Webinar

Understanding WASH Challenges at the Urban Fringe

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Findings from CSE's study on Recently Transitioned Peri-Urban Areas of Bijnor

A Case Study of Bijnor, Uttar Pradesh

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Presentation Structure

01	Background, Need, Aim, Objectives, Scope and Methodology of the study
02	Peri-Urban Transition Dynamics
03	Assessment of Water Supply, Sanitation and Stormwater Management
04	Findings & Gap Analysis
05	Recommendations and Way Forward

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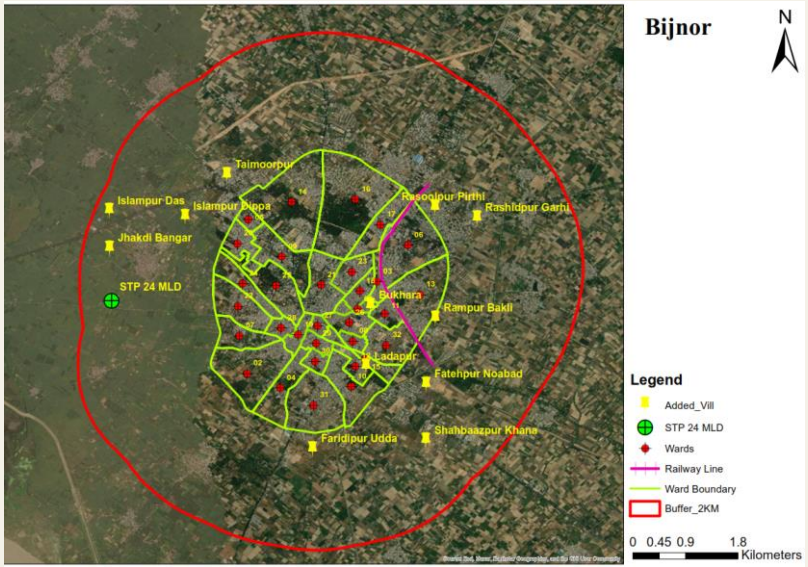
Background and Context

14	796 ha	78,367	3.65→11.2 km²	25→32
Villages Added (Dec 2020)	New Land Area Added	Population Added (As per Census 2011)	Municipal Area >3 times increase	Wards Expanded

- Census (2011) : Pop. – 93,170 and 17,650 HHs
- After merger: Pop. 1,71,537 (as per census 2011)
- Current Pop. – 2,11,263 persons and 42,252 HHs (SBM Portal)

Rapid Expansion:

- Over the period, across the Bijnor Extended Area, land use has shifted from agricultural, industrial, or mixed-residential states into densely built urban and peri-urban environments
- Expansion increased service burden but services are not proportional
- Still reliance on in-sufficient and in-efficient existing rural infrastructure



Aim/Objective and Scope of the Study

Aim and Objective

To assess infrastructure, challenges, policies, and community perspectives of water, wastewater, and stormwater management in Bijnor's recently added peri-urban villages, and suggest sustainable, and practical intervention strategies.

Scope

Covers 5 wards (representing 9 out of 14 merged villages – approx. 60%) in Bijnor Extended Area, assessing water supply, sanitation (wastewater/septage), and stormwater management, along with **governance and service delivery gaps**, while excluding **solid waste management** and **extreme weather events/climate risk analysis**.

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Survey details and methodology

Secondary Research
(Policy Review, Reports, Telephonic Interactions)

Stakeholder & Infrastructure Mapping
(Ward Demarcation, Roles mapping)

Development of Survey Tools
(Water, Sanitation, Stormwater, Socio-economic)

Primary Data Collection
(Surveys, KIIs, FGDs, Consultations)

Data Analysis
(Identifying Issues, Gaps & Challenges)

