Draft Masterplan Report

for Solid Waste Collection and Disposal Management

in Meherpur Paurashava

CLIENT

Preparation of Development Plan for Meherpur Zilla Project

URBAN DEVELOPMENT DIRECTORATE (UDD)
82, Segunbagicha, Dhaka-1000

CONSULTANT

GEOMARK LIMITED
House # 33, Road # 12,
Pisciculture Housing Society,
Mohammadpur, Dhaka-1207,
Phone: +8801716291050
Email: geomarkbd@gmail.com

GOVERNMENT OF THE PEOPLE'S REPUBLIC OF BANGLADESH

Urban Development Directorate (UDD)

Meherpur Paurashava Waste Management Masterplan

Under

Preparation of Development Plan for Meherpur Zilla Project

Submitted to

Ahmed Akhtaruzzaman

Senior Planner & Project Director

"Preparation of Development Plan for Meherpur Zilla Project."

Urban Development Directorate (UDD)

Submitted by

GEOMARK LIMITED

House –33, Road –12

Pisciculture Housing Society

Mohammadpur, Dhaka-1207

Contact No: +8801716291050

E-mail: geomarkbd@gmail.com

November 2025

Executive Summary

Meherpur Paurashava is a compact district town generating about 18–20 tons of solid waste per day, of which only 14–16 tons reach the official disposal site at Shinger Math and Moymarir Math in Ward 7. The rest remains in yards, roadside heaps, or drains that ultimately discharge to the Bhairab River. Street cleaning depends almost entirely on manual sweeping: waste is pushed to roughly 332 designated roadside spots, now mostly open piles since the former 150 bins disappeared. From there, three operational uncovered trucks and a few small vans haul mixed household, market, clinic, construction, and drain waste directly to the dumping area. Two additional 3-ton trucks are out of order, there is a single underutilized transfer point at Gorosthan Para (Ward 8), and an existing treatment plant stands idle. Informal recyclers already recover some materials and produce fertilizer, but without formal links to the municipal system.

This Masterplan proposes a shift from this fragmented “sweep and dump” practice to a planned, two-tier collection and resource-recovery system. The priority is reliable, town-wide collection. The plan rationalizes and expands collection points so households in all nine wards are within reasonable walking distance of a bin or designated spot, and it formalizes ward-based routes and time windows so residents know when to put waste out. Handcarts, tricycles, and small vans will serve narrow lanes and dense neighbourhoods, feeding waste to nearby Secondary Transfer Stations (STSs) instead of making long trips to the landfill.

A network of 463 new bins and six STSs, including an upgraded facility at Gorosthan Para, sits at the core of the new system. GIS-based service-area analysis shows these locations can cover the entire Paurashava, including currently underserved fringe areas of Wards 4, 5, 7, and 9. Primary vehicles deliver loads to the nearest STS, where waste is consolidated, stored briefly, and pre-sorted, while larger trucks handle bulk transport to the landfill along six defined haul routes. To support this, the plan calls for immediate repair of the two broken 3-ton trucks and procurement of at least one new 3-ton covered truck, with a gradual transition to a mostly covered secondary fleet.

Because nearly all waste is now mixed, source segregation is a central pillar. Households, markets, clinics and institutions will separate organics, dry recyclables and residual waste, using colour-coded bins or bags backed by by-laws aligned with the Solid Waste Management Rules 2021. Clean organic waste will feed composting and fertilizer production in partnership with existing recyclers; recyclables will move through a more organized recovery chain; only true residues will go to landfill or future RDF processing. The landfill itself will be upgraded with a paved segregation yard, sorting platforms and clearly demarcated cells for different waste types, plus space for composting units and a future material-recovery facility, alongside a technical review of the idle treatment plant.

The plan embeds school programmes, ward-level meetings and training for sweepers, drivers and recyclers, supported by a simple, transparent financing framework built on modest user fees, municipal budget allocations and targeted external support. Phased implementation—starting with quick repairs, a new truck, better routes, and basic segregation, then moving to full STS construction and expanded recovery offers Meherpur a realistic roadmap to an integrated, resilient, and resource-oriented solid waste management system.

Table of Contents

List of Figures

List of Table

Chapter 1: Introduction

1.1: Study Background

Meherpur Paurashava is a fast-growing municipal center, where expanding commercial activity, rising household consumption, and increasing urban density have sharply amplified daily waste generation. Despite this growth, the existing solid waste management system remains basic, heavily manual, and unequipped to manage the volume and diversity of waste produced each day. The municipality currently collects only a portion of the estimated **18–20 tons of daily waste**, while the rest accumulates at 332 open dumping points scattered across the nine wards.

Formal waste bins once numbering 150 have completely disappeared, and households now rely on informal open spots on roadsides to dispose of daily waste. Collection trucks, most of which are **uncovered and partially functional**, transport mixed waste directly to two crude dumping grounds at **Shinger Math and Moymarir Math** in Ward 7. This direct-haul, bin-less system exposes residents to odors, litter, drain blockage, vector infestation, and significant environmental degradation, particularly along drainage channels flowing westward toward the **Bhairab River**.

Like many small towns in Bangladesh, Meherpur does not practice segregation at source. All waste organic, plastic, commercial, agricultural, drain waste, and medical waste is mixed and dumped together, eroding opportunities for composting, recycling, or safe disposal. Although recyclers operate informally at the dumping site, their role is unstructured and limited. The municipality has one Secondary Transfer Station (STS) at **Gorosthan Para**, but it functions mostly as an unloading point rather than a full consolidation and sorting facility.

These challenges collectively highlight a system stretched beyond its capacity: equipment shortages, absence of bins, insufficient staffing, irregular coverage in narrow lanes, and a non-operational treatment plant have made waste management reactive instead of planned. With urban growth continuing and community expectations rising, Meherpur urgently requires a structured, forward-looking Solid Waste Management Masterplan to modernize operations, reduce environmental risks, and improve public health outcomes.

A masterplan is crucial not only to address current service gaps but also to align the municipality with national policy frameworks, including the **Solid Waste Management Rules 2021**, which emphasize 3R principles, source segregation, and institutional accountability. This plan will guide Meherpur in transitioning from scattered, manual waste handling to an integrated, efficient, and environmentally responsible system capable of supporting future growth.

1.2: Objectives of the Solid Waste Management Master Plan

The Solid Waste Management Master Plan for Meherpur Paurashava is driven by a set of well-defined objectives that address technical, operational, environmental, and policy aspects of waste management and to guide Meherpur Paurashava toward a cleaner, healthier, and more sustainable waste management system. These objectives provide direction for all components of the plan:

- To assess the current state of solid waste generation, collection, transportation, and disposal in the municipality.
- To identify critical gaps and challenges in infrastructure, manpower, operations, and policy.
- To design a phased improvement plan covering short-term fixes and long-term structural upgrades.
- To promote community-based waste segregation, composting, and recycling practices.
- To propose institutional and financial models for sustaining the waste management system.
- To ensure that all proposed activities align with national environmental regulations and public health priorities.

Together, these objectives ensure that the master plan is **comprehensive** covering the physical infrastructure needs, the day-to-day service improvements, environmental protection goals, and the necessary policy and behavioral changes. They provide a checklist against which the success of the plan can eventually be measured. By meeting these objectives, Meherpur Paurashava will be positioned to deliver a much-improved solid waste management service that is reliable, environmentally sound, and responsive to the community's needs.

1.3: Scope and Limitations of Study

The scope of work for the Meherpur Solid Waste Management Master Plan outlines the major tasks and study components that will be undertaken. It defines *what* activities are included in developing the master plan from data collection and surveys to project design and stakeholder engagement. The following sub-sections describe each element of the scope:
This masterplan covers all major waste streams generated within Meherpur Paurashava, including:

- **Generation and composition** of waste from households, markets, clinics, agriculture, and drains
- **Primary and secondary collection** systems
- **Route structure, fleet capacity, and operational performance**
- **Disposal practices** at Shinger Math and Moymarir Math
- **Infrastructure assessment**, including designated dumping points, STS, and unused treatment facilities
- **GIS-based spatial analysis**, including ward-level waste patterns
- **Stakeholder consultations** with municipal staff, sweepers, recyclers, and residents
- **Proposal of future interventions**, including bins, STS upgrades, covered vehicles, segregation, route redesign, and landfill improvements

It includes assessment of existing systems, design of interventions (collection, transfer, disposal, treatment), stakeholder mapping, cost estimation, and an implementation roadmap.

Limitations

- Liquid waste, faecal sludge, and industrial hazardous waste are excluded from this study.
- Detailed engineering designs, BOQs, and environmental impact assessments for specific infrastructure are outside the scope of this masterplan but may be recommended as follow-up actions.
- The plan is based on data collected within a defined timeframe; actual conditions may shift due to rapid urban or population changes. Regular revisions are recommended to keep the plan relevant.

1.3.1: Data Collection and Review

Preparing the Solid Waste Management Masterplan for Meherpur Paurashava began with a systematic and detailed process of data collection and review. The goal was to build an accurate, evidence-based understanding of how waste is currently generated, handled, transported, and disposed within the municipality. Because Meherpur operates with a largely manual and bin-less system, collecting reliable information from both field observations and municipal records was essential.

The first step involved compiling quantitative data from the Paurashava's conservancy section. This included daily waste generation estimates, documented quantities of household, market, clinic, agricultural, and drain waste, and information on designated disposal spots. The municipality maintains an updated record of **332 active dumping points** where households place waste after sweeping, and these locations were verified through field visits. Data on vehicle availability and operational status were gathered directly from the municipal workshop: Meherpur currently owns **five trucks (three operational)** and **seven covered vans**, alongside limited vans and three-wheelers used in narrow lanes. Details on their carrying capacity, downtime, and operational hours were collected to understand logistical constraints.

The review extended to an examination of formal documents: previous municipal reports, annual conservancy budgets, vehicle-log records, drain-cleaning logs, and any existing plans or proposals related to sanitation and waste management. Discussions with the Paurashava's engineering and public health sections provided insights into how drains interact with waste entry, particularly regarding westward outfall into the Bhairab River.

To complement municipal records, extensive field verification was carried out. Waste workers, sweepers, and van drivers were interviewed to understand real collection patterns, challenges in narrow lanes, timing of collection rounds, and common waste hotspots. These workers provided practical details that are not found in official documents—such as the tendency of households to dump waste before dawn, the overflow of market waste requiring twice-daily clearing, and the obstacles created by uncovered drains where waste regularly falls through broken slabs.

Community-level observations were also essential. The team documented the absence of any bins (despite past installation of 150 units), the nature of roadside dumping practices, and the typical composition of mixed waste found in households and markets. Informal recyclers working at Shinger

Math and Moymarir Math were interviewed to understand the types of materials recovered, the volume of recyclables extracted, and the role of waste-derived fertilizer preparation in local agriculture.

Where data gaps existed for example, exact waste generation rates in certain wards estimates were drawn from field discussions, ward-level population patterns, and comparative benchmarks from similar municipalities. These estimates were later cross-checked with ward councillors and conservancy supervisors.

Together, this multi-source approach municipal records, field observations, worker interviews, community feedback, and on-site inspections formed the baseline dataset that underpins the entire Masterplan. By grounding the analysis in real conditions and triangulating information from multiple stakeholders, the study ensures that proposed solutions are practical, context-sensitive, and aligned with Meherpur's operational realities.

1.3.2: Survey and Mapping

Survey and mapping activities formed a central part of understanding Meherpur Paurashava's existing waste management system. Because the municipality operates without formal bins and relies instead on 332 open dumping spots, on-the-ground verification and spatial documentation were essential for accurately capturing how waste flows across the nine wards.

The survey process began with systematic field walks along major, secondary, and narrow residential roads. These visits were designed to identify the precise locations of all designated dumping spots, informal waste piles, and areas where roadside accumulation frequently occurs. Each spot was georeferenced using GPS-enabled devices and later transferred into a GIS environment. The resulting point dataset provided the first complete spatial inventory of waste disposal behavior in Meherpur.

Parallel to disposal-spot mapping, the team traced the movement patterns of municipal sweepers, van drivers, and truck operators. Routes followed by the three operational garbage trucks—from their early morning rounds between 8–9 AM to the secondary round between 9–11 AM—were physically observed. The survey captured how one route generally covers the eastern belt, one covers the western neighborhoods, and a third connects the north–south corridor. These route traces were digitized and overlaid on the municipal road network to identify gaps, overlaps, and underserved pockets.

Market areas, especially the main bazaar and the cattle market near Gorosthan Para, were surveyed separately, as they generate the highest concentration of wet, organic waste. The survey team documented locations where waste is dumped before being taken to the STS or transported directly to Shinger Math and Moymarir Math. Observations also included timing of waste accumulation, worker availability, and the functional role of the existing STS near the cattle market.

Drainage mapping was another key component. Waste accumulation around covered drains—particularly near broken slabs where garbage slips into the drainage line—was recorded, along with problem zones where drain outlets carry waste toward the Bhairab River. This helped illustrate how solid waste contributes to blockages and waterlogging during monsoon months.

Household and community surveys added behavioral insight. Short interactions with residents in Wards 1, 2, 7, and 8 revealed typical disposal routines, perceptions of municipal service quality, and reasons for

open dumping. These qualitative findings were noted and later linked to mapped hotspots to understand why certain points consistently accumulate waste.

All spatial and survey data were integrated into a GIS platform to produce maps showing:

- Distribution of the 332 dumping points
- Coverage of existing truck routes
- Ward-level waste generation patterns
- Problematic drainage–waste interaction zones
- Location of the STS and final disposal grounds
- Areas lacking collection coverage

This spatial framework now serves as the analytical base for identifying service gaps, designing new bin placement strategies, optimizing transport routes, and planning future STS enhancements. By combining field observation with GIS-driven analysis, the survey and mapping component provides a realistic, ground-verified picture of Meherpur's existing waste management landscape and the geographic logic behind its operational challenges.

1.3.3: Solid Waste Management Improvement Projects

Based on the data and survey insights, the master plan will identify a set of priority improvement projects for Meherpur's solid waste management system. This is a core part of the scope: formulating tangible solutions and interventions that the Paurashava can implement. The projects will cover the full cycle of waste management from collection to disposal. For example, one likely project is establishing an improved waste collection system – this could involve procuring new collection equipment (such as additional rickshaw-vans or a small dump truck), setting up a door-to-door collection scheme in all wards, and providing more communal bins in strategic locations. The plan will detail the design of such a project, including the number and type of vehicles needed, crew requirements, and routing plans.

