

CITY LOGISTICS PLAN

Prayagraj Final Report

June 2023



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List of Abbreviations

3PL	Third Party Logistics
AFS	Air Freight Station
AKIC	Amritsar - Kolkata Industrial Corridor
BAU	Business as Usual
BET	Battery Electric Trucks
CAGR	Compound Annual Growth Rate
Cantt.	Cantonment
CDP	City Development Plans
CLP	City Logistic Plan
CMP	Comprehensive Mobility Plan
CNG	Compressed Natural Gas
COE-UT	Centre For Excellence In Urban Transport
DMIC	Delhi Mumbai Industrial Corridor
EDFC	Eastern Dedicated Freight Corridor
EV	Electric Vehicle
EVS	Electric Vehicles
EXIM	Export-Import Bank of India
FTWZ	Free Trade Warehousing Zone
GDP	Gross Domestic Product
Gol	Government Of India
GST	Goods & Services Tax
GT	Goods Terminal
HDT	Heavy Duty Trucks
ICD	Inland Container Depots
ICE	Internal Combustion Engine
IIDC	Industrial Interaction & Development Cell
IIEPP	Industrial Investment And Employment Promotion Policy
IT	Information Technology
Kms	Kilometres
LCV	Light Commercial Vehicles
MB	Mid - Block
MDT	Medium Duty Trucks
MMLP	Multi Modal Logistics Park
MOHUA	Ministry Of Housing And Urban Affairs
MP	Master Plan
NH	National Highway
NLP	National Logistic Policy
OC	Origin Cordon

OP	Operator
PDA	Prayagraj Development Authority
PM	Prime Minister
PMGS-NMP	Prime Minister Gatishakti National Master Plan
PPP	Purchasing Power Parity
PPP Projects	Public Private Partnership Projects
PWD	Public Works Department
RTO	Regional Transport Office
SC	Screen Line
SCL	Sustainable City Logistics
SCV	Small Commercial Vehicles
SEZ	Special Economic Zone
Sq.Km.	Square Kilometre
SUDA	State Urban Development Agency
SWOT	Strengths, Weaknesses, Opportunities, And Threats
TD	Truck Driver
TMC	Turning Movement Count
TOR	Terms Of Reference
UMTC	Urban Mass Transit Company
UP	Uttar Pradesh
UPSIDC	Uttar Pradesh Industrial Development Corporation
URFTM	Urban Road Freight Transport Management
WFPR	Work Force Participation Rate
ZET	Zero-Emissions Trucks

EXECUTIVE SUMMARY

Transport & Logistics plays a pivotal role in the global economy. The logistical cost in India is about 13%-14% of GDP as against about 7-8% of GDP in developed economies. With the objective to reach five trillion USD economy by 2026-27, efforts are made on one hand to increase production and to cut down its overall logistics cost (up to single digit) on the other. In order to reduce the overall cost and become competitive both in domestic and international market to ensure comprehensive development of logistics initiatives towards infrastructure development, logistics planning, pro-active governance and adoption of technology have been taken under various Schemes such as: “Gatishakti”, “Sagarmala”, “Bharatmala”, “Make in India” etc.

In India, MSME sector contributes around 33% of the country’s total GDP and is predicted to contribute worth US\$ 1 trillion to India’s total exports by 2028. The Ministry of Micro, Small and Medium Enterprises has taken a number of steps to promote MSME sector for Ease of Doing Business at a grass-root level by involving generally neglected and small scale entrepreneurs like women, marginal entrepreneurs, local artisans etc, in improving retail and wholesale trade to expand their reach and distribution globally. In the District of Prayagraj in total 44,182 MSMEs were registered in Udyam Registration Portal (as on 31 March 2022).

The State of Uttar Pradesh has set a goal to reach one trillion dollars in the referred period. In order to achieve the target, set for the state unit or city level efforts are made under Gati Shakti platform to boost the last-mile connectivity to improve economic zones and industrial parks by incorporating infrastructure schemes. The aim is to increase productivity and cut down overall logistics cost with increasing cargo storage & handling capacity as well as reducing the turnaround time to boost trade. In the agriculture sectors efforts are also initiated to reduce overall post-harvest losses for different commodities, by creating required warehousing, cold storage and allied facilities as well as organising multi-modal transfer and transport to offer cost effective for fast deliveries.

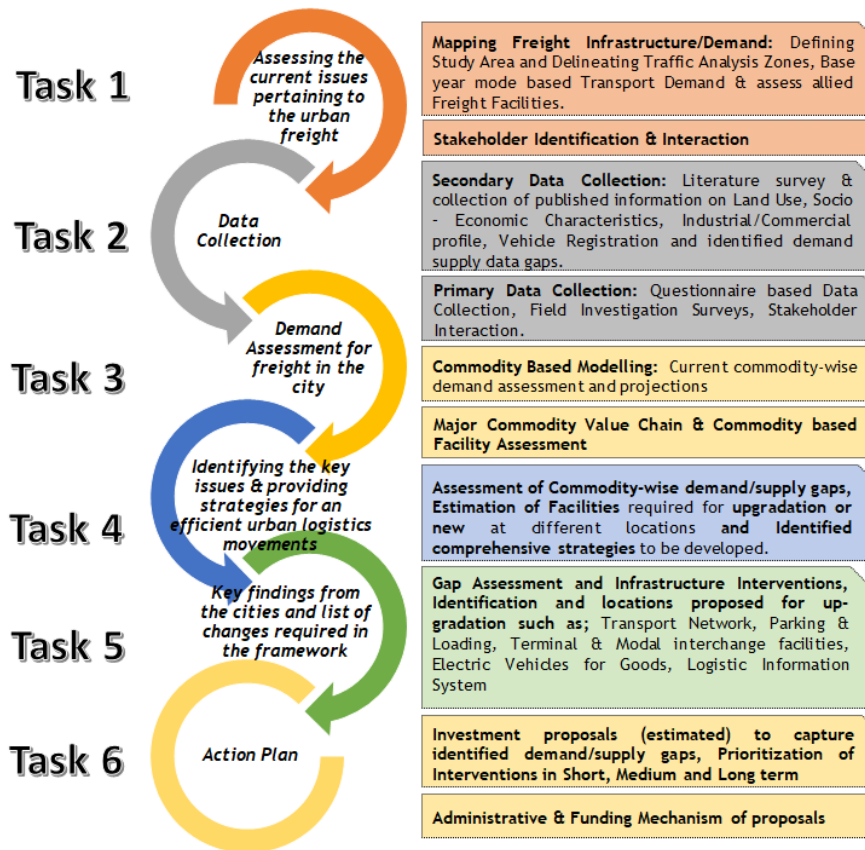
Prayagraj is one of the seven smart freight cities identified for preparation of detailed City Logistics Plan to improve the efficiency as well as ensure smooth movement of urban freight for sustained economic growth of the city and safe urban environment with minimum costs and maximum reliability.

Study Vision 2042: *Freight logistic system is to create technologically enabled, integrated, cost-efficient resilient network, sustainable transportation options to reduce congestion and emissions, and provide a safe environment for the citizens and logistic industry.*

Study Objectives:

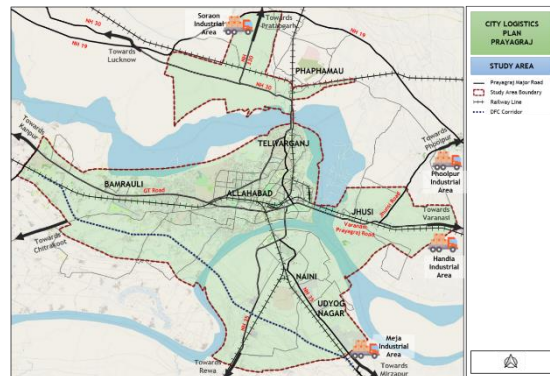
- To reduce the freight cost and delivery time.
- To reduce the movement of through truck in core city area.
- To reduce the overall trips length between production units and freight facilities
- Introduction to freight ITS to reduce the waiting time, and for better utilization of freight facilities
- To reduce the quantum of empty trips in the city, through introducing Multimodal transport options
- To reduce the emission from freight mobility by deploying electric vehicles

The scope of work for the study is as per the Terms of Reference (ToR).



The study area comprises Prayagraj Urbanizable limits (367.73 sq.km) as per the Draft Master Plan, Prayagraj 2031 as shown in **Error! Reference source not found.**

As per Census-2011, it has a total population of 13,34,870. Major industries in Prayagraj are tourism and agriculture. Total GDP of the district recoded at market price (2019-2020) was to the tune of ₹39,428.70 Crore, contributing about 3.4% to the State GDP.



Prayagraj is an important commercial centre in Uttar Pradesh, well-connected with various modes of transport i.e. road, rail, IWT and air. Although the city has well developed road network, but majority of the roads connecting various residential areas with trading centres are narrow & congested. The study area is served by ten railway stations of which only 3 railway stations are designated for goods traffic (Naini Junction, Iradatganj & Subedarganj). The airport is located in Bamrauli, around 12 km away from the city centre. It is pertinent to note that Prayagraj is one end of National Waterway-1, however, no long-distance (inter-city) good & passenger services are operated because of low water draft.

To generate base year freight traffic, requisite information from railway, IWT & Airport were collected from the concerned offices. In the case of road transport, since no authentic

information on goods movement pattern are available, primary surveys were carried out adopting en-route check post approach at 8 locations serving inter-city traffic.

Locations	Direction	Total Vehicles	No. of Goods Vehicles/day
OC-1 Ayodhya Prayagraj Road (Holagarh Road)	Mau Aima to Diha	1636	3384
	Diha to Mau Aima	1748	
OC-2 Phoolpur Road	Phulpur to Sahson	1561	3023
	Sahson to Phulpur	1462	
OC-3 Prayagraj Bypass (Toll Road)	Prayagraj to Banaras	219	601
	Banaras to Prayagraj	382	
OC-4 Lucknow Prayagraj (NH 30)	Prayagraj to Lucknow	1910	3921
	Lucknow to Prayagraj	2011	
OC-5 Prayagraj Kuwarpatti Road (Near Rampur Tiraha)	Naini Chowk to Rampur Tiraha	2056	4238
	Rampur Tiraha to Naini Chowk	2182	
OC-6 Prayagraj Road (Near Ghurpur)	Ghurpur to Naini Chowk	2322	4647
	Naini Chowk to Ghurpur	2325	
OC-7 Chail Road (Near Payri)	Jayantpur to Chail	590	1200
	Chail To Jayantpur	610	
OC-8 Kanpur Prayagraj Rd (Near Puramufti)	Muratganj to Prayagraj	1970	3977
	Prayagraj to Muratganj	2007	

Based on OD Surveys at above locations, following has been observed (distribution of traffic based on number of vehicles intercepted):

- Inter-City Traffic originating from study area - 25%
- Inter-City Traffic terminating in the study area - 27%
- Transiting traffic (passing through the study area) - 48%

In addition to capture intra-study area movement of cargo sample transport unions/ agencies/ operators/ traders were contacted and required information elicited through personal interaction by canvassing specially designed questionnaire. The average trip length between 5.3 km and 8.6 km has been recorded. Important locations in Prayagraj identified as major cargo contributing are: Transport Nagar, Meerapur, Mutthiganj/ Hatthiya Chauraha, Naini, Daryaganj, Teliyanganj, Civil Lines, Kydganj and Prayagraj Core City.

Base year (2022) total cargo traffic estimated in the study area was to the tune of 1,16,886 tonnes, predominantly by road transport contributing to the extent of 1,12,909 T, followed by railways 3,955 T and airways 22 T. Agro-based commodities (Wheat, Rice, Fruits, Vegetables etc.) contributed about 51.7% (53,270 tonnes per day) of the total cargo, as against Non-Agro based commodities showing a share of 48.3% (49,750 tonnes per day). The average daily traffic estimated for the year 2032 worked out to 1,28,105 T and 1,54,332 T in the year 2042, cumulative of road, rail and air.

Keeping vision, objectives and scope of the work in view, Improving Logistics Efficiency, Reducing Logistics Costs, Decongest the city, Segregation of freight and passenger movement and Comprehensive Policy & Planning have been conceptualized. In order to realize the said activities: Moving heavy vehicle traffic away from the city centre, Provision of adequate loading/unloading facilities, Commodity specific storage spaces, Feeder to city by LCVs, Setup of Multimodal Transport Hubs for bringing freight on national network have been examined.

For smooth, cost effective, environmental friendly and seamless movement of cargo required facilities towards goods vehicle parking, cargo storage, intermodal shift, terminal development have been proposed under a set of assumptions.

In order to arrive at future demand of various facilities, existing infrastructure has been examined to assess demand gap. Further, wherever required new facility/facilities have been estimated.

In view of the fact that business-as-usual scenario may translate into inefficient transport system in future, leading to loss of time and capital as well as will also trigger a poor quality of life for the city's residents, leading to loss of citizens' health. Thus, it is essential that an early action is taken to improve upon the scenario before it is too late to act. To facilitate future volumes of cargo, in line with Central and State Government Policies and Guidelines, a set of short, medium and long term infrastructure development proposal have been prepared to achieve the goals and objectives set forth. Individual proposal and its area is summarised as under:

S.No	Proposed Facility	Location	Area (Ha.) Available as per Draft Master Plan, 2031	Proposed landuse	Area Required (Ha.)
1	Transport Nagar	Ayodhya Road	97	Residential	30
2	Truck Terminal 1	Rewa Road	22	Truck Terminal	8
3	Truck Terminal 2	Kanpur Road	12.4	Residential	8
4	Truck Terminal 3	Jhunsi	11	Truck Terminal	8
5	Warehouse 1	Naini	431	Industrial	3
6	Warehouse 2	Lucknow Road	27	Warehousing	3
7	Warehouse 3	Naini	431	Residential	3
8	Cold Storage 1	Lucknow Road	27	Industrial	2
9	Cold Storage 2	Ayodhya Road	18	Industrial	2
10	Cold Storage 3	Mundera Mandi	24	Mundera Mandi	2
11	Multimodal Logistic Park	Naini	93.5	Industrial	93.5
12	IWT Terminal	Naini	48	IWT Terminal	48
13	Inland Container Depot (ICD)/ Dry Port	Naini	19	Industrial	15
14	FTWZ/ SEZ	Naini	431	Industrial & Public Facilities	50
15	Industrial Park	Lucknow Road	160	Industrial	160
16	Truck Parking (Suberdarganj Railway Station)	Suberdarganj	3.5	Railway Land	3.5
17	Wholesale Market	Jhunsi	11	District Town Centre	11

In total 1 Transport Nagar, 3 Truck Terminals, 3 Warehouses, 3 Cold Storages, 1 Industrial Park and 1 Wholesale Market (shifting proposed) has been recommended. Other facilities such as IWT terminal, MMLP, ICD/SEZ etc. have also been proposed as shown in the location map below.



S.No.	Proposed Facility	Location
1	Transport Nagar	Ayodhya Road
2	Truck Terminal 1	Kanpur Road
3	Truck Terminal 2	Rewa Road
4	Truck Terminal 3	Jhunsi
5	Warehouse 1	Naini
6	Warehouse 2	Lucknow Road
7	Warehouse 3	Naini
8	Cold Storage 1	Lucknow Road
9	Cold Storage 2	Ayodhya Road
10	Cold Storage 3	Mundera Mandi
OTHER FACILITIES		
11	IWT Terminal	Naini
12	Multimodal Logistic Park	Naini
13	Inland Container Depot (ICD)/ Dry Port	Naini
14	FTWZ/ SEZ	Naini
15	Industrial Park	Lucknow Road
16	Truck Parking (Suberdarganj R.S.)	Suberdarganj
17	Wholesale Market	Jhunsi

The proposals and strategies can thus be concluded as follows:

S.No.	Strategies	Proposal
1.	Network strategies	<ol style="list-style-type: none"> 1. Proposal of widening of Outer Ring Road for City to 100m 2. Appropriate use of Ganga-Expressway 3. Proposal of widening of NH-35 to 75m
2.	Parking or Loading Strategies	<ol style="list-style-type: none"> 1. Truck Terminals/ Transport Nagar 2. Truck Parking Area
3.	Location and zoning of land use	<ol style="list-style-type: none"> 1. Cold Storages 2. Warehouses 3. Wholesale Market relocation and decongestion
4.	Licensing and Regulations	<ol style="list-style-type: none"> 1. Night Time entry of freight vehicles 2. Traffic Restrictions for different vehicles in different areas.
5.	Pricing Strategies	<ol style="list-style-type: none"> 1. Encourage & facilitate use of electric freight vehicles
6.	Terminals and Modal Interchange Facilities	<ol style="list-style-type: none"> 1. MMLP 2. Inland Container Depot (ICD)/ Dry Port 3. IWT Terminal
7.	Traffic information Systems	<ol style="list-style-type: none"> 1. Traffic Control & Management System 2. Smart Routing & Dispatch 3. Real Time Monitoring & tracking 4. Vehicle and freight location information 5. Traffic and infrastructure information
8.	Electric Vehicles for Goods	<ol style="list-style-type: none"> 1. Urban E-freight studies 2. Ease in the registration process 3. Reducing Road Tax on electric freight vehicles 4. E-Charging facilities at Truck Terminals & Transport Nagar
9.	Electronic Toll Collection (ETC)	<ol style="list-style-type: none"> 1. Upgradation to State of the art toll collection system such as GPS based toll collection system.