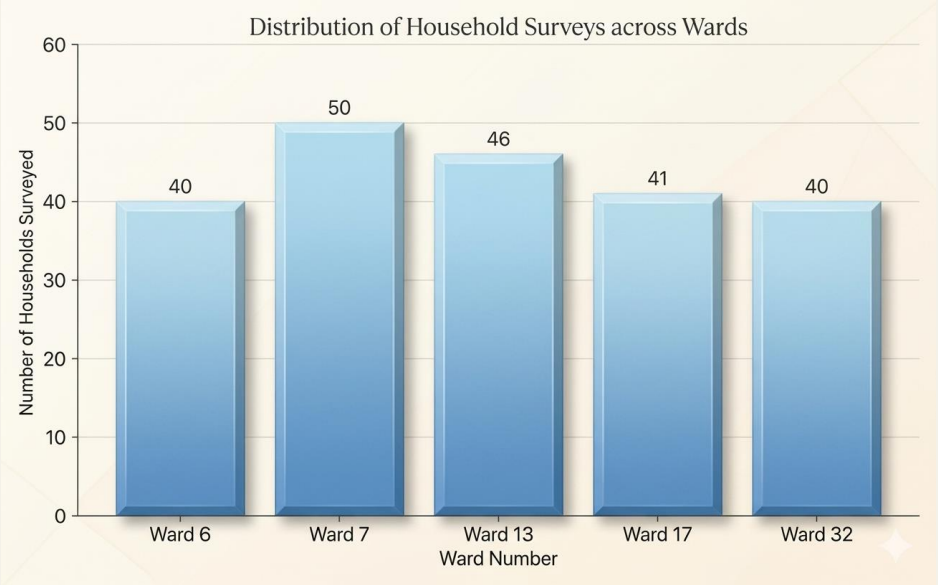
Technical Assessment & Feasibility Analysis

Comparative Evaluation & Expert Consultations

Formulation of Recommendations & Suggestive Measures

Mix Methods approach
(Quantitative + Qualitative), Spatial mapping & GIS analysis, data validation and triangulation

Total Household Surveyed- 217
KIIs- 25
FGDs- 10



Peri-urban Transition Dynamics

Ward	Settlement Type	Key Characteristics	WASH Infrastructure Status
Ward 17	**Mostly urban type settlement**, well planned colonies	High civic awareness, pucca housing, stable incomes	**Partially sewered,** Organized drains
Ward 6	**Mixed** demography, Major **Industries**, colonies settled on converted farmlands.	Sugar mill, railway, modern housing	**Entirely non-sewered;** wastewater accumulates in Nawab ka Hatta, Improperly designed drain
Ward 7	Sparsely populated, mostly **rural-type housing**	Livestock, mixed housing, planned colony pocket	**Partially sewered**, Predominantly natural open drains
Ward 13	**Predominantly rural** and densely populated	Dense, unplanned, poor civic maintenance	**Entirely non-sewered**; WW collects in pond, few newly constructed drains were found
Ward 32	**Mixed rural- urban type settlement**, highly congested	Densely populated, mix of low and high income group people	**Partially sewered**, Both Kachha-Pucca drains

Settlements

Ward 13

Ward-17

Ward 32

Ward-6

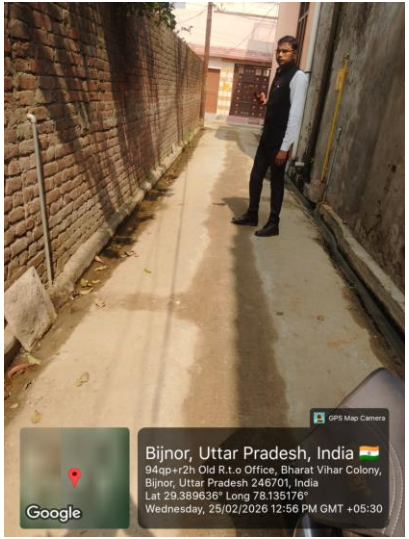
Ward-7

Assessment of Water Supply

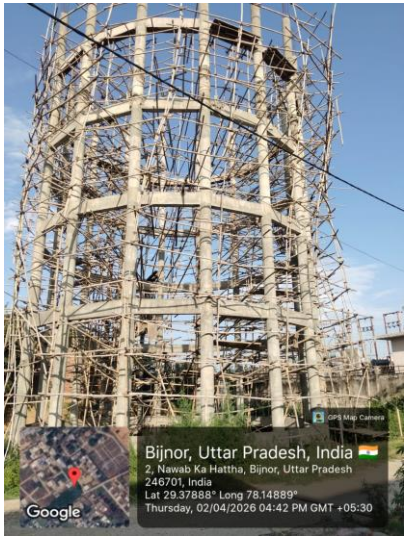
Water Supply status in Peri-Urban Wards

- Transitional villages (BEA) rely on basic rural-type water supply infrastructure; 3 tubewells and 4 overhead tanks serve 14 villages
- Approx 70–80% households depend on private borewells, indicating high groundwater reliance
- Water supply is ~1–3 MLD, based on earlier GP systems (55 LPCD)
- Actual consumption is 100–150 LPCD (as per survey analysis)
- Supply is intermittent, limited to ~4 hours per day
- Ground Water Quality- Hard, turbid or iron rich
- Groundwater contamination due to red category industries, resulting in 120-250 ft deep submersibles
- Dual-Agency Confusion- Jal Nigam (G) and JalKal (U) create governance challenge
- Wastewater Exceeds Supply Estimates due to unaccounted private extraction.
- Large Storage Tanks (2000-3000 L) in wards and 17 to meet water demand

