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Ministry of Housing and Public Works
Urban Development Directorate
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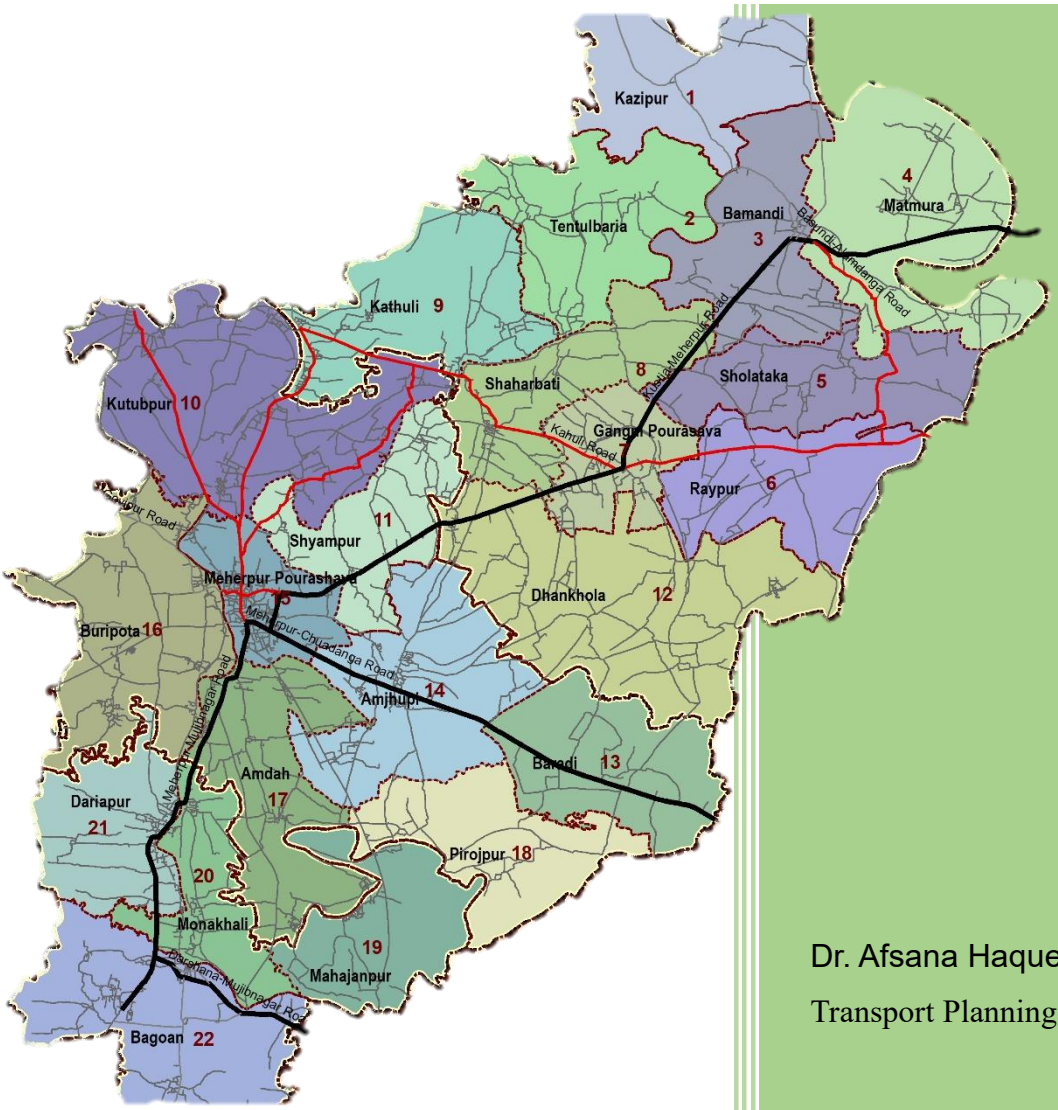
Preparation of the Development Plan for Meherpur Zilla

Assignment 03



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1. Introduction

Meherpur District, located in the southwestern region of Bangladesh under Khulna Division, is the country's smallest district by area, covering approximately 716.08 square kilometers. Despite its compact size, Meherpur holds profound historical and strategic importance, being the birthplace of the Provisional Government of Bangladesh, established on April 17, 1971, at Baidyanathtala (now Mujibnagar). The district's proximity to the Indian state of West Bengal on the west and its connectivity with Kushtia and Chuadanga districts to the east give it considerable regional significance for cross-border trade and transport integration.

Administratively, Meherpur is divided into three upazilas—Meherpur Sadar, Gangni, and Mujibnagar—comprising 18 unions, 199 mouzas, and 255 villages. Meherpur town, situated along the Bhairab River, functions as the district's administrative and economic core. With a population of 705,356 (2022 Census) and a literacy rate of 68.14%, Meherpur is transitioning from a rural agrarian base toward a more urbanized, service-oriented economy. However, the district's transport network and mobility systems remain heavily influenced by its rural character, marked by a predominance of local and union roads serving agricultural movement and intra-district accessibility.

The economic structure of Meherpur is largely agrarian, with agriculture accounting for nearly 69% of income sources, followed by commerce (13.83%) and small-scale trade. Consequently, seasonal agricultural transport plays a central role in shaping traffic patterns and congestion dynamics, particularly around market hubs such as Bamandi, Gangni, and Meherpur Pourashava. The district's transport infrastructure extends across 185.34 km of upazila roads, 212.81 km of union roads, and 527.69 km of village roads, supplemented by several regional highways that link Meherpur to major urban centers like Chuadanga, Kushtia, and Darshana. These routes form the backbone of both passenger and freight mobility, though their capacity is increasingly strained due to rising motorization, informal roadside activities, and inadequate road geometry.

In recent years, infrastructural and institutional developments—such as the establishment of Meherpur University (2023) and the proposed railway line from Darshana through Mujibnagar—have begun to redefine Meherpur's regional connectivity and urban structure. These initiatives, along with the proposed circular road linking key highways and growth corridors, are expected to transform local mobility, support decentralization, and enhance access to education, employment, and trade.

However, this transition also brings new challenges. Unplanned roadside vending, seasonal freight congestion, inadequate road width, and weak multimodal integration threaten the efficiency and safety of Meherpur's evolving transport system. Therefore, comprehensive planning is essential to balance development with sustainability—ensuring that road expansion, land-use conversion, and institutional growth proceed in harmony with the district's socio-economic and environmental context.

In this context, the present report analyzes the current transport conditions, socio-economic dynamics, and travel behavior of Meherpur District, aligning them with the Proposed Development Plan to forecast future transport demand and recommend strategic interventions. The study integrates field survey findings, trip generation and distribution modeling, and land-use considerations to provide an evidence-based framework for shaping a safe, efficient, and sustainable transport network that supports the district's long-term development vision.

2. Review of Existing Plans and Policies

A robust transportation development strategy must align with both national and regional policy frameworks to ensure coherence, integration, and sustainability. The following section reviews the key national-level strategies and local development plans relevant to the Meherpur District, emphasizing their implications for transport planning.

2.1 National Level

2.1.1 Eighth Five Year Plan (8FYP)

The Eighth Five Year Plan (July 2020 – June 2025) is the primary operational document for realizing the Government of Bangladesh's long-term Vision 2041. In the transport sector, the 8FYP marks a strategic shift from a purely construction-focused approach to a more holistic vision of creating an integrated, efficient, and sustainable multi-modal system. The plan's objectives are to enhance regional balance, strengthen rural-urban linkages, and bolster international connectivity to drive economic growth.

A powerful testament to this priority is the government's financial commitment. The transport and communication sector saw its Annual Development Programme (ADP) allocation rise to 28.88% in the 2023-24 fiscal year. This substantial figure, far exceeding the plan's initial average allocation of 17.4%, signals a clear national consensus: transport infrastructure is the primary engine for economic dynamism, trade facilitation, and social inclusion.

For Meherpur, a district with a vibrant agricultural economy and strategic cross-border potential, the 8FYP's focus is exceptionally relevant. Efficient transport networks are a prerequisite for agricultural commercialization, enabling farmers to move perishable goods to urban markets and processing centers with minimal cost and spoilage. This development plan is a direct, on-the-ground implementation of the 8FYP's inclusive growth strategy, designed to address critical gaps in regional corridors, improve last-mile connectivity for rural communities, and unlock the district's latent potential for trade and commerce.

2.1.2 Sustainable Development Goals (SDGs)

The 2030 Agenda for Sustainable Development provides a universal framework for achieving a more sustainable and equitable future. The transport strategy for Meherpur is fundamentally aligned with several key SDGs, ensuring that local development contributes to global targets.

- **SDG 9 – Industry, Innovation, and Infrastructure:** This goal calls for building "quality, reliable, sustainable, and resilient infrastructure." For Meherpur, this translates into upgrading key regional and upazila roads into all-weather corridors that can support year-round economic activity, withstand monsoon flooding, and facilitate the efficient movement of goods from farms to markets and industries.

- **SDG 11 – Sustainable Cities and Communities:** Target 11.2 specifically aims to "provide access to safe, affordable, accessible and sustainable transport systems for all." The 2025 survey data for Meherpur reveals an overwhelming dependence on informal para-transit. Our proposals for regulating these services, introducing structured public bus routes, and creating safe pedestrian zones directly address this goal, aiming to transform Meherpur and Gangni Pourashavas into more inclusive, accessible, and less congested urban centers.
- **SDG 13 – Climate Action:** The transport sector is a significant contributor to greenhouse gas emissions. The high prevalence of motorcycles in Meherpur, while providing mobility, also contributes to local air pollution and carbon emissions. By promoting a modal shift towards higher-capacity public transport and zero-emission non-motorized transport (NMT) like cycling and walking, this plan directly supports Bangladesh's national climate commitments.
- **SDG 17 – Partnerships for the Goals:** A complex undertaking like revamping a district's transport system cannot be achieved by a single entity. Its success hinges on a robust, coordinated partnership between the Urban Development Directorate (UDD), the Roads and Highways Department (RHD), local government institutions, private sector transport operators, and community stakeholders. This collaborative approach is the essence of SDG 17.

2.1.3 New Urban Agenda (NUA)

The New Urban Agenda (NUA) provides a global blueprint for people-centered urban development. It advocates for designing cities and towns that are compact, connected, and resilient, with transport systems that serve all members of society equitably. The urban dynamics of Meherpur, where the Pourashavas act as vital service and employment hubs for a vast rural hinterland, make the NUA’s principles particularly pertinent.

The NUA champions:

- **Inclusive Mobility:** This means planning for the needs of women, students, the elderly, and low-income groups who disproportionately rely on walking and para-transit. Our proposals for safer footpaths and regulated rickshaw/easy-bike services are a direct application of this principle.
- **Integration of Land Use and Transport:** By strengthening transport corridors, we must also guide development to prevent uncontrolled urban sprawl. The goal is to foster dense, mixed-use development around transport hubs, reducing the need for long-distance travel for basic services.
- **Resilience and Climate Adaptation:** Situated in the Ganges Delta, Meherpur is vulnerable to climate impacts like intense rainfall and flooding. Transport infrastructure, therefore, must be designed with resilience in mind, incorporating features like proper road drainage and climate-proof materials.

2.1.4 National Land Transport Policy (NLTP)

The National Land Transport Policy (NLTP) serves as the foundational "rulebook" for the sector in Bangladesh. Its long-term vision is to create a **safe, affordable, technologically advanced, and environmentally sound system**. This policy provides the philosophical and regulatory backbone for the specific interventions proposed for Meherpur.

