous year	Situation according to Toposheet
			settlements, hotels				water during monsoon, Cattle bathing	
9	**Maa Chamunda temple pond**	Yes	Yes, used water from nearby settlements	No	Yes	2.4	Yes, it dries during summer and fills with water during monsoon	Existing
10	**Hanuman Bagichi**	Yes	Yes, used water from nearby settlements	No	Yes	2.9	Yes, it dries during summer and fills with water during monsoon	Man-Made
11	**Ramtal Kund**	No	Yes	Yes	Yes	3.5	Yes	Existing
12	**Potra Kund**	No	No	Yes	Yes	Could not conduct due to accessibility	Yes	Existing
13	**Balbhdra kund**	Yes	Yes, used water from nearby settlements	Yes	Yes	Could not conduct due to accessibility	Yes	Existing
14	**Shantanu Bihar mandir kund**	Yes	Yes, used water from nearby settlements	Yes	No	2.3 3.8	Yes	Man-Made

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Annexure 6: Flora Found in the Braj Region

Sacred Forests (Bans / Vans) in Braj Region

Sacred Forest Name
Mahavan
Kamyavan
Kokilavan
Talvan
Kumudvan
Bhandirvan
Khadiravan
Lohvan
Bhadravan
Bahulavan
Vilvavan
Belvan

Annexure 7: Chief Trees and Flora of the Region

Common Name	Botanical / Scientific Name (as listed)
Babul	N/A
Neem	*Azadirca Indica*
Sheesam	*Delber jiasisoo*
Jamun	*Syzygiu mcumini*
Mango	*Mangifera Indica*
Siras	*Albiz zialabbek*
Arua	*Alanthu sexcelsa*
Baheda	N/A
Amltas	*Cassia Fistula*
Papari	*Holoptelaintegrfolia*
Pipal	*Ficus species*
Tulsi	N/A
Faras	*Tamrixauriculate*
Karil	N/A
Pilu	*Salvadoraoleoides*
Hins	*Capparishorrida*
Kadams	N/A
Dho	N/A
Ganger	N/A
Khajur	*Phoenix species*
Bargad	*Ficusindica*
Chhonkar	N/A
Jharber	*Zizyphusnumularia*
Ber	*Zizyphusxylocarpus*
Pilkhun	N/A
Imali	N/A
Khirni	*Manilkara hexandra*
Rakhaya	N/A

Source: Braj Development plan: conservation plan for natural landscapes of braj, Vol II- C, Uttara Pradesh Braj Teerath Vikas Parishad, UP, Dec 2021

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Annexure 8: Fauna Found in the Braj Region

Mammals & Wild Animals

Common Name	Botanical / Scientific Name
Leopard	*Panthera pardus*
Wolf	*Canis lupus*
Hyaena	*Hyaena hyaena*
Blue bull / Nilgai	*Boselaphus tragocamelus*
Wild boar	*Sus scrofa cristatus*
Jungle cat	*Felis chaus*
Chinkara	*Gazella bennettii*
Hog deer	*Axis porcinus*
Porcupine	*Erethizon dorsatum*
Hare	*Lepus ruficaudatus*
Monkey	*Macaca mulatta*
Langur	*Presbytis entellus*

Birds

Common Name	Botanical / Scientific Name
Little grebe	*Tachybaptus ruficollis*
Bar headed goose	*Anser indicus*
Common teal	*Anas crecca*
Gadwall	*Anas strepera*
Grey partridge	*Perdix perdix*
Lesser florican	*Sypheotides indicus*
Sand grouse	*Pterocles exustus*
Heron	*Ardea cinerea*
Coot	*Fulica atra*
Stork	*Ciconia Ciconia*
Flamingo	*Phoenicopterus roseus*
Black partridge	*Melanoperdix niger*
Common or gray quail	*Coturnix coturnix*
Common pea fowl / Peacock	*Pavo cristatus*
Sarus	*Grus antigone*
Wedge-tailed gee pigeon	*Treron phoenicoptera*
Black rock pigeon	*Columba livia*
Cattle egret	*Bubulcus ibis*
Griffon vulture	*gyps fulus*
Indian cuckoo	*Cuculus micropterus*
Koel	*Eudynamys scolopaceus*
Mottled wood owl	*Strix ocellata*
Baya	*Ploceus philippinus*

Reptiles

Common Name	Botanical / Scientific Name
Crocodile	*Crocodylus palustris*
Turtle	*Kachuga tectum*
Monitor lizard	*Varanus monitor*
Oriental garden lizard	*Calotes versicolor*
Python	*Python molurus*
Cobra	*Naja, naja*
Dhaman or rat snake	*Python mucosus*
Wolf snake	*Lycodon aulicus*
Water snake	*Natrix piscator*

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Common Name	Botanical / Scientific Name
Black barred snake	*Oligodon arnensis*
Pond turtle	*Lissemys punctata*
Indian softshell turtle	*Trionyx gangeticus*
Yamuna kachhua	*Kachuga tectum*