Another key intervention will be the development of a waste disposal or processing facility. The master plan will examine options for a suitable disposal solution for Meherpur: this might be the construction of a controlled landfill site on land identified by the municipality, possibly combined with a resource recovery facility (like a sorting center or a composting facility for organic waste). If a new site is needed, the plan will outline the criteria for site selection and the basic design (for instance, a small sanitary landfill cell with leachate control, or a fenced dumping yard with designated zones for composting). In case land acquisition for a landfill is challenging (a common issue in Bangladesh), the plan might propose interim solutions such as improving the existing dumpsite with some containment measures or exploring a shared regional landfill with nearby towns.

Additionally, specialized projects will be proposed to address gaps. This could include setting up a medical waste management system for clinics (if biomedical waste is currently mixed with municipal waste), introducing public awareness and cleanliness drives (as a "software" project to change behavior), and pilots for waste segregation (for example, selecting one neighborhood to pilot separating organic waste for composting with community participation). Infrastructure like public waste bins, covered storage sheds for collected waste, and personal protective equipment for workers are also part of the improvement measures.

For each identified project, the master plan will provide a concept design or description, justify why it is needed, and estimate the resources required (land, capital cost, operational cost). The plan will effectively create a portfolio of SWM projects – ranging from low-cost immediate fixes to larger investments – that together will upgrade Meherpur's solid waste management. These projects will later be prioritized and phased (in Chapter 8 of the report), but in this scope section, all potential interventions are put on the table for consideration.

1.3.5: Complementary Programs

Technical fixes alone cannot solve solid waste problems; human behavior and community cooperation are just as important. Therefore, the master plan's scope includes designing complementary programs that will run in parallel with infrastructure improvements. One major complementary component is community awareness and public education. The plan will outline initiatives to educate the citizens of Meherpur about proper waste practices – for example, campaigns to encourage households to store waste in bins with lids, not to litter in drains, and to cooperate with waste collectors by handing over trash at specified times. This could involve school programs (to teach students about the 3Rs: Reduce, Reuse, Recycle), distribution of leaflets on waste segregation, and even door-to-door outreach in neighborhoods by volunteers or municipal staff.

Another complementary program is to foster behavioral change regarding waste segregation. The plan may propose a pilot program where households are given two bins (one for organic waste, one for others) and are encouraged through incentives or demonstrations to separate their waste. Community-based organizations and local influencers (such as imams of mosques or school teachers) might be engaged to spread messages on cleanliness and health impacts of waste mismanagement. The goal is to gradually instill a culture in which disposing of garbage properly is seen as everyone's responsibility.

Engaging the private sector and NGOs is also covered under complementary measures. The master plan will consider roles for private businesses in improving SWM, for instance, contracting a private company or youth cooperative to handle door-to-door collection under Paurashava supervision, or encouraging local entrepreneurs to start recycling ventures (perhaps a small-scale plastic recycling unit or a community compost sale program). It will also look at how NGOs or civil society groups can support, as NGOs often have experience in community mobilization and behavior change campaigns in Bangladesh.

Furthermore, the plan will propose incentive programs such as cleanest ward competitions, where communities that keep their area litter-free are recognized, or fee rebates for households that segregate waste properly. Another complementary aspect is improving the municipal complaint system so residents can report waste problems (like a missed pickup or an illegal dumpsite) and have them addressed quickly – these builds trust and participation.

In summary, this scope item ensures that alongside the "hardware" (trucks, bins, landfills), the "software" – i.e., human and social dimensions are addressed. The complementary programs are essential for making the technical solutions work effectively on the ground. By changing attitudes and involving citizens, these programs aim to make the improvements sustainable. After all, a clean Meherpur cannot be achieved by the Paurashava alone; it requires broad public support, and that is what these programs seek to cultivate.

1.3.6: Legislative and Institutional Arrangements

An important component of the master plan is reviewing and strengthening the legislative and institutional framework for solid waste management in Meherpur. This entails looking at the existing laws, regulations, and organizational setup that govern how waste services are delivered. At the local level, Meherpur Paurashava likely has certain bylaws or regulations (under the Local Government (Pourashava) Act, 2009 and other relevant rules) that pertain to waste – for example, rules against littering, provisions for waste fee collection, or assigned duties of municipal staff. The master plan will review these local regulations to identify if they are adequate or need updates. For instance, the plan may recommend formulating a new municipal bylaw requiring every household and shop to use a covered bin and participate in waste segregation, with penalties for non-compliance, in line with the national Solid Waste Management Rules 2021 which call for mandatory source segregation and introduce concepts like EPR.

On the institutional side, the plan examines the roles and capacity of the Paurashava's departments involved in waste management. In Meherpur, the conservancy section (or health section) of the municipality is typically responsible for solid waste. The plan will assess whether this section has a clear structure and sufficient manpower. It will clarify roles such as who supervises the waste workers, how many sweepers or cleaners are assigned per ward, and what the responsibilities of Ward Councillors are in supporting waste management. If coordination issues exist say, between the municipal health section and the engineering section (for drain cleaning or waste vehicle maintenance) the plan will highlight the need for better inter-departmental collaboration.

The scope also includes exploring partnerships and institutional arrangements beyond the Paurashava. This could mean coordination with the Upazila administration or the Department of Environment on regulatory oversight (for example, ensuring that any new dumpsite complies with environmental clearance processes). It also could involve identifying opportunities for public-private partnerships (PPP) for instance, contracting out the operation of a compost plant to a private firm or engaging a local NGO to run community awareness activities on behalf of the Paurashava.

Another institutional aspect is capacity building. The master plan will outline needs for training municipal staff on modern waste management practices (like safe landfill operations, or bookkeeping for waste fee collection). It may recommend creating a dedicated position (e.g., a Waste Management Officer) within the municipality to champion the implementation of the plan.

By addressing legislative and institutional arrangements, the master plan ensures that there is a solid governance foundation for all technical interventions. Essentially, this task is about enabling the Paurashava to effectively implement and sustain the proposed waste management improvements through clear mandates, robust policies, and an empowered organization. Any gaps in the current framework will be met with recommendations whether it's drafting a new regulation, signing an MoU with another agency, or reorganizing the municipal waste management team to create an environment in which the master plan's initiatives can flourish.

1.3.7: Environmental Screening and Stakeholder Engagement

Solid waste management improvements go hand in hand with environmental considerations and community input. Therefore, the master plan's preparation includes a process of environmental screening as well as ongoing stakeholder engagement. Environmental screening means that the team will assess

the potential environmental impacts of both the existing waste management practices and any proposed projects. For example, the current open dumping in Meherpur might be causing leachate to seep into nearby soils or water – the plan will document these baseline environmental issues (perhaps through simple tests or observations of soil/water quality near the dumpsite, and noting any prevalent nuisances like smoke or pests). Then, for each major proposed project (say, developing a new landfill or a composting center), an initial environmental examination will be conducted. This involves identifying possible impacts (like odor, groundwater contamination, or attraction of vermin) and suggesting mitigation measures to incorporate in project design (such as lining a landfill and installing drainage to manage leachate, or planting a vegetation buffer around a waste site to reduce odor spread).

In essence, the plan will ensure that environmental safeguards are built into the recommendations, aligning with national environmental regulations and good practice. If any project appears to have significant adverse impacts, the plan will either propose alternatives or outline what further detailed environmental assessment will be needed before implementation.

Equally important is stakeholder engagement throughout the planning process. The master plan team will actively consult a broad range of stakeholders in Meherpur. Key stakeholders include the municipal elected officials (the Mayor and Councillors), who will provide insights on political and community priorities and must ultimately approve the plan. The input of municipal staff and waste workers is vital – their practical experience can highlight issues that data might miss (such as specific local challenges in certain wards). The plan will likely convene meetings or focus groups with these staff to discuss problems and possible solutions.

Local community stakeholders are also engaged: this can include representatives from each ward (members of Ward Committees or citizen groups), market traders' associations, women's groups, and others. The planning team will hold community consultation meetings to share initial findings and listen to the community's concerns and suggestions. For example, residents may point out particular "black spots" where garbage is always dumped illegally, or they might express willingness to separate waste if the municipality provides multiple bins. Public feedback is invaluable to ensure the plan's proposals are socially acceptable and address real needs.

Furthermore, any relevant external stakeholders – such as the Department of Public Health Engineering (if they have projects in town), NGOs working in sanitation or environment, or neighboring local government bodies – may be consulted for coordination purposes. The engagement process will be documented, and the master plan will reflect the consensus and major concerns raised by stakeholders. By involving the community and stakeholders from the start, the plan builds local ownership. It also helps to pre-empt implementation issues – since stakeholders who have been heard and involved are more likely to support and cooperate with the plan's execution.

In summary, the environmental screening ensures the master plan is environmentally responsible, and stakeholder engagement ensures it is community-centered and realistic. Both elements are crucial for the long-term success and sustainability of the waste management improvements envisioned for Meherpur.

1.4: Study Area

Meherpur Paurashava is the principal urban center of Meherpur District, positioned in the southwestern corner of Bangladesh and forming the administrative nucleus of Meherpur Sadar Upazila. The town emerged historically as a trading and administrative hub, situated close to the border with India's West Bengal state. This border proximity has shaped Meherpur's growth, with transport corridors radiating outward to Chuadanga, Mujibnagar, and Meherpur, creating a compact yet strategically connected municipal landscape. The municipality covers roughly **15–16 square kilometers** and consists of **9 administrative wards** that encompass both densely built-up town areas and peripheral semi-rural neighborhoods.

The spatial structure of Meherpur reflects a classic concentric–radial urban form. The historic town core **Ward 01, Ward 02, and parts of Ward 03**, contains tightly clustered residential blocks, the primary bazaar area, administrative offices, and major civic facilities. Streets are narrow and organic, with mixed-use strips lining the central commercial arteries. As one moves outward along the major radial roads, the density gradually thins, giving way to semi-urban patches and then to agricultural fields on the edges of **Wards 04, 05, 07, and 08**. The northern and eastern fringes, in particular, remain largely agrarian with scattered homesteads, ponds, and fallow plots.

Meherpur's growth is shaped by both physical and administrative constraints. To the **north and east**, large stretches of agricultural land and low-density settlements limit compact expansion, while to the south and west, the road corridors act as the main spines around which new development clusters. The linear expansion along the major roads especially toward **Amjhupi and Mujibnagar**, shows active ribbon development, with new commercial and mixed-use structures gradually replacing older residential pockets. However, the presence of fragmented agricultural land inside the municipal boundary means certain neighborhoods are disconnected or separated by open fields, making infrastructure delivery and waste collection logistically challenging. These transitional spaces are typical of a small but expanding municipality shifting from a rural base toward a more urbanized structure.

Despite these challenges, the municipality retains a coherent functional character. Its central wards serve as the economic and service hub, while peripheral wards accommodate low-density housing, agriculture, and small cottage industries. Understanding this settlement pattern is crucial for planning solid waste management, optimizing route networks, and identifying suitable locations for facilities like STS, community bins, and waste-processing zones.

1.4.1 Land Use Composition

- **Residential Areas:** Residential land use is the dominant category across the municipality. The densest clusters appear in Ward 01, Ward 02, Ward 03, and Ward 06, where houses are closely spaced along a network of internal lanes. The residential fabric becomes gradually sparse toward the edges—particularly in Wards 04, 05, 07, and 08—where settlements merge with agricultural homesteads and scattered rural-style compounds.
- **Commercial Zones:** Commercial activities follow a clear linear pattern, concentrating along the main road corridors that traverse the central wards. Wards 01, 02, and 03 show the strongest commercial intensity, reflecting the traditional bazaar and municipal market area. These corridors anchor the town's economic interactions and host shops, service enterprises, and mixed-use buildings.

- **Agricultural Land:** Large expanses of agricultural land dominate the northern and eastern sectors, mainly in Wards 04, 05, 07, and 08. These green buffers indicate that Meherpur remains a peri-urban town with a strong rural interface. Agriculture still plays a significant role in shaping local livelihoods and influencing land-use fragmentation.
- **Community and Non-Government Services:** Community services—including educational institutions, administrative offices, and social facilities—are primarily concentrated around the central urban core. Schools and colleges appear in nearly all wards but are densest in Wards 01, 02, and 03, reflecting the town's role as a district-level service center.
- **Manufacturing and Processing Areas:** Light industrial and processing activities are scattered but more noticeable in Wards 03, 07, and 08. These include small workshops, storage facilities, and service-related industries that support local commerce and transport activities.
- **Waterbodies and Fallow Lands:** Numerous ponds and low-lying wetlands dot the municipality, especially along the northern and eastern wards. These waterbodies contribute to drainage circulation, small-scale aquaculture, and ecological balance within dense urban blocks.
- **Road Network:** The road system forms a clear radial pattern, connecting the town center to surrounding rural unions and major transport routes. The central intersection in Ward 01 acts as the main node from which major roads extend toward all peripheral wards. This structure shapes the distribution of commercial strips, influences settlement expansion, and guides future infrastructure investments.
- **Health Facilities:** Health institutions—clinics, hospitals, and diagnostics—are centrally located to maximize accessibility. They are particularly visible within Wards 01 and 02, consistent with the distribution of administrative and commercial functions.
- **NGO and Non-Government Services:** NGO facilities appear dispersed, embedded within residential and commercial landscapes across multiple wards, providing localized community support.