Key directives of the NLTP that inform this plan include:

- **Road Safety:** Given the high volume of motorcycle traffic and mixed-vehicle conditions, the NLTP's emphasis on stronger vehicle fitness enforcement, improved driver training, and modern traffic management is critical.
- **Cost Reduction in Logistics:** For Meherpur's agro-based economy, minimizing the cost of transporting goods is essential for improving farmer incomes and regional competitiveness. This policy guides our focus on improving road quality and streamlining freight movement.
- **Modernization and Technology:** Modern transport is not just about new pavement. It involves leveraging technology for greater efficiency. The NLTP encourages the use of smart solutions, such as GIS-based traffic monitoring and digital fare collection, which are incorporated into our long-term proposals.
- **Multimodal Integration:** The policy advocates for leveraging different modes of transport to create a more efficient and resilient overall system. While road transport is dominant, the plan considers opportunities for integrating waterway transport for freight where feasible, reducing pressure on the road network.

2.2 Regional and Local Level Plans

While national policies provide a guiding framework, the specific development blueprints for Meherpur's municipalities and upazilas offer a granular view of on-the-ground priorities. These local plans, developed through extensive consultation, directly address existing infrastructure deficits and lay out a strategic vision for a more organized, resilient, and connected district.

2.2.1 Meherpur Municipality Master Plan (2017–2037)

The Meherpur Municipality Master Plan is a comprehensive, 20-year strategic document designed to guide the urban development of the district's primary administrative and commercial center. Recognizing challenges such as unplanned and narrow roads, traffic congestion, and inadequate drainage, the plan proposes a series of transformative interventions aimed at creating a modern, efficient, and environmentally sustainable urban transport system.

Key proposals include:

- **Hierarchical Road Network:** A core strategy is the establishment of a structured road hierarchy to improve traffic flow and management. This includes

creating primary roads (up to 48 meters Right of Way), secondary roads (48 meters), and tertiary roads (18 meters).

- **Significant Network Expansion:** To address existing congestion and future demand, the plan outlines an ambitious expansion of the road network:
    - **Widening:** A total of **46.14 km** of existing roads are proposed for widening.
    - **New Construction:** Approximately **27.67 km** of new roads are planned to improve connectivity and open up new areas for development.
- **Dedicated Transport Terminals:** To alleviate congestion caused by on-street parking and disorganized loading/unloading, the plan proposes the establishment of a dedicated truck terminal. The existing bus terminal is deemed sufficient if properly modernized and managed.
- **Non-Motorized Transport (NMT) and Pedestrian Safety:** Acknowledging the importance of sustainable mobility, the plan proposes the introduction of dedicated cycle lanes (1.2 to 1.5 meters wide) and the construction of 14.25 km of new footpaths to ensure pedestrian safety.

2.2.2 Gangni Paurashava Master Plan (2011–2031)

The Gangni Paurashava Master Plan mirrors the strategic vision of the Meherpur plan, acknowledging similar deficiencies such as unplanned road networks and poor intersection design. It puts forward a multi-faceted strategy to build a resilient and efficient transportation system for Meherpur's second-largest urban center.

Key proposals include:

- **Establishment of a Hierarchical Road Network:** The plan proposes a clear road hierarchy with specified Right of Way (RoW) to manage traffic flow effectively:
    - **Primary Roads:** RoW of 60, 80, and 100 feet.
    - **Secondary Roads:** 40 ft RoW.
    - **Tertiary and Local Roads:** 30 ft and 20 ft RoW respectively.
- **Major Road Widening and New Construction:** A significant expansion is planned to accommodate future growth:
    - **Widening:** A total of 78.75 km of existing roads are proposed for widening, with a focus on local (40.46 km) and primary (17.31 km) roads.
    - **New Construction:** 26.51 km of new roads are planned, primarily local roads (16.60 km), to enhance internal connectivity.
- **Development of Critical Terminals:** To resolve congestion, the plan proposes several dedicated terminal facilities:

    - A new Bus Terminal on 2.66 acres in Ward 01.
    - A Truck Terminal on 4.45 acres in Ward 05.
    - Eight formal Tempo Stands across various wards.
- **Intersection Improvement and Pedestrian Safety:** The plan targets known congestion points like Bus Stand Mor and Thana Mor, proposing the proper design of intersections with traffic islands. It also recommends footpaths for all roads wider than 20 ft and separate lanes for NMT vehicles.

2.2.3 Mujibnagar Upazila Five-Year Plan (2022-2027)

As the historical heart of Bangladesh, Mujibnagar Upazila's development plan places a strong emphasis on improving connectivity to support its unique tourism potential and agricultural economy. The five-year plan identifies key infrastructure priorities to enhance the quality of life for its residents and better integrate the upazila with the rest of the district.

Key transport-related elements of the plan include:

- **Existing Infrastructure Base:** The plan notes that Mujibnagar Upazila currently has 70.23 km of paved (pacca) roads, 156.88 km of unpaved (katcha) roads, and 23.82 km of HBB (Herring Bone Bond) roads. There are no rail or waterway transport options available.
- **Focus on Connectivity:** The plan acknowledges the need to improve road networks to better connect rural areas with the main urban centers and the historic Mujibnagar Complex, which attracts tourists year-round.
- **Integration with Broader Goals:** The plan is framed within the context of achieving national development targets, including Vision 2041 and the Sustainable Development Goals, by focusing on improving local infrastructure to drive economic growth and social inclusion. It operates on a five-year cycle (2022-23 to 2026-27) to align with national planning schedules.

3. Current Scenario from Survey Data

3.1 Socioeconomic Profile of Households

The socioeconomic characteristics of households in Meherpur District provide critical insights into travel behavior and transport demand patterns. The findings from the household interview survey (HIS) are summarized below.

3.1.1 Age Structure of Household Heads

The age distribution of household heads shows a strong concentration in the middle-adult categories. Leadership within households is most commonly assumed between the ages of 30 and 59, when individuals are typically engaged in peak economic and social responsibilities. The 40–49 age group accounts for the largest share, while younger heads under 25 are comparatively rare. A decline is evident after the age of 60, although the 65+ group shows a modest resurgence, indicating that some households continue to be headed by elderly members. This pattern reflects a socio-economic structure where responsibility for households is concentrated among the economically active age groups, with older generations retaining leadership in certain cases.

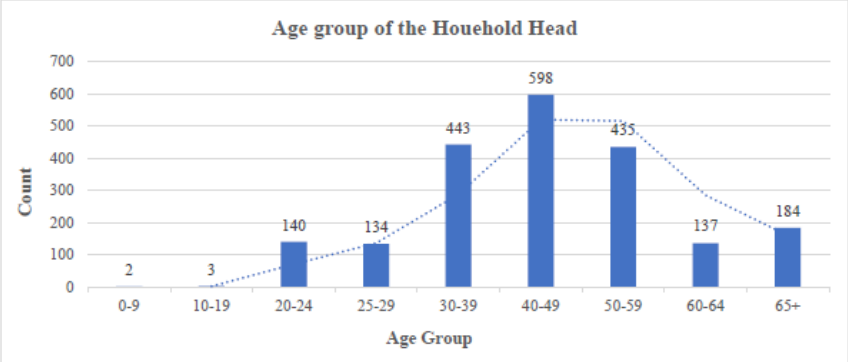

Figure 1 Age group of the Household Head

3.1.2 Income Distribution

Household income levels indicate a strong concentration in the lower-income brackets, highlighting economic vulnerability and limited income diversity across the district.

- A majority of household heads (1,249) fall within the less than 20,000 BDT/month category.
- The second largest group (763 households) reports monthly earnings between 20,000 and 40,000 BDT.
- Only a marginal proportion of households' income is above 40,000 BDT, with as few as 3 households earning more than 100,000 BDT per month.

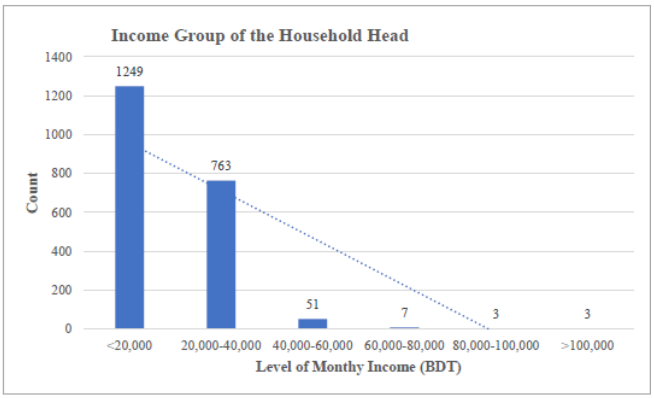

Figure 2 Income group of the Household

This distribution reflects a community that operates largely within modest financial means, with relatively limited representation of higher-income groups. The implications for transport are clear: affordability remains a central issue, with the majority of households likely to prioritize cost-efficient and accessible transport modes.

3.1.3 Educational Attainment

The educational profile of household heads reveals a predominance of low formal education levels.

- The largest segment (814 heads) has below primary education.
- Another 496 heads have completed education only up to class six to ten.
- At the secondary and higher secondary levels, the numbers decline to 277 (SSC) and 246 (HSC) respectively.
- Tertiary education attainment remains limited, with 147 holding BA/BSc degrees and 56 at the MA/MSc level.

The low prevalence of higher education suggests limited access to advanced employment opportunities, which in turn shapes travel demand by reinforcing dependence on local and regional labor markets. The dominance of low to moderate education also suggests potential constraints on household decision-making capacity in relation to migration, mobility choices, and long-term economic planning.

3.1.4 Trip Maker Ratio

The trip maker ratio—defined as the number of trip makers per household—varies with income and provides an important measure of mobility capacity.

- Households earning less than 20,000 BDT/month record a ratio close to 1 trip maker per household.
- As income rises to 20,000–40,000 BDT, the ratio increases modestly to 1.08.
- At 40,000–60,000 BDT, the ratio reaches 1.33, and among households in the 60,000–80,000 BDT range, the ratio peaks at 2 trip makers per household.

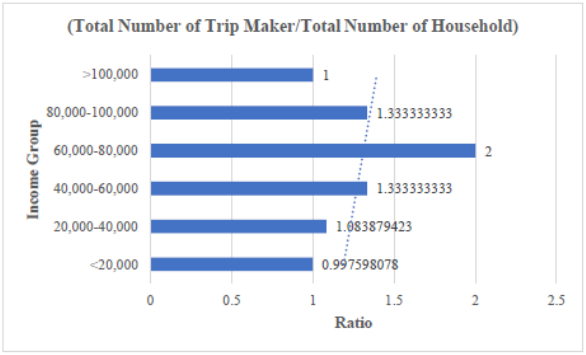

Figure 3 Total Number of Trip Maker/Total Number of Household

This trend demonstrates a clear correlation between income and mobility. Higher-income households have greater travel capacity, with more members actively participating in work, education, or other activities that require regular trips.

3.1.5 Gender Distribution of Household Members

The survey also highlights gender composition across the three upazilas:

- **Gangni:** 1,032 males and 47 females.
- **Meherpur Sadar:** 752 males and 62 females.
- **Mujibnagar:** 241 males and 38 females.