Pisces (Fishes)

Common Name	Botanical / Scientific Name
Rohu	*Labeo rohita*
Mahseer	*Barbus [Tor] putitora*
Lake fish	*Barbus chilinoides*
Rishala	*Orcinus sinuatus*
Katla or bhakur	*Catla catla*
Mrigala or nain	*Cirrhinus cirrhosus*
Mullet	*Mugil corsula*

Source: Braj Development plan: conservation plan for natural landscapes of braj, Vol II- C, Uttara Pradesh Braj Teerath Vikas Parishad, UP, Dec 2021

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Annexure 9: Existing Riparian buffer along Streams and Canal

Stream 1

Typology	Total Length (m)
Dense Vegetation	6226.10
Low Density Vegetation	2641.60
Agricultural Land	13561.40
Built Up	1919.30
Total	24348.40

Stream 2

Typology	Total Length (m)
Dense Vegetation	64233.40
Low Density Vegetation	0.00
Agricultural Land	40728.50
Built Up	1457.70
Total	106419.60

Agra Canal

Typology	Total Length (m)
Dense Vegetation	69881.5

Annexure 10: Existing Riparian buffer along man-made drains

Typology	Total Length (m)
Dense Vegetation	145889
Low Density Vegetation	89185
Agricultural Land	59239
Embankment	141594
Built Up	39927
Total	475834

Annexure 11: Existing Riparian buffer along Masani drain

Typology	Total Length (m)
Dense Vegetation	145889
Low Density Vegetation	89185
Agricultural Land	59239
Embankment	141594
Built Up	39927
Total	475834

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Annexure 12: Yamuna River Action Plan–URMP Convergence Matrix

S.No.	Action Points Short Term Action Point	Applicability to Mathura-Vrindavan URMP	Response (URMP interventions addressing the action point)
I.	**Sewage Management**		
(a) Short Term Action Point			
1	Estimation of total sewage generation from City/Towns where sewage treatment facility does not exist and preparation of DPR for treatment of sewage	**Applicable**	Sec. 5.2.1 estimates sewage generation; Rec. 5 Capacity Enhancement of STPs; Rec. 11 sewer extension for newly merged areas; Int. 4 and Rec. 3 (FSSM Plan) cover unsewered areas.
2	Measurement of flow & load of all the drains contributing pollution load in River Yamuna	**Applicable**	Rec. 10: seasonal flow and pollution-load measurement at all 36 drain outfalls; Rec. 4 flow sensors on Masani drain; Annexure 6 drain survey.
3	Installation of Bar-meshes in the drains & regular cleaning & disposal of Solid Waste from them	**Applicable**	Int. 1: Riser-type trash traps on 5 nallahs; Rec. 10: bar screens with cleaning/disposal schedule on remaining drain outfalls.
4	Untapped drains to be provided with modular treatment facilities/ In-Situ bio-remediation or Phytorid-SWAB (CSIR-NEERI) based treatment	**Applicable**	Rec. 10: interim in-situ bioremediation / Phytorid treatment on untapped drains until the 13 MLD and 60 MLD STPs are commissioned; Rec. 6 Phytorid/DEWATS for pond inflows.
5	Completion and commissioning of under construction STP	**Applicable**	Sec. 5.2.5: under-construction 13 MLD (Vrindavan) and 60 MLD (Mathura) STPs; Rec. 5 SBR upgrades; Rec. 10 I&D gap register tracks completion dates.
6	Formulation of Action Plan for long term use of treated water discharged from STPs	**Applicable**	Objective 5 / Rec. 15: City Reuse Plan for treated used water (industrial, urban non-potable and agricultural reuse); Int. 4 and Rec. 3 reuse of co-treatment effluent.
7	Installation of Web Cams & OCEEMS in STPs	**Applicable**	Rec. 5 (operational measures): OCEMS and CCTV at all STPs and co-treatment units with UPPCB/CPCB connectivity.
8	Formulation of Action Plan for income generation of STPs including installation of Solar Power Plants, Energy Plantation & sale of sludge and treated water, bio-composting etc.	**Applicable**	Rec. 15: tariff-based sale of treated water and sludge-based manure; Rec. 5: solar power on STP land; Int. 4 / Rec. 3 sale of biosolids.
9	Obtaining Consent to Operate/Establish and Hazardous Authorization from UPPCB	**Applicable**	Rec. 5 (operational measures): valid CTE/CTO and authorisation from UPPCB for all STPs and co-treatment units, reviewed quarterly by the District Ganga Committee.
10	Preparation of DPR for channelization including diversion of sewage generated from household / township / villages to	**Applicable**	Rec. 10: I&D gap register of all untapped/partially tapped drains; ongoing 13 MLD and 60 MLD STPs;