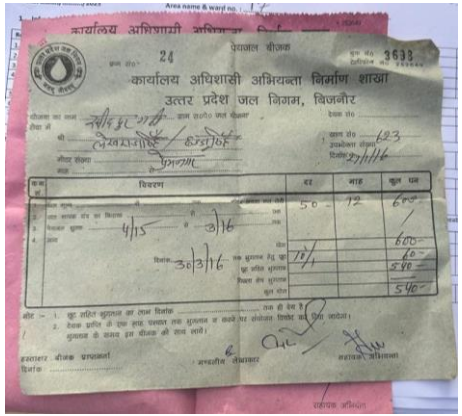
Under-construction OHT in Ward 7

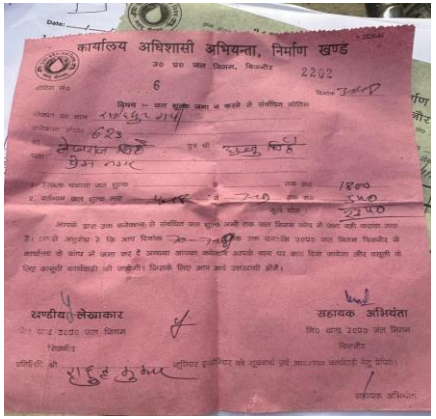


New WS pipeline connection ward-7



Under-construction OHT in Ward 6





Water bill from UPJN Gramin (ward 17)

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Assessment of Wastewater and Faecal Sludge Management

Sewerage Network & Treatment Infrastructure

24 MLD

Sewage Treatment Plant (Commissioned 2019)

~80 km

Gravity Sewer Network

17

Drain Interception Points (NGT directive)

~30%

Co-Treatment Capacity Currently Utilized

20 KLD

Faecal Sludge Co-Treatment Unit (Est. 2022)

0%

Household Sewer Connection

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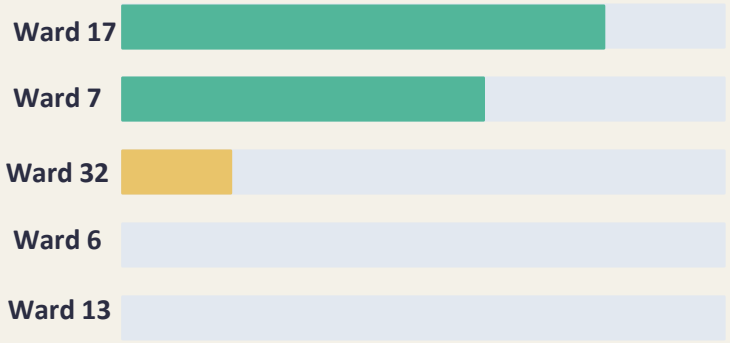
Wastewater Management in BEA

Ward-wise Wastewater Conveyance to STP



Ward 17	80%	3 interception points; 20% stagnates locally goes to nearby farm lands and empty plots through drains
Ward 7	60%	Via natural drain near STP; Chamunda Colony unserved; rest waste water goes to empty plots or open fields or sometimes stagnates in lanes, 1 interception
Ward 32	18%	Wastewater intercepts through 2 interception points; residual WW accumulates behind Healers Hospital
Ward 6	0%	0% reaches STP — accumulates in Nawab ka Hatta or drains to Choya River
Ward 13	0%	0% reaches STP- accumulates in Rampur Bakli pond near cremation ground

Chhoeya river where drains from ward 6 and other wards ends

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WARD 13- Rampur Bakli- Pond and wastewater coming to pond