S.No.	Strategies	Proposal
10.	Logistics Information systems	1. Warehouse operations and inventory information 2. Joint Delivery Platform 3. Delivery Space Booking System 4. Vehicle identity information 5. Shipment information
11.	Vehicle Technology Improvements	1. Improvement of e-truck vehicles
12.	Voluntary Cooperation	1. Increased awareness among RTO official for e-vehicles. 2. e-NWR (Electronic Negotiable Warehousing Receipt)- Loans to farmers, traders on goods in warehouses
13	Socio-Economic Development	1. FEZ/ SEZ/ FTWZ 2. Industrial Park 3. Warehousing

Keeping above proposals in view, associated stakeholders/departments at city/ District/ State / Central level have been suggested for appropriate logistics infrastructure development funding and maintenance, such as:

1. Logistics Infrastructure Development Authorities:
 - Prayagraj Development Authority (PDA)
 - Nagar Nigam (Municipal Corporation)
 - Uttar Pradesh State Warehousing Corporation
 - Mundera Mandi
 - Prayagraj Smart City Limited (PSCL)
 - Jal Nigam (Water & Sanitation Department)
 - Irrigation Department/ Ganga Pollution Control Unit (GPCU)
2. Road Infrastructure Development Authorities:
 - National Highways Authority of India (NHAI)
 - Public Works Department (PWD)
 - Uttar Pradesh State Highways Authority
3. Rail Infrastructure Development Authorities:
 - Indian Railways
 - Dedicated Freight Corridor Corporation of India Limited (DFCCIL)
4. Industrial Development Authorities:
 - Uttar Pradesh State Industrial Development Authority (UPSIDA)
 - District Industrial Centre
5. Licensing Authorities:
 - Uttar Pradesh Pollution Control Board
 - Town and Country Planning Department
 - Regional Transport Office (RTO)
6. Air and Water Infrastructure Development Authorities:

- Inland Waterways Authority of India (IWAI)
- Airports Authority of India (AAI)

7. Regulatory Authorities:

- Traffic Police
- Regional Transport Office (RTO)

8. Other stakeholders:

- State Goods and Services Tax (SGST)/Central Goods and Services Tax (CGST) Department
- Labour Commissioner Office
- Uttar Pradesh State Industries Association (UPSIA)

Towards various infrastructure development activities recommended up to 2042, a total investment of **INR 3615.66 Cr.** has been estimated, of which **INR 407.16 Cr.** proposed to be organised under PDA, summarised below:

S. No	Proposed Elements of CLP Prayagraj	Freight Proposals	Mobility	Total Proposal	Unit Rate (in Rs. Cr.)	Estimated Cost (in Rs. Cr.)	Administrative/ Agency	Funding
1	Existing Road Improvements & New Proposed Roads	Outer Ring Road		66 km	14 cr. Per km	924	NHAI	
2	Proposed Freight Facilities	Multimodal Logistic Park		1	1500	1500	NHIDCL	
		Transport Nagar		1	20	20	PDA	
		Truck Terminal		3	30.72	92.16	PDA	
		Truck Parking (Suberdarganj R.S)		1	10	10	Railways	
		IWT Terminal		1	200	200	IWAI	
		Warehouses		3	15	45	UPSWC/ CWC/ PDA/ Private Agencies	
		Cold Storage		3	30	90	UPSWC/ CWC/ PDA/ Private Agencies	
		Inland Container Depot (ICD)/ Dry Port		1	50	50	Railways/ NHIDCL/ UPSIDA	
		FTWZ/ SEZ		1	500	500	UPSIDA/ NHIDCL	
		Industrial Park		1	130	130	PDA/ UPSIDA	
Wholesale Market		1	30	30	PDA/ Nagar Nigam/ Private Agencies			
3	Freight ITS Infrastructure	Integrated Freight Management System		2	5	10	Uttar Pradesh State Government (Policy Decision)	
		Joint Delivery Platform		3	0.5	1.5		
		Delivery Space Booking System		2	0.5	1		
4	Low Emission Zone	LEZ in the Core Area		2	6	12	RTO/ Traffic Police	
Grand Total						3615.66		
Projects to be implemented by PDA				12		407.16 cr.		



CHAPTER 1

INTRODUCTION

1. INTRODUCTION

1.1 STUDY BACKGROUND

Transport & Logistics plays a pivotal role in the global economy. “The International Bank for Reconstruction and Development/The World Bank” periodically publish “Logistics Performance Index (LPI) and Its Indicators Report based on information collected through relevant surveys from member nations surveys. The LPI ranks countries on six parameters - efficiency of the customs clearance process, quality of trade and transport-related infrastructure, ease of arranging shipments, competence, and quality of logistics services, ability to track and trace consignments, and frequency with which shipments reach their destination within the scheduled time. India has climbed up to the 38th spot (in the list of 139 surveyed nations) in the World Bank’s Logistics Performance Index (LPI), improving its ranking by 16 places from 2014 to 2022 (Released on Aril 21st, 2023). Although LPI measures the ease of establishing reliable supply chain connections and the structural factors that make it possible, such as quality of logistics, trade and transport related infrastructure is an indicator of international trade practice, it also substantiates domestic performance.

According to a study, the logistical cost in India is about 13%-14% of GDP as against about 7-8% of GDP in developed economies. With the objective to reach five trillion USD economy by 2025, efforts are being made on one hand to increase production, and to cut down its overall logistics cost (up to single digit) on the other. Currently, freight transport is primarily road-dominated that accounts for nearly 59% of freight movement, whereas rail share is 35% followed by waterways (6%) and less than 1% by air (Niti Ayog, 2021). In order to reduce the overall cost and become competitive both in domestic and international market, and to ensure comprehensive development of logistics initiatives towards infrastructure development, logistics planning, proactive governance and adoption of technology have been taken under various Schemes such as: “Gatishakti”, “Sagarmala”, “Bharatmala”, “Make in India” etc. In this direction, the Government of India is coming up with 2-Dedicated Freight Corridors (DFC) i.e., Eastern Dedicated Freight Corridor (EDFC) and Western Dedicated Freight Corridor (WDFC) as high speed and high-capacity railway corridor for the transportation of freight. As these corridors will reduce the logistics costs and timing of transportation, two prominent Industrial Corridors i.e. Delhi-Mumbai Industrial Corridor (DMIC) and Amritsar-Kolkata Corridor (AKIC) are coming up around both these DFCs. Other projects such as Multi Modal Logistic Parks, Rapid Rail Transit System, Expressways, UDAN - Regional Air Connectivity Scheme etc., are also being implemented to reduce the cost of logistics spending from 14% of GDP to less than 10%.

In the global trade, Micro, Small and Medium Enterprises (MSME) play a significant role. In developed economies the contribution of MSME sector is above 50% whereas the underdeveloped fail to reach such levels. In India, MSME sector contributes around 33% of the country’s total GDP and is predicted to contribute about US\$ 1 trillion to India’s total exports by 2028. The Ministry of Micro, Small and Medium Enterprises has taken a number of steps to promote MSME sector for Ease of Doing Business at a grass-root level by involving generally neglected and small scale entrepreneurs like women, marginal entrepreneurs, local artisans etc, by improving their retail and wholesale trade so as to expand their reach and distribution globally. In the District of Prayagraj in total 44,182 MSMEs were registered in Udyam Registration Portal (as on 31 March 2022) that comprise of micro, small and medium units (predominantly micro units).

Consequent to the target set by the Government of India, the State of Uttar Pradesh has set a goal to reach one trillion dollars by 2025. The State therefore promoting rapid infrastructure development and industrialisation, as logistics and manufacturing are fundamentally linked. Creating robust transportation infrastructure network and promoting inter- modalism for enhanced traffic linkages for improved last mile/ first mile connectivity to economic hubs are the pre requisite for economic development. In line with this, wherein each district is considered as a traffic generating region, the urban units which act as a consolidation/distribution and trade centre, has a major role to play.

Currently, a large number of economic zones and industrial parks are not able to reach their full productive potential due to inefficient and fragmented multi-modal connectivity. In order to achieve the target, set for the state or city, efforts are being made under the Gati Shakti platform to boost the last-mile connectivity by incorporating infrastructure schemes. The aim is to increase productivity and cut down the overall logistics cost by increasing cargo storage & handling capacity as well as reducing the turnaround time to boost trade. In the agriculture sectors efforts are also being initiated to reduce the overall post-harvest losses for different commodities by creating required warehousing, cold storage and allied facilities as well as organising multi-modal transfer and transport to offer cost effective fast deliveries.

As Prayagraj is one among the 7 cities in the State of Uttar Pradesh chosen by Government of India for “Freight Smart Cities Phase I”. Thus, it was identified by the state for the preparation of detailed City Logistics Plan, to develop logistics in peri urban areas and towns. This will help cities map their current freight performance, define their present and future needs, and identify reform areas in their respective areas.

City Logistics Plan for Prayagraj is initiated with the aim to improve the efficiency as well as ensure smooth movement of urban freight for sustained economic growth of the city and safe urban environment with minimum costs and maximum reliability.

1.2 OBJECTIVE OF THE STUDY

The objective of the study is given in **Figure 1-1** below:



Source: UMTC

Figure 1-1: Objectives of the Study

1.3 SCOPE OF THE STUDY

The scope of work is reproduced below;

Task-1 Assessing the Current Issues pertaining to the Urban Freight Movement

- Mapping Freight Infrastructure: This would include mapping the freight generators/attractors, freight storage and distribution facilities and other transport related infrastructure.
- Stakeholder Interaction: Extensive stakeholder interaction with truck operators, warehouse operators, industrial units etc.

Task-2 Data Collection

The understanding of logistics in a city requires extensive data collection both vehicular as well as commodity based. Data collection would be based on primary as well as secondary sources.

Primary Data Collection

- Roadside interview survey of freight vehicle.
- Freight vehicle traffic count survey.
- Parking survey.
- Truck driver survey.
- Truck operator survey.
- Truck terminal survey.
- Survey of existing warehouse, facilities for drivers, administrative facilities and infrastructure, taxation system, peak hours' freight movement, types of freight moving into and out of the city, bottle neck in the freight movement.

Secondary Data Collection

- Demographic Profile /characteristics of the town.
- Socio-economic profile (employment and socio-economic parameters)
- Freight vehicle registration data.
- Land use development plan of the project influence area.
- Profile of industrial/commercial development.

Task-3 Demand assessment for freight in the city

- Commodity based modelling to assess the current situation of goods movement in the city and further demand projections for horizon years.
- Mapping the major commodity value chains and assessing the future demand of incoming / outgoing freight.

Task-4 Identifying the key issues & providing strategies for an efficient Urban Logistics Movement

Based on above analysis, stakeholder interactions as well as the demand projections, future challenges are to be identified and further comprehensive set of strategies are to be developed for efficient & sustainable urban freight movement.

Task-5 Action Plan

Based on the strategies identified, interventions will be categorized as short term, medium term and long term followed by action plan including related tasks, activities service providers / organization as well as the timelines.

Task-6 Key finding from the cities and list of changes required in the framework

The key purpose of this study is to identify and remove unintended bottlenecks (refer Table 1-1).

Table 1-1: City Logistics Initiatives or Measures

Initiative	Description
Network strategies	Specific routes which could be nominated for use by trucks, such as truck routes designated only for specific classes of vehicles
Parking or Loading strategies	Provision of different facilities for parking, loading and unloading: curb-side use, off-street facilities and truck parking facilities
Location and zoning of land use	Considering spatial concentrations of transport generating or attracting activities near freight transport facilities
Licensing and regulations	Provision of a menu of traffic regulations or measures, such as allocation of curb space, loading time restrictions, truck routes regulations and truck access controls, transport regulations, like permits for entering certain areas, or vehicle regulations, to regulate vehicle sizes or emissions
Pricing strategies	Consideration of road pricing or charges on access or parking as means to allow market mechanisms solve traffic congestion
Terminals and modal interchange facilities	In consonance with the master plans, assess transfer points at borders of urban areas, providing transport optimization and limiting the number of truck movements in urban areas
Traffic information systems	Provision of road traffic information through variable message signs and information communication system through electronic traffic boards
Electric Vehicles for goods	Suggestions on introduction of new generation vehicle maximizing movement of vehicles and commodities
Electronic Toll Collection (ETC)	Installation of electronic systems at limited access roads, such as tolled expressways, to improve performance of toll collection and decrease impediment
Logistics Information systems	Employed in-company or between companies to improve distribution of goods or they can be employed between companies for cooperative pick-up and delivery or for cooperative operation of terminals
Vehicle technology Improvements	Improvement of vehicles so as to obtain better performance or to reduce energy-use affecting engine, cargo handling or construction of vehicles
Voluntary cooperation	Employing various cooperative pick-ups and delivery or cooperative operations of terminals

The tasks identified above are summarized as under (refer Figure 1-2);

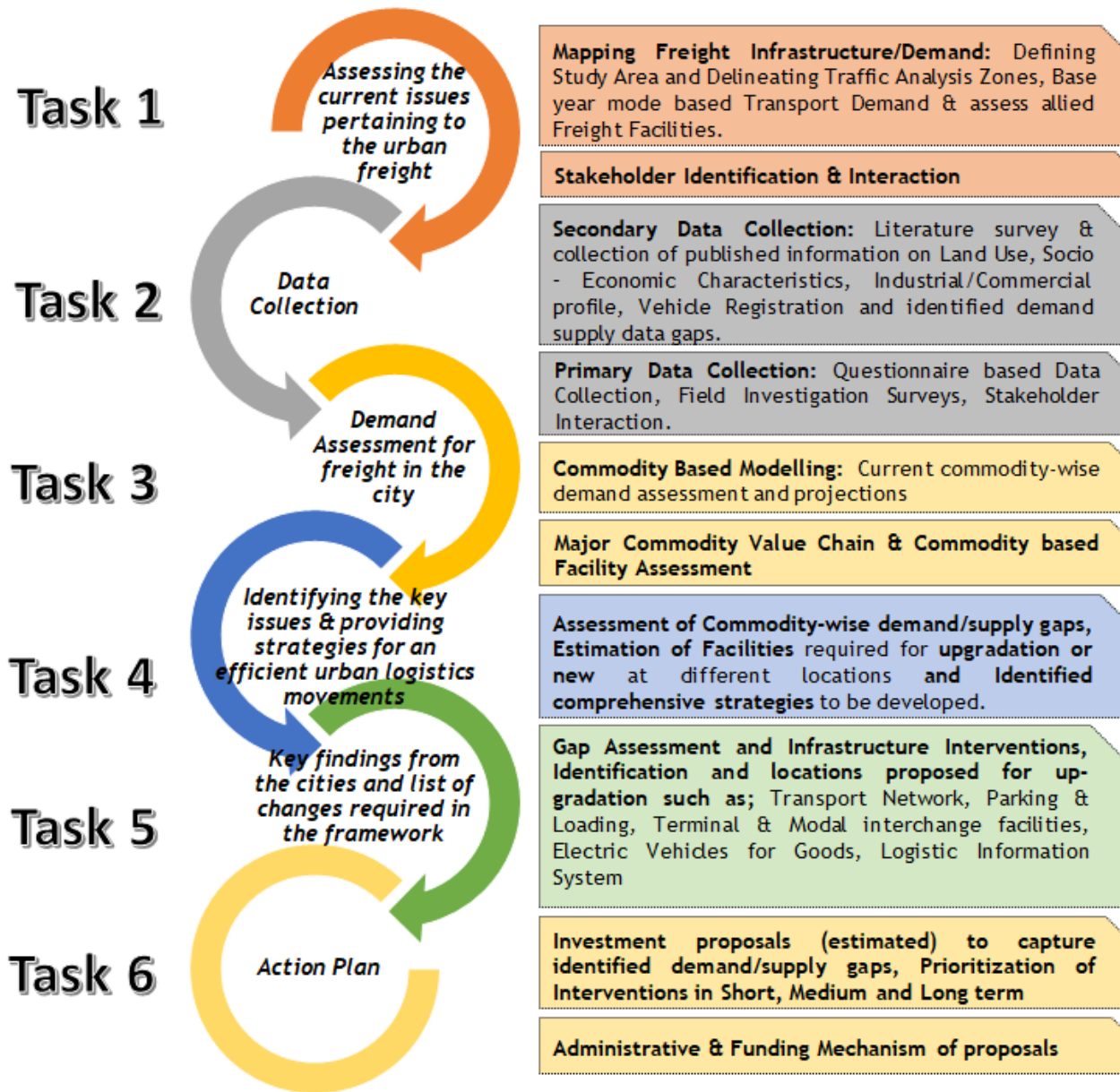


Figure 1-2: Task Summarisation

Source: UMTC

1.4 APPROACH & METHODOLOGY

To appropriately signify each aspect in preparation of Prayagraj City Logistics Plan, a well-defined approach has been evolved. Various steps taken to suitably represent each sector are described as under.