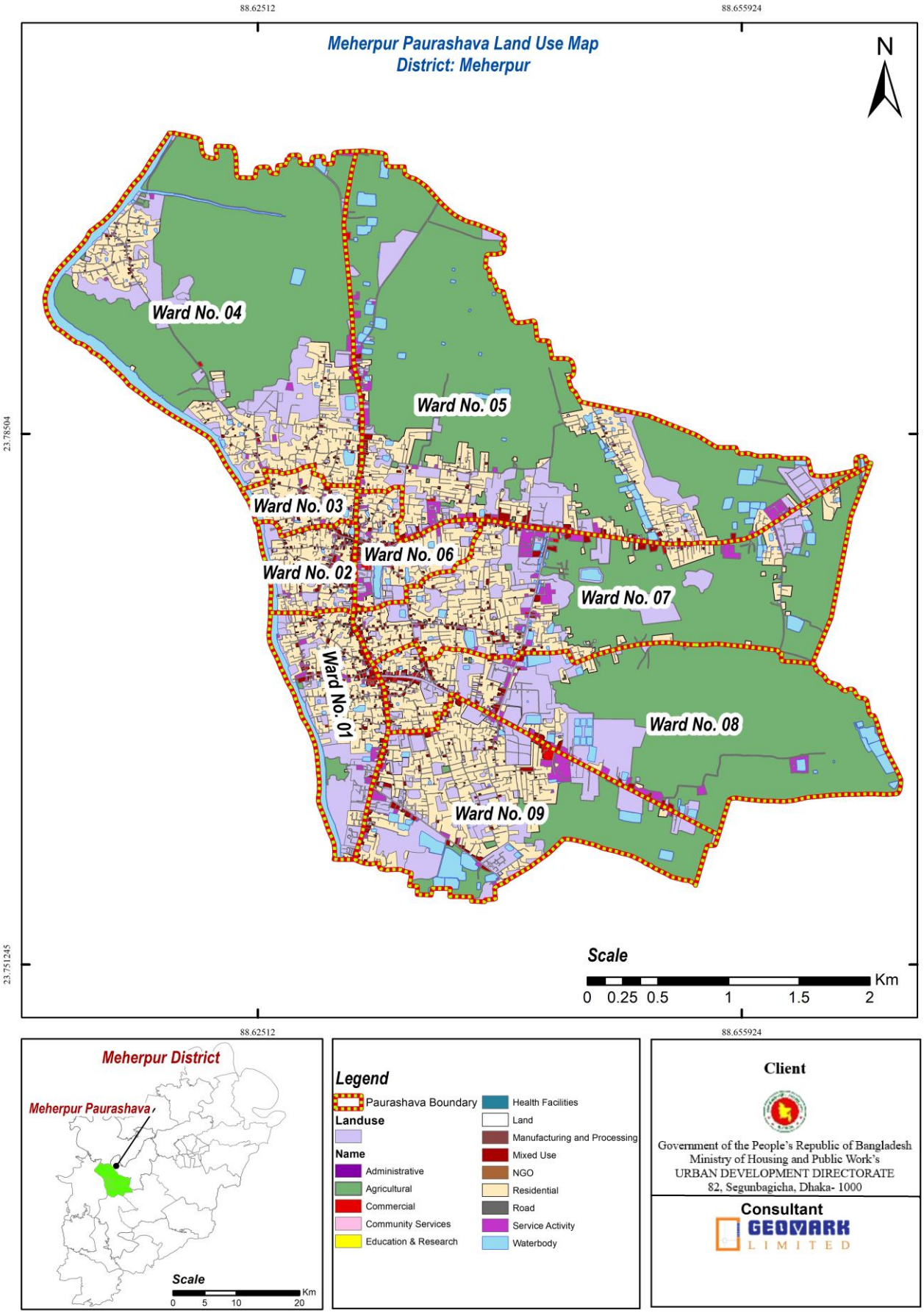


Figure 1: Land use Map of Meherpur Paurashava

1.4.2 Waste Management Infrastructure

Meherpur Paurashava operates a highly developed, dense and quantitatively impressive municipal waste management system, with a total of 332 waste collection points strategically distributed across the nine wards. The clear dominance of informal and municipal dustbins, combined with targeted placement of formal and drum bins, reflects a mature, population-responsive and adaptive approach that closely matches actual waste generation patterns.

Dumping Site & Fecal Sludge Treatment Plant (FSTP):

The Final Dumping Station is located in the south-eastern part of Ward No. 08 and serves as the primary terminal disposal hub for the entire Paurashava. Additional designated Land Fill Sites ("M" icons) exist in Wards 01, 09 and parts of Ward 06, functioning either as controlled secondary disposal areas or overflow/historical sites.

Waste Bin Types and Distribution:

The municipality employs a combination of formal dustbins, informal bins, drum bins, and cement casting bins.

- **Formal Dustbins** are systematically placed along major roads and intersections in Wards 04, 05, 06, and 08, primarily the commercial and densely populated zones.
- **Informal Dustbins** appear in peripheral and low-density areas, showing community-driven or temporary waste storage spots.
- **Drum Bins** and **Cement Casting Bins** are scattered across inner neighborhoods, offering localized collection options.
- The **Municipal Wastebins** (marked with orange icons) dominate the central transport corridors.

Collection and Disposal Routes:

The solid black lines represent the disposal route plan, covering all major roads connecting to the central dumping site. These routes ensure efficient collection from each ward, especially the densely populated **Wards 04, 05, 06, and 08**, which generate the majority of municipal waste. The network's connectivity indicates a well-structured and accessible layout, minimizing travel distance for waste transport vehicles.

Functional Pattern and Spatial Analysis

The spatial pattern shows a **hub-and-spoke structure** where waste is collected from multiple decentralized bins toward a single treatment and dumping location in Ward 03.

- The **central corridor** (Wards 04–08) forms the operational core of waste management activities due to higher population, commercial activity, and institutional presence.
- The **outer wards (01, 02, 07, 09)** have fewer bins, reflecting their lower waste generation and semi-urban character.
- The road-based collection system demonstrates good coverage but would benefit from secondary collection points in peripheral wards to enhance efficiency.

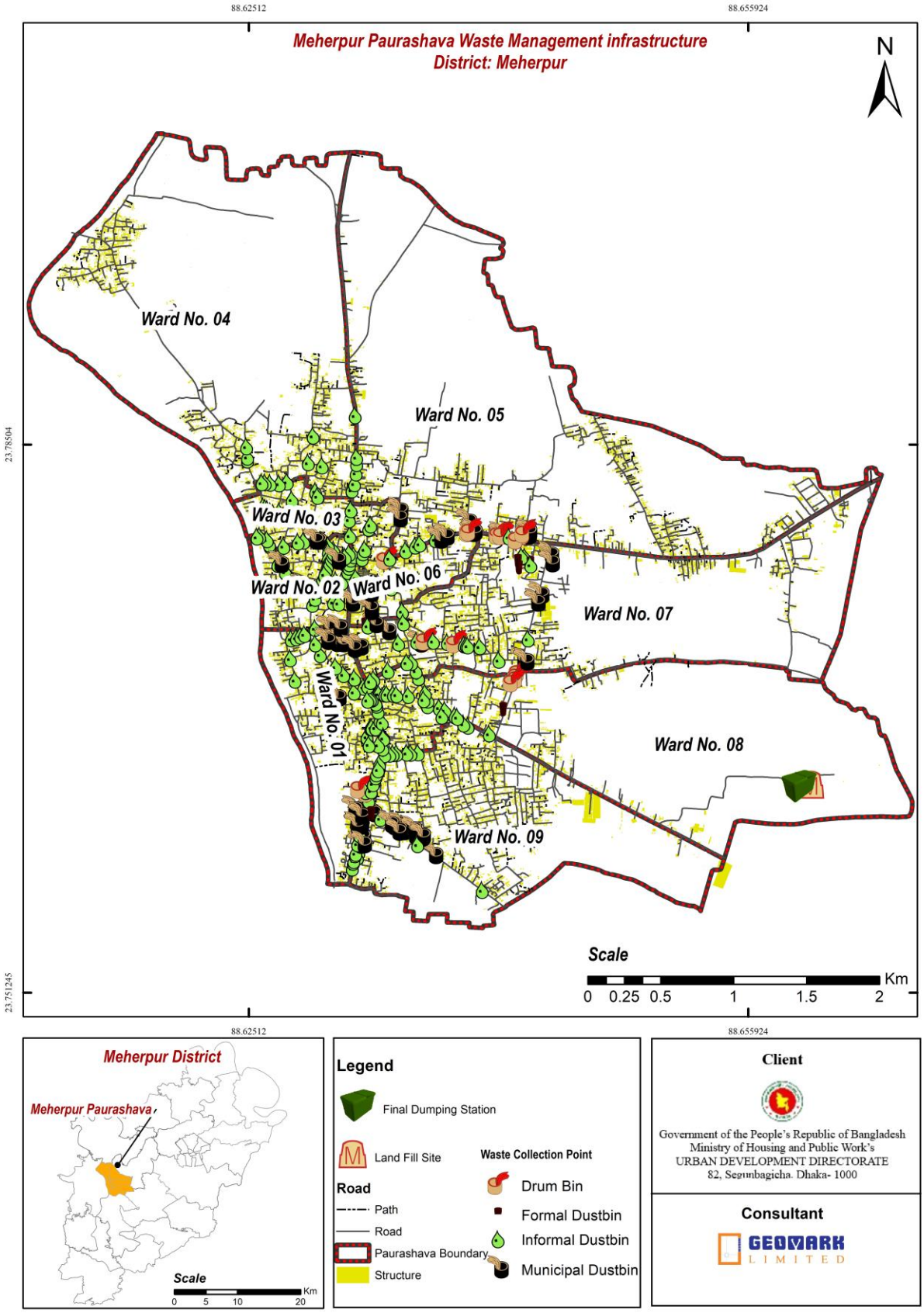


Figure 2: Existing Waste Management Infrastructures of Meherpur Paurashava

Chapter 2: Literature Review

2.1 Defining Waste, Solid Waste and Municipal Waste

Waste is the spare things that we do not use. But there is a saying someone's waste is someone's raw materials and resources if used correctly and efficiently (Alam Safiqul, 2025).

Waste broadly includes any unwanted or discarded materials. **Solid waste** specifically refers to non-liquid waste from domestic, commercial, industrial or institutional sources (e.g. kitchen scraps, market waste, packaging, manufacturing by-products). **Municipal solid waste (MSW)** is the subset of solid waste collected by city corporations or municipalities from urban areas; it typically includes household and street sweepings along with some commercial waste. Haider & Riaz (2021) define solid waste management (SWM) as the planning, control and implementation of waste handling – from generation through collection, transfer, treatment and final disposal – in line with public health, environmental and engineering best practices. Municipal SWM is therefore the process by which a municipality organizes these activities within its jurisdiction. In Bangladesh, urban waste management is generally a municipal responsibility (city corporations or Paurashava handle MSW).

2.2 Classification of Solid Waste

Meherpur's waste can be classified by material type, reflecting what actually appears on local streets and in bins:

- **Organic (Kitchen, Food and Market Waste):** This is the dominant fraction – easily 65–75% of total waste. Households generate vegetable peels, cooked food leftovers, fish and meat waste, while the main markets and hotels add huge quantities of spoiled fruits, vegetables and fish off-cuts. Agricultural waste (straw, grass, crop residues) that enters the municipal stream adds another 2 tons daily.
- **Street sweeping and drain-cleaning waste:** Approximately 6 tons/day of street sweepings + 3–5 tons/day of silt and debris removed from drains. This fraction contains soil, leaves, dust, plastic litter and organic matter.
- **Plastics:** Mostly single-use carry bags, food packaging, wrappers and PET bottles. Plastics constitute roughly 8–12% of collected waste but are highly visible because they do not decompose.
- **Paper and Cardboard:** Newspapers, cardboard boxes and packaging make up a smaller share (typically 3–5%). These come from shops, offices and household waste.
- **Textiles and rubber:** Old clothes, shoes, slippers, rags – about 2–4%.
- **Metals and Glass:** Cans, tins, metal scraps (nails, pipes) and glass bottles are present in very small quantities. Local scrap dealers recover these; they are a minor fraction of volume.
- **Clinical/hazardous waste:** Approximately 2 tons/day come from clinics and diagnostic centres (bandages, syringes, gloves, vials, expired medicines). This waste is currently mixed with household waste, creating serious health risks.

Overall, Meherpur's waste profile – very high organic content with modest plastic and little else matches patterns seen in similar Bangladeshi towns.

2.3 Solid Waste Management (SWM) Practices in Meherpur

Primary collection in Meherpur is community-bin based. Households, shops, clinics and markets do not receive door-to-door service; instead, residents must carry their waste to roadside collection points.

Table 1: Waste collection points

Bin Type	Number
Municipal bins	89
Informal bins	214
Drum bins	21
Formal bins	8
Total	**332**

Source: field survey, October 2025

(Note: The earlier statement that "no bins remain" was incorrect or outdated. While many of the original 150 municipal bins supplied years ago have disappeared or become unusable, the Paurashava and residents have replaced them with a mixture of municipal-issue bins, commercially bought drums, and informal/makeshift containers. The 332 "designated spots" recorded in municipal records actually now have 332 containers of varying types.)

Sweepers start work at dawn, sweeping streets and drains and depositing the material at these points. Households and businesses are supposed to bring waste to the points between 7–9 AM so that it coincides with truck collection (8–11 AM).

Three uncovered garbage trucks are operational:

- 1 × 1.5-ton
- 2 × 3-ton

Two additional 3-ton trucks are currently out of order.

The trucks follow three rough routes (east, west, west, and north–south axis) and normally complete one full round per day. Some areas receive a partial second collection between 9–11 AM. Waste is taken either directly to the final dumpsites (Shinger Math and Moymarir Math, Ward 7) or via the secondary transfer station at Gorosthan Para near the cattle market (Ward 8).

Because trucks are open-topped, leachate leaks and litter scatters along the routes. Daily collection achievement is only 14–16 tons against 18–20 tons generated, leaving roughly 4–6 tons uncollected every day. The uncollected waste is either burned openly, thrown into drains, buried in backyards, or dumped illegally along the town outskirts.

There is one small treatment/composting facility that exists on paper but has never been operational.

In summary, Meherpur's current system remains a very basic "collect-and-dump" model with inadequate containers, insufficient vehicles, no source segregation, no treatment, and significant quantities of waste left on the streets daily.

Data stored and section updated. Ready for next chapter/section or any further revisions.

2.4 Recycling and Composting in Meherpur

Meherpur already has an active informal recycling chain. Waste pickers and small kabalis collect plastics, paper, cardboard, metals and glass either from the 332 roadside points or directly from the dumpsites. Some recyclables are also sold by households and shopkeepers before the trucks arrive.

Notably, informal recyclers in Meherpur already convert part of the organic waste into fertilizer – they collect market vegetable waste and produce compost for sale to farmers. This proves that composting is both technically feasible and economically viable in the local context.

However, the scale is tiny compared to the opportunity. With 12–15 tons of organic waste reach the roadside points and dumpsites every day. A properly designed municipal or community composting programme could divert at least 50–60% of total waste from dumping, produce several hundred tons of good-quality compost annually, create permanent jobs for sweepers and waste pickers, and generate revenue for the Paurashava, and drastically reduce odour and leachate problems at the dumpsites.

2.5 Hazardous and Clinical Waste

Approximately 2 tons of clinical waste are generated daily by clinics, diagnostic centres and pharmacies in Meherpur town. This waste is currently thrown into the same roadside points as household waste and ends up mixed in the open trucks and dumpsites.

Syringes, needles, blood-stained cotton, gloves and expired medicines therefore directly endanger sweepers, van pullers, truck drivers, waste pickers and even children and animals at the dumpsites. Studies across Bangladesh have repeatedly shown that waste handlers suffer higher rates of hepatitis, skin infections and injuries because of improperly disposed medical waste.

Meherpur Paurashava must immediately segregate clinical waste at source. Clinics should be required to use colour-coded bins and puncture-proof sharps containers, and the Paurashava should arrange separate collection and safe treatment (incineration or autoclaving). Until a proper system is in place, the current practice constitutes a clear public health emergency.

2.6 Legal Framework for SWM

Meherpur's SWM is governed by a cascade of laws and rules. At the top are national policies and environmental laws:

- **Paurashava Act 2009** (updated municipal law) – charges municipalities with public health, conservancy and sanitation duties, which include solid waste collection and disposal.
- **Environment Conservation Act 1995 (amended)** – provides the basis for pollution control. Under this Act the government has promulgated specific rules on waste: the **Waste Management Rules 2021** (which cover SWM broadly), **Medical Waste Management Rules 2008**, and **Hazardous Waste Rules (Shipbreaking) 2011**.