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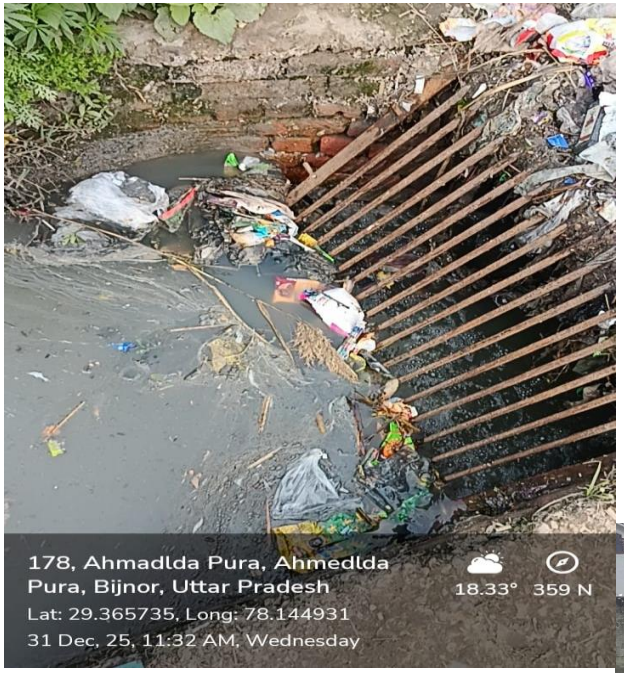


Ward 32-Wastewater interception

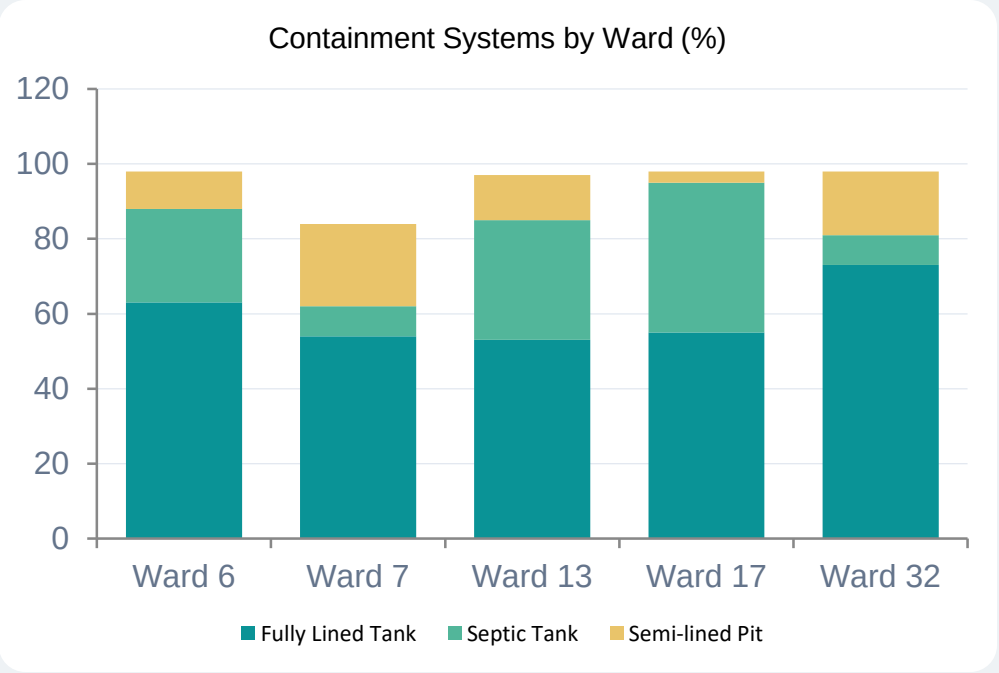
Wastewater that is not intercepted is collected behind Healer hospital-Ward 32

Wastewater collecting in empty plots-ward 7

Wastewater interception point ward 7

Wastewater interception point ward 17

Onsite Sanitation Systems & Desludging Practices in BEA



Key FSM Findings

100%	Household toilet coverage across all surveyed wards
100%	Households relying on On-Site Sanitation Systems (OSS)
>80%	Mechanical (vacuum tanker) desludging preferred
1–15 yrs	Desludging frequency — reactive, not scheduled
~92%	Households prefer private operators (speed & accessibility)

⚠ Effluent from 80–95% of containment structures discharges directly into open drains — converting stormwater channels into open sewers.