1.4.1 SPATIAL COVERAGE/ STUDY AREA

Keeping in view the terms of reference, the study area is defined in consultation with Prayagraj Development Authority Officials (discussed in chapter on Study Area Profile).

1.4.2 MODAL COVERAGE

The study area is already connected by road, rail, IWT and Airways. Keeping in view the type of freight traffic estimated to be handled in case of rail, IWT and Airways network external connectivity has been prepared, whereas in the case of road, important road links within the study area, connecting traffic contributing locations such as; trade centers, Mandis, Parking areas, intermodal terminals and external links have been considered. In order to meet projected cargo demand for intermodal mix and proposed facilities such as; ICDs, DCTs, MMLP, warehouses, cold storage etc. road connectivity has been studied.

1.4.3 TRAFFIC ZONES

To logically develop freight movement pattern in the study area which will cater to the entire country, the traffic zones have been prepared. Broadly, the traffic zones are divisible in two parts i.e. Internal traffic zones and External traffic zones. On one hand internal traffic zones represent areas falling within the study area, whereas external traffic zones include areas outside the study area limits. This allowed the consultants to arrive at commodity wise originating, terminating and/or transiting traffic from the study area. In the case of districts of UP (outside Study Area), each district is considered as an independent traffic analysis zone (TAZ) whereas for other states, each state is also denoted as traffic analysis zone.

To appropriately capture intra study area traffic, the study area is divided into a number of traffic zones coterminous with Wards or the important locations/trading centre which are the major traffic contributors (originating /terminating areas), to develop intra study area cargo movement pattern. The details are shown in Figure 1-3. The list of TAZ's are given as **Annexure 1-1**.

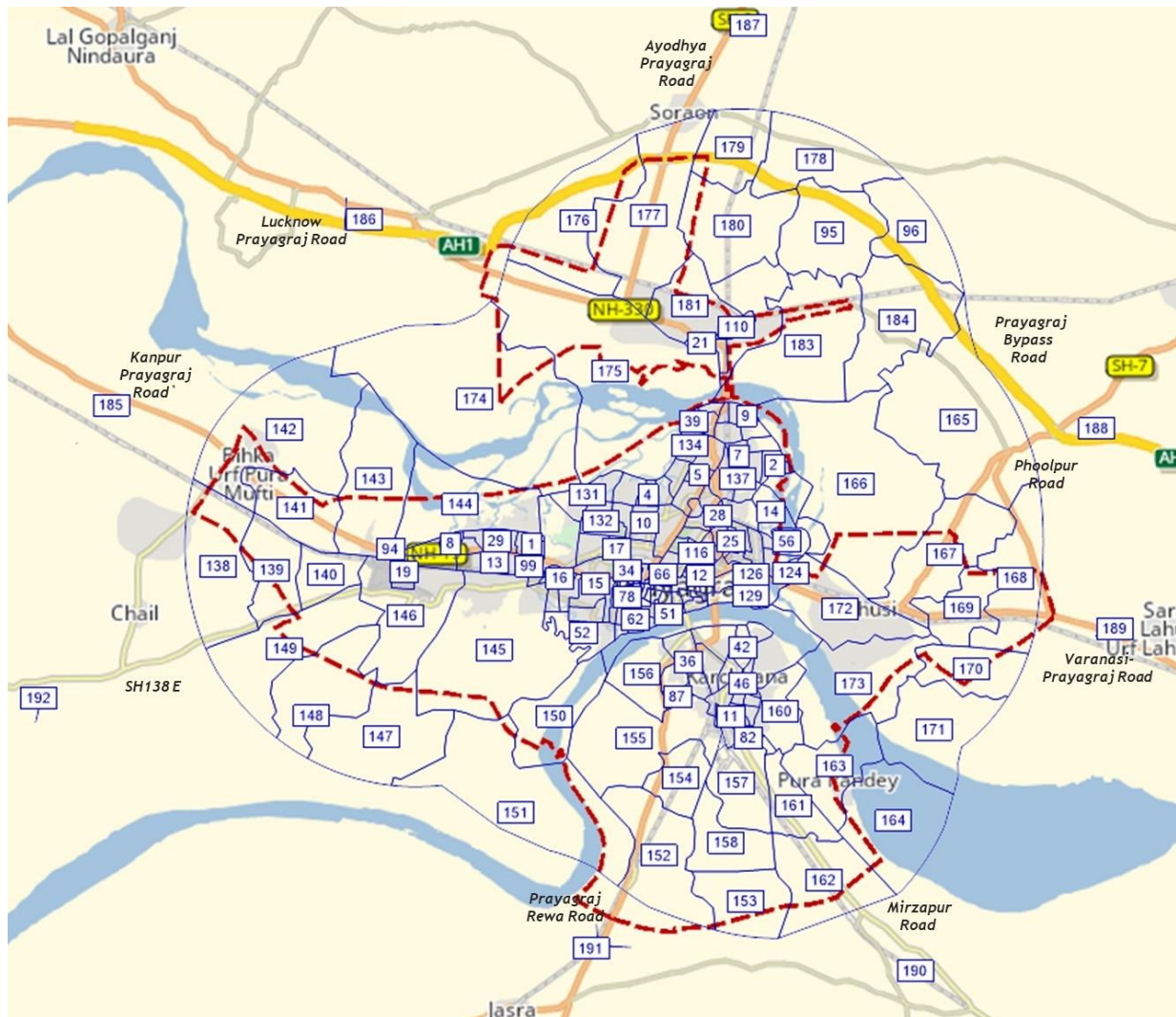


Figure 1-3 Map Showing the FTAZ

1.4.4 BASE YEAR

To bring all information to a common period, 2022-23 is considered as base year of the study. The secondary data which pertained to different years have been updated by applying appropriate raising factors.

1.4.5 COMMODITY GROUPING

To judiciously cover all the commodities for preparing the future facilities demand, the entire of range of commodities envisaged to be moved by different modes are arranged in homogenous groups, based on their nature of handling (baggage), storage and movement pattern. All the bulk commodities germane to be moved by railway and IWT are given due reference in this regard. Commodity wise groups are listed in **Annexure 1-2**.

The study also covered regional traffic analysis, gap identification to represent ongoing and future transport demand, various infrastructure development proposals, solutions and costs.

Different tasks identified for the study are mapped as under (refer **Figure 1-4**):

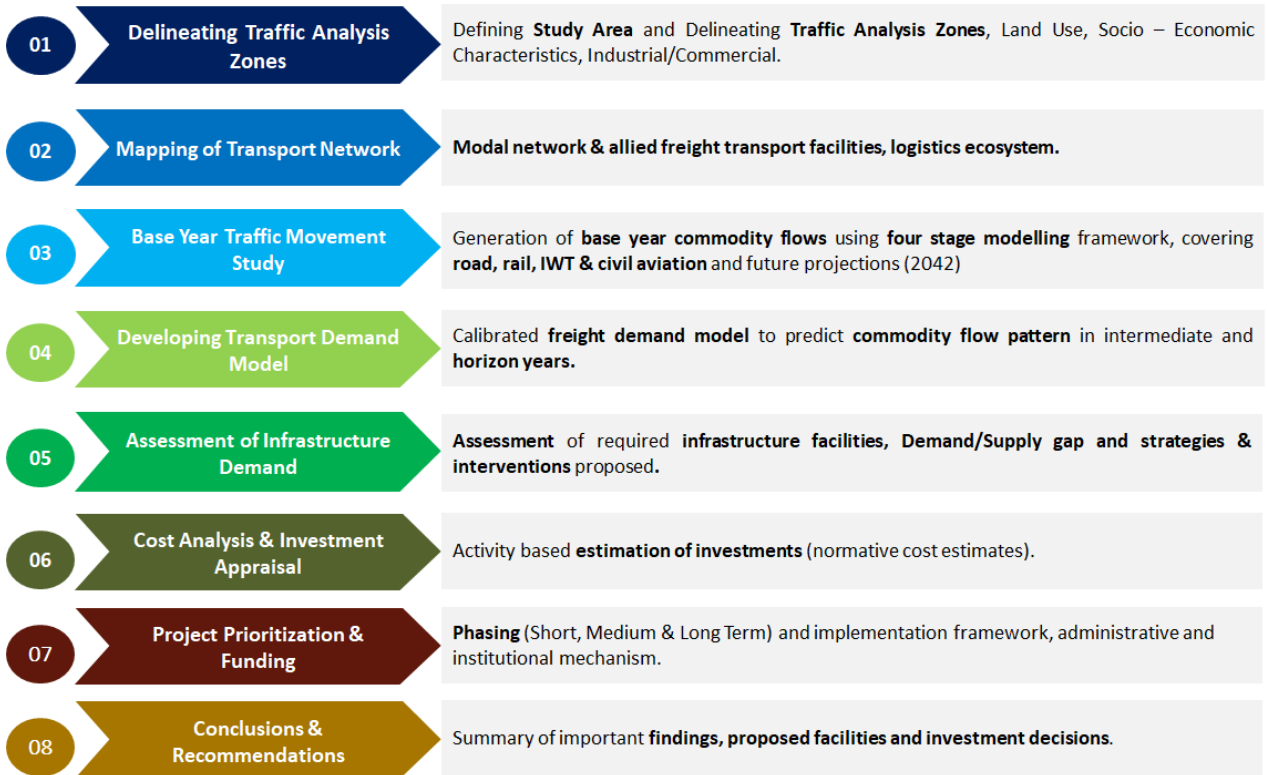


Figure 1-4: Approach and Methodology for the Study

Source: UMTC

1.5 ORGANIZATION OF THE REPORT

The Final Report consists of six chapters given in Figure 1-5 below:



Source: UMTC

Figure 1-5: Report Structure

The background of the entire page is an aerial photograph of a city street grid. Overlaid on this are several semi-transparent colored regions: a red region at the top left and bottom right corners, a purple region at the top right and bottom left corners, and a central horizontal band that is split into a red upper half and a grey lower half. The text is centered within these bands.

CHAPTER 2

STUDY AREA PROFILE

2. STUDY AREA PROFILE

Prayagraj is a major city in the Indian state of Uttar Pradesh. It is the administrative headquarters of the Prayagraj district the most populous district in the state and 13th most populous district in India. The city is the judicial capital of Uttar Pradesh, with the Prayagraj High Court being the highest judicial body in the state. As of 2011, Prayagraj is the seventh most populous city in the state, with an estimated population of 1.53 million in the city. In 2011 it was ranked the world's 40th fastest-growing city. In 2016, it was also ranked the third most liveable urban agglomeration in the state (after Noida and Lucknow) and sixteenth in the country. As Prayagraj is one among the 7 cities in the State of Uttar Pradesh chosen by Government of India for "Freight Smart Cities Phase I", the city has high economic opportunities, and this further enhances the freight dominance in the city.

This section discusses the Prayagraj city study area, location setting, land use as per the master plan, demographic & economic characteristic and culminates with the categorisation of city as per the MoHUA framework.

2.1 LOCATION SETTING

Prayagraj lies in Southern part of Uttar Pradesh, at the confluence of the Ganga and Yamuna. The region was known in antiquity first as the Kuru, then as the Vats country. To the southwest is Bundelkhand, to the east and southeast is Baghelkhand, to the north and northeast is Awadh and to the west is the lower doab (of which Prayagraj is part). The city is divided by a railway line running East-West. South of the railway is the Old Chowk area, and the British-built Civil Lines is to the North of it. Prayagraj is geographically and culturally strategically located. Geographically part of the Ganga-Yamuna Doab (at the mouth of the Yamuna), culturally it is the terminus of the Indian West. The Indian Standard Time longitude (25.15° N 82.58° E) is near the city. According to a United Nations Development Programme report, Prayagraj is in a "low damage risk" wind and cyclone zone. In common with the rest of the doab, its soil and water are primarily alluvial.

Other prominent cities of the state like Pratapgarh lie towards the North of the city, Bhadohi to its East, Rewa towards South, Chitrakoot (earlier Banda) to the West, and Kaushambi, which was till recently a part of Prayagraj, to its North-West. The geographic location of the city is given in Figure 2-1.