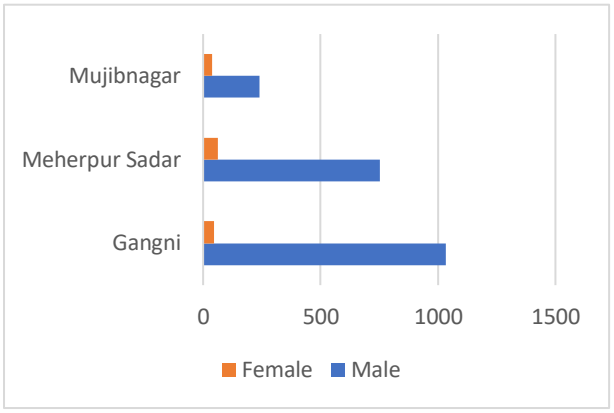

Figure 4 Upazila wise Gender Distribution

This significant imbalance reflects male dominance in household reporting and decision-making structures. It also suggests that female participation in household leadership is limited, which may influence the prioritization of transport needs and preferences in a male-centred framework.

3.2 Existing Transport Network

The transport infrastructure of Meherpur is characterized by a dominance of local roads, reflecting the district's rural settlement pattern and the priority given to last-mile connectivity. The total length of the existing network exceeds 1,400 kilometers, yet the distribution across road categories reveals a pronounced imbalance.

Road Hierarchy and Distribution

- **Local Roads:** With a total length of approximately 1,065 kilometers, local roads overwhelmingly dominate the network. These narrow roads, varying between 6 to 30 feet in width, provide essential intra-village and intra-settlement connectivity. They function as the backbone of mobility for rural communities, ensuring access to agricultural land, markets, schools, and healthcare facilities.
- **Union Roads:** Accounting for 218 kilometers, union roads act as intermediate connectors between local roads and higher-order roads. They are critical for linking clusters of villages with upazila centers, though their coverage remains limited relative to local demand.
- **Upazila Roads:** Spanning 70 kilometers, upazila roads provide important sub-district-level connections but remain underdeveloped in both length and quality. Their limited extent reflects a weak middle layer in the district's road hierarchy.
- **Regional Highways:** With only 103 kilometers, regional highways are sparse, limiting Meherpur's direct integration with national corridors and trade routes. The shortage of higher-capacity regional roads constrains economic growth, particularly given Meherpur's strategic position along the border with West Bengal.

- **Village Roads:** The least represented category, village roads contribute just 27 kilometers, underscoring their minor role in the broader network.

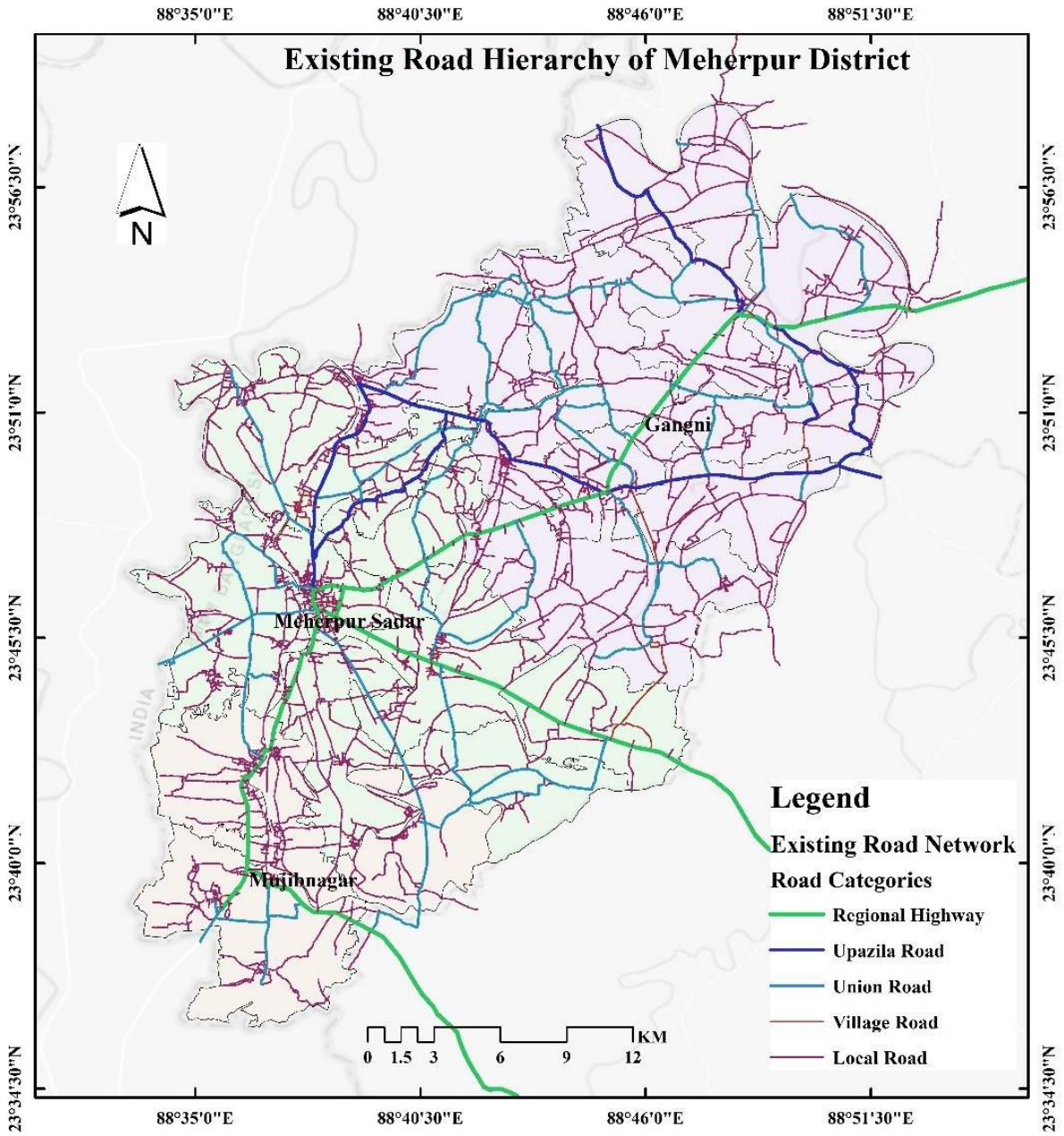

Figure 5 Existing Road Network across all major Road Categories

3.3 Trip Generation and Spatial Attraction Dynamics

The Household Interview Survey (HIS) and subsequent trip generation modeling provide a comprehensive picture of mobility patterns in Meherpur District. Both the spatial analysis of trip attractions and the zone-wise trip generation for 2025 highlight how demographic concentration, economic activity, and service availability shape daily travel demand across the district. Each Union and Paurashava is considered as a Traffic Analysis Zone (TAZ). Thus, 22 TAZ is been Prepared. Total of 4 TAZ lies between Mujibnagar Upazila territory, where total of 8 falls in Meherpur Sadar Upazila and the rest (10) belongs to Gangni Upazila.

Table 1 Description of Traffic Analysis Zone (TAZ)

TAZ No	Union Name	Upazila Name	District
1	Kazipur	Gangni	Meherpur
2	Tentulbaria	Gangni	Meherpur
3	Bamandi	Gangni	Meherpur
4	Matmura	Gangni	Meherpur
5	Sholataka	Gangni	Meherpur
6	Raypur	Gangni	Meherpur
7	Gangni Pourasava	Gangni	Meherpur
8	Shaharbati	Gangni	Meherpur
9	Kathuli	Gangni	Meherpur
12	Dhankhola	Gangni	Meherpur
10	Kutubpur	Meherpur Sadar	Meherpur
11	Shyampur	Meherpur Sadar	Meherpur
12	Dhankhola	Gangni	Meherpur
13	Baradi	Meherpur Sadar	Meherpur
14	Amjhupi	Meherpur Sadar	Meherpur
15	Meherpur Pourashava	Meherpur Sadar	Meherpur
16	Buripota	Meherpur Sadar	Meherpur
17	Amdah	Meherpur Sadar	Meherpur
18	Pirojpur	Meherpur Sadar	Meherpur
19	Mahajanpur	Mujibnagar	Meherpur
20	Monakhali	Mujibnagar	Meherpur
21	Dariapur	Mujibnagar	Meherpur
22	Bagoan	Mujibnagar	Meherpur

3.3.1 Spatial Concentration of Trip Attractions

The kernel density analysis of trip destinations reveals that travel demand is spatially concentrated around specific nodes, with clear hierarchical patterns:

- **Meherpur Pourashava:** This area exhibits the highest intensity of trip attraction, marked in red on the density map. Its centrality stems from its role as the administrative, educational, commercial, and service hub of the district. The municipality attracts commuters from surrounding unions for jobs, schools,

healthcare, and markets, reinforcing its position as the core destination within Meherpur's mobility structure.

- **Gangni Pourashava and Bamandi:** These centers emerge as secondary hotspots, each showing significant clustering of trips. Gangni Pourashava plays a sub-regional role, serving as a local employment and service hub, while Bamandi, despite its smaller population, attracts disproportionately high travel activity, reflecting its active local economy and high per-capita mobility.

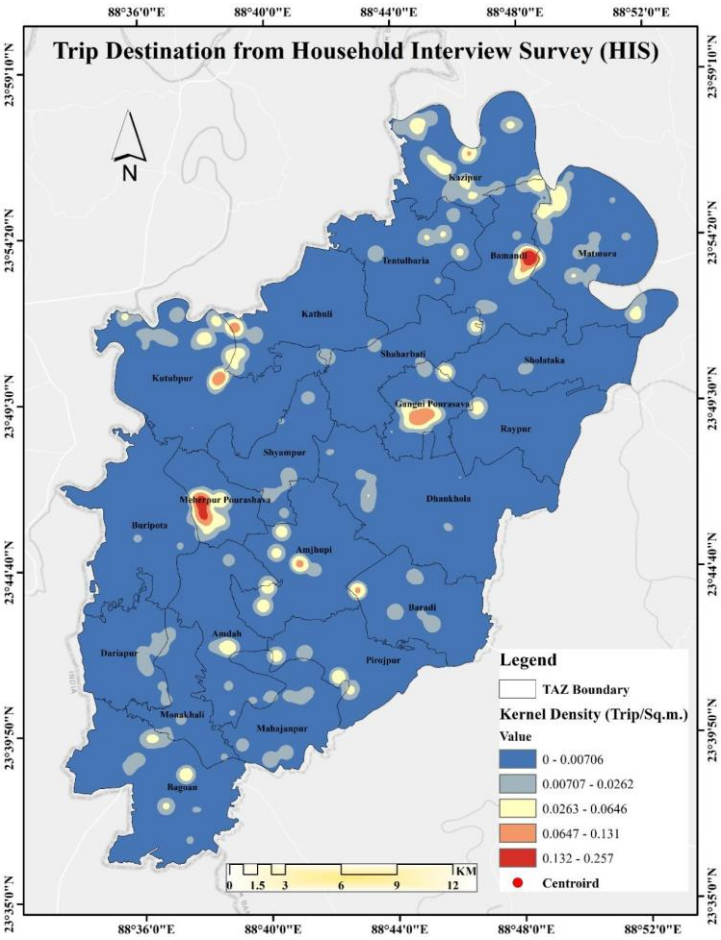

Figure 6 Kernel Density of Trip Destination

- **Other concentrations (Amjhupi, Matmura, Kutubpur, Kathuli): These areas show smaller but distinct pockets of trip attraction. Their role is more localized, catering to nearby settlements rather than acting as district-wide magnets.**

- **Peripheral rural areas:** Large portions of the southern and peripheral unions display very low trip densities, indicating limited attraction potential. Travel in these areas is largely contained within local boundaries, with fewer linkages to external zones.

This pattern demonstrates a center-periphery structure: strong municipal cores dominate travel flows, supported by intermediate activity centers, while peripheral rural areas remain weakly connected.