- **Solid Waste Management Rules, 2021** – issued by the Ministry of LGRD/Environment, these rules mandate the 3R strategy (reduce/reuse/recycle) and even introduce Extended Producer Responsibility for plastics and packagingsdgs.un.org. The rules require municipalities to provide SWM services and encourage source-segregation and waste minimization.
- **Mandatory Jute Packaging Act 2010** – legally requires certain agricultural and food products to use jute (biodegradable) packaging, thereby reducing plastic bag use.
- **City Corporation Acts** similarly assign waste management duties to the larger city governments (though less relevant to a small pourashava like Meherpur).
- **Local Bylaws:** Paurashavas often issue their own bye-laws (under the Paurashava Act) to regulate garbage collection, fees, and dumping sites.

Together, these laws form a framework: SWM is a municipal obligation by law, and national policies push 3R and safe disposal. (For example, the government specifically notes that Bangladesh's SWM Rules 2021 include provisions on waste segregation, recycling targets and accountability, and it was the first time Extended Producer Responsibility was included in Bangladeshi lawsdgs.un.org.) Meherpur Paurashava must operate within this legal context, applying relevant sections (for instance, by requiring landlords to provide bins and paying user fees, enforcing no-dumping regulations, etc.).

Legally, Meherpur Paurashava has clear authority and responsibilities. The Local Government (Paurashava) Act (2009) lists **waste removal and collection** as a mandatory municipal duty. Under this Act, Meherpur's council can also levy sanitation fees (sometimes called "poura tax") on residents and businesses to pay for waste services. Nationally, Bangladesh has several regulations relevant to SWM. The Solid Waste Management Rules 2021, for example, require local governments to provide waste collection, encourage source segregation, and introduce extended-producer-responsibility for plastic and e-waste. There are also general provisions under the Environment Conservation Act (1995) that classify certain medical and chemical wastes as hazardous.

In practice, however, Meherpur's use of these legal powers is limited. The Paurashava has not yet passed strong local bylaws on waste or begun charging dedicated waste fees. Enforcement is weak: dumping fines exist on paper but are rarely imposed. Mandatory segregation rules (from 2021) are not enforced at the household level, so all waste is mixed in practice. In effect, while Meherpur has the legal authority to manage SWM, the institutional capacity to enact and enforce rules is still lacking. This gap means many of the regulations designed to protect health and environment remain aspirations rather than realities.

Chapter 3: Present Situation of SWM in Meherpur Paurashava

Consultants and survey teams adopted a holistic approach with extensive field verification (November 2025), detailed discussions with Paurashava officials, sanitation workers, van drivers, sweepers, recyclers and residents, and ward-wise waste quantification. The team analysed all available municipal records, photographed existing infrastructure, verified vehicle status, container inventory and dumping sites, and cross-checked waste generation estimates through direct measurement at collection points and the dumpsites. Based on this analysis, the team had proposed a methodology for conducting the study, which covers the description of hypothesis, variables, study models, sampling methods, sample size, indicators for data collection, etc.

3.1 Existing Problems of Solid Waste Management in Meherpur

- **Open dumping:** Although there are 332 containers of various types, waste is routinely placed on the ground beside overflowing containers or in vacant plots, drains and low-lying areas. Scattered waste is visible in every ward.

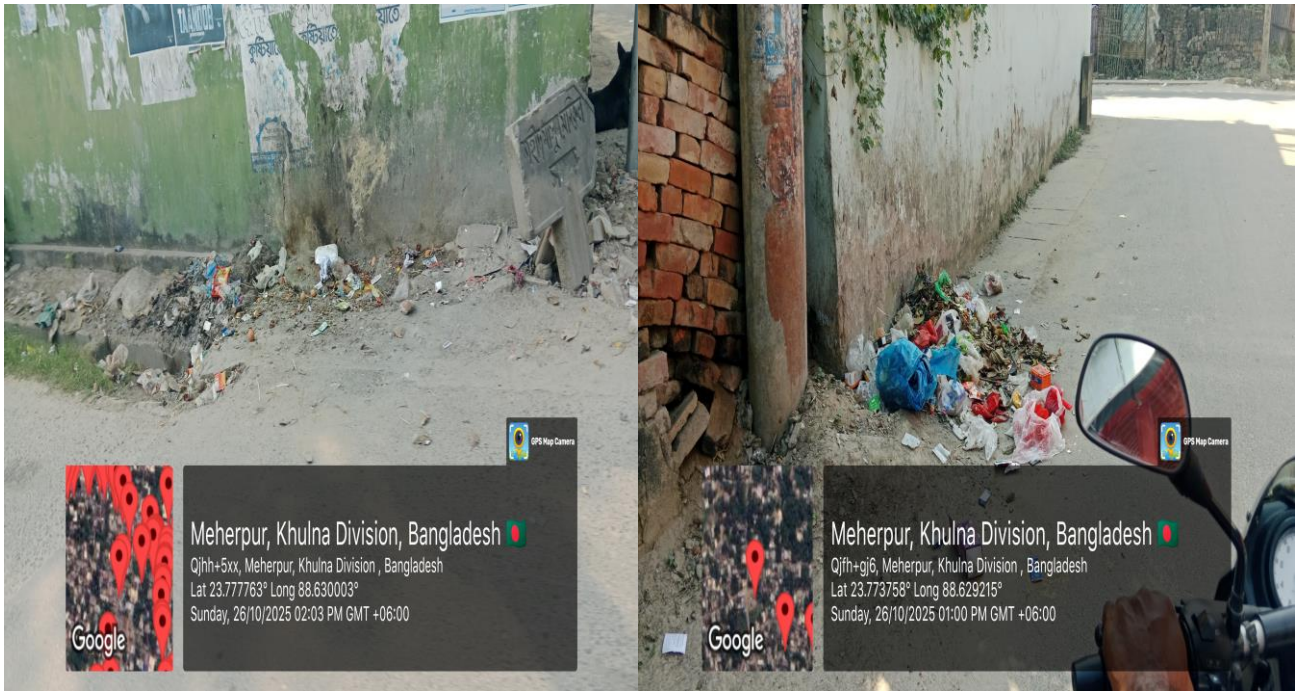


Figure 3: Open dumping place in Meherpur

- **Insufficient bins:** Total containers stand at only 332 for the entire municipality (89 municipal bins, 8 formal bins, 21 drum bins, 214 informal/makeshift containers). Many are damaged, lidless or burnt. This forces residents to place waste on the ground, where it is scattered by animals and rain.

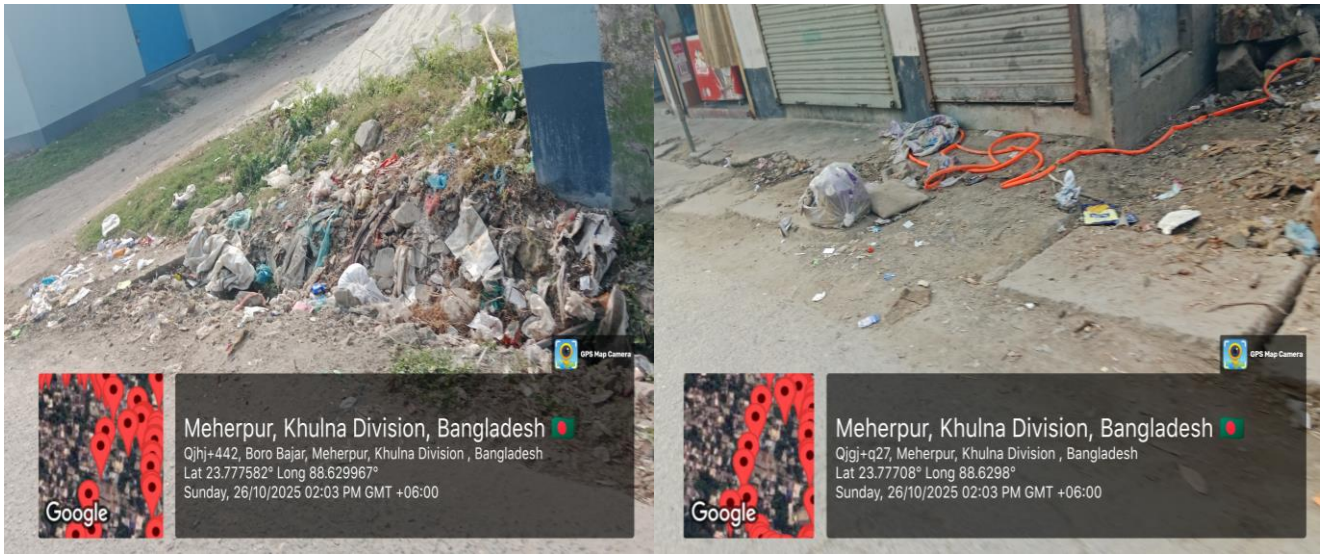


Figure 4: Bin Scarcity in Meherpur

Figure 5: Trash overflow scenario in Meherpur

- **Burning of garbage:** Especially during cooler months, households and vendors often burn mixed waste to clear it. This generates toxic smoke and pollutants.
- **Poor service coverage:** Collection routes miss many neighborhoods. Narrow or unpaved lanes are skipped, leaving areas of the town without service.

Figure 6: Poor Service Coverage in Meherpur Paurashava

- **Limited equipment:** Only 3 uncovered garbage trucks are operational out of 5 owned (1 × 1.5-ton, 2 × 3-ton running, 2 × 3-ton broken for extended periods). Only 2–3 vans available for narrow lanes.
- **No segregation:** All waste streams – household, market, clinical, construction debris – are mixed together from the point of generation.

Figure 7: Mixed waste (food, plastic, clinical, bricks) in one open dustbin

- **Lack of public awareness:** Many people in Meherpur are unaware of proper disposal methods or the impacts of littering. Throwing garbage on roads is still common practice.

Figure 8: Scenario of throwing garbage beside the bin in Meherpur

- **Funding and management gaps:** No dedicated conservancy fee, no functional treatment facility despite one existing on paper, very low wages for sanitation workers, inadequate PPE, and no updated waste management plan or bylaws.
- **Health hazards:** Approximately 2 tons/day of clinic waste (syringes, bandages, vials, expired medicines) is mixed with household waste and ends up at open dumpsites, directly endangering workers and waste pickers.

Figure 9: Potential Health Hazard in Meherpur

These on-the-ground problems – open dumping, limited bins, waste burning, patchy coverage, and low awareness – combine to make solid waste a visible nuisance and health issue in Meherpur. Addressing them will require targeted investments (more bins and vehicles), strict enforcement of sanitation rules, and education campaigns to change behavior.

3.2 Overall Waste Generation by Source in Meherpur Paurashava

Meherpur generates roughly 18–20 tons of municipal solid waste per day, about 8/10 t/d from households and 5 t/d from marketplaces – with a very high organic content. Field surveys indicate that 60–70% of this waste is biodegradable kitchen and market waste (e.g. food scraps, plant matter), similar to other small Bangladeshi towns.

Table 2: Composition of Household Waste

Waste Type	Estimated Share (%)	Typical Sources & Examples
Organic	65-75	Kitchen scraps, vegetables, leaves, rice, fish bones
Inorganic (non-bio)	13-20	Plastic, polythene, bottles, paper, textiles
Hazardous	~10	Batteries, expired medicines, mosquito coils
Sanitary/Liquid	5-10%	Wastewater from kitchens, toilets, wash areas

The remainder includes plastics, paper, textiles and other materials in small proportions. In practice there is almost no source segregation: mixed waste is disposed together. This reflects a national pattern where recent regulations (e.g. Solid Waste Management Rules 2021) do mandate household separation of waste, but implementation remains extremely weak. As a result, recyclables are not routinely separated and mixed wastes (often still wet) dominate the stream.

Table 3: Waste Generation by Source in Meherpur Paurashava

Waste Source	Estimated Daily Generation (tons/day)	Notes
Households	8–10	Mostly organic waste
Marketplaces	5	Includes vegetable, fish, meat waste
Industrial Areas	2	No industrial waste reported

Waste Source	Estimated Daily Generation (tons/day)	Notes
Agricultural Waste	2	Not separately recorded
Roads/Drains	Occasionally collected	Much of it ends up in canals via drains
Uncollected	4-6	Need immediate action.

3.2 Waste collection and transportation

Meherpur's collection system is community-container-based, with 332 containers placed across 9 wards. There is no door-to-door collection. Residents must carry waste to roadside points. Three uncovered garbage trucks collect waste daily between 8–11 AM using three broad routes (east, west, north–south). Waste is transported to the final dumpsites. Collection efficiency stands at only 70–80%. There are **no secondary transfer stations** in Meherpur; garbage is loaded into trucks directly at the collection points and hauled straight to the disposal site. This limited infrastructure – few bins, a handful of ageing trucks, and no intermediate transfer point – makes the collection service unreliable and spatially patchy.

3.2.1 Primary Collection of Solid Waste

Primary collection in Meherpur involves the gathering of waste from roadside drums or informal piles placed by households, markets, and shops. Currently:

- Collection is done manually by municipal workers.
- Waste is gathered using open-bed trucks (3 operational), three-wheelers, and vans.
- Households dispose of waste in roadside drums or in open spaces; only about 15% have access to any kind of bin.
- There is **no formal door-to-door collection** or household bin distribution yet, although future plans suggest a 3-bin system (biodegradable, non-biodegradable, and medical).

Public participation is weak. The absence of educational campaigns and bin infrastructure further reduces efficiency. Organic and inorganic wastes are collected together, limiting any scope for processing or recycling downstream.

3.1.2 Secondary Transfer Station (STS)

Currently, Meherpur Paurashava has **no Secondary Transfer Station (STS)** infrastructure.

- All waste collected from roadsides is directly hauled to the final disposal site at Morghati.
- This direct haul system is inefficient, especially for distant or densely populated wards.
- The absence of an STS means longer haul times, more wear on limited vehicles, and operational delays.
- The Masterplan identifies the need for one or more STSs to serve as consolidation points, reduce fuel costs, and streamline waste flow.

Implementing STSs could significantly improve route efficiency, allow for partial sorting, and reduce strain on the existing collection fleet.

3.3 Waste treatment and disposal

Meherpur currently practices crude open dumping at two sites in Ward 7 (Shinger Math and Moymarir Math). There is no lining, no daily cover, no leachate management and no gas venting. Fires occur regularly. A small treatment/composting facility was constructed several years ago but has never been made operational due to lack of budget, staff and management system. This remains unused – a clear missed opportunity given the town's 70%+ organic waste.