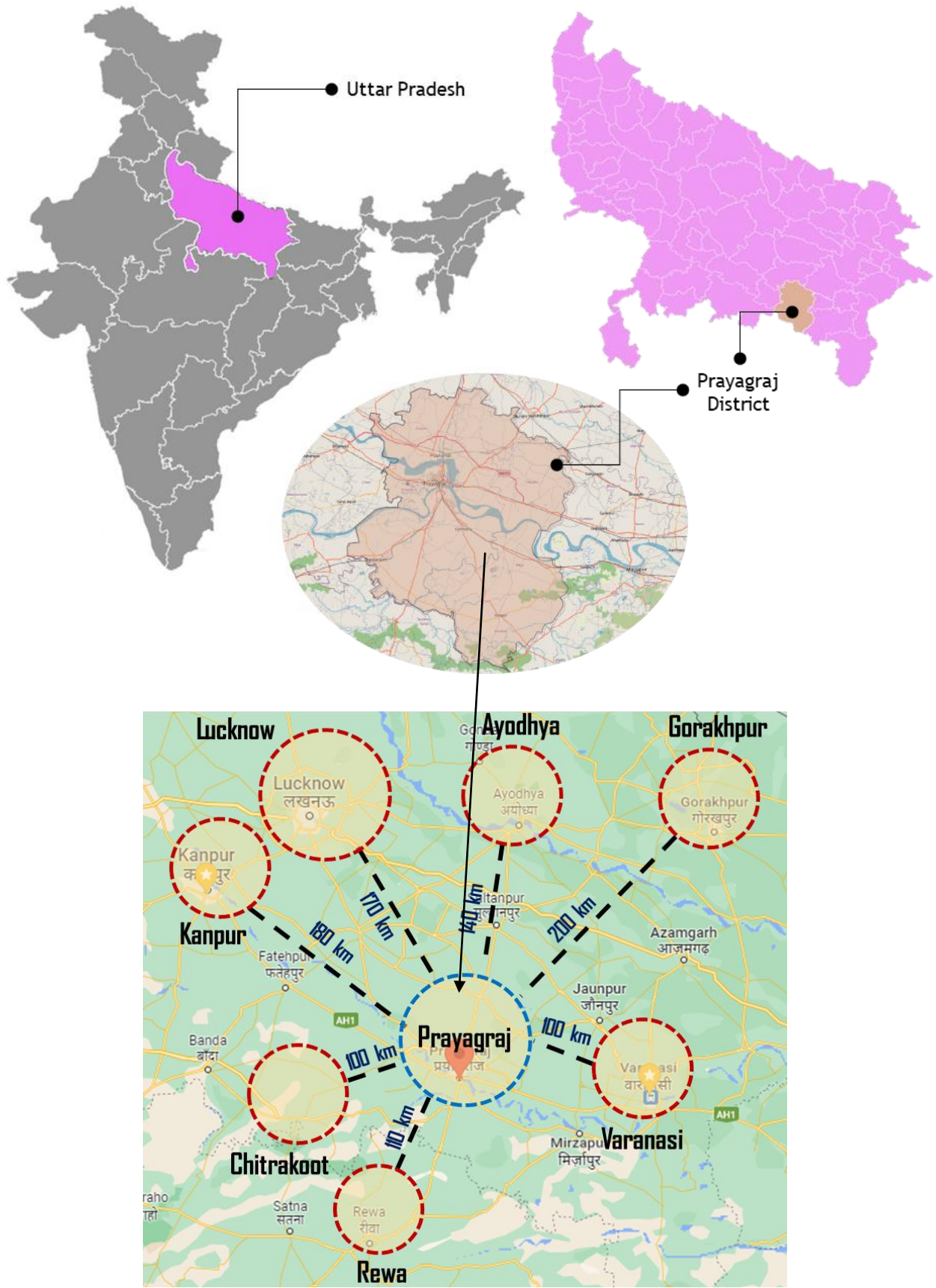
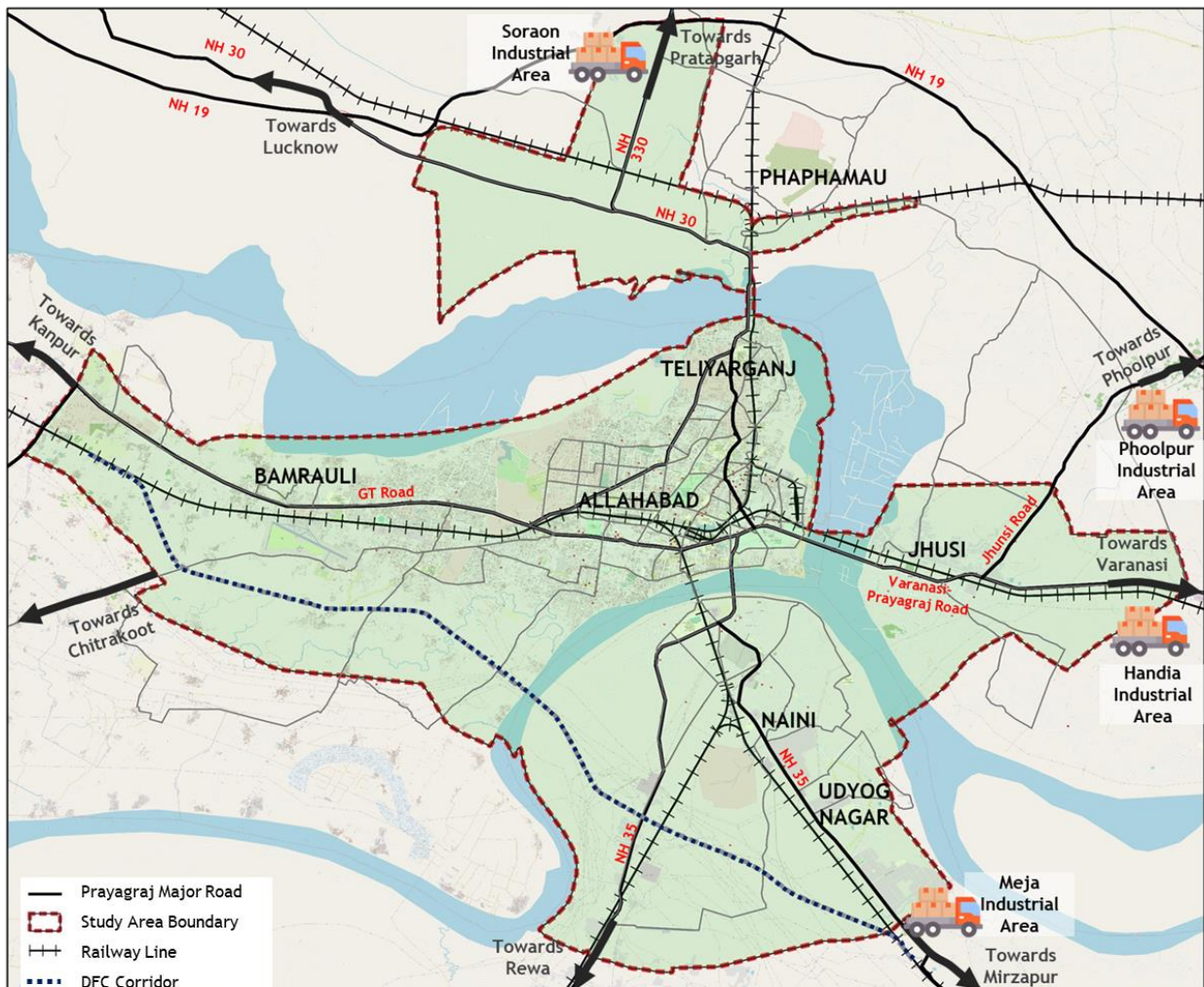


Figure 2-1: Prayagraj City's Geographical Location

2.2 STUDY AREA

A strategic delineation of project influence area beyond the city limits is required to study the concatenating effect of freight movement in Prayagraj. Delineation for the current study had been carried out based on the understanding of the geographical setting, freight infrastructures, freight flow patterns and the major impacted areas. Accordingly, the study area is considered same as that of Prayagraj Urbanizable limits, as per the Draft Master Plan, Prayagraj 2031, which is about 367.73 sq.km.

Prayagraj is strategically located and has a high level of freight movement due to its proximity to industrial areas. These factors have led to the development of allied industries in the region. The project influence area is proposed to be a buffer zone centred on Prayagraj city and includes areas such as Teliyarganj, Udyog Nagar, and Naini within the city, as well as adjacent industrial areas like Soraon, Phoolpur, Handia, and Meja. The study area has been shown in Figure 2-2 below.



Source: Prayagraj Draft Master Plan 2031

Figure 2-2: Prayagraj City Logistic Plan Study Area

2.2.1 ROAD NETWORK CONNECTIVITY

Prayagraj constitutes the core of the present city structure providing not only residential land use but also educational, commercial (retail, wholesale), small scale manufacturing of iron, plastics and wooden goods etc. The old city has an irregular road network comprising of major roads, which are almost 2-3 lane wide. The narrow and congested secondary roads lead the vehicular traffic from households and commercial centres to the Grand Trunk Road which is a major arterial road of the city and vice versa. Civil Lines is a well-planned area in the form of grid-iron pattern interspersed with Open Park like spaces. The major roads have a 4-lane divided carriageway with wide footpaths on either side and service lane. The collector roads are 2 to 3 lanes wide and intersect the major roads at traffic rotary. The area is separated from the old city by Prayagraj railway station.

The city is surrounded by Mumfordganj and Phaphamau in the North, Allapur in the East and Naini in the South. The road network in these areas vary from 2 lanes to a single lane. These high-density areas with unplanned development activities result in various traffic problems.

Road infrastructure like markings and signage's, footpath, signalling system and road geometrics are irregular in areas like Muttiganj, Transport Nagar etc. Hence, immediate attention is required to have a harmonized vehicular movement, to ensure smooth movement of freight in the city free from casualties and fatalities.

The road network connectivity of the city is shown in Figure 2-3 below.

Table 2-1: Area under Roads in Prayagraj

Class	Area (Ha)	Percentage	Sub-class	Area (Ha)
Road	1,263	2.54	Bypass	57.25
			Major City Road	1153.6
			Service Road	42.04
			Major District Road	9.9

Source: Draft Master Plan, 2021

Table 2-2: Length of various roads

S.no.	Right of Way (m)	Length (km)	Percentage
1	< 10	0.31	0.1%
2	10-20	151.7	32.5%
3	20-30	127.4	27.3%
4	30-40	108.6	23.3%
5	>40	78.3	16.8%
6	Total	466.31	100%

Source: CMP, 2020

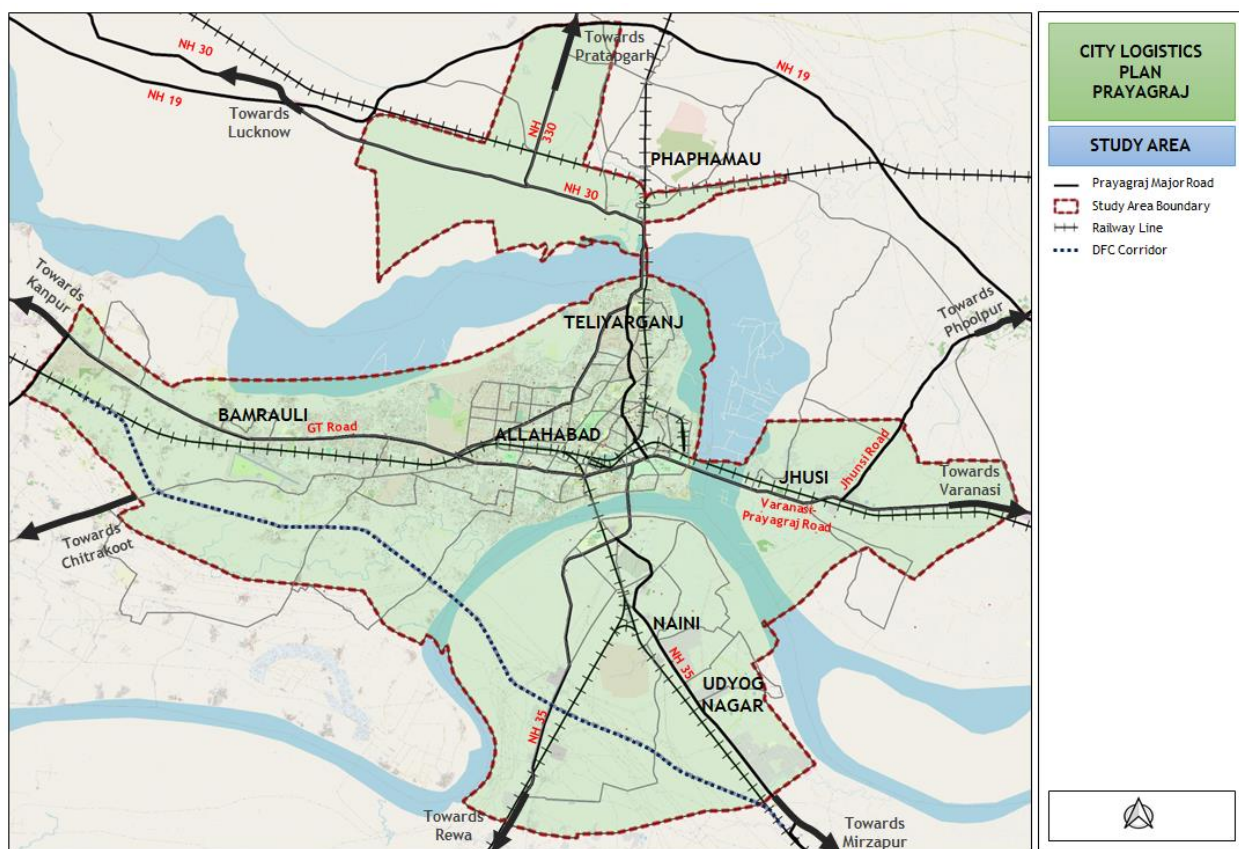
Within the study area discussed in Section 2.2 & depicted in Figure 2-3, following are the category of roads prevalent:

Regional roads: These include NH 19 (Kanpur- Prayagraj- Varanasi- Dhanbad- Kolkata), NH 30 (Lucknow- Raebareilly- Prayagraj- Rewa- Jabalpur) & NH35 (Banda- Prayagraj- Mirzapur- Varanasi).

Major urban roads/ arterial roads: The major roads are Grand Trunk Road, Stanley road, PD Tandon Marg, Katra road, MG Marg, Civil lines, SP Marg, KN road, Naini Road, Thornhill road, Kutchery road and Varanasi road. They connect numerous city activities and cater to intra-city transportation.

Local and internal roads: Local roads in Prayagraj city's unplanned regions and inner core areas are relatively narrow. Additionally, many slow-moving vehicles utilise them, which increases congestion.

The road network connectivity of the city is shown in Figure 2-3.



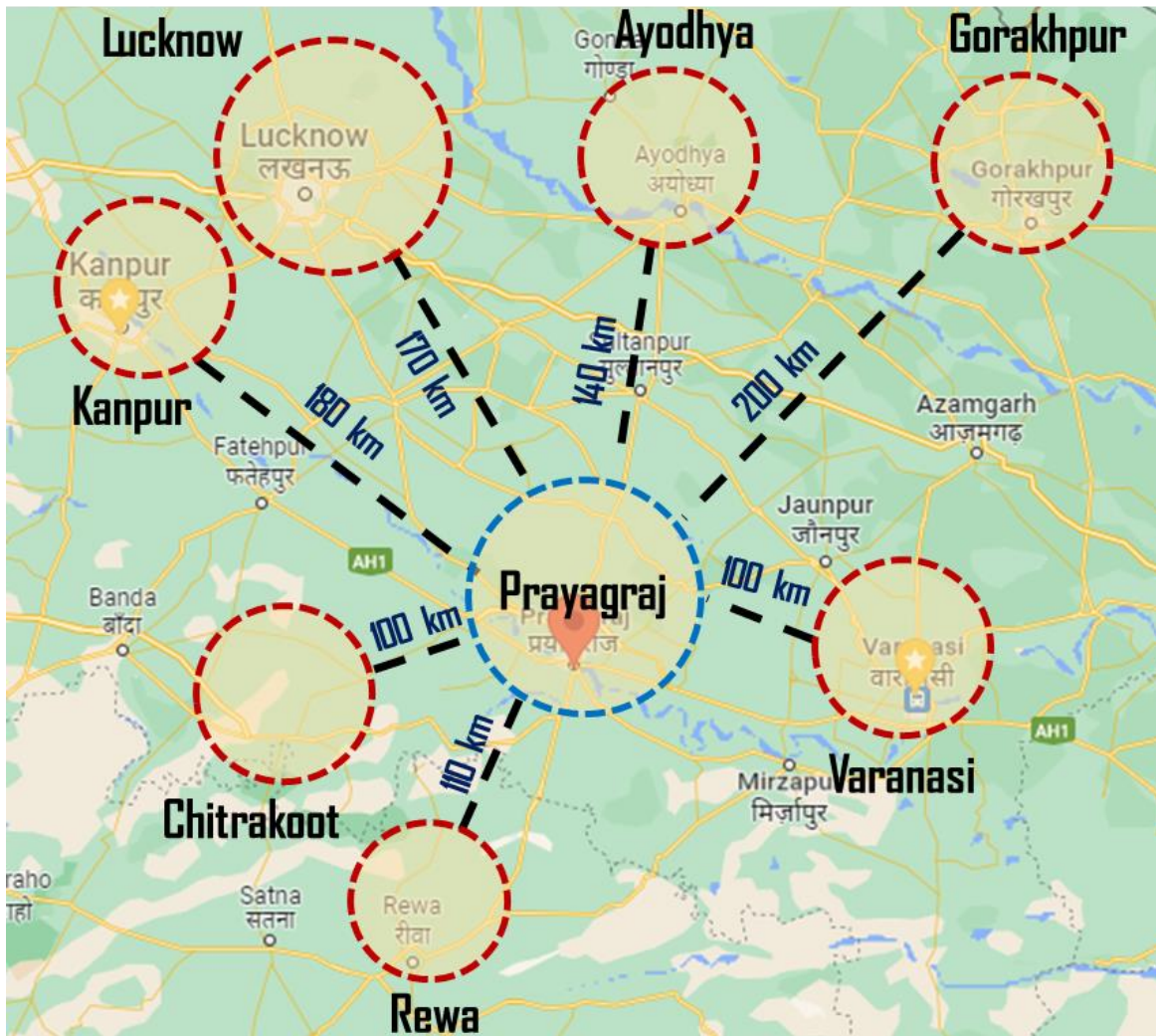
Source: Primary Analysis, UMTC

Figure 2-3: Prayagraj City Road Network Connectivity

2.3 REGIONAL CONNECTIVITY

Considering the strategic location of Prayagraj and its close proximity to some of the important industrial areas of the state, moderate to heavy freight movement is observed in the city. Prayagraj city acts as the central attraction zone for the towns nearby since it acts as the judicial capital of the state as well as has major religious and tourist importance, thereby inducing development of allied industrial sectors in the region. Due to importance of the city, it is

proposed to be connected by Ganga Expressway from Meerut to Prayagraj. The regional connectivity of the city is shown in Figure below.



Source: UMTC

Figure 2-4: Regional Connectivity of Prayagraj City

2.3.1 RAILWAY CONNECTIVITY

Prayagraj falls on the important railway corridors of the country such as Delhi - Kolkata and Patna - Mumbai route. The city is connected to all major cities in Uttar Pradesh and across the country such as Kolkata, New Delhi, Hyderabad, Patna, Mumbai, Visakhapatnam, Chennai, Bangalore, Guwahati, Thiruvananthapuram, Pune, Bhopal, Kanpur, Lucknow and Jaipur.