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S.No.	Action Points Short Term Action Point	Applicability to Mathura-Vrindavan URMP	Response (URMP interventions addressing the action point)
	sewer lines and interception of all drains (excluding drains carrying industrial wastewater) for ensuring proper treatment through upcoming STPs.		Int. 3 Vishram Ghat I&D pump; Rec. 4 Masani drain hydraulic separation.
11	Septage Management in the areas where sewerage network does not exist	**Applicable**	Intervention 4: co-treatment plants (2 x 50 KLD + 70 KLD); Intervention 5: FSSM Plan
(b) Long Term Action Point			
12	Laying of Sewerage Network & Connection of households to the sewer line in order to utilize the installed capacity of existing STPs	**Applicable**	Laying of Sewerage network is being undertaken by UP Braj Teerath.
13	Establishment of Sewage Treatment Plants of adequate capacity	**Applicable**	Reccomendation 5: Augmentation of Mant Road, Pagal Baba, Laxmi Nagar and Masani STPs; ongoing 13 MLD and 60 MLD STPs.
14	Tapping & diversion of the drains having high sewage load to STPs to be constructed on I&D model	**Applicable**	Reccomendation 4: Masani drain; ongoing 60 MLD STP (Aurangabad drains) and 13 MLD STP (Chaitanya Vihar, Sunrakh); Int. 3 Vishram Ghat I&D.
15	Infrastructure Development in Irrigation/Horticulture/ Sprinkling/Industrial use etc. And ensuring use of treated water	**Applicable**	Treated used water is being utilized by IOCL.
16	Installation of Solar Power Plant & Energy Plantations in the vacant land of STPs	**Not Applicable**	Not in URMP Scope
17	Installation of supplementary/tertiary treatment system in existing STPs which are not able to achieve discharge norms in the present system	**Applicable**	Reccomendation 5: (operational measures): tertiary filtration and disinfection at all STPs; SBR upgrades; IIT pilot at 14.5 MLD STP.
18	Treatment of waste water in Rural areas flowing into the river by Bioremediation/Phyto-remediation/Oxidation Pond etc.	**Partially Applicable**	Reccomendation 8: DEWATS/Phytorid for pond inflows; Rural drains are outside the URMP scope.
19	Ensuring ODF in all the villages situated along the river	**Not Applicable**	Not in URMP Scope
II.	**INDUSTRIAL WASTE MANAGEMENT**		
(a) Short Term Action Point			
20	Re-inventorisation of Water Polluting Industries in the catchment area of the drains and their status with respect to consent, installation of ETP, adequacy of ETP and final discharge point	**Applicable**	Sec. 5.2.3 (industrial units and effluent status: no discharge observed in field;
21	Monitoring of water polluting industries and ensuring closure of industries which are operating without consent or non-compliant	**Not Applicable**	Not in URMP Scope
22	Installation of OCEEMS, Flow Meter & Web Cams in large and medium	**Not Applicable**	Not in URMP Scope

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S.No.	Action Points Short Term Action Point	Applicability to Mathura-Vrindavan URMP	Response (URMP interventions addressing the action point)
	category of GPIs with connectivity to the server of CPCB and UPPCB		
23	Closure and legal action against the illegal water polluting industries operating in nonconfirming /residential areas	**Not Applicable**	Not in URMP Scope
24	Upgradation of CETP at UPSIDC, Industrial Area, Site- A, Mathura.	**Applicable**	The existing CETP is already under utilitized. This upgradation is not required at this point.
(b) Long Term Action Point			
25	Adoption of cleaner technologies by water polluting industrial sectors having major impact on water quality of the river. For eg. – Electroplating, Dyeing, Pulp & Paper industries etc.	**Not Applicable**	Not in URMP Scope
26	Imposing stringent norms in Distillery, Pulp & Paper, Slaughter House & Tannery sectors	**Not Applicable**	Not applicable: no distillery, pulp & paper, slaughter house or tannery units on Mathura drains.
27	Reducing abstraction of ground water by reuse/recycle of treated effluent by installation of additional treatment facilities & process improvement	**Applicable**	Supply of treated water to IOCL and other industries to reduce groundwater abstraction;
28	Use of treated effluent from CETPs for industrial and irrigation purposes	**Partially Applicable**	Refer Sl.No. 24 above.
29	Actions related to improvement of ETPs and reduction of use of ground water by the industries as per the prescriptions given in Appendices of Yamuna Ation Plan	**Not Applicable**	Not in URMP Scope
30	Modification of CETP, Mathura	**Partially Applicable**	Refer Sl.No. 24 above.
III.	**SOLID WASTE & FLOOD PLAIN ZONE MANAGEMENT**		
(a) Short Term Action Point			
31	Strictly ensuring prohibition of dumping of solid & other waste within 500 Meters of the banks of the river	**Applicable**	Reccomendation 6: mapping of dumping hotspots within 500 m, CCTV and penalties; Int. 1 trash traps; Int. 12 signages; Int. 15 River Sabha; Int. 19 clean-up drives.
32	Collection & Segregation of Solid Waste as per the provision of SWM Rules, 2016	**Applicable**	Sec. 5.3.1 door-to-door collection; Rec. 13 progressive increase in source segregation; Int. 18 composting & segregation workshops; Int. 10 campaign.
33	Disposal of Recyclable waste through registered recyclers	**Not Applicable**	Not in URMP Scope
34	Compliance of SWM Rules, 2016 by bulk generators (onsite bio-composting, disposal of recyclable waste through registered recyclers)	**Not Applicable**	Not in URMP Scope