3.4 Existing infrastructure and facilities

The town's waste infrastructure is modest. **Collection vehicles:** Meherpur has only a few open-bed trucks or vans (some 2–4 units) for waste pickup. Many of these are over 10 years old, with mechanical issues and limited hauling capacity. No separate vehicles exist for recyclable materials. **Bins and drums:** Public waste bins are scarce and unevenly distributed. A survey found roadside drums only in the busiest markets and central wards; most residential streets have none. Without secondary sorting stations, recyclables are left mixed with trash. **Wastewater/drainage:** There is no integrated sewer system; liquid waste from sinks and drains flows into open channels or rivers. Meherpur's stormwater drainage is limited to a few natural khals (canals) and some uncovered drains. Crucially, the solid waste and drainage systems are not linked: garbage is not generally conveyed by drains, but indiscriminate dumping has blocked many small khals. During rains, plastic and organic waste commonly clog the drainage network, worsening urban flooding.

Public toilets exist in major markets and the bus terminal, but there is no formal city-wide septic suction service; septage is manually emptied (often unsafely) until the FSTP comes online.

Table 3: Existing Waste Collection Infrastructure

Component	Quantity/Status	Remarks
Municipal Garbage Trucks	5 total (3 operational)	1 × 1.5-ton, 4 × 3-ton (2 broken)
Covered Vans	0	0
Vans for narrow lanes	2–3	Used in narrow lanes
Roadside Bins/Drums	332 total (89 municipal, 8 formal, 21 drums, 214 informal)	Only in key market/central areas
Secondary Transfer Stations	None	Direct dumping from drums to disposal site
Treatment/composting facility	1	Not operational
FSTP	2 (Shinger Math & Moymarir Math, Ward 7)	Open dumping
Landfill (planned)	Basic layout, site identified	No engineered cell built yet

3.5 Community behavior and institutional constraints

Source segregation is practically non-existent. Residents and shopkeepers mix all waste types. Public awareness is very low – many citizens still see roadsides and drains as acceptable disposal places when containers are full or distant. Sanitation workers report low wages, lack of PPE and job insecurity as major issues. The Paurashava has no dedicated waste management cell, no conservancy fee collection, and no partnership with NGOs or private sector. National regulations (Solid Waste Management Rules 2021) remain unimplemented at local level.

Table 4: Key Institutional and Community Challenges

Category	Description
Public Awareness	Very low; no campaigns conducted
Community Behavior	Mixed waste, roadside dumping common
Institutional Limitations	No dedicated SWM department or fee
Budget Constraints	Severe; dependent on general revenue only
Manpower	Insufficient sweepers and drivers; low wages
Infrastructure Gaps	Only 3 trucks running, ageing containers, non-functional treatment plant
Drainage-Waste Linkage	Solid waste regularly blocks covered drains

3.6 Stakeholders of Solid Waste Management of Meherpur Paurashava

The effectiveness of solid waste management (SWM) in Meherpur Paurashava depends on the coordination and contribution of multiple stakeholder groups. Each plays a distinct role across various stages of the waste management chain from generation to final disposal.

Table 5: Stakeholders of Solid Waste Management of Meherpur Paurashava

Stakeholder Group	Role in SWM
Municipality (Pourashava)	Core responsibility for collection, transportation, and disposal
Public Health Engineering Dept.	Technical support for drainage and sanitation
Households	Primary waste generators; minimal source segregation
Shopkeepers & Market Vendors	Contribute significantly to daily waste, especially organic
Van Drivers & Sweepers	Frontline collection and street cleaning

Stakeholder Group	Role in SWM
NGOs (e.g., Basha Foundation)	Limited-scale involvement in awareness and waste handling
Donors (e.g., ADB, WB)	Infrastructure funding support (vehicles, drainage)

3.7 Existing Bins Coverage in Meherpur Paurashava

Meherpur Paurashava currently has **approximately 332 waste containers (89 municipal bins, 8 formal bins, 21 drum bins, and 214 informal/makeshift containers) distributed across roughly 250–260 designated collection points in the 9 wards** (field verified, October 2025). The service area coverage map (with multi-ring buffers representing approximate walking-distance radii) reveals a highly uneven spatial distribution that strongly favours the established urban core while leaving newer, peripheral and less accessible areas severely underserved.

The highest concentration of collection points (yellow dots) is found in Wards 01, 02, 03, 06 and 09, which together form the traditional town centre and main commercial hub. In these wards the buffers overlap extensively, creating near-continuous service coverage in the densest settlements. Almost every household and shop in the central-south and south-western parts of the municipality can reach a container within **50–100** metres.

By contrast, **Wards 04, 05, 07 and 08** show dramatically lower density of collection points. Large portions of these wards – particularly the northern **(Ward 04 & 05)**, eastern **(Ward 07)** and **south-eastern (Ward 08)** expansions–fall completely outside even the outermost service buffer. Residents in these underserved areas routinely walk **200–500** metres or more to the nearest container, and many simply do not bother, resulting in widespread roadside dumping, use of vacant plots, or throwing waste into drains.

This centre-heavy, perimeter-weak pattern directly explains the persistent complaints heard during field consultations: residents in peripheral wards report that containers are “too far”, “always full by evening”, or “non-existent in our lane”. Collection vehicles also struggle to serve narrow or unpaved lanes in these wards, further reducing effective coverage.

The current placement strategy appears to have followed main roads and older settlements rather than population density or ward-wise waste generation. Consequently, even though the total number of containers (332 containers) sounds reasonable on paper, the spatial inequity means that actual daily service coverage is far lower than it could be.

The Masterplan therefore prioritises a scientific redistribution and major addition of containers (target: 650–700 new or replaced twin-container stations) to achieve a maximum **100-metre walking distance** for every household across all 9 wards, with particular emphasis on the currently neglected **Wards 04, 05, 07 and 08**. New container sites will be selected based on population density, road access, waste quantification data, and proximity to markets/clinics to ensure equitable, efficient and hygienic primary collection municipality-wide.

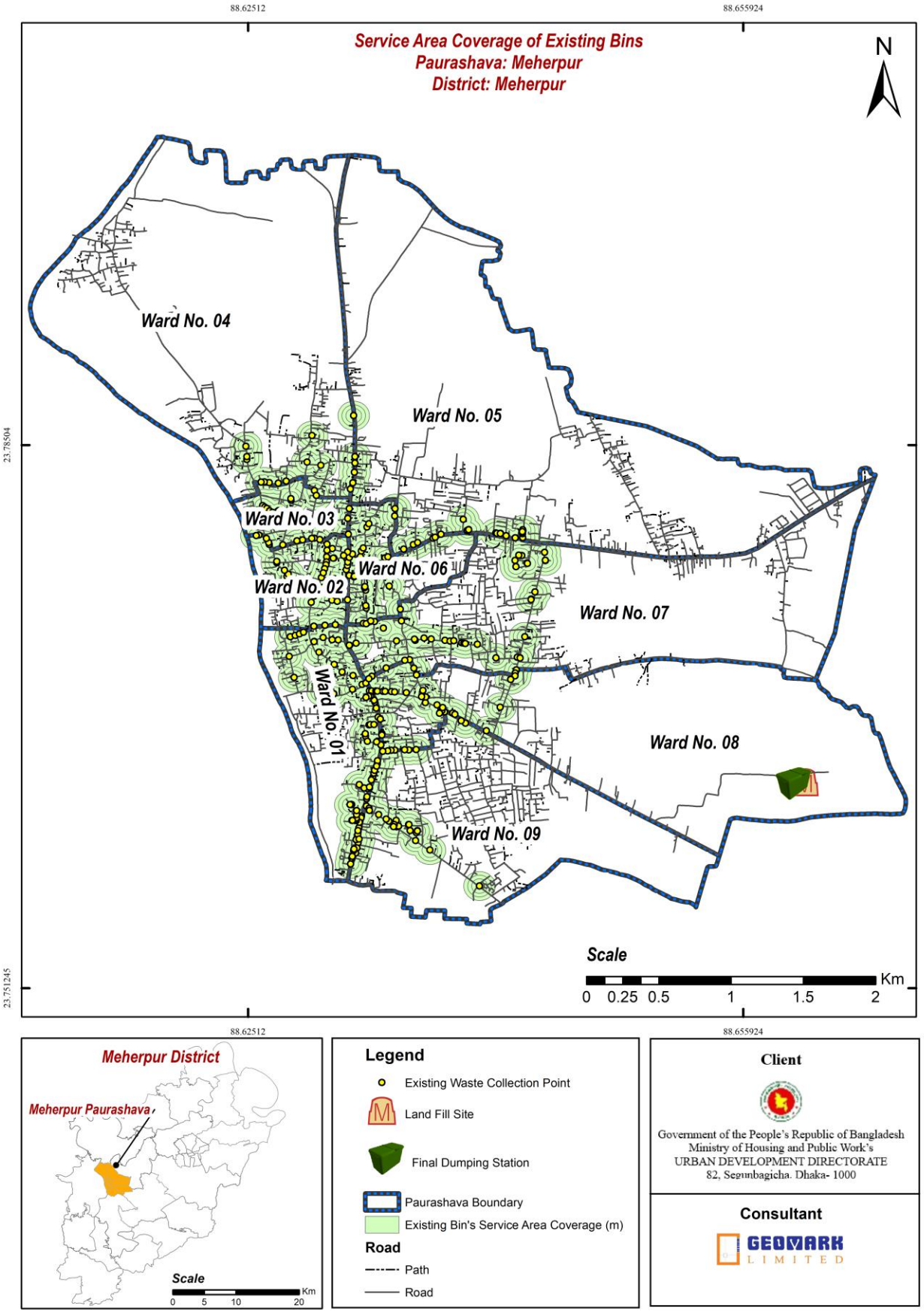


Figure 10: Service Area Coverage of Existing Bins

Chapter 4: Proposal of Future Waste Management Initiatives

4.1 Physical Initiatives to tackle waste management challenges

4.1.1 Bin Placement for the easy access for the public use

Meherpur's waste collection currently lacks sufficient public bin infrastructure, especially in residential neighborhoods and low-income areas. Only a limited number of large roadside drums exist in central wards and markets, leading to widespread open dumping in areas where formal collection points are missing. To address this, the Paurashava proposes:

- **Strategic placement of durable public bins** at high-traffic locations such as ward junctions, bus terminals, and marketplaces to ensure cleaner public spaces and reduce indiscriminate dumping.
- **Deployment of community collection drums** in slum settlements and peripheral wards where door-to-door collection is unfeasible due to narrow lanes or scattered dwellings.
- **Use of standard-design bins** that are compatible with existing collection vehicles and can be easily relocated or replaced when needed.

While a 3-bin system has been recommended by the district administration, the current Masterplan recognizes that **practical segregation at the household level is not yet feasible** due to low awareness, inconsistent collection, and lack of enforcement. Therefore, **waste will continue to be collected in mixed form** and transported to the disposal site. To compensate, **segregation will be carried out at the landfill zone**, where organic, recyclable, and hazardous materials will be separated manually or mechanically prior to final processing or burial. The bin placement initiative thus serves as a logistical improvement for cleaner public spaces—not as a primary tool for waste sorting at the source.

This approach balances operational realities with incremental improvements, laying the groundwork for future adoption of source segregation once infrastructure and public behavior have matured.

Applying the **WHO standard** of one bin every 50–100 meters, combined with a location-allocation analysis, the Masterplan identifies **463 new bin** locations that directly target both unserved and underserved neighborhoods of Meherpur Paurashava. The model prioritizes zones where bin access was previously absent or insufficient, ensuring that residents no longer need to rely on open dumping or distant disposal points. By strategically expanding coverage into these critical gaps, the Paurashava can improve daily waste-collection efficiency, reduce environmental nuisance, and move toward a more equitable and accessible urban waste-management system.

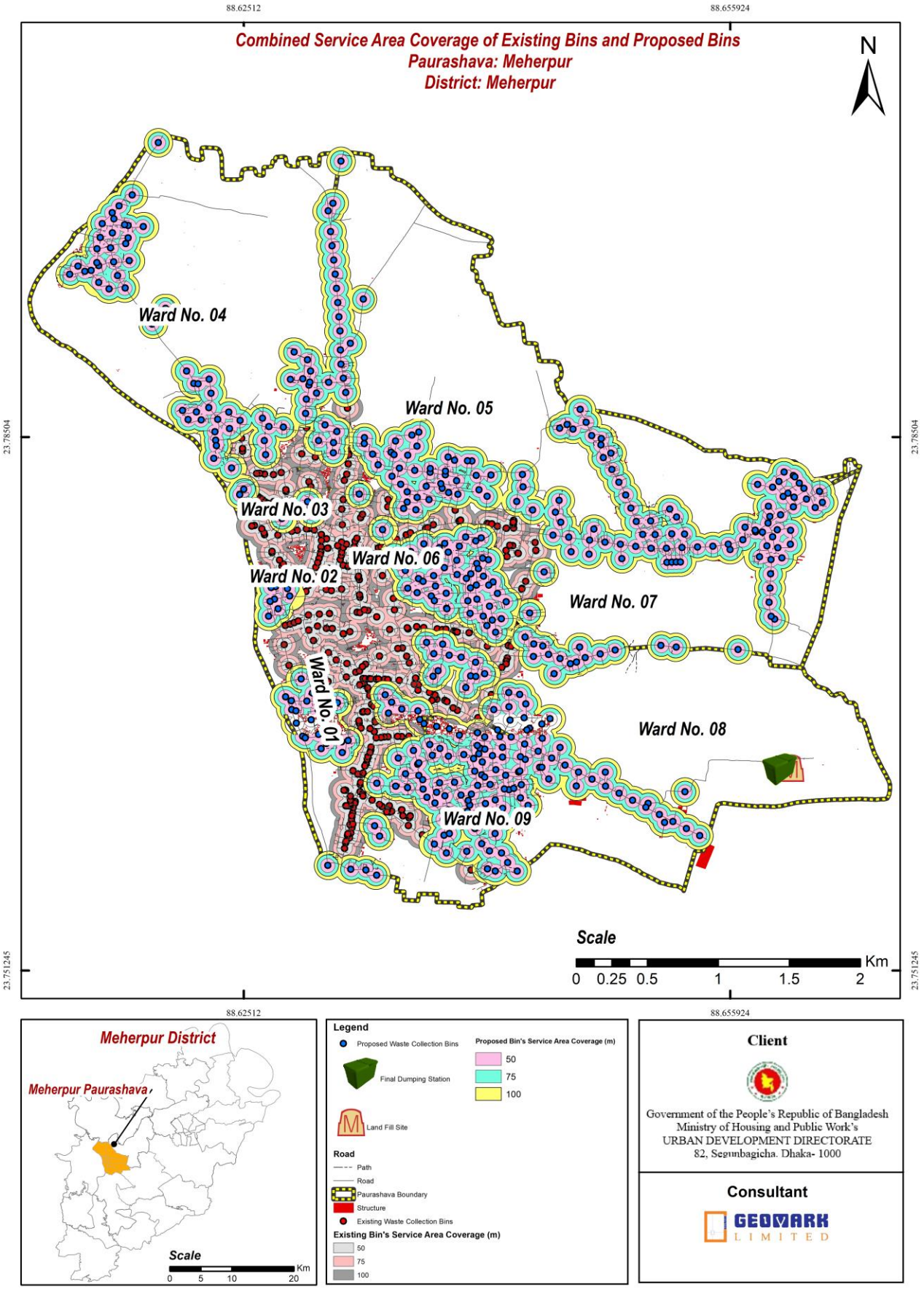


Figure 11: Bin assignment for the underserved and unserved areas

Table 4: Ward-Based Proposed Bin

Ward No.	Bin Number
1	23
2	08
3	05
4	70
5	101
6	14
7	101
8	46
9	95
Total	463

4.1.2 Proposal for a Secondary Transfer Station (STS), Meherpur Paurashava

At present, municipal waste in Meherpur Paurashava is collected manually from roadside drums, scattered bins and open piles and then hauled directly to the existing landfill/final dumping site located on the south-eastern fringe of Ward No. 08. Because there is no Secondary Transfer Station (STS) system, the collection operation now faces:

- Long haul trips for small collection vehicles,
- High fuel consumption and operating cost,
- Faster deterioration of vehicles, and
- Limited coverage in the outer and fringe wards.