There are ten railway stations in Prayagraj, which are as follows:

- Prayagraj Junction in civil lines area
- Subedarganj Railway Station
- Naini Railway Station
- Cheoki Junction Railway Station
- Prayag Junction Railway Station
- Rambagh Railway Station
- Barmauli Railway Station

- Phaphamau Railway Station
- Iradatganj Railway Station
- Jhunsi Railway Station

Of these, Prayagraj Junction is the most significant railway station of the city. It is one of the main railway junctions in Northern India and serves as the headquarters of the North Central Railway Zone. With the future developments taken into consideration, the other railway stations namely Rambagh, Prayag, Subedarganj and Naini need to be revamped and re-developed for better operations and passenger amenities.

Of the 10 station Subedarganj, Naini and Iradatganj stations cater to freight traffic. Subedarganj is primarily used for incoming-outgoing Oil Tankers from IOCL and at Naini and Iradatganj constitute miscellaneous goods like cement, fertilizers, agro-products etc. commodities are transported. The current volume of freight traffic at the 3 stations is about 3609 MT per day. With the future requirements and increased frequency of goods and passenger trains, provisions for loading/unloading and warehousing/storage at these three stations may also be explored. Figure 2-5 below shows locations of the railway stations in Prayagraj.



Source: Comprehensive Mobility Plan Prayagraj 2020 and Primary Analysis, UMTC

Figure 2-5: Prayagraj City Rail Network Connectivity

2.3.2 AIRPORT CONNECTIVITY

Prayagraj is served by Prayagraj Airport, which began operations in February 1966. The airport is 12 kilometres from the city centre and lies in Bamrauli, Prayagraj. Currently, there are only few airlines operating here. Alliance Air operates for Delhi and Bilaspur and Indigo operates for Delhi, Mumbai, Bangalore, Pune, Gorakhpur, Bhopal, Bhubaneswar, Raipur, Dehradun and Kolkata. It is an Indian Air Force (IAF) Controlled airport thus, has limited access to civilians. The freight movement from Prayagraj Airport has started since July,2022. The location of Prayagraj airport is highlighted in Figure 2-6 and the annual traffic handled by the airport is given in Table 2-3 below.



Source: Primary Analysis, UMTC

Figure 2-6: Prayagraj Airport

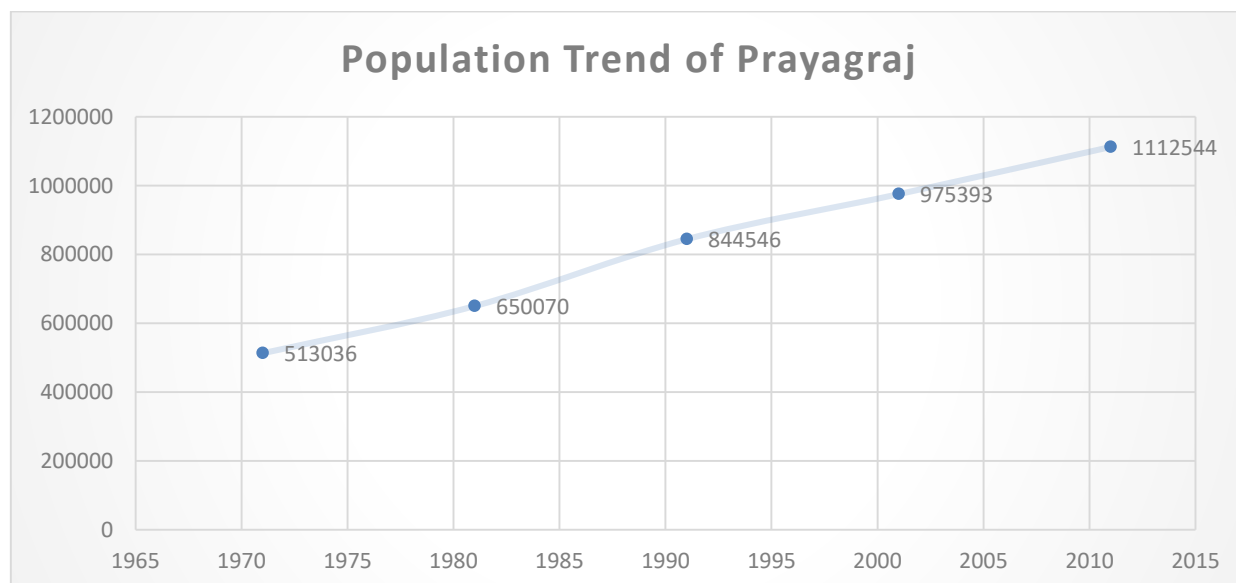
Table 2-3: Annual Traffic at Prayagraj Airport

Annual Traffic Handled (F.Y.)		2019-20	2020-21
1	Aircraft Movement	4,483	4,124
2	Passenger	4,15,064	3,47,166
3	Total Freight Cargo (tons)	0	0

Source: AAI

2.4 DEMOGRAPHIC & SOCIO-ECONOMIC CHARACTERISTICS

As is evident from Table 2-4, the population of the city has been growing continuously and there has also been not much variation in the growth rates over the past few decades except for the decade 1961-71. The total population for the study area is 13,34,870 (Census of India, 2011). The urban area constitutes the Prayagraj Municipal Corporation area (ward 1-80) and outgrowth areas including Subedarganj Railway Colony, Begum Bazar, Bhagal Purwa, Kodra, IOC Colony etc. The Municipal Corporation area houses most of the population i.e. 10,87,117 (Census of India, 2011; Source: ANN). As per the Development Plan prepared by Prayagraj Development Authority, the population of Prayagraj Master Plan Area for 2001 was estimated to be 12 lakhs with growth rate of 42% and in conjugation with the proposed development, the planned area was expected to accommodate a population of 22,60,000 by 2021. The population growth trend from 1971 to 2011 is depicted in the Figure 2-7 and Table 2-4 below. In view of Master Plan projections and considering the high rate of growth in the area, CMP, 2020 for Prayagraj had also projected the population of Prayagraj for the horizon year i.e., for 2031 as 30 lakhs.



Source: Draft Prayagraj Master Plan 2031

Figure 2-7: Population trends of the study area

Table 2-4: Census population and growth trend of Prayagraj Urban Agglomeration/ Study Area

Census Years	Population (In Lakhs) *
2001	10,98,960
2011	12,68,110

Source: Draft Prayagraj Master Plan 2031

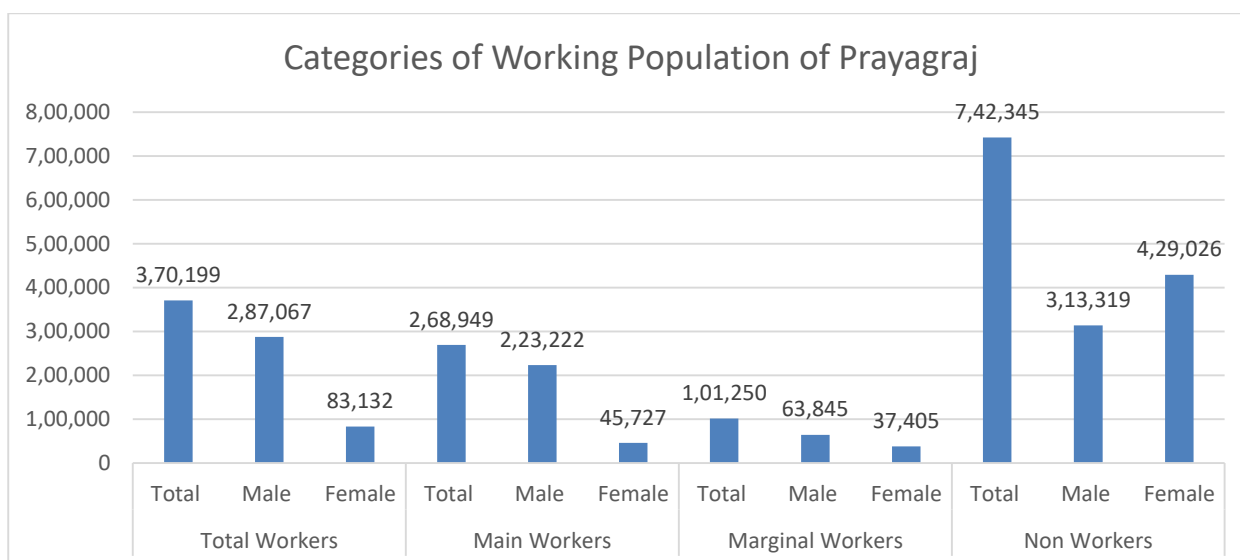
As per Census 2011, Work force Participation Rate (WFPR) for the city is observed to be 33%, which is at par with most of the cities of similar size. It is clear from the Table 2-5 below, that number of workers increased by 48% over the last decade. However, most of the workers who joined were marginal workers.

The WFPR from Census 2011 data gender wise reflects the number of working & non-working population as shown in the Figure 2-8.

Table 2-5: Existing Work Force Participation Rate

Category of Workers	Gender Classification	No. of Persons - 2011	No. of Persons- (2001)	% Growth
Total Workers	Total	3,70,199	2,49,597	48%
	Male	2,87,067	2,16,671	32%
	Female	83,132	32,926	152%
Main Workers	Total	2,68,949	2,11,320	27%
	Male	2,23,222	1,87,115	19%
	Female	45,727	24,205	89%
Marginal Workers	Total	1,01,250	38,277	165%
	Male	63,845	29,556	116%
	Female	37,405	8,721	329%
Non-Workers	Total	7,42,345	7,25,796	2%
	Male	3,13,319	3,23,101	-3%
	Female	4,29,026	4,02,695	7%

Source: Census 2011



Source: Census of India, 2011

Figure 2-8: Existing Work Force Participation Rate - Census 2011

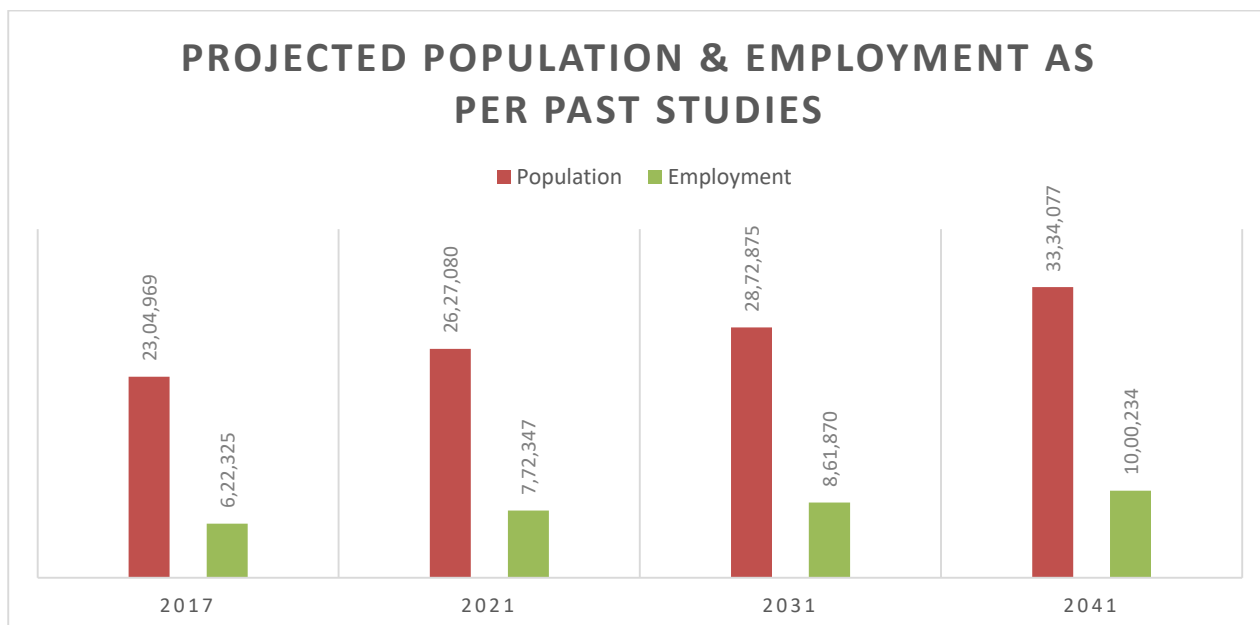
The projected population and employment from the past studies are shown in Table 2-6 below.

Table 2-6: Projected Population & Employment as per Past Studies

Projections	2017	2021	2031	2041
Population	23,04,969	26,27,080	28,72,875	33,34,077
Employment	6,22,325	7,72,347	8,61,870	1,00,0234

Source: Updated Comprehensive Mobility Plan Prayagraj, 2020

The Figure 2-9 shows the projected population and employment as per the past studies. This depicts continuous positive growth of population and employment estimated for study area. Population and employment are important parameters for undertaking this study as it also represents increase in demand and supply of freight in the city.



Source: Updated Comprehensive Mobility Plan Prayagraj 2020

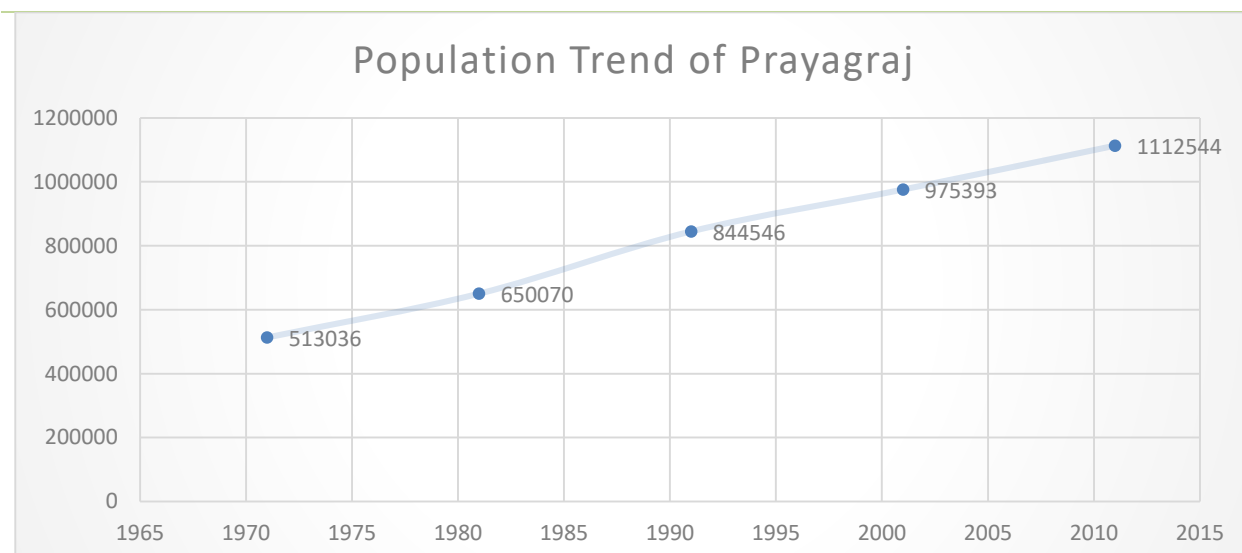
Figure 2-9: Projected Population & Employment as Per Past Studies

The population projection for horizon year of the study is given in the Table 2-7. The population is estimated by taking the average of three methods namely Arithmetic Increase Method, Incremental Increase Method and Geometric Increase Method.

Table 2-7: Projected Population & Employment for the Horizon Year of this Study

Projections	2001	2011	2022	2032	2042
Population	10,98,960	12,68,110	15,29,371	18,36,701	22,12,137
Employment	2,49,597	3,70,199	5,04,692	6,06,111	7,30,005

Source: Primary Analysis, UMTC



Source: Primary Analysis, UMTC

Figure 2-10: Projected Population & Employment for the Horizon Year of this Study

2.5 ECONOMIC CHARACTERISTIC

The major industries in Prayagraj are tourism and agriculture. There are secondary activities and manufacturing also taking place in the city, of which, some are registered while some are not. A significant activity in the city is the large scale construction taking place which adds to the city's economy. The third All India Census for Small Scale Industries shows that there are more than 10,000 unregistered small-scale industry units in the city. The study also has an upcoming Logistics Park sprawling over an area of about 1200 acres.

The total GDP of the district was around ₹39,428.70 Crore at market price (2019 - 2020) and ₹37,397.59 Crore at basic price in 2011 - 2012.

The Table 2-8 showing the economic analysis of the district while comparison of the district & state GDP is shown in the Table 2-9 below.