3.3.2 Trip Generation from Traffic Analysis Zones (2025)

The quantitative trip generation model, projected for 2025, provides further clarity on both absolute demand volumes and per-capita trip activity across the 22 Traffic Analysis Zones (TAZs).

1. **Highest trip generators (absolute demand):**
    - **Kazipur (43,148 trips/day)** – The largest generator due to both its large projected population (43,630) and very high trip rate (0.99).

- **Meherpur Pourashava (37,951 trips/day)** – Despite a smaller population than Kazipur, it produces comparable volumes because of its **functional centrality** as a service and activity hub.
- **Matmura (37,409 trips/day)** – High total trips, largely population-driven, making it a significant contributor to district travel.
- **Kutubpur (36,847 trips/day)** – Another large union where population size drives demand.

These four zones alone generate well over **150,000 trips per day**, accounting for a substantial share of total district mobility.

2. **Strong secondary tier (26,000–33,000 trips/day):**
    - Buripota (33,371), Amjhupi (29,045), Bagoan (28,499), Gangni Pourashava (27,291), Bamandi (26,516).
    - While not as dominant as the top tier, these zones are critical for regional mobility. Bamandi is notable: its relatively small population (30,476) produces a high trip volume due to a strong per-capita trip rate (0.87), indicating active travel behavior and strong local economic engagement.
3. **Medium generators (20,000–27,000 trips/day):**
    - Zones such as Shaharbati (26,014), Dhankhola (27,546), Amdah (24,663), Sholataka (20,153) fall into this category. Some zones (like Shaharbati) stand out for their high per-capita trip intensity (0.98), while others (e.g., Dhankhola) show middling totals because of lower trip rates despite larger populations.
4. **Lowest generators (below 20,000 trips/day):**
    - Shyampur (16,399), Baradi (17,367), Pirojpur (16,640), Mahajanpur (15,843), Dariapur (15,826), Monakhali (19,329).
    - **These areas produce the least daily trips, reflecting lower population size and/or weaker mobility intensity. They remain essential for basic accessibility but are unlikely to drive regional demand.**

3.3.3 Trip Rates and Intensity

Beyond absolute volumes, per-capita trip rates reveal important differences in mobility behavior:

- **High activity zones:**
    - Kazipur (0.99), Shaharbati (0.98), Gangni Pourashava (0.88), Bamandi (0.87), Monakhali (0.86).

- These areas demonstrate strong travel intensity relative to population size. Their high mobility suggests higher engagement in work, trade, or service-oriented trips, marking them as mobility-active zones.

- **Low activity zones:**
  - Dhankhola (0.60), Pirojpur (0.63), Baradi (0.65).
  - **These areas show weaker per-capita mobility, possibly due to more localized economies, fewer service destinations, or lower disposable incomes limiting daily travel.**

This duality—volume vs. intensity—is central for transport planning:

- **Population-heavy zones** (Kazipur, Matmura, Kutubpur, Meherpur Pourashava, Buripota) drive absolute travel demand and will require infrastructure that can handle large traffic volumes.
- **High trip-rate zones** (Shaharbati, Bamandi, Gangni Pourashava, Monakhali) exhibit mobility intensity, necessitating policies that enhance service frequency, affordability, and modal options to match their active demand profiles.

3.3.4 Trip Purpose Distribution

An analysis of trip purposes offers deeper insight into the functional character of travel demand:

Home-Based Work (HBW): 62.21% of trips

Work-related trips dominate travel behavior, reflecting the economic profile of the district. With a large proportion of households engaged in agriculture, trade, and informal employment, daily commuting for work is the primary driver of mobility. This dominance of HBW trips underscores the importance of ensuring reliable, affordable, and time-efficient connectivity between rural settlements and employment hubs such as Meherpur Pourashava, Gangni Pourashava, and Kazipur.

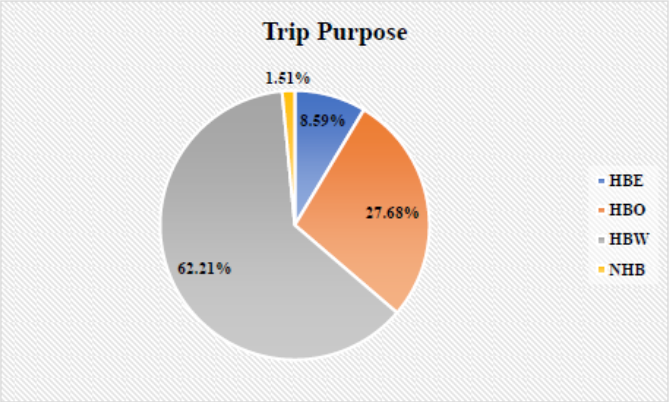

Figure 7 Trip Purpose Distribution

Home-Based Other (HBO): 27.68% of trips

The second-largest category includes trips for shopping, social visits, health services, and other non-work activities. These trips highlight the role of municipal centers as

service destinations and suggest that improvements in local market accessibility, healthcare connectivity, and short-distance mobility can significantly enhance daily life for residents.

Home-Based Education (HBE): 8.59% of trips

Education trips form a moderate share of daily travel. The demand is concentrated in zones hosting schools, colleges, and madrashas, particularly around Meherpur Pourashava and Amjhupi. Despite being a smaller share, these trips are critical from a social equity perspective, as access to educational facilities shapes long-term human development.

Non-Home-Based (NHB): 1.51% of trips

This category is minimal, reflecting the relatively limited occurrence of chained or business-related trips that do not originate from home. The small share suggests that most daily mobility in Meherpur is structured around the home as the central node, with fewer complex trip chains typical of larger urban areas.

3.4 Origin–Destination Patterns

The Household Interview Survey (HIS) and subsequent O–D matrix analysis reveal a distinct spatial pattern of travel flows in Meherpur District, where the majority of trips remain localized within unions, but a strong inter-zonal pull is exerted by the two municipal centers—Meherpur Pourashava (TAZ 15) and Gangni Pourashava (TAZ 7). Together, these patterns reflect both the self-sufficiency of rural settlements and the centralizing influence of urban cores.

TAZ Origin/TAZ Destination	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22
1	32373	279	4465	1116	0	0	2511	0	0	558	0	279	0	279	1116	0	0	0	0	0	0	0
2	558	15070	2232	3628	0	0	1116	0	0	0	0	0	279	0	0	0	0	0	0	0	0	0
3	1395	0	16744	1116	0	0	558	0	0	279	0	0	0	0	0	0	0	0	0	0	0	0
4	0	0	11163	27629	0	0	3069	0	0	0	0	0	0	0	558	0	0	0	0	0	0	0
5	279	1953	279	0	8930	279	7814	1395	0	0	0	0	0	1395	279	0	0	0	0	0	0	0
6	279	0	2232	0	0	5581	4186	837	0	0	0	0	0	0	1953	0	837	0	0	0	0	0
7	0	0	279	0	0	0	20931	558	279	0	0	279	0	0	2511	0	0	0	0	0	0	0
8	279	0	1395	558	1953	0	7256	4186	3348	1395	0	1395	0	0	279	0	0	0	0	0	0	0
9	558	0	0	0	0	0	3069	0	10326	3348	279	1116	0	0	7814	0	0	0	0	0	0	0
10	0	279	0	0	0	0	558	0	2790	27908	279	0	0	0	5302	0	0	0	0	0	0	0
11	0	0	0	0	0	0	0	558	0	558	12279	0	0	558	2232	0	0	0	0	0	279	0
12	0	0	279	0	0	0	1674	0	0	0	0	32373	0	0	1116	0	0	0	0	279	0	0
13	0	0	0	0	0	0	0	0	0	0	0	279	10884	558	279	0	0	0	0	0	0	0
14	0	0	0	0	0	0	0	0	0	0	1395	0	0	20931	3907	0	0	1116	0	0	0	0
15	0	0	0	279	0	0	279	0	558	558	279	279	279	0	31257	1116	0	279	0	0	279	0
16	0	0	0	1116	0	0	0	0	0	0	0	279	0	0	12558	18698	837	0	279	558	1953	279
17	0	0	0	0	0	0	0	0	0	279	0	279	0	2790	4465	1395	17023	279	279	0	0	558
18	0	0	0	0	0	0	0	0	0	0	0	0	0	558	1116	0	0	16744	837	558	0	0
19	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1116	0	558	279	12000	837	279	558
20	0	0	0	0	0	0	0	0	0	0	0	0	0	279	1395	0	0	0	0	13116	2511	0
21	0	0	0	0	0	0	0	0	0	0	0	0	0	0	837	0	0	0	0	1116	12837	279
22	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1116	0	0	0	0	2232	0	21489
	Kazipur	Tentulbaria	Bamandi	Matmura	Sholataka	Raypur	Gangni Pourasava	Shahorbati	Kathuli	Kutubpur	Shyampur	Dhankhola	Baradi	Amjhupi	Meherpur Pourashava	Buripota	Amdah	Pirojpur	Mahajanpur	Monakhali	Dariapur	Bagoan

Figure 8 TAZ to TAZ Trip Origin and Trip Distribution

3.4.1 Dominance of Intra-Zonal Trips

The O–D matrix shows that the largest values lie along the diagonal cells, representing intra-zonal trips. For example:

- Kazipur (TAZ 1) records 32,373 intra-zonal trips,
- Dhankhola (TAZ 12) similarly produces 32,373 local trips,
- Meherpur Pourashava (TAZ 15) generates 31,257 intra-zonal trips.

This pattern confirms that most daily mobility is localized within the same union or municipality. Residents rely on proximate services, markets, schools, and employment opportunities, reducing the need for frequent long-distance travel. Such a pattern is typical of semi-urban and union-level contexts, where basic socio-economic needs can often be met without leaving the local area.

From a transport planning perspective, the predominance of intra-zonal trips emphasizes the importance of maintaining and upgrading local road infrastructure—particularly local and union roads that facilitate short-distance movements, agricultural access, and market connectivity.

3.4.2 Strong Pull of Meherpur Pourashava (TAZ 15)

While local trips dominate, the most significant inter-zonal attraction is concentrated in Meherpur Pourashava:

- It attracts over 80,000 trips daily, compared to producing around 35,000.
- This imbalance underscores its role as the district's primary magnet for employment, commerce, administration, healthcare, and education.

The municipality's centrality creates a continuous inflow of trips from nearly all surrounding unions, making it the core node of the regional transport network. Its attractiveness extends beyond its own population, drawing trips from more than 20 other zones, including Kutubpur, Buripota, Amjhupi, and Kazipur.

This dominance reflects a monocentric travel structure, where Meherpur Pourashava serves as the primary service hub. For planning, this necessitates policies aimed at managing inflows into the municipality—such as developing public transport links, reducing congestion through bypasses, and strengthening feeder connections from peripheral unions.

3.4.3 Supporting Role of Gangni Pourashava (TAZ 7)

Gangni Pourashava functions as a secondary attraction hub, drawing nearly 50,000 trips daily while producing only about half of that. The municipality attracts substantial inflows for both work and education trips, supported by its role as a local trading and service center.

Its spatial pull is broader than its population base, evidenced by connections with 12 other zones, including nearby unions such as Matmura, Shaharbati, and Bamandi. Gangni thus operates as a sub-center, alleviating pressure on Meherpur Pourashava by providing alternative destinations for services and employment.

From a strategic standpoint, Gangni's strengthening as a secondary hub is critical to achieving a polycentric urban network, where reliance on a single dominant core is reduced, and mobility patterns are more evenly distributed.