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S.No.	Action Points Short Term Action Point	Applicability to Mathura-Vrindavan URMP	Response (URMP interventions addressing the action point)
35	Upgradation & operation of existing nonoperational & non-complying Solid Waste Treatment Facilities as per prescribed norms	**Applicable**	Section 5.3: assessment and upgradation of MRF, compost units and incinerators.
36	Compliance of C&D Waste Management Rules, 2016 & prohibition of illegal dumping of C&D waste	**Applicable**	Section 5.3: prohibition of C&D dumping on floodplain and ghats, linked to the 50 TPD C&D plant.
37	Installation of Web Cams in Solid Waste & C&D Waste Treatment & Disposal Facilities with open access to UPPCB & CPCB server connectivity	**Applicable**	Intervention12
38	Formulation of Action Plan for income generation of Solid Waste & C&D Waste Treatment & Disposal Facilities including installation of Solar Power Plants, Energy Plantation & sale of RDF, compost etc.	**Applicable**	Intervention12
39	Obtaining Consent to Operate/Establish and Authorization from UPPCB	**Not Applicable**	Not in URMP Scope
40	Ensuring idol immersion in environmental friendly manner by creation of artificial ponds with proper lining & proper disposal of sludge & effluent	**Applicable**	Reccomendation 6: lined artificial immersion ponds during festivals; Int. 11 biodegradable kits; Int. 14 temple/mosque networks.
41	Ensure strict prohibition of encroachments & illegal constructions in FPZ	**Applicable**	Recommendation1: flood lines, 200 m buffer, FPZ Guidelines 2025
42	Removal of solid waste & algal growth disposed in the river by use of low cost innovative techniques with involvement of local community	**Applicable**	Section 8.2: mounted trash skimmers along ghat stretches; Int. 1 trash traps; Int. 19 clean-up drives.
(b) Long Term Action Point			
43	Establishment of new solid waste & C&D treatment & disposal facilities against the gap with respect to generation of solid waste	**Applicable**	Intervention12
44	Treatment & disposal of legacy waste dumped within 500 meters of the bank of the River	**Applicable**	No legacy waste reported
45	Construction of electric/fuel efficient crematorium to stop disposal of unburnt/ semi burnt corpses in the river	**Applicable**	No crematorium along the river banks
46	Demarcation & notification of FPZ by introducing Pillars at suitable locations in river flood plain and preventing encroachment in river bed.	**Applicable**	Recommendation 1: 5/25/100-year flood lines; physical demarcation with pillars (additional floodplain measures).
47	Removal of illegal encroachments & constructions from FPZ	**Applicable**	Recommendation 1: removal of encroachments and rehabilitation of informal settlements within HFL through DM-led committee.
IV.	**ECOLOGICAL FLOW & GROUND WATER MANAGEMENT**		

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S.No.	Action Points Short Term Action Point	Applicability to Mathura-Vrindavan URMP	Response (URMP interventions addressing the action point)
	(a) Short Term Action Point		
48	Identification, inventorization & geo referencing of wetlands/water bodies including their zone of influence & catchment areas within 2 Km of the river	**Applicable**	Intervention 5: waterbody database extended to all waterbodies within 2 km of the river; Rec. 6 prioritisation of ponds; Annexure 4.
49	Identification & geo referencing of vacant lands in the vicinity of the river for development of bio-diversity parks & forest areas	**Applicable**	Objective 4: identification of vacant floodplain land for a biodiversity park and riverine forest;
50	Identification of external water sources like canal escapes etc. for addition of water in the river for dilution purposes	**Applicable**	Reccomendation 4: Rawal canal escape water separated from the Masani drain. Canal escapes are a basin/State action.
51	Prohibition of illegal mining & diversion of river stream	**Not Applicable**	No mining reported along the banks of Yamuna River
52	Ensuring rain water harvesting/recharging structures/rainer wells on river banks & construction of water harvesting structures	**Applicable**	Table 8-1 item 5 (RWH and 30% permeable area); Reccomendation 8: Sponge Parks.
	(b) Long Term Action Point		
53	Notification of E-flow of the River	**Not Applicable**	Not applicable at city level (Central/State function).
54	Ecological restoration of the wetlands including plantation in the catchment area & development of community based ecotourism in the wetland	**Applicable**	Reccomendation 8 pond restoration; Intervention. 6 Dampier Nagar Pokhar; Objective 7 & 8 eco-tourism.
55	Development of Bio-diversity Parks and Riverine Forests by plantation & regeneration of native species of trees, grasses & herbs and establishment of new nurseries	**Applicable**	Intervention 7 riparian restoration with native species; Reccomendation 9: native-species nursery under Objective 4.
56	Adoption of good irrigation/Agriculture practices, suitable crop selection, use of sprinkler/drip irrigation to minimize the water consumption through awareness & support to the farmers	**Not Applicable**	Not applicable (agricultural practice).
57	Removal of encroachment from wetlands, ponds & their restoration	**Applicable**	Rec. 8 Phase I encroachment control; Int. 5 database; Table 8-1 item 3.
58	Allowing flow of fresh surplus water source like canal for restoration of E-flow	**Not Applicable**	Not applicable (basin/State action).
59	Recharge of dry Wells and Ponds	**Applicable**	Objective 3: inventory and revival of historic wells and kunds where hydrogeology permits; Rec. 6; Reccomendation 8 Sponge Parks.
V.	**MONITORING & EVALUATION**		
60	Daily Monitoring of river water quality at the upstream & downstream of cities & meeting points of the major drains	**Applicable**	Included in the interventions