Table 2-8: Gross District Domestic Product by Economic Activity

S.No.	ECONOMIC ACTIVITY	GDP (₹ in Crore) At Constant Prices	
		2018-2019	2019-2020
1	Agriculture, Forestry and Fishing	3,634.13	3,730.58
1.1	Crops	2,092.12	2,033.26
1.2	Livestock	1,069.85	1,187.57
1.3	Forestry and Logging	379.34	411.64
1.4	Fishing and Aquaculture	92.82	98.12
2	Mining and Quarrying	1,307.82	1,097.38
A	PRIMARY	4,941.96	4,827.96
3	Manufacturing	3,041.58	2,787.60

S.No.	ECONOMIC ACTIVITY	GDP (₹ in Crore) At Constant Prices	
		2018-2019	2019-2020
4	Electricity, Gas, Water Supply & Other Utility Services	522.63	551.28
5	Construction	6,657.35	7,097.25
B	SECONDARY	10,221.56	10,436.13
6	Trade and Hotel & Restaurant	2,089.63	2,303.29
7	Transport, Storage & Communication	4,326.73	4,875.99
7.1	Railway	758.88	749.48
7.2	Transport by Means Other than Railways	2,613.01	3,054.67
7.3	Storage	40.50	54.95
7.4	Communication & Services Related to Broadcasting	914.35	1,016.88
8	Financial Services	1,258.41	1,425.75
9	Real Estate, Ownership of Dwellings and Professional Services	4,592.92	4,614.50
10	Public Administration	6,310.88	6,410.69
11	Other Services	2,325.95	2,503.27
C	TERTIARY	20,904.51	22,133.50
D	GROSS DISTRICT VALUE ADDED (At Basic Prices)	36,068.02	37,397.59
E	GROSS DISTRICT DOMESTIC PRODUCT (At Market Prices)	38,460.45	39,428.70

Source: GDIC

The comparison of the state and district GDP in 2018 - 2019 & 2019 - 2020 is shown in the Table 2-9. Comparing with the State GDP of Uttar Pradesh, the Prayagraj has the approximate contribution of 3.4% & 3.43% for the year 2018-19 & 2019-20 respectively.

Table 2-9 :- Comparison of State & District GDP

Year	GDDP (Prayagraj)	State GDP (Prayagraj)	Share of Prayagraj in State GDP
	(₹ In Crore)		
2018-19	38460.45	1131108.14	3.40%
2019-20	39428.70	1148576.79	3.43%

Source: GDIC

The primary sectors like agriculture contribute to around 13% in the district GDP (2019 - 2020), while secondary sectors contribute about 28% in the GDP (2019 - 2020) & highest share comes from tertiary sector, which contribute to around 59% in the GDP (2019 - 2020). The details of the same is given in Figure 2-11 below.

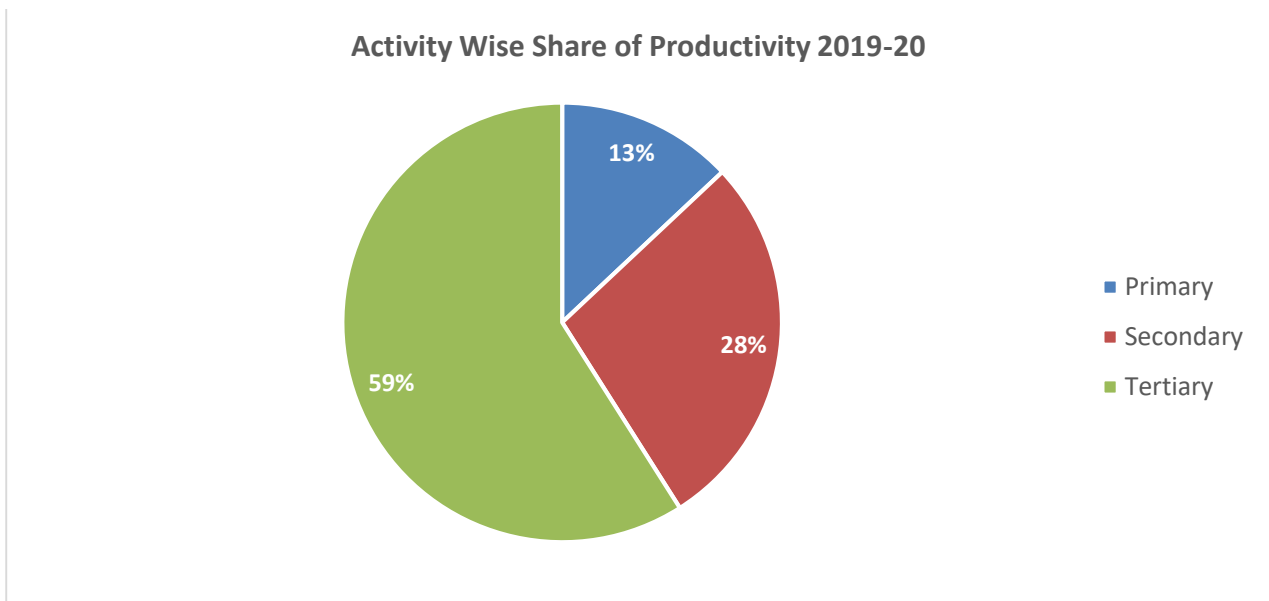
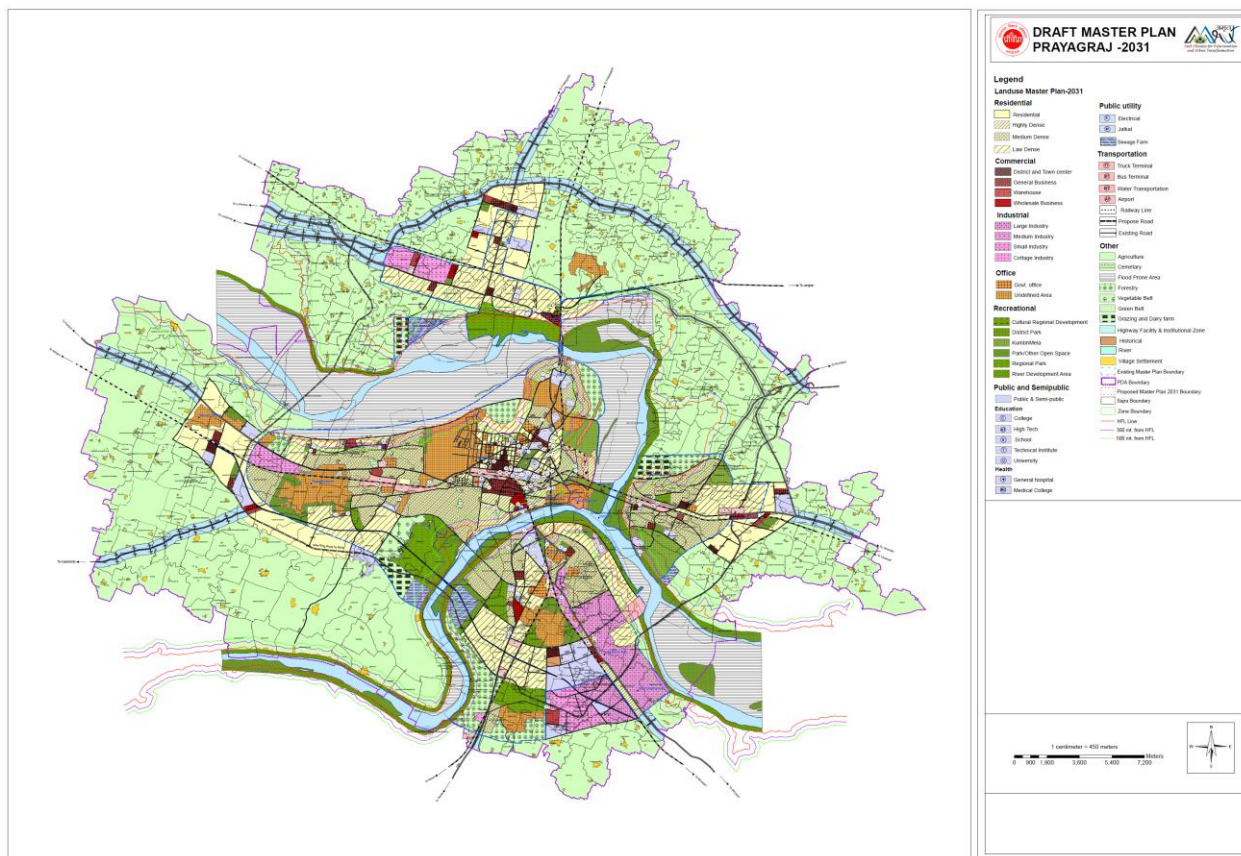


Figure 2-11: Activity wise Share of Productivity in 2019-20

Source-GDIC

2.6 EXISTING LAND USE CHARACTERISTICS

The Prayagraj Master Plan, 2031 is being prepared to guide the balanced growth of the city in which macro level proposals identifying city level wholesale and retail commercial centres, administrative centres were proposed. It proposes major expansion of the city within its municipal limits through provisions of ring roads and development of residential and other support economic and urban infrastructure facilities. The land use proposed for Prayagraj Development Area under Draft Masterplan for Prayagraj, 2031 is shown in Figure 2-12.



Source: Prayagraj Draft Master Plan 2031

Figure 2-12: Draft Land Use Proposed for Prayagraj Development Authority 2031

The Figure 2-12 & Table 2-10 below illustrates the proposed land use distribution for Prayagraj Development Area under the Masterplan for Prayagraj 2031. Nearly 12% of land use falls under transportation/ circulation area. The industrial areas were observed to hold 6% of the total land use distribution.

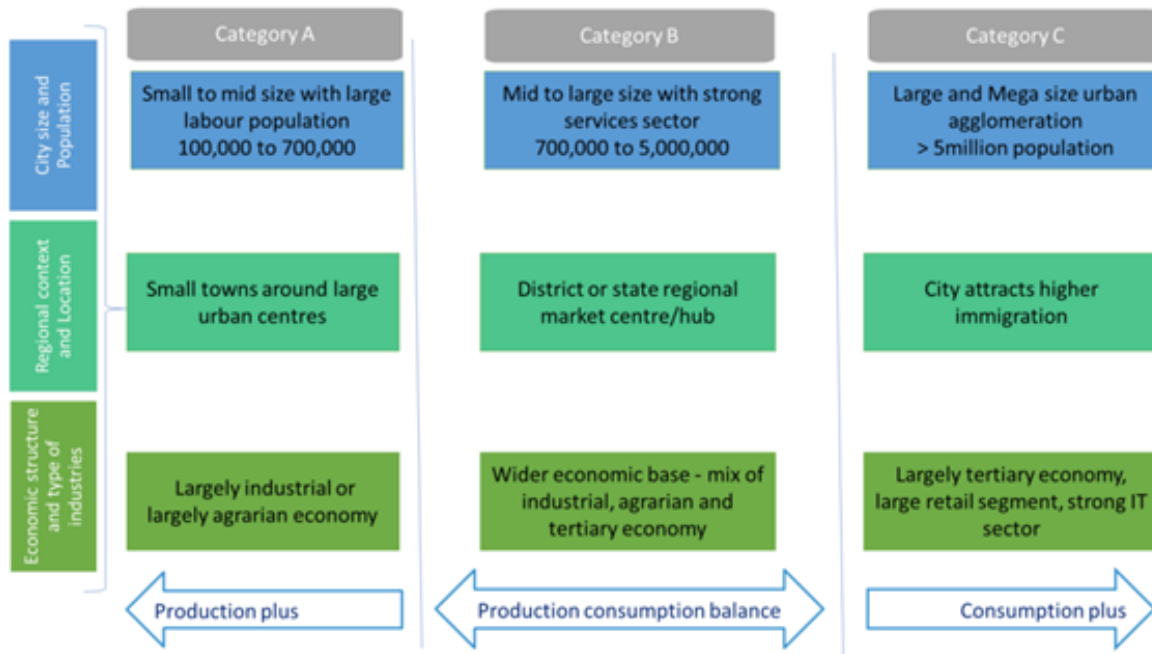
Table 2-10: Land Use Composition (Prayagraj Masterplan 2021)

Land Use	Area (in Ha)	% Share
Residential	111.64	36.11
Commercial	7.46	2.41
Manufacturing/ Industrial	17.22	5.57
Government	26.24	8.49
Recreational	49.53	16.02
Public & Semi-Public Facilities	11.79	3.82
Public Utilities	6.90	2.23
Transportation/ Circulation	37.36	12.08
Other Land uses	40.99	13.26
Total	309.17	100

Source: CMP Prayagraj 2020

2.7 MOHUA FRAMEWORK - CITY CATEGORIZATION

The categorization of city according to MoHUA framework (Guidelines for National Sustainable Urban Freight Transport System) is based on 3 distinct categories; population size of the city, regional context & location and economic structure & type of industries. The framework details are shown in **Figure 2-13** below.



Source: Guidelines for National Sustainable Urban Freight Transport System

Figure 2-13: City Categorization MoHUA Framework

Prayagraj city falls within the population range of Category B (Production consumption balance) however have evolved in tertiary and services sector. There are fewer industries in the urban area of the city, as they have been observed to shift to outskirts in order to obtain competitive land and utilities. Additionally, the city attracts higher immigration, nano-stores (few sq. m.), informal eateries and restaurants, larger formal hospitality sector and mostly more IT related developments. Such cities have larger geographical sprawl and become large consumption hubs.

2.8 SWOT ANALYSIS

SWOT (Strengths, Weaknesses, Opportunities, and Threats) analysis is a framework used to evaluate a cities industrial & freight movement existing position and to develop strategic planning. SWOT analysis assesses internal and external factors, as well as current and future potentials. **Figure 2-14** below list the SWOT analysis based on a detailed reconnaissance survey.



STRENGTHS

Good road and railway connectivity, Meeraganj and Naini Industrial Areas , Presence of 1 Transport Nagar for freight handling and movement, BPCL and Alstom like large industries available in the city, Good connectivity by railways with all major cities, viz., Kolkata, Delhi, Jaipur, Lucknow and Mumbai, Hyderabad, Bhopal and Chennai.

WEAKNESSES

Narrow and undivided Roads, absence of southern bypass for the city leads to freight movement through city, hereby causing congestion, encroachment on carriageways due to Parking and Hawkers in central core area where major whole sale markets dominate, presence of only 1 Transport Nagar and lack of proper logistic hubs which are integrated with rail (ICDs), lack of efficient traffic management

OPPORTUNITIES

New additional Naini industrial area of 1800 acre, Economic benefit due to existing geographical location and connectivity, Availability of Land, Passing of EDFC corridor through the city. This will increase the potential of the development ICDs and speed up the freight mobility, upcoming Prayagraj Bypass will speed up the freight mobility for the External-to-External freight movement, high potential for IWT project

THREATS

Various industries and wholesale market are located in the central part of the city attracts the various freight vehicle movement, Lack of freight handling infrastructure like Transport Nagar/Logistics Hub results in free movement of heavy vehicles and unauthorized parking.