Bijnor 20 KLD co-treatment Unit on 24 MLD STP

Assessment of Stormwater Management

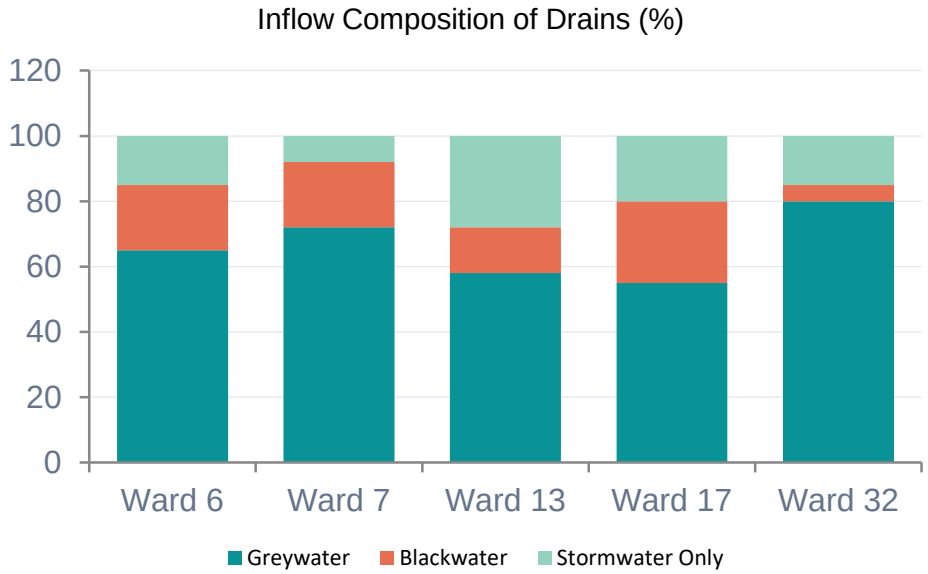
Stormwater & Drainage

- **Unplanned peri-urban growth** → Loss of natural drainage, Increased runoff, causing waterlogging, and flood risk
- **Inadequate infrastructure** → Drains unable to handle peak rainfall, causing frequent flooding
- **Poor planning & O&M gaps** → Encroachments, missed outfalls, and limited O&M

Stormwater & Drainage — Wardwise Snapshot

Ward	Coverage	Flow Type	Flooding/ Waterlogging	Key Challenges
Ward 6	88%	95% Mixed Wastewater	Sometimes flooding up to 24 hrs in some areas	High solid waste accumulation (~72%); poor design, siltation & chokepoints; missing outfalls; foul odour & weak O&M
Ward 13	90%	96% Mixed Wastewater	Frequent flooding; prolonged waterlogging (hours to days)	High solid waste accumulation (75%); discharge into ponds; poor design & maintenance
Ward 17	100%	95% Mixed Wastewater	Largely functional; minimal flooding	High blackwater presence; discontinuous drains; clogging; weak interception systems
Ward 7	98%	88% Mixed Wastewater	High flooding; long-duration waterlogging (>24 hrs)	Damaged drains; discontinuous network; high odour; stagnation
Ward 32	66%	90% Mixed Wastewater	Frequent waterlogging (hours to days)	High solid waste accumulation (~63%); poor design; foul smell

Stormwater & Drainage



Ward 13 worst case: 56% HHs flood during rain;
Ward 7: 48% experience flooding >24 hrs after rain.

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Stormwater & Drainage — Critical Service Gap

Drain outfall in open land in ward 6

Drain carrying chemicals in ward 6

Defunct bioremediation system in ward 13

High presence of blackwater in drain in ward 17

Kachha drain crossing road in ward 7

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Findings & Gap Analysis

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Service and institutional gaps in BEA

Service Gaps

- Wastewater management is not appropriate in all the wards
- Intermittent services like drain cleaning, solid waste collection – not happening properly
- Storm water management - absent

Reasons

- Lacking adequate infrastructure
- Lack of human resources and unclear roles
- Limited financial ability

Institutional Gaps

- **Lacking tax collection:** ULB is not able to levy urban taxes as appropriate improvement in basic services is not achieved
- **Governance transition gap:** Shift from Gram Panchayat to municipal systems creates unclear roles and service discontinuity ex water supply is looked after by Jal nigam (G) and Jalkal (U)
- Physical barrier (such as a railway line) disrupts **integrated infrastructure planning and service delivery** across urban areas.