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S.No.	Action Points Short Term Action Point	Applicability to Mathura-Vrindavan URMP	Response (URMP interventions addressing the action point)
61	Weekly monitoring of drains, STPs & CETPs	**Applicable**	Included in the interventions
62	Monitoring of water polluting industries	**Applicable**	Included in the interventions
63	Monitoring of ground water quality within 500 meters of the rivers & drains	**Applicable**	Included in the interventions
64	Pre-monsoon & post-monsoon monitoring of ground water level	**Applicable**	Included in the interventions
65	Measurement of River flow as per the protocol	**Applicable**	Included in the interventions
66	Project formulation & funding including recurring expenses for employment of JRFs/Monitoring Assistants/Field Assistants, purchase of kits & equipments, vehicle on rental basis, development of Web Portal & establishment of Control Room, purchase of desktop computers, printers/ LED Monitor etc.	**Not Applicable**	Not applicable (UPPCB institutional item).
67	Development of Web Portal for reporting & centralized monitoring of water quality of the river & drains and action points with access to all concern stakeholders. departments/agencies responsible for implementation of the action plan	**Applicable**	Included in the interventions
68	Establishment of Regional Control Rooms at District/ Division Level for monitoring & uploading of data related to monitoring of water quality & compliance of action points with its integration to the State Level Control Room	**Applicable**	Included in the interventions

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Annexure 13: CPCB - Designated Best Use classification

Designated-best-Use/ Beneficial Use	Classification of water	Criteria
Drinking water source without Conventional treatment but after disinfection	A	1. Total Coliforms Organism MPN/100 ml shall be 50 or less 2. pH between 6.5 and 8.5. 3. Dissolved Oxygen 6 mg/l or more 4. Biochemical Oxygen Demand 5 days 20 °C 2 mg/l or less
Outdoor Bathing (organized)	B	1. Total Coliforms Organism MPN/100 ml shall be 500 or less. 2. pH between 6.5 and 8.5 3. Dissolved Oxygen 5 mg/l or more 4. Biochemical Oxygen Demand 5 days 20 °C 3 mg/l or less
Drinking water source after conventional treatment and disinfection	C	1. Total Coliforms Organism MPN/100 ml shall be 5000 or less 2. pH between 6 and 9 3. Dissolved Oxygen 4 mg/l or more 4. Biochemical Oxygen Demand 5 days 20 °C 3 mg/l or less
Propagation of wild life and fisheries	D	1. 1. pH between 6.5 and 8.5 2. Dissolved Oxygen 4 mg/l or more. 3. Free Ammonia (as N) 1.2 mg/l or less
Irrigation, industrial cooling, controlled waste disposal	E	1. pH between 6.0 and 8.5 2. Electrical Conductivity at 25 °C micro mhos/cm maximum 2250 3. Sodium absorption ratio maximum 26 4. Boron maximum 2 mg/l

Source: Central Pollution Control Board

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Annexure 14: Detailed observations of on-site survey of 36 drains of Mathura-Vrindavan

S no.	Name of Nallah	Discharge of Nallah (MLD)	Tapping (Yes/ No)	Pictures	Salient Features and Issues
1	Kalidah drain	0.49	Yes		• Bypassed to Kosi Nallah instead of being diverted to STP • No confirmed direct STP connection — treated water outcome unclear • Low flow (0.49 MLD) but bypass sets a poor precedent if made permanent
2	Bihar Ghat drain	0.62	Yes		• Pumped via Biharghat IPS → Mukherjee Park MPS → 4 MLD STP • Multi-stage pumping chain increases risk of failure at any link • No solid waste or quality issues recorded; routine O&M needed
3	Chirghat drain	0.09	Yes		• Solid waste accumulated at the drain • No litter trap installed; waste likely reaching I&D structure • Very low flow (0.09 MLD) but debris can block the interception chamber
4	KC Ghatndrain	0.06	Yes		• Routed via Gyan Gudri IPS → Rajpur Khadar MPS → 8 MLD STP • Long pumping chain through multiple stations; any breakdown causes overflow