Source: Site Reconnaissance & Primary Survey, UMTC

Figure 2-14: SWOT Analysis of Prayagraj City



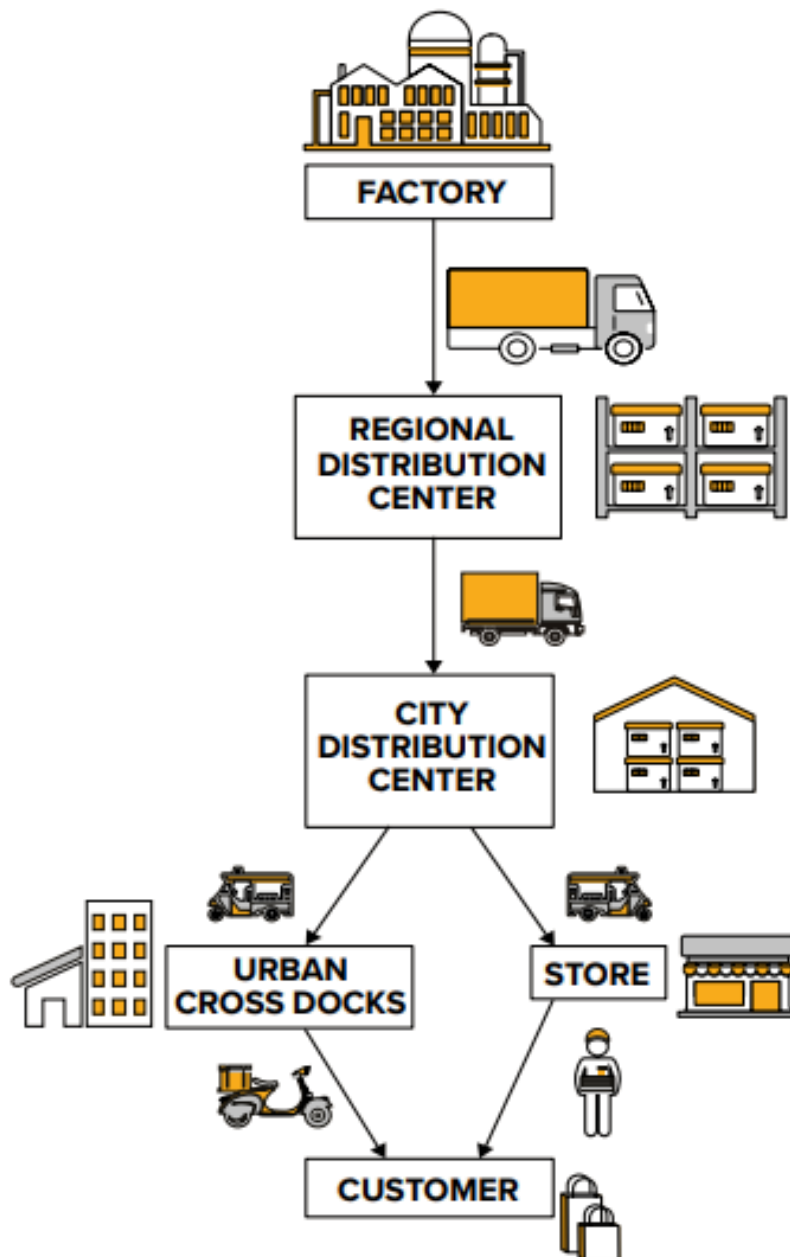
CHAPTER 3

CITY LOGISTICS SECTOR

3. CITY LOGISTIC SECTOR

3.1 OVERVIEW

This chapter discusses the available information and insights on the city logistics sectors in the city? Or Country? Data on freight vehicle registration, Export-Import (EXIM) details and Industrial profile mix is analysed to understand in detail the profile of the logistic sector in the study area. This section also discusses the key stakeholders, which shall form part of the supply chain from private sector as well as public sector.



Source: Efficient Urban Freight Policy Framework, MoHUA

Figure 3-1: Urban Logistic Supply Chain

3.2 URBAN FREIGHT INDUSTRIES MAPPING

The regional location and fertile land of Prayagraj have helped the city in its development of a strong economic base. Prayagraj city is one of the largest commercial centres in Uttar Pradesh; and also has the second highest per capita income and the third-highest GDP in the state. The Northern part of Prayagraj district, popularly known as Gangapar, is endowed with good fertile soil for cultivation of food grains, pulses, oil seeds and vegetables.

Prayagraj has some glass and wire-based industries. The main industrial areas of Prayagraj are Naini and Phulpur, where several public and private sector companies have their units, offices and factories. Bharat Petroleum Corporation Limited, India's largest oil company (which is also state-owned), is setting up a seven million tonne per annum (MTPA) capacity refinery at Lohgara, with an estimated investment of Rs. 62 billion. Prayagraj Bank which began operations in 1865 was founded in Prayagraj. Also, Bharat Pumps & Compressors and A. H. Wheeler and Company have their headquarters in the city. Major companies in the city are Reliance Industries, GE T&D, ITI Limited, BPCL, Dey's Medical, Food Corporation of India, Raymond Synthetics, Triveni Sheet Glass, Triveni Electroplast, EMC Power Ltd, Steel Authority of India, HCL Technologies, Indian Farmers Fertilizer Cooperative (IFFCO), Vibgyor Laboratories, Geep Industries, Hindustan Cable, Indian Oil Corporation Ltd, Baidyanath Ayurved, Hindustan Laboratories and Prayagraj Enterprises. The city is also headquarters of the Central Organization for Railway Electrification. The primary economic sectors of the district are tourism, fishing and agriculture, and the city is a hub for India's agricultural industry. The Naini area is essentially an industrial hub, with major textile industries, hardware, electronics etc. located there. Prayagraj district has 84 kms. DFC alignment from Bamrauli to Jigna passing through it. An integrated industrial Township (Saraswati Hi-tech City) is also proposed in 1,200 acres of area in Prayagraj under the Dedicated Freight Corridor. Operation Command Center (OCC) will house command and control center to monitor all trains and power supply systems on Eastern Dedicated Freight Corridor.



Source: DFFCIL

Figure 3-2: Proposed DFC Alignment for Prayagraj (Study Area)

In Prayagraj the wholesale markets are located in the heart of the city in areas such as Mutthiganj and Hatiya Chauraha. Developing wholesale markets in Naini, Jhunsi and Phaphamau with improved connectivity through bypasses and new links would reduce the pressure and congestion in core areas of Prayagraj. Based on the primary data collected, the following key freight generation/attraction areas have been identified:

1. Transport Nagar
2. Sabzi Mandi
 - a. Mundera Mandi
 - b. Meerapur Sabzi Mandi
 - c. Naini Sabzi Mandi
 - d. Phaphamau Sabzi Mandi
 - e. Govindpur Sabzi Mandi
 - f. Madhwapur Sabzi Mandi (Bahraina)
3. Logistics Collection Centres
 - a. Mutthi Ganj, Hatiya Chauraha
 - b. Transport Nagar
4. Industrial Areas
 - a. FCI Warehouses, FCI Road
 - b. Udyog Nagar/ Naini
 - c. UPSIDC Naini
 - d. Teliarganj Industrial Area
 - e. Phoolpur



Source: Primary Survey & Draft Master Plan, Prayagraj-2031, UMTC

Figure 3-3: Key Freight Generation & Attraction Areas

There are five major industrial areas which are described in the **Table 3-1**.

Table 3-1: Top Industrial Area Distribution

Name of Industrial. Area	Area (in Ha)	% Area
Major Industrial Area		
UPSIDC Naini	314.57	84%
DIC Naini	26.942	7%
MNNIT Teliyarganj	7.6	2%
Udyog Nagar	10.00	3%
Phoolpur	10.00	3%
Total area (Major Industrial Area)	369.112	99%
Mini Industrial Area		
Soraon	1.2	0.3%
Meja	1.2	0.3%
Handia	1.2	0.3%
Total (Mini Industrial Area)	3.6	1%

Source: District Industrial Profile of Prayagraj District

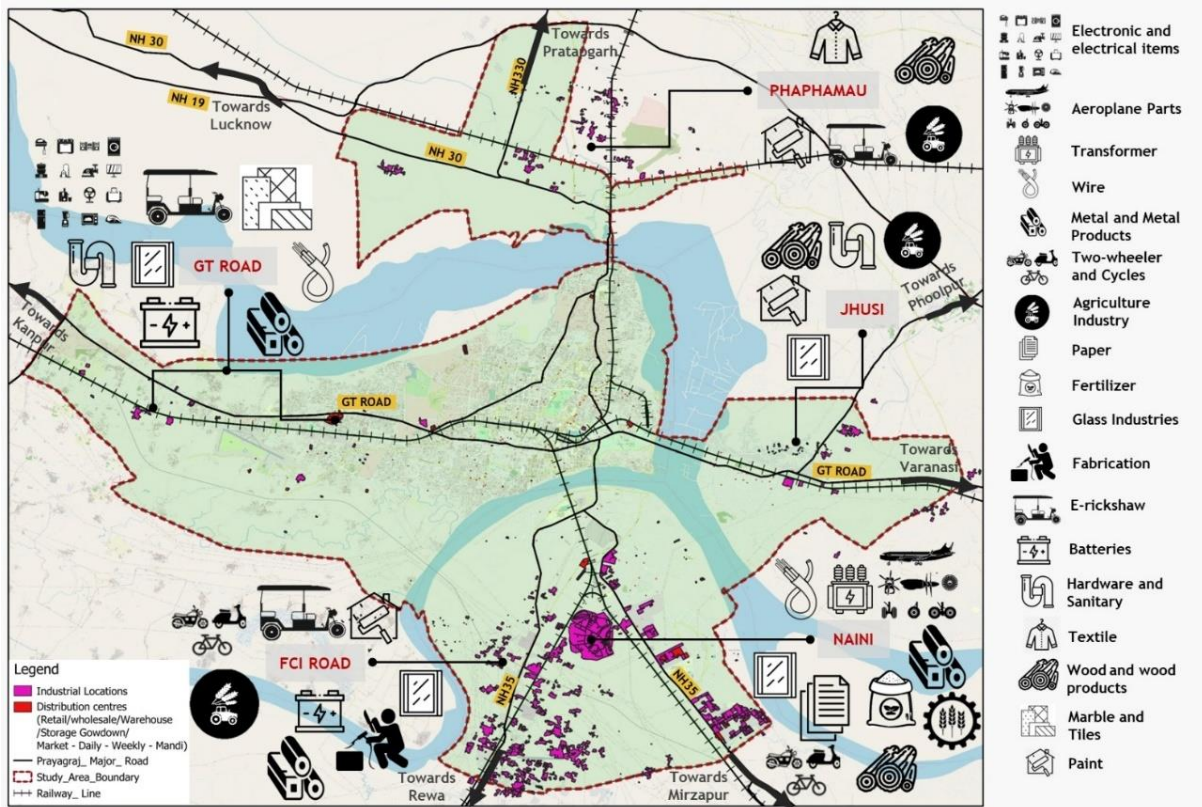
The major industrial area has 99% of area lying under industrial land use, while only 1% are under mini-industrial area.

Logistics transport sector in the city can be mapped into intra-city, inter-city, and export markets. The sector is heavily dominated by road transport. Mapping of Prayagraj's logistics transport sector is given in Table 3-2. The majority of industries are located in Naini Industrial area as shown in Figure 3-4.

Table 3-2: Prayagraj's Logistics Transport Sector Mapping

	Road	Rail	Inland Water	Air
Intra-city	Dominated by Road	Nil	Nil	Nil
Inter-city	Dominated by Road	Mainly cement and oil comes via rail	Developing	Minimal
International Export	Minimal	Nil	Developing	Nil

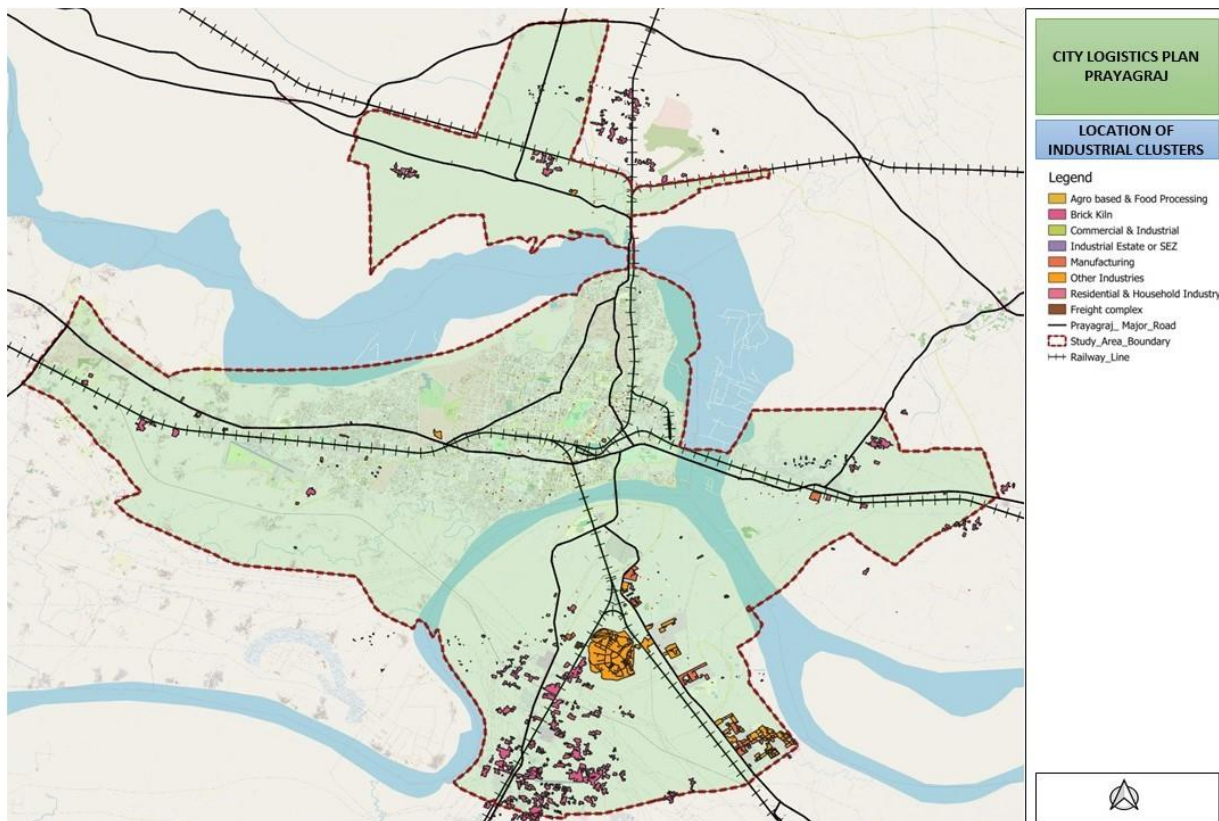
Source: Primary Analysis, UMTC



Source: Draft Master Plan, Prayagraj- 2031

Figure 3-4: Location of Industries and Distribution Centres

Figure 3-5 shows the location of industries based on industry type.



Source: Draft Master Plan, Prayagraj- 2031

Figure 3-5: Location of Industrial Cluster

Table 3-3: Area of Industries based on Industry Type

S.NO.	SUB-CLASS OF LANDUSE	AREA (HEC.)	% OF URBANISABLE AREA
1.	Agro based & Food Processing	5.80	0.016%
2.	Brick kiln	662.08	1.800%
3.	Commercial & Industrial	0.72	0.002%
4.	Cottage and Household	1.14	0.003%
5.	Freight Complex	0.29	0.001%
6.	General Business	55.84	0.152%
7.	Industrial Estate / SEZ	0.73	0.002%
8.	Informal Shop	2.13	0.006%
9.	Manufacturing	132.13	0.359%
10.	Market (Daily & Weekly) / Mandi	17.9	0.049%
11.	Storage Godown	5.09	0.014%
12.	Other Industries	436.86	1.188%
13.	Recycling Plant	18.46	0.050%
14.	Residential & Household Industry	4.65	0.013%
15.	Warehouse	14.49	0.039%
16.	Wholesale	1.19	0.003%
TOTAL		1,359.5	

Source: Draft Master Plan, Prayagraj- 2031

As per Prayagraj Master Plan 2031, existing area under industrial landuse and allied activities is 1,359.5 Hectare while total of 1,722.89 Hectare of land is proposed under Industrial landuse which accounts for 5.57% of the total urbanisable land area. Thus, a major focus was on hightech industrial development in view of the educational profile of the city. Land for medium and small industry has been proposed on Kanpur Road considering the upcoming industrial development in the area. Naini area has been provisioned with additional proposed industrial zone in view of the available infrastructure and efficient connectivity. It has also been noted that household industries are allowed in medium density residential zone at Sahso and Varanasi Road junction. Majority of the existing units at these locations are agro, garment, metal fabrication, engineering units or transport equipment repair-based industries.

3.3 FREIGHT VEHICLE REGISTRATION DATA

As Prayagraj has experienced rapid industrial growth, there has also been a corresponding increase in the use of goods vehicles for efficient transportation of goods within and between cities. This trend of motorization has been driven by the need to fulfil the demands of the growing industries in the region. The city experiences traffic congestion on all of its major and minor arterial roads, and a significant contributor to this issue is the lack of infrastructure specifically designed for the movement of goods. This results in a lack of organization and regulation of freight traffic, contributing to the congestion problems.