Gap Analysis: Water Supply

Indicator	Urban BNPP (Core)	Transitional Villages (BEA)
Source of Water Supply	**33 tubewells + 12 OHTs**	**3 tubewells and 4 OHTs**
Water Supply Volume	**17.5–20 MLD**	**~1-3 MLD (rural supply)**
Per Capita Consumption	**135-150 LPCD**	**100–150 LPCD (estimated through survey analysis)**
Supply Duration	**18 hrs/day**	**~4 hrs/day**
Groundwater Dependence	**~50% households have private borewells**	**70–80% HHs rely on private borewells**
Piped Coverage	**100% households**	**Uneven; Ward 13 nearly nil**
Responsible Agency	**Municipal Jalkal Department**	**UPJN Gramin**

Gap Analysis: Wastewater & Faecal Sludge Management

Indicator	Urban BNPP (Core)	Transitional Villages (BEA)
Sewer Network Coverage	~80 km (covers around 90% core area)	10-15% area has Sewer lines
Household Sewer Connections	Absent	Absent
OSS Dependence	100%	100%
Dominant Containment	Septic tanks & Fully lined tanks (FLTs)	Mix of septic, FLT, semi-lined, open-bottom pits
Effluent Discharge	Into open drains → interception	Into open drains, open land, ponds, partly interception
Desludging Frequency	3–10 years	1–15 years
FSM monitoring	Strong, licensed operators-FS dispose at 20 KLD co treatment	Weak; operators bypass co-treatment plant due to long distance

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Gap Analysis: Stormwater Management

Indicator	Urban BNPP (Core)	Transitional Villages (BEA)
Drainage Infrastructure	Pucca roadside drains in most built-up areas (mostly open)	**Mix of Kachha – Pucca drains, Natural open drains also prevalent**
Type of water flowing	Limited separation; drains often carry mixed wastewater	**Almost drains carry mixed wastewater**
Drain Coverage	Almost 100% coverage	**95% coverage**
Drain Design	Mostly open drains, some sections covered	**Narrow, shallow, and discontinuous open drains**
Drain Outfalls	Mostly connected to bigger drains and interception systems reaching to STP	**Often terminate in vacant plots, ponds, or agricultural fields due to absence of mapped outfalls**
Drain Maintenance	Municipal cleaning and desilting conducted periodically	**Maintenance largely reactive and occurs after flooding events**
Solid Waste in Drains	Occasional blockage in dense areas	**Around 70% households reporting solid waste accumulation in drains**
Flooding and Waterlogging Risk	Moderate, only during heavy rainfall	**High due to clogged drains, poor gradients, and mixed wastewater flows**

Cross-Cutting Systemic Constraints

1. High groundwater use present

Unmonitored private borewell use distorts demand projections, generates excess wastewater, and overwhelms drains and the STP — undermining capacity planning.

2. Challenges due to NOC delays from Railways

Physical and hydraulic barrier prevents gravity-based sewerage expansion to eastern wards. Areas east of the line have pronounced service deficits. Railway board hardly permits for such ventures.

3. Institutional Transition Gaps

Post-GP-to-BNPP transition, it has left unclear O&M responsibilities, contested asset ownership, limited budget for peri-urban wards, and no formal grievance framework.

4. Data and Planning Deficits

No GIS-based drain mapping, no comprehensive drain inventory, no ward-level sanitation plans. Interventions remain piecemeal and reactive without evidence base.

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Recommendations

Recommendations

Immediate Measures (0–2 Years)

Focus: Pollution reduction and infrastructure optimization.

- **Asset Mapping:** Complete ward-level mapping of drains and sanitation systems for targeted interventions.
- **Preventive O&M of stormwater Drains:** Institutionalize pre-monsoon desilting and install drain covers to block solid waste.
- **Pond Rejuvenation:** Deploy low-cost interventions (screening, wetlands, floating bio-remediation) for three priority ponds.
- **FSM Strengthening:** Utilize small vehicles for dense areas; launch awareness campaigns on safe disposal and bye-laws.

Recommendations

Medium & Long-Term (2–10 Years)

Focus: Formalized services and sustainable resource management.

- **Decentralized Treatment (2–5 yrs):** Implement community-level units (DWWTs) and in-situ nallah treatment to reduce central STP loads.
- **Service Formalization (2–5 yrs):** Establish scheduled desludging through private contracts and formalize BNPP's O&M budget.
- **Strategic Infrastructure (5–10 yrs):** Expand existing STP in phases and construct a new plant for areas across the railway line.
- **Digital Governance:** Integrated MIS platforms for data-driven planning.

Thank You

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