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S no.	Name of Nallah	Discharge of Nallah (MLD)	Tapping (Yes/ No)	Pictures	Salient Features and Issues
5	Banshi Bat drain	0.29	Yes		• Diversion sewer on Parikrama Road connected to Gyan Gudi SPS
6	Rajpur Nallah	0.08	Yes		
7	Jagannath Ashram Nallah	1.52	Yes		• Monitoring gap — no water quality or flow data on record • Given ashram proximity, risk of religious waste / floral offerings entering drain
8	Ranapat Ghat drain	0.23	Yes		

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S no.	Name of Nallah	Discharge of Nallah (MLD)	Tapping (Yes/ No)	Pictures	Salient Features and Issues
9	Bhauraghat drain	0.08	Yes		• Ghat-side drains typically accumulate puja waste;
10	Rangji's garden drain	0.51	Yes		
11	Gaura Nagar drain	3.08	Yes		
12	Chaitanya Bihar Nallah (Sunrakh) - 1	3.34	No		• UNTAPPED — 3.34 MLD flows directly to river with zero treatment • Solid waste is a major documented issue — no litter trap installed • Receives Chetan Vihar Nallah upstream; combined load from Chhatikara area • Earmarked for diversion to 13 MLD STP (under construction) — I&D must be synchronised

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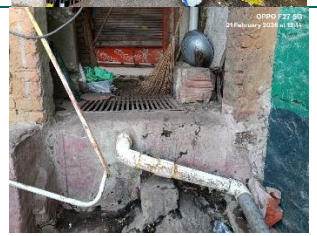
S no.	Name of Nallah	Discharge of Nallah (MLD)	Tapping (Yes/ No)	Pictures	Salient Features and Issues
13	Chaitanya Vihar Nallah (Sunrakh) - 2	0.56	No		• Currently untapped — I&D structure under construction • Until I&D is commissioned, 0.56 MLD continues to reach river untreated • To be diverted to 13 MLD STP once I&D work is complete • Construction timeline must be tracked and expedited

Sl. No.	Name of nallah	Discharge of nallah (MLD)	Tapping (yes/no)	Pictures	Salient features and Issues
1	Jaisinghpura drain	1.7	Yes		• Moderate flow (1.70 MLD) with no documented issues or routing details • Absence of data for a >1 MLD drain is a monitoring concern • I&D structural condition and IPS performance should be field-verified
2	masani drain	16.82	Yes		• Overflow due to storm water and flowing into Yamuna.

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Sl. No.	Name of nallah	Discharge of nallah (MLD)	Tapping (yes/no)	Pictures	Salient features and Issues
3	Shahganj Nallah	0.88	Yes		-
4	Chakratirtha	0.79	Yes		-
5	octroi post	1.95	Yes		-
6	Kishan Ganga	0.36	Yes		-
7	Gau Ghatu	0.1	Yes		-
8	Chintaharan	0.26	Yes		• It is pumped to Bengali ghat.

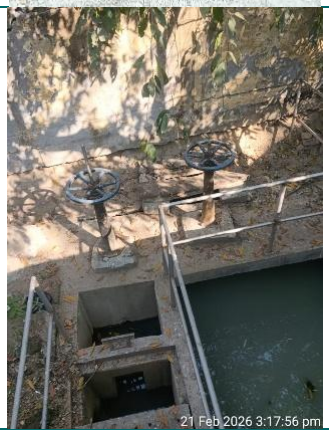
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Sl. No.	Name of nallah	Discharge of nallah (MLD)	Tapping (yes/no)	Pictures	Salient features and Issues
9	Daulamola	1.71	Yes		• Connected to Chintaharan IPS via 200mm diameter pipe • 200mm dia pipe may be undersized for 1.71 MLD — capacity check needed • Pipe surcharge risk during peak/monsoon flows could cause overflow at IPS
10	Rani Ghat	0.05	Yes		• Feeds into Swami Ghat I&D structure
11	Swami Ghat	0.27	Yes		• Swami Ghat I&D + IPS collects both Swami Ghat and Rani Ghat drain flows • Pumped to Bengali Ghat MPS for onward conveyance to STP • Dual-drain I&D chamber needs frequent desilting given combined load
12	Askunda Ghat	0.27	Yes		• Solid waste accumulation is a major issue
13	Vishram Ghat	0.21	Yes		• Pump inside I&D chamber is manually operated overflow risk when unattended • No automation (SCADA/timer) installed; predictable failure point • When operating, pump diverts flow to main sewer line • Automation is a low-cost, high-impact fix must be prioritised immediately