3.4.4 Intermediate and Peripheral Unions

Several unions play intermediary roles in the O–D system:

- Bamandi and Dhankhola are connected with at least nine other zones, acting as moderately strong local centers with balanced trip production and attraction.
- Amjhupi and Monakhali attract more trips than they produce, highlighting their service functions despite smaller populations.
- Conversely, unions such as Kazipur, Matmura, Sholataka, Shaharbati, Kathuli, Buripota, and Amdah consistently produce more trips than they attract, indicating their character as residential zones feeding commuters into larger centers.

At the periphery, zones like Shyampur, Baradi, Pirojpur, Mahajanpur, and Dariapur record fewer than 20,000 trips in both production and attraction. These unions are low-demand generators, reflecting limited economic and service bases, but remain important for ensuring equitable access to the transport network.

3.4.5 Functional Purpose of Flows

- **Home-Based Work (HBW**): The strongest concentration of work trips flows into Meherpur Pourashava (77,899 trips) and Gangni Pourashava (37,371 trips), both attracting more than double their production. This confirms their role as the core employment destinations.
- **Home-Based Education (HBE):** Buripota produces the largest number of education trips (17,867), while Gangni Pourashava attracts over 10,000 education trips, drawing students from surrounding unions.
- **Home-Based Other (HBO):** Dhankhola, Matmura, and Kazipur dominate this category, with high trip production but lower attraction—suggesting weak employment bases and dependence on miscellaneous social and shopping trips.
- **Non-Home-Based (NHB):** A marginal share, with Matmura and Kazipur recording the highest but still limited flows, indicating relatively simple trip chains compared to larger urban contexts.

3.5 Modal Choice Analysis

3.5.1 Cordon-Wise Modal Choice Patterns

The cordon surveys reveal a highly motorcycle-dominated transport landscape, with motorcycles consistently accounting for between 40% and 60% of trips across most cordons. Alongside motorcycles, para-transit modes—particularly battery easy bikes, pedal/battery vans, and rickshaws—form the backbone of daily mobility.

- **Inner Cordon 01 (Meherpur–Dhaka):**

  Long-distance corridor dominated by motorcycles (52.8%), followed by easy bikes (13.4%) and vans (10.5%). This shows motorcycles as the preferred flexible option for inter-district trips, while para-transit continues to carry a notable share.

- **Inner Cordon 02 (Gangni–Kathuli Bazar):**

  A shorter regional corridor where motorcycles (53.6%) dominate, with vans (28.1%) making up a very high share. This reflects strong dependence on vans for medium-distance rural accessibility.

- **Inner Cordon 03 (Meherpur–Kushtia):**

  Modal mix is broader: motorcycles (43.4%) lead, but vans (13.7%), easy bikes (12.5%), and motorized 3-wheelers (7.9%) also carry significant shares. This suggests diversification of mobility options along a regional trade/commute corridor.

- **Inner Cordon 04 (Hat Boalia–Gangni):**

  The most motorcycle-dependent corridor with 60.7% share. Vans contribute 21.6%, showing the route's reliance on informal intermediate transport.

- **Inner Cordon 05 (Gangni–Dhankhola Road):**

  Motorcycle share (52.4%) again dominant, followed by vans (27.2%), with easy bikes and CNGs making up ~7% each.

- **Inner Cordon 06 (Thana Road–Govipur):**

  More diversified modal structure: motorcycles (43.2%), but also bicycles (23.6%), rickshaws (10.2%), and easy bikes (14.7%). The higher bicycle share reflects affordability and suitability for shorter intra-rural trips.

- **Inner Cordon 07 (Meherpur–Kathuli):**

  Motorcycles (40.2%) remain highest, but easy bikes (16.0%), vans (14.6%), and bicycles (10.3%) have strong roles, suggesting multi-modal dependency.

- **Inner Cordon 08 (T-Intersection at Boro Bazar–Char Rastar Mor, Meherpur Municipality):**

Being a key intersection inside Meherpur Pourashava, the mode share reflects short-distance, mixed flows. Rickshaw/van, easy bikes, motorcycles, and bicycles dominate. The flow is highly localized, with trips peaking at specific hours (market and office times). This confirms Meherpur Municipality's role as the dense core of para-transit activity, supported by informal, flexible vehicles.

- **Inner Cordon 09 (Chuadanga–Meherpur):**

  Largest sample of trips (17,614). Motorcycles (46.1%) dominate, with easy bikes (12.2%), vans (8.6%), bicycles (8.1%), rickshaws (6.1%), and CNGs (7.8%) providing significant modal diversity.

- **Inner Cordon 10 (T-Intersection at Hotel Bazar Mor, Meherpur Municipality):**
  Similar to C-08, this node shows high dependency on para-transit (rickshaw/van, easy bikes, and motorcycles), but with even greater temporal variation. The modal split fluctuates across the day, with motorcycles dominating in inter-district trips and rickshaws/easy bikes carrying intra-urban passengers. This node reflects the hybrid nature of mobility at urban cores—mixing short errands, commercial activity, and through-flows.
- **Inner Cordon 11 (Kedargonj Node – Six-Route Intersection):** As the largest node, Kedargonj concentrates the highest trip volumes, integrating flows from six different routes. Motorcycles again dominate, but rickshaw/van and easy bikes absorb a significant share due to short-distance interchange trips. Unlike linear corridors, Kedargonj serves as a multi-directional hub, meaning para-transit modes are especially critical in maintaining circulation.

Across all cordons, the trend is clear: motorcycles and informal para-transit modes (vans, easy bikes, rickshaws) account for the overwhelming majority of trips, while formal buses and cars are negligible.

3.5.2 Occupational Modal Choice Patterns

The occupational breakdown further reinforces the dominance of low-cost, flexible modes:

- Farmers & laborers rely primarily on easy bikes and vans, as these offer affordability and accessibility for short-distance trips to fields, markets, and local centers.
- Businessmen and employees (public/private) also rely heavily on easy bikes, vans, and motorcycles, reflecting their short- to medium-distance commuting needs.
- Students strongly depend on rickshaw/van and easy bikes, which provide low fares and wide availability.
- Housewives are the single group most dependent on rickshaw/van trips, tied to shopping and local errands.

- Retired/unemployed individuals record fewer trips but still rely on the same para-transit modes for affordability and convenience.

This demonstrates a shared dependence across socio-economic groups on informal transport, with motorcycles serving more affluent or mobile households, and rick shaws/easy bikes serving broader low-income and captive riders.

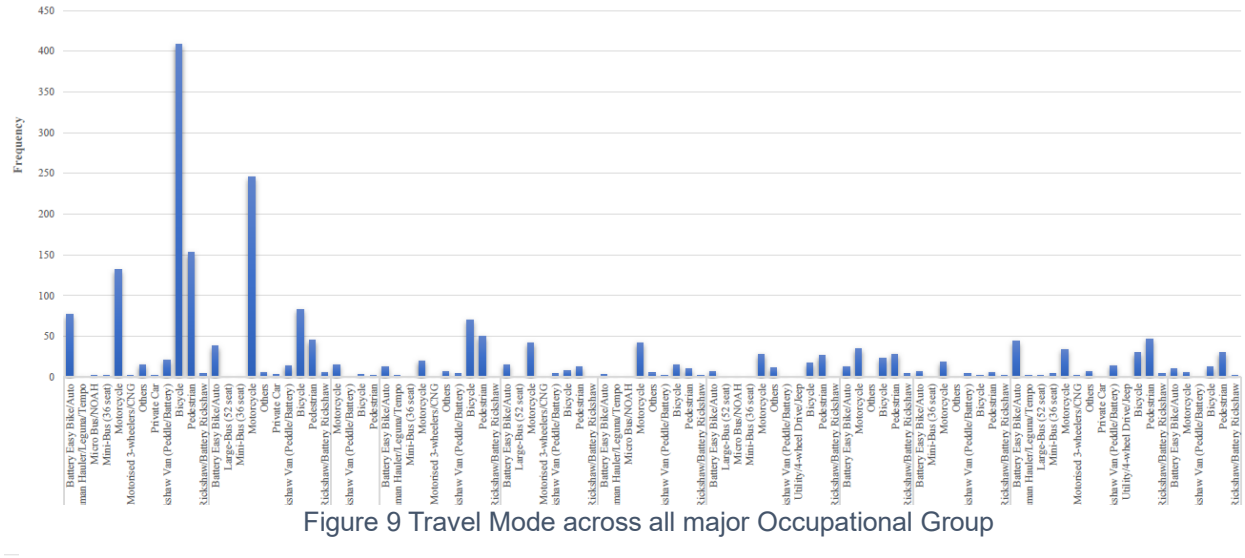

Figure 9 Travel Mode across all major Occupational Group

Table 2 Cordon Wise Modal Choice

Inner Cordon	Route / Node	Total Trips (24h)	Motorcycle Share	Van (Pedal/Battery)	Easy Bike/Auto	Other Notable Modes	Interpretation
C-01	Meherpur–Dhaka	9,733	52.8% (5,142)	10.5%	13.4%	CNG marginal	Long-distance corridor – motorcycles dominate
C-02	Gangni–Kathuli Bazar	6,302	53.6% (3,376)	28.1% (1,768)	Low	–	Short corridor, van share very high
C-03	Meherpur–Kushtia	8,310	43.4% (3,606)	13.7%	12.5%	CNG (7.9%)	Diverse corridor, balanced para-transit
C-04	Hat Boalia–Gangni	5,899	60.7% (3,579)	21.6%	Low	–	Highest motorcycle dependence
C-05	Gangni–Dhankhola	3,540	52.4% (1,855)	27.2%	7.1%	CNG (7.2%)	Strong van + motorcycle mix
C-06	Thana Rd–Govipur	8,122	43.2% (3,510)	5.9%	14.7%	Bicycle (23.6%), Rickshaw (10.2%)	Bicycle-heavy short rural trips
C-07	Meherpur–Kathuli	11,954	40.2% (4,800)	14.6%	16.0%	Bicycle (10.3%), Rickshaw (8.5%)	Multi-modal corridor
C-08	T-Intersection, Boro Bazar (Meherpur)	Node	Moderate	Moderate	High	Rickshaw/Van, Bicycle	Dense urban para-transit hub
C-09	Chuadanga–Meherpur	17,614	46.1% (8,127)	8.6%	12.2%	Bicycle (8.1%), Rickshaw (6.1%), CNG (7.8%)	Largest corridor, diverse modes
C-10	T-Intersection, Hotel Bazar Mor (Meherpur)	Node	Moderate	Moderate	High	Rickshaw/Van, Motorcycles	Hybrid urban-commercial node
C-11	Kedargonj Node (Six-route intersection)	Node	Very High	High	High	Rickshaw/Van, Easy Bike	Largest interchange hub

3.6 Locational hotspot dynamics

3.6.1 Observed phenomena

I. Street food vendors and informal stalls

In the core of Meherpur town, particularly around the municipal complex and Shahed Dr. Shamsujjoha Park, a distinct evening-to-night hotspot emerges every day between 4:00 p.m. and 11:00 p.m. Street vendors and informal food stalls line the footpaths and spill into curbside areas, reducing space for pedestrians and channelling foot traffic into the main carriageway. This overlap of pedestrian movement, informal stalls, and vehicular traffic creates a complex and congested street environment. Kerbside activity, including the loading and unloading of goods, intensifies during these hours, further reducing the effective road capacity. What would otherwise be a normal evening traffic flow is transformed into a high-friction corridor with slower speeds, higher travel times, and greater safety risks for vulnerable road users.