To improve the system, the introduction of **six** Secondary Transfer Stations distributed across Meherpur Paurashava is proposed as a core upgrade in waste logistics. Under the current single-stage system, waste picked up by handcarts, rickshaw vans, small three-wheelers and light trucks must travel all the way to the final disposal site in Ward No. 08. This increases travel distance; reduces the number of trips each vehicle can make per day and leaves many outlying neighborhoods under-served.

In line with accepted international practice and WHO guidance, primary collection vehicles should only operate over short distances inside neighborhoods and should not be used for long hauls to the landfill. Waste should first be consolidated at strategically located STSs and then transported in bulk by larger trucks to the final dumping/landfill site. Secondary transfer points reduce travel time on collection routes and support more reliable daily collection, especially in dense urban areas.

To select suitable STS locations for Meherpur, a network-based service-area analysis was carried out using the New Service Area Tool of ArcGIS Network Analyst. The analysis was performed on the actual road network, not on simple straight-line buffers. Three service-distance bands—500 m, 1500 m and 2500 m—were used, following WHO recommendations and international benchmarks for efficient primary and secondary transport. The resulting service-area map shows how the six proposed STSs together extend coverage to all nine wards and will:

- Act as consolidation points for primary collection loads,
- Allow intermediate sorting and short-term storage, and
- Enable scheduled, bulk transfer by higher-capacity trucks to the final dumping and landfill facilities in Ward No. 08.

This shift from direct haul to a two-stage system is essential for reducing operational delays, increasing route efficiency and creating room for gradual segregation of different waste streams before final disposal.

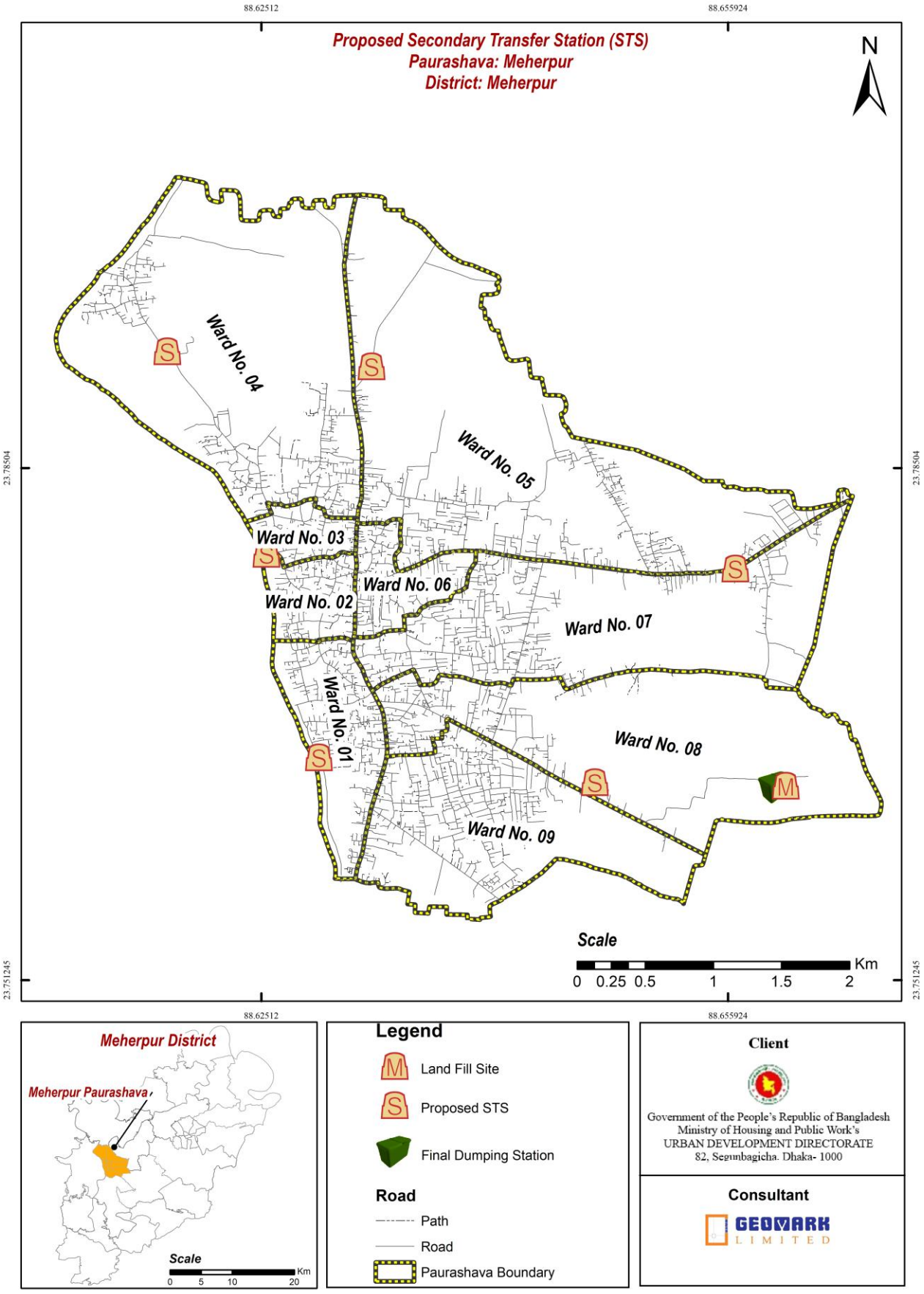


Figure 12: Proposed Secondary Transfer Stations (STS)

Purpose & Benefits of Introducing 6 STSs

1. **Cutting Long-Haul Trips**
   Right now, waste from all wards is hauled straight to the existing final dumping / landfill site in Ward No. 08. That forces small collection vehicles to make long trips across town, driving up travel time and fuel use. Network analysis shows that many neighborhoods sit more than 2 km from the landfill, which is beyond a practical direct-haul distance for rickshaw vans, handcarts, and small three-wheelers.
2. **Raising Operational Efficiency and Saving Fuel**
   WHO guidance highlights that transfer stations reduce transport costs by shortening the distance small vehicles travel before unloading. In Meherpur, the 6 proposed STSs will act as nearby discharge points: collection vehicles can empty quickly, turn around faster, and cover more households per day with lower fuel consumption and less wear and tear.
3. **Reaching the Outer and Fringe Wards**
   Several peripheral areas—especially in Wards 04, 05, 07 and 09—are currently difficult to serve regularly because of their distance from the final dumping site. With the new STSs, these localities fall within the 500–2500 m network catchments, giving every ward a practical access point to the formal waste collection system.
4. **Improving Segregation and Interim Storage**
   - Each STS in Meherpur will function as a managed handling point where:
   - waste can be stored safely for a short period,
   - basic sorting can be done,
   - recyclables and organic fractions can be separated, and
   - hazardous or problematic items can be isolated before loading onto larger trucks. This creates the platform for gradual improvement in recycling, composting and safer waste handling.
5. **Enabling Scheduled Bulk Transport to the Landfill**
   Once waste is consolidated at the 6 STSs, high-capacity trucks can move it to the final dumping/landfill site in Ward No. 08 on fixed, pre-planned schedules. This two-tier collection system is consistent with WHO's recommended approach: short, frequent primary collection within neighborhoods, followed by less frequent but efficient bulk transfer from STSs to the disposal site.

4.1.3 Procurement and Use of Covered Trucks

Meherpur currently operates 3 uncovered garbage trucks (1 × 1.5-ton and 2 × 3-ton) and has 2 additional 3-ton trucks out of order, for a total fleet of 5. All are open-bed vehicles, supported by 2–3 small vans. Waste is swept into about 332 roadside spots and then taken directly to the dumping/landfill area at Shinger Math and Moymarir Math (Ward 7), often via the secondary point at Gorosthan Para (Ward 8).

This results in open transport, roadside spillage and odor, and an unreliable service whenever one truck breaks down. The minimum immediate requirement is:

- **procurement of at least one new 3-ton covered garbage truck**, and
- **repair and return to service of the two broken 3-ton trucks**.

Once these actions are taken, the improved fleet should be used as follows:

1. **Priority use of covered trucks**
   - Deploy the new covered truck and the repaired units on routes serving dense residential areas, markets, schools and clinics, where hygiene and odor control are most critical.
   - Gradually confine open-bed trucks to construction debris and inert waste only.
2. **Strengthening primary collection with vans**
   - Use the existing vans for short neighborhood collection routes feeding the STS at Gorosthan Para and any future STSs, instead of sending them all the way to the landfill.
   - This shortens turnaround time and frees the larger trucks for bulk hauling.
3. **SOPs, maintenance and training**
   - Prepare route-wise operating procedures for covered trucks (loading, tarping, cleaning, and parking).
   - Implement a preventive maintenance schedule so repaired trucks stay operational.
   - Train drivers and helpers on safe operation of covered vehicles and on preventing in-transit spillage.

With one new covered truck in operation and the two broken 3-ton trucks repaired, Meherpur will immediately increase its available capacity, improve cleanliness along haul routes, and create a more reliable backbone for future STS-based collection.

4.1.3 Arrangement for Segregation in Landfill Zone

At present, waste reaching the **landfill area at Shinger Math and Moymarir Math (Ward 7)** is largely **unsegregated**: household waste, market waste, street sweepings, drain silt, bricks, sand, and occasional medical/clinic waste are dumped together. A treatment plant exists but is not in use, and whatever segregation happens is informal, carried out by recyclers who recover limited materials or convert some waste into fertilizer.

This mixed dumping shortens landfill life, increases leachate and odor problems, and wastes opportunities for resource recovery. The landfill zone should be upgraded to include organized segregation and pre-treatment, building on the presence of recyclers and the unused treatment facility. The following measures are proposed:

1. **Dedicated Segregation Yard Near the Tipping Area**

- Develop a paved segregation yard immediately downstream of the main tipping point where incoming trucks unload.
- Construct simple **segregation sheds** (roofed, open-sided structures) under which manual sorting of mixed waste can take place in all weather.

2. **Sorting Platforms and Basic Equipment**
   - Install raised platforms or simple conveyor lines (even manually driven at first) for separating:
     - recyclables (plastics, paper, metal, glass),
     - organics suitable for composting,
     - inert materials (sand, bricks), and
     - hazardous/medical fractions requiring special handling.
   - Provide hand tools, crates, and labeled storage bays for each category.
3. **Zoning of the Landfill into Functional Cells**
   - Demarcate and signpost separate cells within the landfill area for:
     - **bio-degradable/organic cover** (for future compost rejects),
     - **residual mixed waste**,
     - **construction and demolition waste**, and
     - **medical or hazardous waste** (with stricter access control).
   - Ensure that only residual, non-recoverable waste is landfilled in the main cells.
4. **Integration with Composting and Recycling Activities**
   - Allocate space for **composting units** linked to the organic fraction recovered at the segregation yard; partner with existing recyclers already converting waste into fertilizer.
   - Reserve plots for future **Material Recovery Facilities (MRFs)** where higher-volume sorting and baling of recyclables can occur as collection segregation improves.
5. **Reactivation or Repurposing of the Treatment Plant**
   - Technically review the existing, unused treatment plant to determine whether it can be:
     - repaired and operated for leachate or wastewater treatment, or
     - repurposed to support composting, bio-slurry, or other pre-treatment functions.
6. **Environmental and Operational Safeguards**
   - Provide storm-water drains and silt traps around the active tipping and segregation areas to prevent wash-off into nearby drains that ultimately discharge to the **Bhairab River**.
   - Establish basic occupational safety measures for workers and recyclers (gloves, masks, designated walkways, and fenced zones).

By reorganizing the landfill at Shinger Math and Moymarir Math into a controlled zone for sorting, pre-treatment, and final disposal, Meherpur can extend landfill life, reduce pollution, and create a practical bridge toward future recycling and composting programs, without waiting for fully advanced facilities to be built.

4.2 Action Plan for Sustainable Solid Waste Management in Meherpur Paurashava

Meherpur Paurashava faces the same structural pressures as other secondary towns in Bangladesh: growing waste quantities, limited transport capacity, almost no source segregation, and heavy reliance on open dumping. Nationally, only about half of generated urban waste is formally collected; the rest ends up in drains, low land and rivers, driving flooding, pollution and disease. Meherpur already generates about 18–20 tons of waste per day but manages to dispose only 14–16 tons, with most of it swept to 332 roadside spots and then hauled in uncovered trucks to the landfill at Shinger Math and Moymarir Math (Ward 7). Households mix organics, recyclables and inert materials together; bins that once existed have disappeared; a treatment plant stands idle; and covered collection is not yet in place.

This action plan is designed to close those gaps in Meherpur by:

- expanding collection coverage and reliability across all 9 wards;
- introducing source-separated collection for organics, recyclables and residuals;
- reorganizing primary collection around designated spots, vans and new STSs instead of direct long-haul trips;
- upgrading the fleet with at least one new covered truck and repairing the broken trucks;
- strengthening landfill-side segregation, composting and recovery (using the idle treatment facility and existing recyclers);
- building sustained community awareness so households and shops actually separate waste;
- piloting resource-recovery options (compost, fertilizer and, where feasible, REFUSE-DERIVED FUEL (RDF)) to reduce landfill load; and
- putting in place a realistic financial model to fund operations, maintenance and gradual system upgrades.