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Sl. No.	Name of nallah	Discharge of nallah (MLD)	Tapping (yes/no)	Pictures	Salient features and Issues
14	Bengali Ghat	0.5	Yes		• CCTV monitoring installed at MPS • ~1 trolley of solid waste collected daily; high debris load on MPS screens • Feed pumped to Trans Yamuna STP • Screen/filter maintenance must be daily with solid waste volume
15	Dhruv Ghat	0.13	Yes		-
16	Amdakhar	26.49	Partial		• LARGEST drain (26.49 MLD) only PARTIALLY tapped • High COD levels confirmed indicate industrial or dairy effluent input • Untapped portion flows directly to the river with high-strength used water • Full I&D must be constructed urgently; source of high COD must be traced • Pre-treatment at source (industrial effluent treatment) may be required
17	Satrangi	1.75	Yes		• Dairy waste is a documented major issue • Dairy units discharging upstream not regulated or pre-treating effluent • Grease/FOG (fat-oil-grease) likely causing I&D chamber blockages • Source identification and enforcement on dairy discharges needed

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Sl. No.	Name of nallah	Discharge of nallah (MLD)	Tapping (yes/no)	Pictures	Salient features and Issues
18	Mahadev Ghat	2.46	Yes		• Dairy waste is a documented major issue, 2.46 MLD affected flow • Dairy effluent raises BOD/COD and FOG levels, disrupting downstream STP • Pre-treatment units (grease traps) must be mandated for upstream dairies • Effluent quality sampling at drain mouth needed to quantify dairy load
19	Cantt	2.29	Yes		
20	Dairy farm	0.17	Yes		• Name suggests dairy origin high BOD/COD likely despite low flow • No documented issues; effluent quality sampling strongly recommended • Even low-volume dairy used water can significantly raise downstream BOD
21	Black Stone	7.64	No		• COMPLETELY UNTAPPED 7.64 MLD flows directly into the river

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Sl. No.	Name of nallah	Discharge of nallah (MLD)	Tapping (yes/no)	Pictures	Salient features and Issues
					• No, I&D structure, no diversion, no treatment whatsoever • Third-largest untapped polluter in the entire network • I&D structure design and diversion to nearest STP must begin immediately
22	Aurangabad downstream	0.73	No		• COMPLETELY UNTAPPED 0.73 MLD reaches river untreated • No I&D or interception infrastructure exists at this location • Part of Aurangabad cluster (with upstream drain) combined I&D feasible
23	Aurangabad Upper stream	1.02	No		• COMPLETELY UNTAPPED 1.02 MLD reaches river untreated • Upstream drain in the same Aurangabad cluster should share I&D solution • Combined tapping of both Aurangabad drains (1.75 MLD total) is most efficient

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Annexure 15: List of IEC Activities under Swachhata Campaigns

S. No.	Activity Name	Target Audience	Description (Brief)	Scheme	Team
1	Swacchata He Sewa Activity (Swacchotsav)	Commercial/Residential	Cultivate a culture of cleanliness through Swachhata Pledge, 'One Hour Together', greenery drives, CTU transformation.	SBM-U 2.0	14
2	Swachh Ward Pratiyogita	Residential Areas	Develop a sense of cleanliness among people to make their homes and wards look better than other wards under SBM 2.0	SBM-U 2.0	14
3	Swachhhata Abhiyan	Commercial/Residential	Regular drives were undertaken to inspire citizens to adopt and maintain cleanliness in their surroundings under SBM 2.0	SBM-U 2.0	14
4	156 Ghante Mahasafai Abhiyaan	Commercial/Residential	Promote public awareness on cleanliness through a continuous 156-hour sanitation drive under SBM 2.0	SBM-U 2.0	14
5	Swacchotsav Event with Mayor	Public/Residential	Strengthen public engagement in cleanliness initiatives by spreading sanitation messages through prominent political ...	SBM-U 2.0	14
6	Cleanup Drives at Ghat	Ghats	Regular drives were undertaken to encourage hygiene and cleanliness at the ghats under SBM 2.0	SBM-U 2.0	14

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Annexure 16: List of IEC Activities on Plastic Pollution Control