Figure 10 Occupied Streets by vendors

II. Periodic Hut

The congestion problem is compounded on weekly hut days and seasonal market occasions, such as the Bamandi cow hut held on Fridays and Mondays. These events bring a surge of freight and livestock-related movements into the municipal core, with nearly 2,000 cattle arriving and more than 15 large trucks directly entering the area. In addition, up to 50–60 more trucks are often observed queuing on adjacent corridors, effectively immobilizing sections of the road network. The mix of heavy trucks, motorcycles, rickshaws, and non-motorized vans within narrow road spaces creates severe operational conflicts, with long queues spilling into surrounding roads. The temporary but intense pressure from livestock markets strains the already saturated evening corridor, disrupting both local mobility and regional through-traffic.

Figure 11 Hut Day at Bamandi, Gangni

III. Seasonal Commercial Activities

Meherpur's transport network is intrinsically linked to its agro-based economy, making it susceptible to severe congestion during peak harvest seasons. The attached map highlights several locational hotspots that transform into informal logistics hubs for seasonal products like mangoes, pineapples, cucumbers, onions, and various vegetables. Key identified points include areas near WAPDA More, College More, Hotel Bazar More, Uzalpur Roads, and the main Bus Stand. During harvesting periods, trucks and other goods vehicles park directly on or alongside the main carriageway at these locations for loading and unloading operations. This activity drastically reduces the effective road width, creating significant bottlenecks. These seasonal disruptions underscore the lack of dedicated off-road loading/unloading facilities and the need for a transport plan that accommodates the district's primary economic drivers.

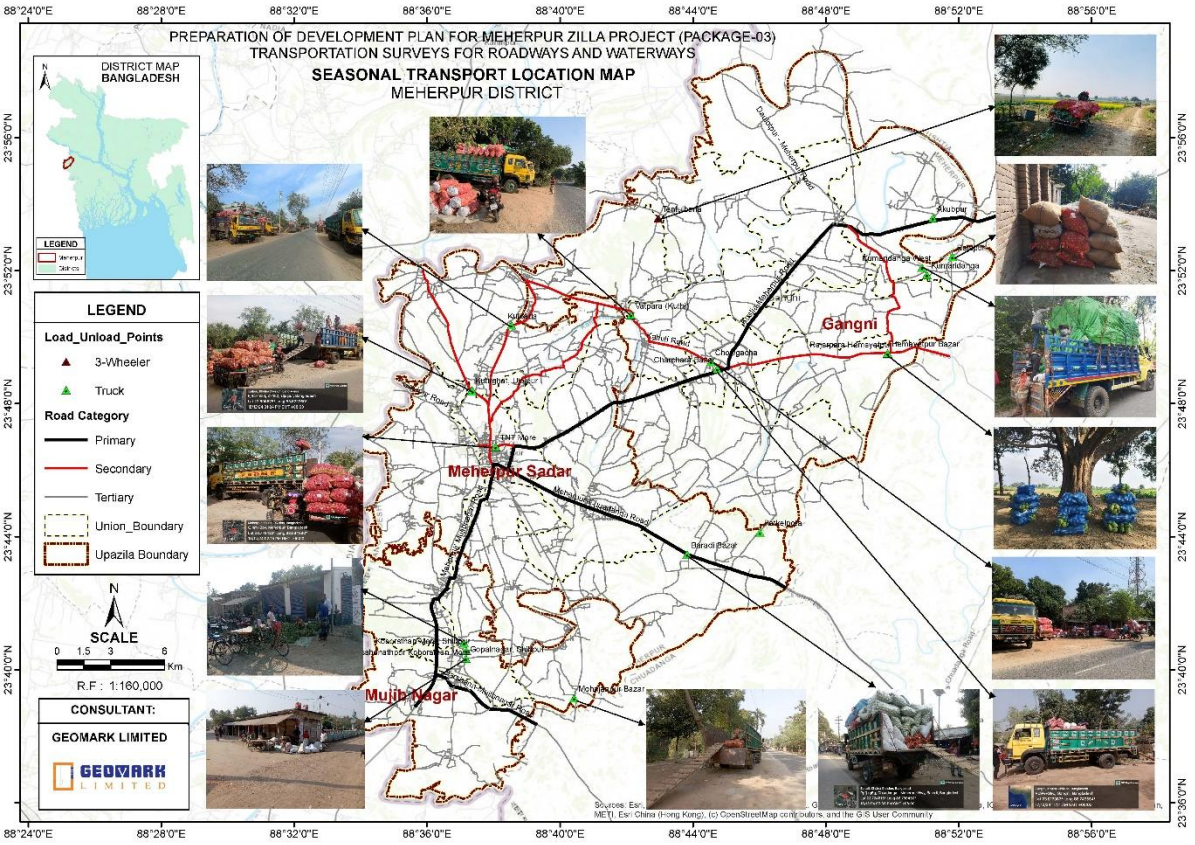

Figure 12 Seasonal Transport Location

IV. Safety Risks in Gangni Municipality

In Gangni Municipality, the encroachment of the central island and road dividers—particularly along the Meherpur–Bamundi Road—by informal street vendors and temporary stalls. These unregulated commercial activities have progressively occupied the median space, drastically narrowed the effective carriageway width and impeding the smooth flow of vehicles. The result is frequent congestion during both morning and evening peaks, as vehicular movement is forced into a single functional lane in each direction, often disrupted further by roadside parking and pedestrian

crossings. The physical obstruction of sightlines and pedestrian spillover into active traffic lanes increases the risk of accidents, especially involving two-wheelers and non-motorized transport users. The informal vending also reduces the operational efficiency of the road—what should function as a primary urban corridor now performs at a sub-collector level of service. Moreover, the mix of slow-moving pedestrian activity with high-speed through traffic creates conflicting movement patterns, amplifying travel delays and elevating the likelihood of minor collisions and pedestrian injuries.

Figure 13 Road Island Occupied by street vendors

3.6.2 Spatial Distribution

The analysis of trip production versus trip attraction across all unions and municipalities reveals a clear spatial hierarchy of mobility within Meherpur District. Meherpur Pourashava stands out as the dominant trip attractor, drawing a disproportionately high number of inbound trips relative to those produced, reflecting its role as the administrative, commercial, and service core of the region. The presence of government offices, educational institutions, healthcare facilities, and major marketplaces consolidates its position as the central node in the district's transport system. Similarly, Gangni Pourashava functions as a strong secondary hub, attracting significant daily movements from surrounding rural unions due to its growing urban functions, including trade, small-scale industries, and transport terminals. Bamundi Union, though smaller in scale, also shows higher trip attraction than production, largely linked to its active market center and livestock trading hub, which draw periodic inflows of both people and freight, particularly on hut days.

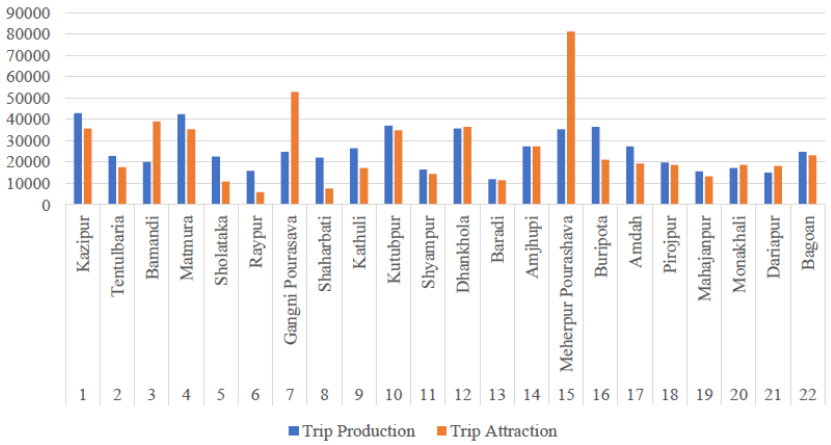

Figure 14 Trip Production vs Trip Attraction across all Union/Municipality

Conversely, rural unions such as Kazipur, Matmura, and Kutubpur exhibit higher trip production compared to attraction, indicating their role as origin zones of commuters

and goods movements rather than service destinations. These areas act as trip feeders, generating large volumes of outward movement toward the municipal cores.

3.6.3 Congestion Intensity and Vehicle Capacity Ratios (VCR)

The Vehicle Capacity Ratio (VCR) statistics offer an important quantitative lens for understanding congestion intensity and how road performance aligns with observed trip production and attraction patterns. The results show that major corridors in Meherpur—particularly Meherpur Hospital Road, Meherpur Main Road, and Kahuli Road—are operating well beyond their practical capacities, with VCR values exceeding 1.0, indicating over-saturation and recurrent congestion. The highest VCR value (1.72) is recorded on Meherpur Hospital Road, followed by Meherpur Main Road (1.61) and Kahuli Road (1.24). These roads correspond directly with zones identified as major trip attractors—notably Meherpur Municipality, Gangni Municipality, and Bamundi Union—confirming that the areas generating the most inbound movement also experience the most severe traffic pressure.

From a functional perspective, Meherpur Hospital Road and Meherpur Main Road serve as internal distribution spines within the municipal core, linking administrative and commercial centers to peripheral residential areas. The AB flow exceeding 2,700 PCU/hour on Hospital Road and over 4,800 PCU/hour on Meherpur-Chuadanga Road (a key regional connector) reflects the intensity of both intra-urban and through-traffic converging in Meherpur Pourashava—the district's prime employment and service hub. Similarly, the Kustia-Meherpur Highway, though classified as a primary regional corridor, approaches capacity (VCR 1.08), suggesting that even inter-district movement is increasingly constrained by local urban congestion. In contrast, roads such as College Road (VCR 0.93) perform relatively better, indicating that congestion is concentrated along economically active corridors with high trip attraction and heavy modal diversity (motorcycles, vans, and para-transit modes).

SL	1	2	3	4	5	6
Name	Meherpur Hospital Road	College Road	Meherpur-Chuadanga Road	Meherpur Main Road	Kustia-Meherpur Highway	Kahuli Road
Class	Secondary	Primary	Primary	Secondary	Primary	Secondary
Road Type	Regional Highway	Regional Highway	Regional Highway	Regional Highway	Regional Highway	Upazila Road
Speed	40	60	60	40	60	30
PCU	800	1350	1350	800	1350	1050
Capacity	1600	5785.7143	4242.8571	1600	5785.7143	2100
AB Flow	2746.5281	4795.9695	4600.4422	2239.2275	5556.9695	2607.3985
BA Flow	1286.1998	5358.2652	4916.6438	2580.0401	6265.5059	1839.1407
Total Flow	4032.728	10154.235	9517.086	4819.2676	11822.475	4446.5393
AB VCR	1.71658	0.828933	1.084279	1.399517	0.960464	1.241618
BA VCR	0.803875	0.92612	1.158805	1.612525	1.082927	0.875781
Max VCR	1.71658	0.92612	1.158805	1.612525	1.082927	1.241618
AB Speed	16.75864	56.04684	49.759021	25.131707	53.133934	22.055007
BA Speed	37.606088	54.217489	47.614332	19.313896	49.73279	27.590561

Figure 15 Major Congestion Area's Vehicle Capacity Ratio (VCR) Statistics

The Vehicle Capacity Ratio (VCR) statistics further quantify the strain placed on these high-demand corridors. Key urban routes—Meherpur Hospital Road (VCR 1.72), Meherpur Main Road (VCR 1.61), and Kahuli Road (VCR 1.24)—operate beyond their designed capacities, reflecting recurrent congestion and declining travel speeds.

These overburdened roads directly correspond to the zones of highest trip attraction, demonstrating a clear relationship between mobility demand and network stress. For example:

- Meherpur Hospital Road serves as a critical connector linking residential peripheries to hospitals, administrative offices, and the municipal market zone, handling over 2,700 PCU/hour.
- Meherpur–Chuadanga Road supports regional freight and passenger flow (4,800 PCU/hour), merging local commuter trips with inter-district movement.
- The Kustia–Meherpur Highway, despite its regional classification, faces near-saturation (VCR 1.08), illustrating how local congestion now affects regional circulation.