The overall goal is to move Meherpur from a “collect-and-dump” approach to a clear, staged waste-flow: **households and markets → segregated primary collection → STSs and segregation yard → composting and material recovery → residual waste to engineered landfill**. In doing so, Meherpur can evolve toward an inclusive, circular model similar to Integrated Resource Recovery Centers, where most waste is treated as a resource rather than a burden.

4.2.1 Expand Collection Coverage and Infrastructure, Meherpur Paurashava

In Meherpur, collection is still centered on manual sweeping and dumping at about **332 designated roadside spots**. From there, waste is taken directly to the landfill at **Shinger Math and Moymarir Math (Ward 7)**, with a secondary point at **Gorosthan Para (Ward 8)**. Outskirts and low-access lanes are irregularly served, so waste often stays in yards, open spaces, or drains.

To move toward universal coverage, Meherpur Paurashava will:

- **Deploy additional and repaired vehicles**
  - Repair the **two broken 3-ton trucks** and bring them back into service.
  - **Procure at least one new 3-ton covered truck** to strengthen capacity and improve hygiene.
  - Assign **2–3 vans and handcarts/tricycles** to short, feeder routes in narrow lanes and dense neighborhoods, especially in Wards 4, 5, 7 and 9 where daily waste generation is higher.
  - Use larger trucks primarily for bulk movement from STSs and transfer points to the landfill in Ward 7.

- **Set ward-based routes and schedules**
  - Prepare **ward-wise route maps** that link households, markets and clinics to the nearest designated spot and future STSs (including the existing Gorosthan Para STS).
  - Introduce **fixed time windows** for collection (e.g., the current 8–9 AM and 9–11 AM slots) and formalize which vehicles serve east, west and north–south corridors so overlaps and missed pockets are minimized.
  - Gradually integrate **GIS-based route optimization** as data improves, to cut travel time and fuel use.
- **Formalize and extend collection service**
  - Formally engage sweepers, van drivers and helpers under clear municipal oversight, with defined beats and performance expectations.
  - Ensure every street is covered **daily or at least several times per week**, with special emphasis on markets, hotels and clinics that generate 7–10 tons/day combined.

By strengthening the fleet, organizing routes and formalizing service for all 9 wards, Meherpur can sharply reduce illegal dumping in drains and low land and directly cut flood and public-health risks.

4.2.2 Implement Segregated Collection at Source, Meherpur Paurashava

At present, **almost all waste in Meherpur is mixed**: household, clinic, market, street sweepings and drain silt are dumped together at roadside spots, then hauled in uncovered trucks to Ward 7. This undermines any chance of efficient recycling, composting or safe handling of medical and hazardous fractions, even though local recyclers already convert some waste into fertilizer.

Meherpur will therefore shift to **source-separated collection**:

- **Standard waste categories**

Households, markets, clinics and institutions will be instructed to separate into at least three basic streams:

  - **Organic/biodegradable waste** – kitchen scraps, hotel and market leftovers, agricultural residues.
  - **Dry recyclables** – paper, cardboard, plastic, metal, glass.
  - **Other/residual waste** – textiles, sanitary waste, contaminated packaging and miscellaneous refuse.
- **Color-coded containers and bags**
  - The municipality will introduce **color-coded bins or polybags** (e.g., green for organic, blue for recyclables, another color or marking for residuals).
  - An initial batch of bags/containers will be distributed **free of cost** in selected pilot wards (e.g., Wards 1, 2 and 7) to encourage early adoption.
  - Clear symbols will be used so even low-literacy users can understand the system.
- **Legal and policy backing**
  - The program will be explicitly linked to the **Solid Waste Management Rules 2021**, which require household-level segregation.

- Public notices, ward meetings and mosque/temple announcements will explain that segregation is not optional but a legal and civic obligation.

- **Linking segregation to downstream processing**
  - Organic waste from households, markets and agricultural residues will be directed to **composting and fertilizer production**, in partnership with existing recyclers.
  - Inorganic recyclables will be channeled through a more formal **recycling chain**, improving income opportunities for local recyclers.
  - Residual mixed waste will go to landfill cells or future **REFUSE-DERIVED FUEL (RDF) / energy-recovery options** as capacity develops.

By aligning container design, household behavior and legal requirements, Meherpur can gradually move from a mixed "collect-and-dump" model to a **segregation-driven system** where each waste stream has a defined path and value.

4.2.3 Community Awareness and Environmental Education, Meherpur Paurashava

Given that residents currently place all waste at open roadside spots without separation, technical fixes alone will not be enough. Behavior change is essential. Meherpur will roll out a targeted awareness and education program focusing on practical actions people can take.

Key activities include:

- **School-based programs**
  - Integrate simple modules on waste, health, and the **3Rs (Reduce, Reuse, Recycle)** into local school activities.
  - Organize student-led **clean-up drives**, poster/essay competitions, and "clean ward" awards.
  - Encourage schools to model segregation on campus with labeled bins, so students see and practice the system daily.
- **Ward-level meetings and focus groups**
  - Conduct **ward-wise meetings and FGDs** with residents, market committees, transport workers and community leaders.
  - Use concrete local examples: blocked drains leading to waterlogging, mosquitoes breeding in clogged water, and open heaps near homes causing bad odor and disease risk (dengue, diarrhea, skin infections).
  - Demonstrate how to separate waste at home using simple containers and how to use the new color-coded system.
- **Engagement with sweepers, van drivers and recyclers**
  - Treat sweepers, van drivers and local recyclers as **frontline messengers**: train them on basic health, segregation messages and how to communicate with residents during daily rounds.
  - Recognize and incentivize good performance (e.g., clean route awards, certificates) to build pride and ownership.
- **Mass communication and feedback channels**
  - Use miking, local cable TV, social media, mosque/temple announcements and posters near markets and clinics to repeatedly reinforce key messages.
  - Create simple feedback channels (ward councilor office, a phone number or suggestion box) so citizens can report missed collection, illegal dumping spots or blocked drains.

Sustained, practical communication—anchored in schools, wards and daily interactions with workers will help Meherpur shift from passive dumping at roadside spots to **active participation** in segregation, cleaner streets and safer drainage.

4.2.4 Resource Recovery: Composting and REFUSE-DERIVED FUEL (RDF) Technology

The plan emphasizes turning waste into value, in line adding **5R** with Bangladesh's national **3R strategy**. Organic waste (the majority of Bangladeshi MSW) will be diverted to **composting**. A corner of the landfill site can host a simple compost facility (or community barrel composter sites), turning food scraps and yard waste into fertilizer for local farmers. This reduces landfill volume and cuts methane emissions.

For the non-organic, non-recyclable fraction, Meherpur proposes to pilot a small **Refuse-Derived Fuel (RDF)** unit. In this process, shredded residual waste (mixed plastics, paper, light fabrics) is dried and pressed into fuel pellets. These RDF pellets can be used by nearby industries (e.g. brick kilns or cement factories) as a substitute for coal. Waste Concern's research indicates RDF made from plastics and paper can replace coal in kilns. Meherpur would seek a partnership (possibly with Waste Concern or a private firm) to design and operate the RDF system under national guidelines.

Key aspects for the REFUSE-DERIVED FUEL (RDF) component:

- **Supply:** Non-recyclable community and commercial waste is routed to the RDF plant instead of landfill. Agreements (MoUs) with local businesses and institutions ensure a steady waste stream.
- **Processing:** The plant will sort and shred the waste, remove inert materials, then pelletize the combustible fraction. (This is similar to MBT plants used internationally.)
- **End use:** The resulting fuel pellets, having a high calorific value, would be sold to energy-intensive consumers. For instance, the Bangladesh cement industry is already exploring RDF use to reduce coal dependency.
- **Economic viability:** Revenue comes from RDF sales and tipping fees charged to waste generators. Costs include machinery (shredders, dryers, pelletizers), labor, and utilities. A detailed business analysis (CAPEX/OPEX) will be conducted to ensure the plant's sustainability.

The RDF project must follow strict environmental controls. Any facility will adhere to DoE emission standards and operate under Waste Management Rules. By adopting proven technology (e.g. proven plastic-to-fuel incinerators) and conducting regular monitoring, Meherpur can harness its waste for energy while minimizing pollution.

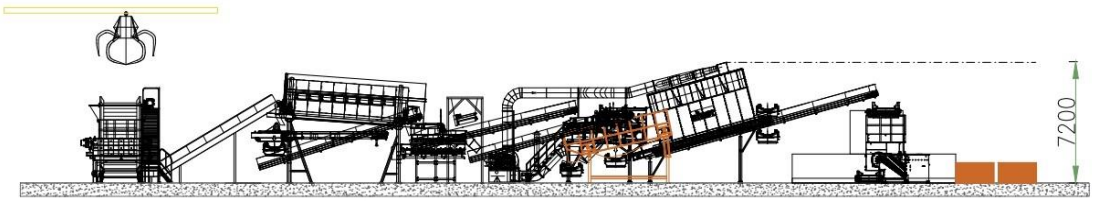


Table 5: Process of Waste Recycling

Business Model for RDF and Resource Recovery

To make the solid waste system financially viable and reduce pressure on the landfill, Meherpur will develop a small RDF (Refuse-Derived Fuel) facility linked to the STS network and landfill zone. The plant will process the combustible fraction of municipal waste—mainly mixed plastics, paper, textiles and packaging that cannot be recycled—into a consistent fuel for cement and other energy-intensive industries.

The basic model is a **municipality–private operator partnership**. Meherpur Paurashava provides land within or adjacent to the landfill and guarantees a minimum daily volume of feedstock through its collection and STS system. A private operator (or SPV) finances, builds and runs the RDF plant, including sorting, shredding, drying and, if needed, pelletizing. The operator is responsible for staffing, maintenance and meeting environmental standards; the Paurashava focuses on collection, segregation and monitoring performance.

The operator's income comes from two main sources:

- **Tipping fees** paid by the Paurashava for every ton of qualifying waste processed instead of landfilled; and
- **RDF sales** to cement or other plants, under long-term supply contracts that specify calorific value, moisture and delivery terms.

Additional revenue can be earned from selling metals and other recyclables recovered during sorting. Tipping fees are set below the full cost of landfilling, so the municipality saves money per ton diverted to RDF while still making the project attractive to the operator.

Costs for the operator include capital investment in buildings and machinery, operating and maintenance expenses (labour, power, spare parts, quality testing) and, where applicable, transport of RDF to buyers. A simple financial model will be used to check those realistic combinations of tipping fee and RDF price cover these costs and provide a reasonable return.

Key risks are feedstock quantity/quality and market off-take. These are managed by: (i) formal agreements with Meherpur Paurashava ensuring minimum tonnage and improved segregation at source; and (ii) long-term contracts with at least one anchor industrial user, with clear quality standards and pricing formulas linked to coal or alternative-fuel prices. Implementation will follow a staged path—pre-feasibility, detailed feasibility and PPP structuring, construction, then scale-up once performance and demand are proven.

In this way, residual waste becomes a revenue-generating fuel, landfill volumes shrink, and the overall solid waste system gains a stable financial backbone instead of depending solely on municipal budget transfers.

4.2.5 Route Proposal for the Waste Collection Trucks

With six STSs in place, secondary transport from STS to the final dumping station (FDS) / landfill at the south-eastern fringe of the Paurashava will be handled by a small fleet of 3-ton covered trucks. The map defines **six fixed routes (1–6)** that link each STS to the FDS using the existing paved network. The idea is simple: primary vehicles and sweepers only move waste to the nearest STS; covered trucks then haul consolidated loads along clearly defined corridors, avoiding local lanes as much as possible.

Route 1 – Southern Corridor (Ward 01 STS → FDS): Starting from the STS in **Ward 01**, the truck follows the southern internal road network, skirting dense residential pockets, and then joins the main east–west arterial through Wards 08–09 before reaching the FDS. This route mainly serves the southern and south-western neighborhoods.

Route 2 – Main Trunk Route (Central STS cluster → FDS): Route 2 is the **principal haulage corridor**. It begins at the central junction near the Wards 02/03 area, collects loads from the nearby STS cluster, passes through **Ward 08**, and continues east–south-east through **Ward 09** directly to the FDS/landfill. Most other routes ultimately feed into this trunk, which is why it is prioritized for the strongest pavement and strictest traffic control.

Route 3 – Eastern Corridor (Ward 07 STS → FDS): From the STS on the **eastern edge of Ward 07**, the truck moves west along a collector road to meet the main north–south connector in Ward 08, then merges onto Route 2 toward the FDS. This route serves the growing eastern fringe while keeping heavy vehicles off minor residential streets.

Route 4 – Inner West Link (Central–West STS → Trunk Route): This short link connects the STS near **Ward 03** to the main north–south spine and then down to the Route 2 trunk. It allows waste from the dense central-west neighborhoods to reach the landfill without sending trucks deep into local alleys.

Route 5 – Western Corridor (Ward 04 STS → Central Junction): Starting at the STS in **Ward 04**, Route 5 runs eastward along the western collector roads to the central junction near Wards 02–03, where it joins Route 4 and then Route 2. This gives the low-density western areas a clear, direct secondary path without cutting across the town's core.

Route 6 – Northern Spine (Northern STS → Central Junction): Route 6 links the STS north of **Ward 05** to the town center via the main north–south spine road. From there, it merges into the central junction and onto Route 2. This route is designed to carry loads from the northern neighborhoods while using the highest-capacity road available.

All six routes have been drawn to:

- keep heavy vehicles on wider, higher-standard roads;
- avoid schools, health facilities and very narrow residential lanes;
- minimize turning movements and congestion at key intersections; and
- ensure every STS has at least one reliable, all-weather connection to the FDS.

Covered trucks will follow these fixed routes on daily schedules (more frequent from high-load STSs), creating a simple, predictable backbone for Meherpur's secondary waste transport system.