S.No.	Activity Name	Target Audience	Description (Brief)	Scheme	Team
1	Single Use Plastic Ban Awareness Activity	Commercial Areas	Awareness drive for SUP ban under SBM 2.0	SBM-U 2.0	14
2	World Paper Bag Day	Public Areas	An initiative was launched to encourage use of paper bags instead of plastic bags under SBM 2.0	SBM-U 2.0	14
3	Plastic Pollution Free Day	Public Areas	A dedicated awareness rally was conducted to sensitize the public about the harmful impact of plastic under SBM 2.0	SBM-U 2.0	14
4	Plastic Bag Free Day	Public Areas	An initiative was launched to encourage the use of eco-friendly alternatives and reduce dependence on plastic bags.	SBM-U 2.0	14
5	PUMA (Plastic Unmoolan Mahaabhiyaan) with RRR Centres	Public Areas	A focused campaign through RRR Centres to curb plastic usage and encourage responsible recycling under SBM 2.0	SBM-U 2.0	14
6	Pledge & Signature Campaign for PUMA	Public Areas	Citizens were mobilized to pledge against plastic use as part of the Plastic Unmoolan Mahaabhiyaan under SBM 2.0	SBM-U 2.0	14
7	Aarambh 6.0	Public Areas	A targeted awareness campaign to educate the public about the harmful effects of plastic	SBM-U 2.0	14

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Annexure 17: List of IEC Activities during Special Events

S.No.	Activity Name	Target Audience	Description (Brief)	Scheme	Team
1	Republic Day Event	Nagar Nigam Campus	Attendees at the Republic Day event were sensitized about cleanliness through the display of placards, banners	SBM-U 2.0	14
2	Awareness Programme at Ghats (Yamuna Arti, Dev Deepawali, Chhath Pooja)	Ghats	During festivals, awareness programmes were organized at the ghats to educate devotees about waste management.	SBM-U 2.0	14
3	Disaster Management Meeting Under City Action Plan	Civil Lines	An initiative was undertaken to spread awareness about disaster management in the backdrop of climate change under SB...	SBM-U 2.0	14
4	Bandhan Swacchata Ka with City Warriors (Raksha Bandhan)	Schools/Colleges	On the occasion of Raksha Bandhan, a workshop on solid waste management was organized where children tied Rakhi's.	SBM-U 2.0	14
5	Swachh Janmashtami	Public Areas	During 'Swachh Janmashtami', tourists and devotees in Mathura were sensitized about cleanliness through placards, ban...	SBM-U 2.0	14
6	Swacchata Ki Rangoli in Holi Festivals	Zonal Offices	At all zonal offices, rangolis made with the four cleanliness colours showcased the importance of proper waste management.	SBM-U 2.0	14
7	Holika Dahan Activity	Public Areas	To create awareness about waste management among citizens through 'Swachhata Rangolis'	SBM-U 2.0	14

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Annexure 18: 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 Mathura-Vrindavan. 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.

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- 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.

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Annexure 19: Prioritization methodology for urban water bodies

This annexure details the methodology used for scoring and prioritizing ponds in Mathura-Vrindavan 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.

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Annexure 20: Priority Table for urban water bodies

Sl. No.	Pond Name / Location	Physical Parameters			Water Quality & Hydrology			Social & Economic Potential			Physical Parameters	Water Quality & Hydrology	Social & Economic Potential	Area (Acres)	PRIORITIES
		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	Indal Kund	3	3	3	1	1	3	3	1	1	9	5	5	1.29	PRIORITY A
2	Shiv Mandir Pond	3	3	5	2	2	3	3	2	1	11	6	7	1.43	PRIORITY A
3	Jaipur Mandir lake	4	4	5	2	1	3	3	1	3	13	6	7	1.45	PRIORITY A
4	Matovan pond	3	3	5	2	2	3	3	2	1	11	7	6	1.48	PRIORITY A
5	Bagel Bagichi	3	4	3	2	2	3	3	1	1	10	7	5	1.8	PRIORITY A
6	Savri masjid pond	3	3	5	2	2	3	3	2	1	11	7	6	1.91	PRIORITY A
7	Nauaon Badi Pokhar	3	3	3	1	1	3	3	1	1	9	5	5	2.92	PRIORITY A
8	Dampier nagar pokhar	4	4	5	1	4	3	4	2	2	13	8	8	3.23	PRIORITY A
9	Maa Chamunda temple pond	3	3	5	2	2	3	3	2	1	10	7	5	8.37	PRIORITY A
10	Hanuman Bagichi	3	2	3	3	4	3	4	1	3	8	10	8	14.37	MANUAL PRIORITY
11	Ramtal Kund	5	4	3	3	5	3	4	5	3	12	11	12	1.24	MANUAL PRIORITY
12	Potra Kund	3	1	1	5	4	0	4	5	5	5	9	14	1.3	PRIORITY A
14	Balbhdra kund	3	1	2	3	1	3	3	1	1	6	7	5	1.91	PRIORITY A

Sl. No.	Pond Name / Location	Physical Parameters			Water Quality & Hydrology			Social & Economic Potential			Physical Parameters	Water Quality & Hydrology	Social & Economic Potential	Area (Acres)	PRIORITIES
		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					
15	Shantanu Bihar mandir kund	**3**	**1**	**1**	**4**	**3**	**3**	**4**	**2**	**3**	**5**	**10**	**9**	**3.73**	**MANUAL PRIORITY**

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