Conversely, College Road (VCR 0.93) and secondary upazila roads exhibit better performance, emphasizing that congestion is spatially clustered around economically dense and service-oriented corridors.

3.7 Possible Challenges

The comprehensive analysis of Meherpur's transport network, socioeconomic profile, and mobility patterns reveals a series of interconnected challenges that threaten the efficiency, safety, and sustainability of the district's transportation system. These challenges arise from both structural infrastructure gaps and behavioral or operational inefficiencies. The key challenges are outlined below under thematic dimensions:

1. Road Network and Capacity Constraints

- **Over-saturation of key corridors**: Roads such as Meherpur Hospital Road, Meherpur Main Road, and Kahuli Road operate well above their capacity (VCR > 1.0), reflecting chronic congestion and declining travel speeds.
- **Inadequate carriageway width:** Road widths ranging from 8 to 30 feet are insufficient for mixed traffic conditions, especially in areas with high motorcycle, van, and easy bike usage.
- **Poor traffic flow integration:** Absence of designated turning lanes, bus bays, and pedestrian crossings leads to high friction between modes, intensifying bottlenecks near intersections and commercial hubs.

2. Concentrated Trip Attraction and Spatial Imbalance

- **Centralized mobility demand**: Meherpur Pourashava, Gangni Pourashava, and Bamundi Union attract disproportionately high trip volumes relative to

production, resulting in radial congestion patterns and heavy inbound movement.

- **Functional dependence on municipal cores:** The lack of alternative employment or service nodes in peripheral unions reinforces daily long-distance commuting, amplifying travel pressure on central roads.
- **Weak multimodal connectivity**: Absence of integrated public transport systems forces over-reliance on paratransit modes (rickshaws, easy bikes, vans), increasing vehicle counts rather than passenger throughput.

3. Modal and Operational Challenges

- **Dominance of informal para-transit:** Easy bikes, battery rickshaws, and vans account for a large share of daily trips but operate without proper regulation, leading to unsafe conditions and random stopping behavior.
- **Motorcycle dependency:** Motorcycles constitute 40–60% of all trips in several cordons, reflecting affordability and flexibility but also contributing to higher accident risk and environmental stress.
- **Lack of formal public transport services:** Limited bus or minibus operations reduce travel options for low-income and non-motorized groups, exacerbating social inequity in mobility access.
- **Insufficient traffic enforcement:** Weak enforcement of parking, speed, and loading regulations enables roadside encroachment and haphazard vehicle movement.

4. Commercial and Seasonal Congestion Hotspots

- **Encroachment by street vendors:** Daily evening-time occupation (16:00–23:00) of footpaths and curb space near Meherpur Municipal Complex and Shaheed Dr. Shamsujjoha Park forces pedestrians onto the carriageway, reducing effective road width and creating pedestrian–vehicle conflict. Also, encroachment of the central island and road dividers—particularly along the Meherpur–Bamundi Road—by informal street vendors narrowing the effective carriageway width and impeding the smooth flow of vehicles.
- **Seasonal freight congestion:** Weekly Bamundi livestock hut and similar seasonal markets attract ~2,000 cattle and 60–70 trucks, causing gridlocks on approach roads due to inadequate loading/unloading facilities.
- **Temporal congestion overlap:** Seasonal, commercial, and commuter traffic coincide during peak hours, overwhelming intersections and corridors connected to the municipal core.

4. Future Development and Expected Outcomes

4.1 Circular Road Development

The proposed Circular Road in Meherpur Municipality—linking the Kushtia-Meherpur Highway, Chuadanga-Meherpur Highway, Meherpur-Mohajanpur Road, and Meherpur-Mujibnagar Road—will function as the primary urban arterial ring, designed to redistribute vehicular flow and relieve the saturated central corridors. Presently, key routes such as Borobazar Road and College Mor experience chronic congestion due to concentrated trip attraction from commercial, administrative, and educational hubs. The circular road is strategically planned to divert through-traffic and freight away from these core bottlenecks.

This circular link will improve traffic dispersion, facilitating cross-town and peripheral movement without requiring entry into the congested town center. It will also strengthen inter-regional connectivity, allowing smoother transitions between adjacent highways and secondary roads. From a transport planning perspective, the new alignment acts as a bypass system—minimizing travel time, reducing VCR levels on internal roads, and enhancing accessibility to outer growth zones like Ujalpur and Kathuli.

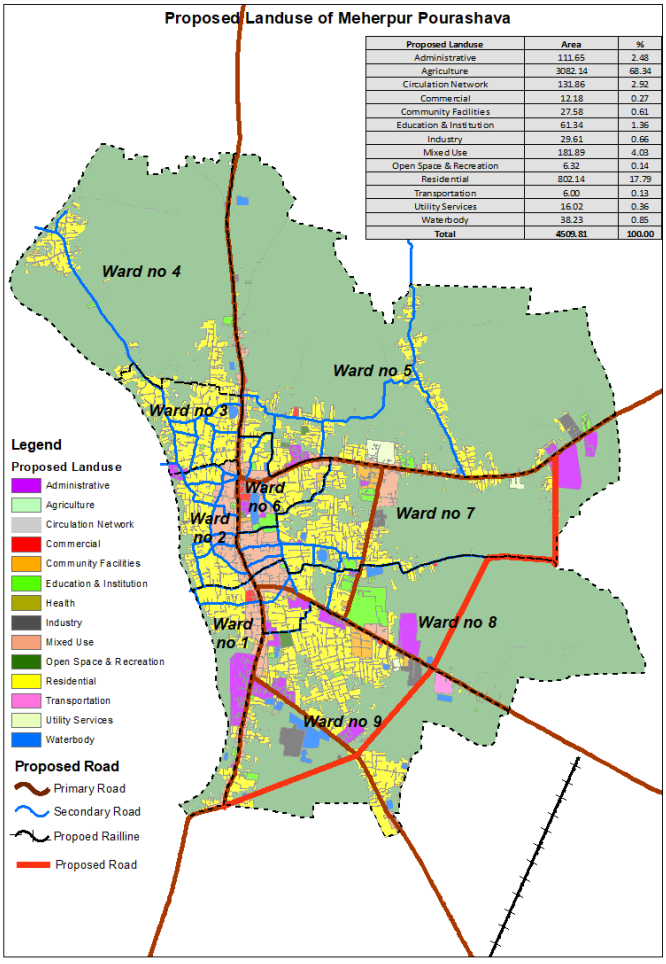

Figure 16 Proposed Road Network of Meherpur Municipality

4.1.1 Possible Impacts

Following the construction of the **proposed Circular Road**, a substantial reconfiguration of traffic movement patterns within Meherpur Municipality is expected. Presently, major corridors such as Meherpur Hospital Road (VCR 1.72), Meherpur Main Road (VCR 1.61), and Kahuli Road (VCR 1.24) operate under oversaturated conditions, reflecting intense congestion generated by overlapping intra-zonal and through trips. With the circular road in operation, it is expected that nearly **30–50% of through traffic and heavy vehicles**—particularly freight and inter-zonal flows currently chhanelling through Borobazar and College Mor—will be diverted to the new peripheral route. As a result,

inner road VCRs could decline to approximately 1.1–1.3 in the short term, improving travel speeds, pedestrian safety, and reducing travel-time variability. Concurrently, the new ring corridor would initially operate at **0.4–0.7 VCR**, absorbing displaced and redistributed vehicular flows. In the medium term, however, as accessibility improves and peripheral land values rise, induced development and increasing vehicular ownership may push the ring's **VCR toward 0.9–1.0**, signifying its gradual transformation into the next high-demand arterial.

Table 3 Hypothetical quantitative effect on VCR and trip distribution

Road / Corridor	**Current VCR**	**Primary effect (diversion %)**	**Short-term (0–3 yrs) VCR estimate**	**Medium-term (5–10 yrs) VCR estimate**
Meherpur Hospital Road (inner spine)	**1.72**	divert 35–50% of through/freight	**1.10 – 1.30** (↓ ~24–36%)	**1.20 – 1.40** (partial rebound due to induced/local growth)
Meherpur Main Road (central)	**1.61**	divert 30–45%	**1.05 – 1.25**	**1.15 – 1.35**
Kahuli Road	**1.24**	divert 20–35%	**0.95 – 1.05** (near capacity or slightly below)	**1.00 – 1.10**
Meherpur–Chuadanga (regional)	**~1.08**	divert 15–30% of long-haul flows to ring	**0.85 – 0.95**	**0.90 – 1.00**
College Road	**0.93**	little change (local access preserved)	**0.85 – 0.95**	**0.90 – 1.00**
New Circular Road (new)	n/a	absorbs diverted flows & new trips	**0.40 – 0.75** (initially comfortable)	**0.60 – 1.00** (approaches capacity with development)

- Diversion % reflects the share of through, freight and inter-zonal traffic plausibly rerouted to the ring. Inner local trips (short trip generators) are not diverted, so inner roads will still have baseline local demand.
- Short-term VCR improvements on inner roads are larger because many trucks and inter-zonal vehicles are easily re-routed. Medium-term VCRs partly rebound because improved accessibility induces local development (new housing, shops, university traffic), and some demand returns to inner streets.
- The new circular road will initially operate with spare capacity (VCR well below 1) but is likely to see rising VCR over time as development clusters along its corridor. Without planning controls, it may approach capacity within 5–10 years.

In terms of spatial impacts, the redistribution of trips will trigger a functional shift in Meherpur's urban structure. The municipal core—once a bottleneck of mixed pedestrian and vehicular traffic—would experience partial decongestion, enabling improved circulation and potential pedestrianization of high-density areas like Borobazar and College Mor. Meanwhile, peripheral corridors connected to the new circular road—especially near Ujalpur, Mujibnagar Road, and Mohajanpur—are expected to emerge as new growth corridors, attracting small-scale logistics hubs, residential clusters, and roadside commercial activities. This peri-urban expansion could gradually elevate trip generation from these nodes, introducing new commuter flows feeding back into the circular road. Over time, the system may transition from a single-core concentration pattern (centered on Meherpur Pourashava) to a multi-nodal mobility structure, with redistributed VCR stress along the ring and its feeder roads. The success of this transformation, however, will depend on access management, truck routing enforcement, and land-use controls to prevent the circular road from replicating the congestion it was designed to relieve.

4.2 New Railway Line and Stations

The proposed railway line branching from Darshana, running through Mujibnagar, and incorporating stations at Monakhali (TAZ 20) and a main terminal in Mujibnagar near Bagoan (TAZ 22), will introduce a new mobility dimension to Meherpur. The railway's impact is expected to be multifaceted and regionally transformative:

- **Shift in Mobility Patterns:** Currently, inter-district and inter-upazila movements depend exclusively on road-based modes, particularly motorcycles, vans, and human haulers. The introduction of rail connectivity will provide an efficient, high-capacity mode for both passengers and freight. This modal diversification will reduce dependency on congested corridors such as the OC-09 (Chuadanga–Meherpur) route, decreasing travel time, fuel consumption, and vehicular congestion.