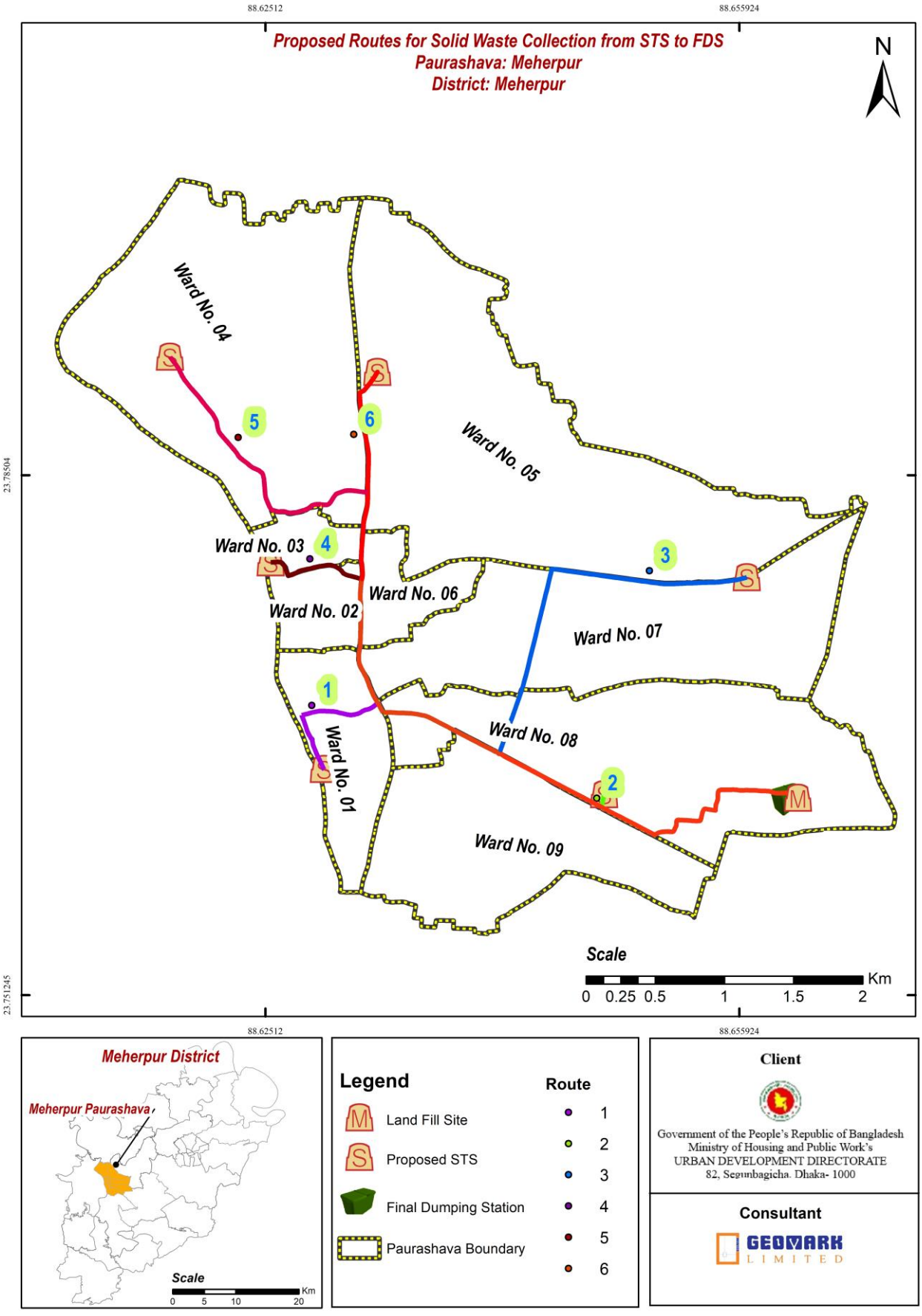


Figure 13: Proposed Waste Collection Route

4.2.5.3 Operational Benefits of the VRP-Based Route System

1. Minimizes Travel Time & Fuel

The VRP solver mathematically minimizes

✓ total distance,

✓ number of vehicle-hours, and

✓ total operating cost.

This significantly improves fuel efficiency and fleet productivity.

2. Reduces Overlap Between Trucks

Manual routing often creates redundant paths. The VRP automatically eliminates route overlap, ensuring that two vehicles do not cover the same street segment unless necessary.

3. Ensures Full Coverage

The model guarantees that every defined service point is visited—critical for equal service distribution across all nine wards.

4. Supports Daily Scheduling

VRP incorporates time-window logic. Even if the municipality later sets preferred collection hours, the VRP-based system can accommodate those constraints.

5. Aligns With STS-Based Collection Strategy

The routing structure validates the introduction of the 5 STSs by creating efficient waste flows from: **Household → Local Loop → Feeder Route → STS → Bulk Transport → Final Dumping Site**

4.2.6 Sustainable Financing and Governance

Financing this integrated system requires multiple sources:

- **Household collection fee:** Residents will pay a modest monthly fee for curbside pickup. For context, Dhaka city residents currently pay about Tk 100–300 (≈US$1–3) per household per month. Meherpur can set an affordable rate (e.g., Tk 50–100) to cover part of operational costs. This user charge encourages households to value the service and helps fund collection staff and trucks.
- **Tipping fees:** A small fee at the landfill/RDF delivery point will be charged to commercial and institutional generators, aligning costs with waste quantity.
- **Government support:** National or district grants/subsidies can underwrite large capital expenses (e.g. vehicles, compost or RDF equipment, bins). The LGED and environment grants could fund the startup costs, as done in similar projects.
- **Public–Private Partnership (PPP):** The RDF plant (and possibly collection services) can be structured as a PPP. In this model, the municipality provides the land or facilities and regulatory support, while a private operator invests in and manages the plant. The private partner recoups investment through future RDF sales. Such a PPP can speed the deployment of technology without straining city finances.

- **Informal sector integration:** Local recyclers and waste-pickers will be integrated into the system. Sorted recyclable materials from Meherpur can be sold to these entrepreneurs (who already recover 15–20% of recyclables informally). Organic waste could be partly managed by farmers or cooperatives (e.g. small farms buying compost). The plan encourages sharing a portion of profits or returns with these community stakeholders, creating incentives to keep waste streams clean.

Municipal governance will shift from service provider to coordinator/regulator. Meherpur 's role will be to allocate routes and waste streams, enforce segregation rules, collect fees, and monitor service contracts. As one study recommends, local government should **"strengthen policy enforcement, integrate the informal sector, and increase financial commitment"** in waste management. Meherpur will implement such a framework, ensuring transparent budgeting (aiming beyond the current <1% of budgets for waste) and robust oversight of private contractors.

4.2.7 Integrated Waste Management Flow

A clear operational pathway will guide waste from generation to recovery. In practice, the flow will be:

- **Generation:** Segregated waste is placed at source by households, markets, and institutions (organic vs. recyclables vs. residual).
- **Collection:** Dedicated vehicles (vans, tricycles) collect segregated streams according to a schedule. Organic bins and dry recyclables are picked up on different circuits.
- **Centralized Sorting Hub:** All collected material is brought to a central site (the municipal landfill or transfer station). Here, any mixed loads are manually sorted: organics are separated from plastics, metals, etc. The site will have designated areas for composting and material recovery.
- **Resource Streams:**
  - *Organics* go to the composting plant or community compost pits, turning into fertilizer.
  - *Recyclables* (paper, metal, certain plastics) are baled or crushed and sold to certified recyclers.
  - *Residuals* (non-recyclable plastics/textiles/paper) go to the RDF processing unit. If needed, very inert waste is landfilled.
- **Energy/Fuel Output:** The RDF unit processes residue into pellets, which are then shipped to industrial users (e.g., brick or cement factories) to be used as alternative fuel.
- **Monitoring and Feedback:** Throughout this chain, municipal officers monitor quantities at each stage. Data on waste volumes and compositions will be tracked to continuously improve operations.
- This integrated approach embodies principles of the **circular economy**. According to Waste Concern's model, an IRRC (integrated resource recovery center) can convert **85–90% of incoming waste** into useful products (compost, biogas, recyclables, RDF). By following these best practices, Meherpur will drastically reduce landfill disposal. As an example, countries with advanced systems recycle or recover most waste (Germany: >67% recovery) and incinerate the rest for energy (Japan: ~80% energy recovery). Meherpur's plan is a scaled-down version of these integrated systems, suitable for a small municipality.

Chapter 5: Conclusion

Meherpur Paurashava has reached a point where "business as usual" in waste management is no longer an option. The assessment carried out for this Masterplan shows a system that has grown incrementally but without an overarching strategy: 332 assorted containers scattered roughly, only three operational trucks out of five, one underutilized STS, and crude open dumping at Shinger Math and Moymarir Math. The collection covers much of the core town but leaves large pockets of the outer wards underserved, while almost all waste remains mixed and untreated. The result is visible litter, clogged drains, exposure of workers and residents to health risks, and a steady build-up of environmental pressure on land and water.

At the same time, the study also highlights Meherpur's strengths. The town is compact, its road network has a clear radial structure, and there is already an active informal recycling chain that recovers materials and produces fertilizer from organic waste. Municipal staff, ward councillors and workers engaged closely during the planning process, and residents repeatedly expressed a desire for cleaner streets and more reliable services. These assets provide a solid platform for change if they are matched with clear direction, investment and enforcement.

The Masterplan responds to this context with a set of practical, mutually reinforcing interventions. On the physical side, it proposes a major expansion and rationalization of primary collection through new, evenly distributed containers so that no household is more than about 100 metres from a disposal point. Six strategically sited Secondary Transfer Stations will replace the inefficient direct-haul model, allowing small vehicles and sweepers to work within short local loops while larger trucks take over the longer runs to the landfill. Procurement of at least one new covered truck and repair of the two broken 3-ton units will stabilize fleet capacity and improve hygiene along haul routes.

Downstream, the plan reimagines the landfill zone at Shinger Math and Moymarir Math as more than just a dumping ground. Segregation yards, functional cells for different waste streams, and space for composting and future MRF operations turn the site into a basic but effective resource-recovery hub. Coupled with the proposed composting and RDF initiatives, this will gradually shift Meherpur away from simple disposal toward a circular model where a large share of organic and recyclable material is recovered, and only true residues are landfilled.

Equally important are the "software" elements. Source segregation—backed by colour-coded containers, clear bylaws and alignment with the Solid Waste Management Rules 2021—sets the behavioural foundation for long-term change. Ward-level meetings, school programmes, engagement of sweepers and recyclers, and simple feedback channels are designed to keep residents informed and involved rather than treating waste as solely a municipal problem. A financing framework built around modest user fees, targeted tipping charges, external grants and potential PPPs aims to make the upgraded system financially viable rather than perpetually dependent on ad-hoc budget allocations.

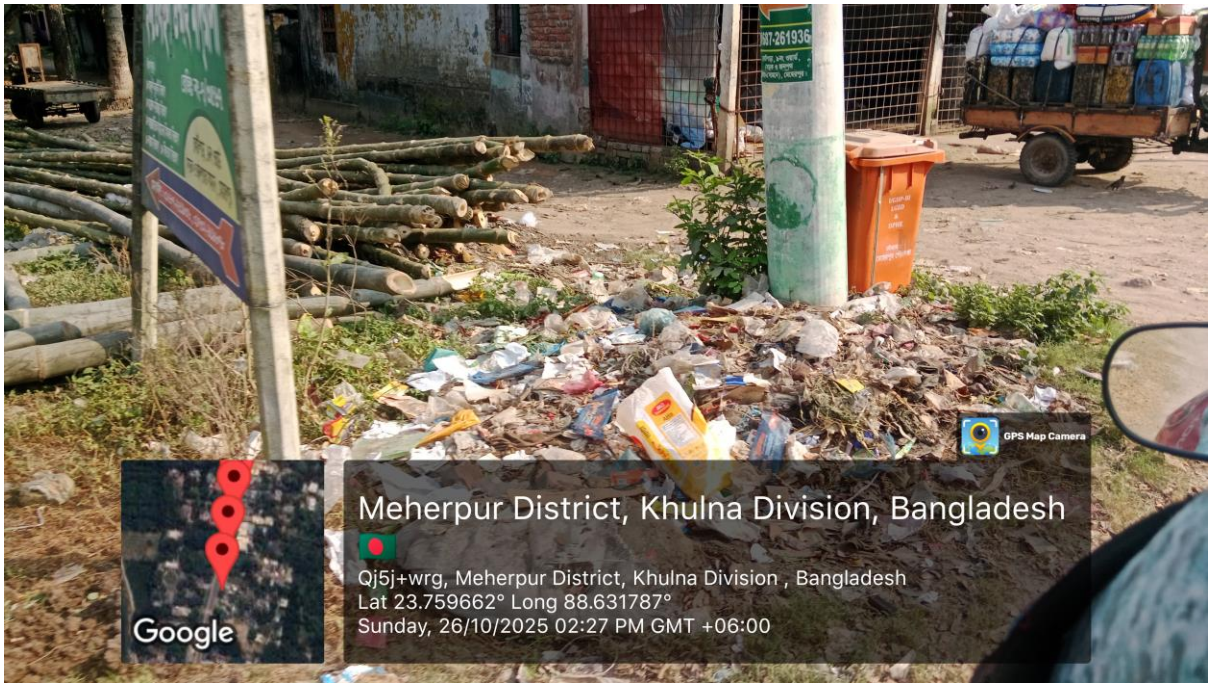
GIS-based analysis ties these pieces together. The mapping of existing dumping points, service gaps and drainage conflict zones, along with VRP-based routing from STSs to the final disposal site, gives the Paurashava an operational blueprint instead of generic recommendations. It shows, street by street, how a six-STS system, an upgraded fleet and optimized routes can provide full coverage to all nine wards while reducing travel time, fuel consumption and overlapping effort.

This Masterplan is intentionally phased. It does not assume that Meherpur can build everything at once or leap overnight to advanced technology. Early actions—repairing trucks, procuring a new covered unit, improving container coverage, organizing routes, activating basic segregation at the landfill—are designed to be affordable and quickly achievable. Medium-term investments in STSs, composting and stronger enforcement can then build on those gains. Throughout, success will depend on consistent political commitment, transparent management, and genuine partnership with residents and the informal sector.

If implemented with that spirit, the plan offers more than cleaner streets. It offers reduced flooding and disease risks, safer working conditions for waste handlers, new livelihood opportunities in recycling and composting, and a visibly improved urban environment that matches Meherpur's role as a district headquarters town. In short, this Masterplan gives Meherpur Paurashava a clear, evidence-based path to move from a fragmented, collect-and-dump approach to an integrated, resilient and resource-focused solid waste management system fit for the coming decades.

Annexure

Waste Disposal Scenario of Meherpur Paurashava




GPS Map Camera
Meherpur, Khulna Division, Bangladesh
Court Building Brunch, Meherpur, Khulna Division , Bangladesh
Lat 23.761684° Long 88.631598°
Sunday, 26/10/2025 02:30 PM GMT +06:00
Google


GPS Map Camera
Meherpur, Khulna Division, Bangladesh
Qjmh+6fj, Meherpur, Khulna Division , Bangladesh
Lat 23.783973° Long 88.628788°
Sunday, 26/10/2025 03:17 PM GMT +06:00
Google


GPS Map Camera
Meherpur, Khulna Division, Bangladesh
Qjjh+vpg বেড় পাড়া, Meherpur, Khulna Division , Bangladesh
Lat 23.781898° Long 88.629367°
Sunday, 26/10/2025 03:18 PM GMT +06:00
Google


GPS Map Camera
Meherpur, Khulna Division, Bangladesh
Qjhp+mm2, Meherpur, Khulna Division , Bangladesh
Lat 23.779292° Long 88.636758°
Sunday, 26/10/2025 03:25 PM GMT +06:00
Google