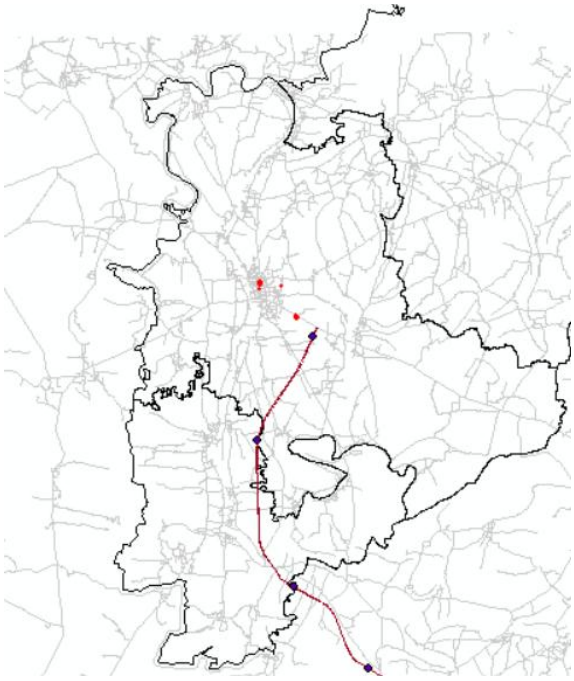

Figure 17 Proposed Railway

- **Decentralization and New Growth Nodes:** The Monakhali station is poised to become a new urban-economic node. As a secondary union, Monakhali currently has moderate trip generation and low attraction. However, the establishment of a station will instantly elevate its functional status, leading

to transit-oriented development (TOD). Additional land uses such as small-scale logistics hubs, agricultural warehousing, trade facilities, and new residential clusters are expected to emerge within a 1–2 km radius of the station. Similarly, Mujibnagar's terminal will strengthen its role as a regional interchange, enabling both passenger transfers and goods movement. This decentralization will reduce excessive dependence on Meherpur Municipality, fostering a more balanced spatial structure across the district.

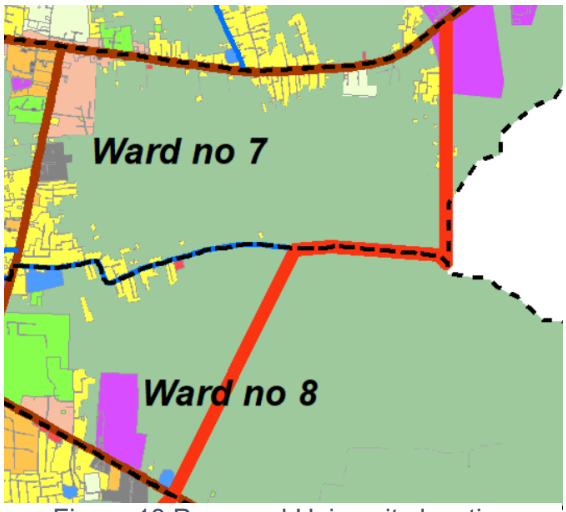

Figure 18 Proposed University location

- **Long-term Strategic Impact:** The rail corridor will enhance Meherpur's integration into the western transport network of Bangladesh, particularly through linkages with Chuadanga, Kushtia, and the Darshana land port. Over time, it could attract cross-border trade flows, expanding the district's economic geography. The resulting intermodal connectivity—between rail, regional highways, and the circular road—will consolidate Meherpur's transition from an agricultural subregion to a logistics-enabled, multi-nodal urban economy.

4.3 Meherpur University on Moyamari Road

The planned Meherpur University on Moyamari Road represents both an educational and spatial milestone for the district. The university will act as a major trip attractor, with thousands of daily student, faculty, and service-related movements. Its location, however, presents a critical infrastructural constraint—the Moyamari Road currently measures only 12 feet in width, insufficient to accommodate expected motorized traffic once the institution becomes operational.

Analytically, this mismatch between land-use intensity and infrastructure capacity signals potential congestion challenges in the near future. With projected daily trip volumes rising significantly, the road will require upgradation to a minimum two-lane standard with provision for sidewalks and bus bays. Integrating Moyamari Road with the new Circular Road will be crucial for distributing inbound and outbound flows efficiently and preventing bottlenecks at access junctions.

Furthermore, the university's presence will likely stimulate secondary land-use transformation—emergence of student housing, commercial amenities, and transport services along the corridor. If unmanaged, this spontaneous development could lead to roadside encroachment, informal parking, and reduced carriageway functionality. Proactive urban design and traffic management interventions, including controlled

access points, parking zoning, and designated pick-up/drop-off areas, will be necessary to maintain circulation efficiency and safety.

4.5 Demand for Road Improvement

A predominant demand across almost all surveyed areas is the fundamental need for constructing new local roads and paving existing unpaved (katcha) or damaged roads. This reflects a critical gap in last-mile connectivity, which directly impacts residents' access to markets, schools, and healthcare, particularly during the monsoon season.

- In Bamundi Union, the community prioritized the repair and widening of the main road from Bamundi Bazar to Tetulbaria School, as well as constructing a new road from Karamdi field to the main road.
- The action plan for Raypur Union calls for the new construction of a road from Raypur Madrasapara to the graveyard and the essential repair of the road connecting to the Dighal Kandi government primary school.
- In Dhankhola Union, a major priority is the repair of the main road from Dhankhola Bazar to the Meherpur-Kushtia highway, alongside the paving of numerous internal village roads.
- Similarly, residents of Kathuli Union have identified the need to pave the road from the Union Parishad to Shuvorajpur and repair the damaged road from Kathuli College to the main road.
- Within Meherpur Municipality, Ward No. 2 residents specifically requested the construction of a new road and drain from the hospital's south side to the bypass road. For Wards 3, 5, and 8, a recurring theme is the need for repairing and widening existing narrow roads to facilitate better vehicle movement.

The community's emphasis on paving local and feeder roads confirms that while major highways are important, daily life and local economic activity are being severely hampered by poor last-mile connectivity. This proposal must prioritize a balanced approach that not only strengthens regional corridors but also allocates significant resources to upgrading the local road network identified in these action plans.

4.6 The Critical Link Between Drainage and Road Longevity

The PRA findings consistently link poor road conditions with inadequate or non-existent drainage systems. Residents have astutely identified that road development is unsustainable without parallel improvements in drainage, as waterlogging during the rainy season rapidly degrades road surfaces and makes them impassable.

- In Dhankhola Union, the community has explicitly requested the construction of concrete (RCC) drains alongside all main roads to address waterlogging.

- The action plan for Ward No. 2 of the municipality combines the proposal for a new road with the construction of a new drain, showing a clear understanding of their interdependence.
- Similarly, the plans for Raypur and Bamundi unions include proposals for new drains and culverts as integral parts of their road development requests.

This grassroots-level understanding reinforces the need for an integrated infrastructure policy. Simply paving roads without addressing drainage is a poor investment that leads to rapid deterioration. All future road construction and repair projects, particularly those funded through the district development plan, must include a mandatory drainage component. This aligns with our strategic proposal for building a climate-resilient network, where effective water management is a core principle of transport infrastructure design.

4.7 Need for Public Transport Infrastructure

While less frequent than road and drain requests, the need for basic public transport infrastructure emerged in key locations, indicating a desire for more organized and reliable transport services.

- In Bamundi Union, a major commercial hub, the community has proposed the construction of a bus stand and a passenger shed to provide a safe and organized space for commuters.
- Similarly, the plan for Raypur Union includes a request for constructing a passenger waiting area at key intersections.

The construction of such infrastructure should be a foundational step in establishing new bus routes, ensuring that services are user-friendly, safe, and accessible from the outset.

4.8 Other Future Implications

Designated Loading and Unloading Zones for Seasonal and Daily Market Activities

Seasonal Food Transportation Scenario

During peak agricultural seasons, Meherpur's transport system experiences significant pressure from the movement of food and farm products across local markets and regional corridors. Trucks, vans, and small carriers frequently stop along arterial and secondary roads for the loading and unloading of goods such as paddy, vegetables, and fruits, particularly around Meherpur Municipality and Ujalpur. This unregulated roadside activity leads to temporary blockages, reduced carriageway capacity, and conflicts with passenger vehicles. The clustering of four loading–unloading points within a 500-meter stretch in Ujalpur exemplifies the spatial

inefficiency of current freight operations. Establishing a single, consolidated loading–unloading zone with designated parking bays, covered storage, and controlled entry–exit points would substantially improve circulation and safety. Locating such facilities along the proposed circular road or near existing arterial routes would divert freight-related congestion away from inner urban streets, ensuring that goods movement remains efficient while minimizing disruption to daily commuters and pedestrians.

Hut and Livestock Market Scenario

In Bamandi and Gangni, periodic hut markets—particularly for livestock—generate intense short-term congestion due to unregulated truck parking and on-street trading. The absence of structured freight handling zones forces heavy vehicles to queue along adjoining corridors, occupying both carriageways and shoulders, and creating severe bottlenecks for through traffic. These conditions also pose safety risks for pedestrians, cyclists, and smaller vehicles navigating within the same constrained spaces. To address this, a dedicated truck parking and unloading area adjacent to the hut zone should be developed, designed to accommodate the high volume of livestock transport and associated support vehicles. Such a facility would enable organized goods transfer, reduce pressure on arterial roads, and separate freight movement from local passenger traffic. Integrating this area with supporting infrastructure—such as access lanes, holding yards, and minor market-link roads—would create a more resilient logistics environment capable of managing both daily and seasonal demand surges without overwhelming the surrounding road network.

Public Space Reallocation for Street Vendors and Food Carts

Street vending plays a vital economic role in Meherpur's urban fabric; however, its current unregulated presence along key roads—particularly near Shahed Dr. Shamsujjoha Park and Meherpur Municipal Complex—has led to chronic congestion and pedestrian–vehicle conflict. To balance economic inclusion with mobility safety, the municipality should reallocate vending activity to organized public spaces.

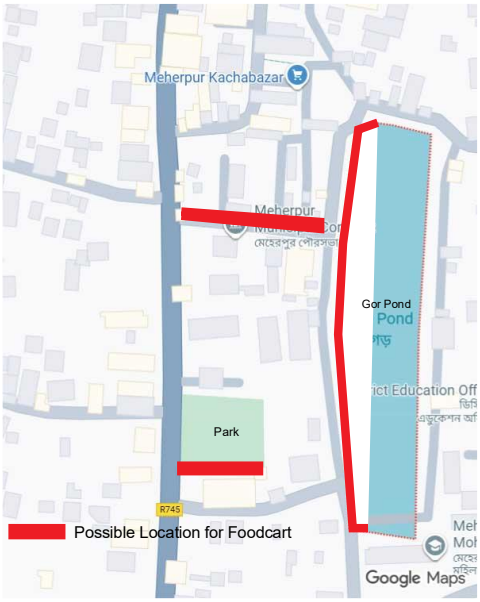

Figure 19 Possible Cart Location

Underutilized open areas such as the **Gorpond** surroundings and **Parkside zones** can be redesigned as dedicated food courts and recreational vending hubs, allowing vendors to operate within a managed environment equipped with waste disposal, seating, and lighting infrastructure. Such reallocation would significantly reduce pressure on carriageways and footpaths, improve pedestrian

safety, and contribute to the development of vibrant evening economies without impeding transport functionality.

Vendor Relocation and Traffic Reorganization in Gangni Municipality

In Gangni Municipality, the occupation of road dividers and central islands by vendors—especially along the Meherpur–Bamundi Road—poses a dual challenge of congestion and safety hazard. Future interventions must focus on the relocation of these vendors to purpose-built vending clusters situated off the main carriageway but within accessible walking distances for customers.

Relocation sites should be strategically selected near high footfall areas yet separated from high-speed vehicle flows to maintain accessibility without compromising road performance. Complementary actions, such as enforcing no-vending zones, installing physical barriers or planters along dividers, and providing formal pedestrian crossings, will further enhance traffic discipline and safety.