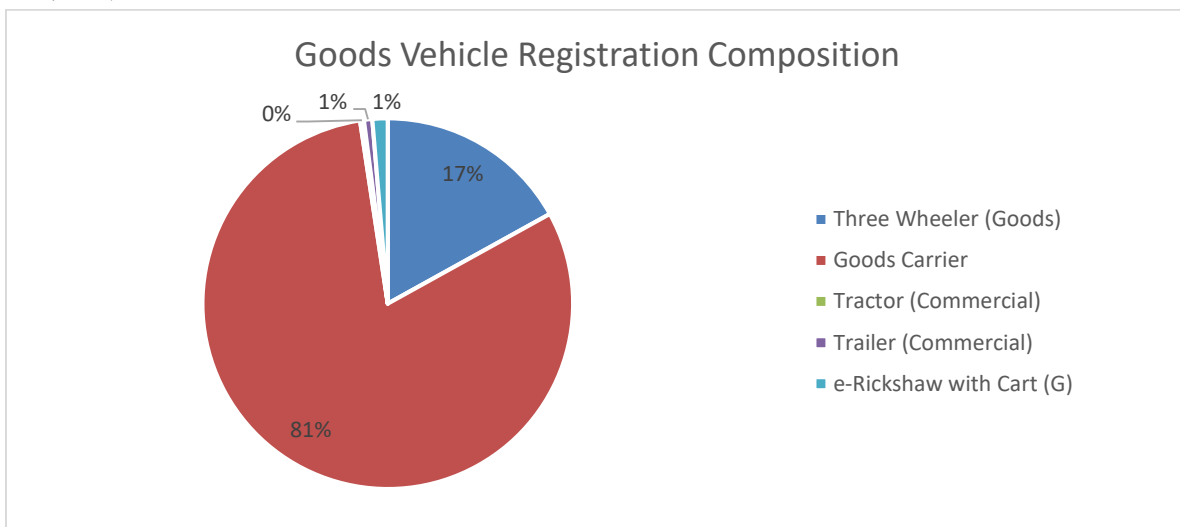
The percentage of goods vehicles registered in Prayagraj district over the past 5 years, has shown a downward trend. The majority of these vehicles were goods carriers, comprising of 81% of the total registered goods vehicles, followed by three-wheelers at 17%. Tractors, trailers, and

electric rickshaws made up the remaining 2%. In goods carrier LCV, Mini LCV, 2/3 Axle Truck and MAV are included. **Figure 3-6 & Table 3-4** shows the number of vehicles registered in the Prayagraj RTO.

Table 3-4: Registration Data- Good Vehicles

Vehicle Class	2018	2019	2020	2021	2022
Three-Wheeler (Goods)	851	873	662	536	368
Goods Carrier	5,715	3,576	2,200	1,804	2,355
Tractor (Commercial)	39	14	7	2	3
Trailer (Commercial)	15	44	35	25	22
e-Rickshaw with Cart (G)	2	9	14	59	175
Total (No.)	8,640	6,535	4,938	4,447	4,945

Source: VAHAN

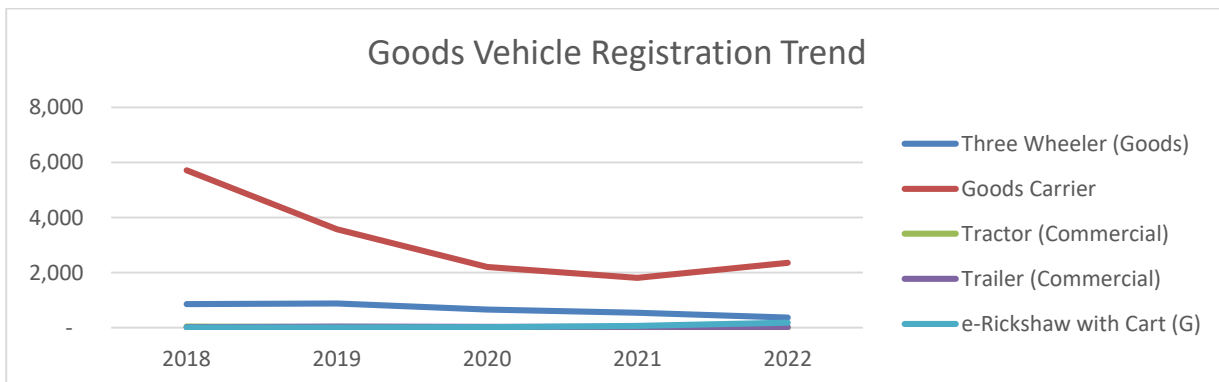


Source: VAHAN

Figure 3-6: Goods Vehicle Registration Composition

There has been a noticeable decline in the number of goods carrier registrations between 2018 and 2021, followed by an increase in registrations in 2021 and 2022. In 2022, the share of vehicle registration stood at 80.6% for goods carrier, 12.6% for 3-Wheeler Goods, 6.8% for E-Rickshaw (Goods), Tractor (Commercial) & Trailer (Commercial) together. The goods vehicle registration trend analysed from data received from VAHAN are given in Source: VAHAN

Figure 3-7 below.



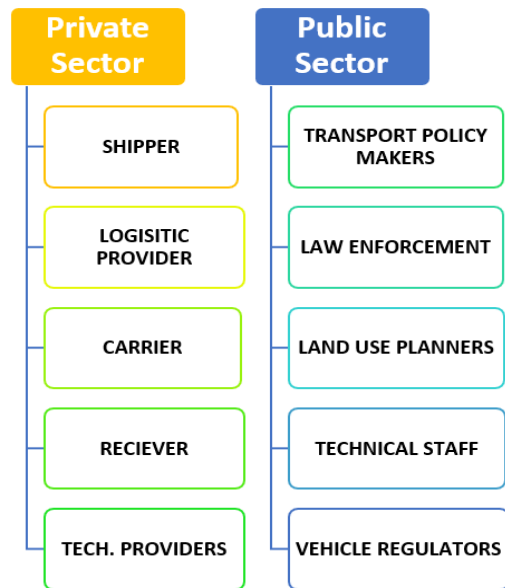
Source: VAHAN

Figure 3-7: Goods Vehicle Registration Trend in Prayagraj

3.4 LOGISTIC SECTOR ECOSYSTEM (KEY STAKEHOLDERS)

The policy makers are required to have good understanding of the relevant policies and the key players involved in urban freight management and its supply chain for effective regulation.

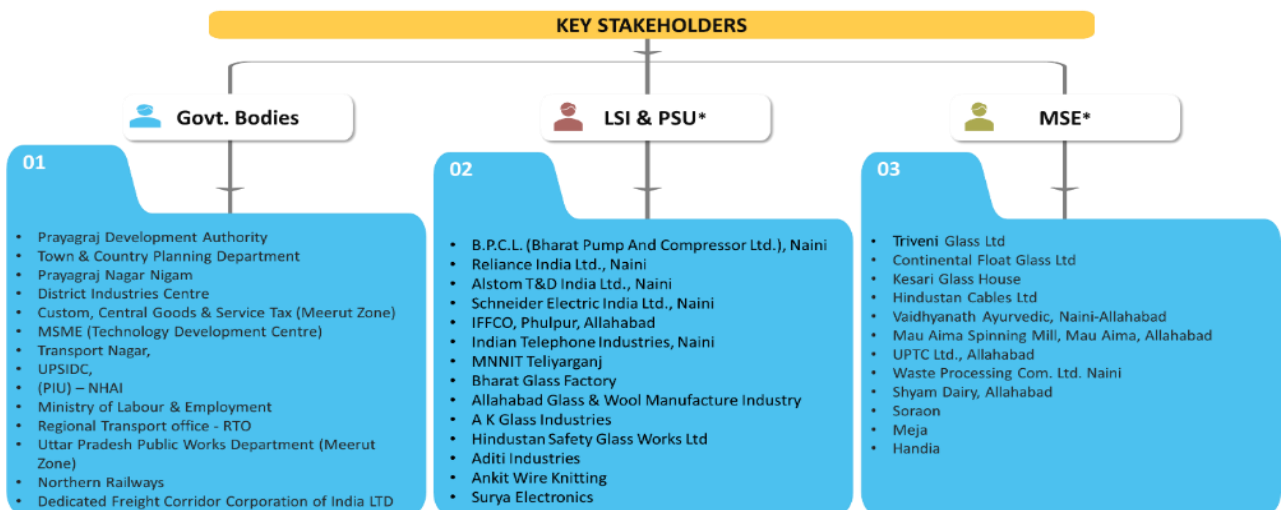
In order to make an effective urban logistic policy, city practitioners must coordinate with a broad spectrum of stakeholders in both public and private sectors. In public sector, urban logistics involves many different overlapping government bodies at national, state and city levels, and other private and public sector stakeholders shown in the **Figure 3-8**. Coordination between these policymakers can avoid contradictory and redundant regulations. Logistics policymaking and infrastructure development affects a wide spectrum of private sector players. Effective engagement and consultation with these players can help city practitioners get a whole systems perspective and enhance the efficiency of the entire urban logistics system.¹



Source: Efficient Urban Freight Policy Framework, MoHUA, GOI

Figure 3-8: Private and Public Sector Key Stakeholders

The key stakeholder ranges from government bodies to truck operators and private industries which are part of the total urban freight ecosystem in the city. Based on an initial assessment the various key stake holder that involves in freight generation and its movements are listed in **Figure 3-9** below.



* LSI - Large Scale Industries, PSU - Public Sector Undertaking and MSE - Medium Scale Enterprises

¹ Efficient Urban Freight Policy Framework, MoHUA, Govt of India

Source: Site Reconnaissance Survey and District Industrial Profile Prayagraj

Figure 3-9: List of Key Stakeholders in Prayagraj City

3.4.1 INDUSTRIAL PROFILE

In master plan 2021, a total of 1,722.89 hectare of land was proposed under industrial land use, which accounted for 5.57 % of the total urbanizable/developable land. Naini area was encouraged with additional proposed industrial zone because of available infrastructure and efficient connectivity. It was noted that household industries were allowed in medium density residential zone at Sahson and Varanasi Road junction.

Master Plan 2031, has proposed an additional area of 851 hectares at Naini i.e. a total of 2,573.89 hectares. Existing industrial development is also taking place in this area. In addition to it, newly proposed industrial zone is connected with proposed ring road. It gives ease of heavy transportation and avoid through traffic within the town. Thus MP, 2031 has allocated 7.00% of overall proposed urbanizable zone for industrial development.

Table 3-5: Proposed Land for Industrial use- Master plan 2031

	Main Town	Naini	Phaphamau	Total
Total	199.89	1,261	262	1,722.89
Large industry	-	1,045	-	1,045
Medium industry	166	-	-	166
Small industry	33.89	216	262	511.89

Source: Draft Master Plan Prayagraj-2031

Table 3-6: Large and Medium Scale Industries

Type of Industry	Industry Units	Major Exportable Item
Large Scale Industries	B.P.C.L. (Bharat Pump and Compressor Ltd.), Naini Reliance India Ltd., Naini Alstom T&D India Ltd., Naini Schneider Electric India Ltd., Naini IFFCO, Phulpur, Prayagraj Indian Telephone Industries, Naini Major Exportable Item Gas Cylinder and Compressors	Gas Cylinder and Compressors
Medium Scale Industries	Vaidhyanath Ayurvedic, Naini-Prayagraj Mau Aima Spinning Mill, Mau Aima, Prayagraj UPTC Ltd., Prayagraj Waste Processing Com. Ltd. Naini Shyam Dairy, Prayagraj	Nil

Source: Primary Analysis, UMTC

The industrial profile of the district is reflected in Table 3-7 below. The MSME Industries across the sectors of food/agro-based industries, repair & servicing, other manufacturing, wood, metal, apparel, paper, electrical and other transport, chemical, leather, and engineering are the key economy drivers in the district.

Table 3-7 : Industrial Profile of the Prayagraj

S.No.	Industry	Total Units	Total Employment	Total Investment (INR In Cr.)
1	Agro based	2060	16,307	3,815.2
2	Soda water	12	1,580	36.5
3	Cotton textile	04	20	45.03
4	Woolen, Silk & Artificial thread-based clothes	09	36	27.9
5	Jute & Jute based	04	20	2.5
6	Ready-made garments & embroidery	1,250	5,420	5,270.24
7	Wood/wooden based furniture	945	3,224	3,204.55
8	Paper & Paper products	41	212	960.10
9	Leather based	21	167	456.01
10	Chemical/Chemical based	210	1,267	1,935.5
11	Rubber, Plastic & petro based	72	602	819.6
12	Mineral based	56	425	535.2
13	Metal based	1,082	3,197	3,306.9
14	Engineering units	1,147	2,191	3,076.6
15	Electrical machinery and transport equipment's	836	2,174	2,681.8
16	Repairing and servicing	1,848	4,852	3,796.0
17	Others manufacturing	450	1,762	1,032.26
	Total	10,047	43,456	31,001.89

Source: District Industrial Profile of Prayagraj

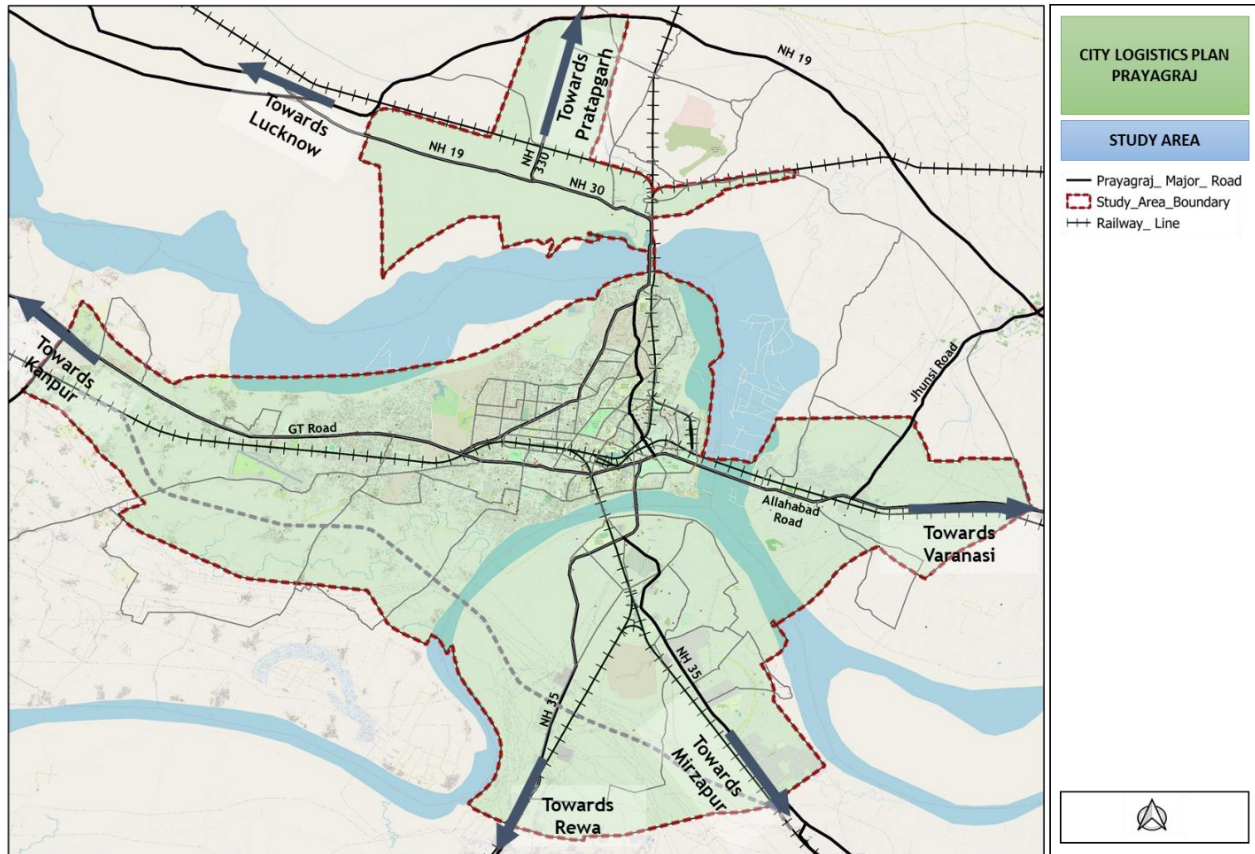
The majority of the existing units are agro, garment, metal fabrication, engineering units and transport equipment repair-based industries. Agro based industries contribute the most in terms of employment, which is approximately 38% of employment in the industrial category. Thus it is the most prominent industry of the district and second highest in terms of Investments. Readymade garments, repairing and servicing, wooden based, metal based, electrical machinery and transport equipment follow it respectively.²

3.4.2 EXISTING FREIGHT MOVEMENT

3.4.2.1 FREIGHT TRANSPORT VIA ROAD

To assess the network characteristics within the study area boundary it is necessary to identify the specified freight corridors on which logistics movements are observed. Figure 3-10 shows the major freight corridors in the city, indicating that logistic movements were observed on almost every major road of the study area. It can be inferred that goods traffic movement was observed in the direction of all the adjacent and surrounding towns of the city i.e. towards Kanpur, Lucknow, Pratapgarh, Varanasi, Mirzapur, Rewa and Chitrakoot.

² District Industrial Profile of Prayagraj



Source: Primary Analysis, UMTC

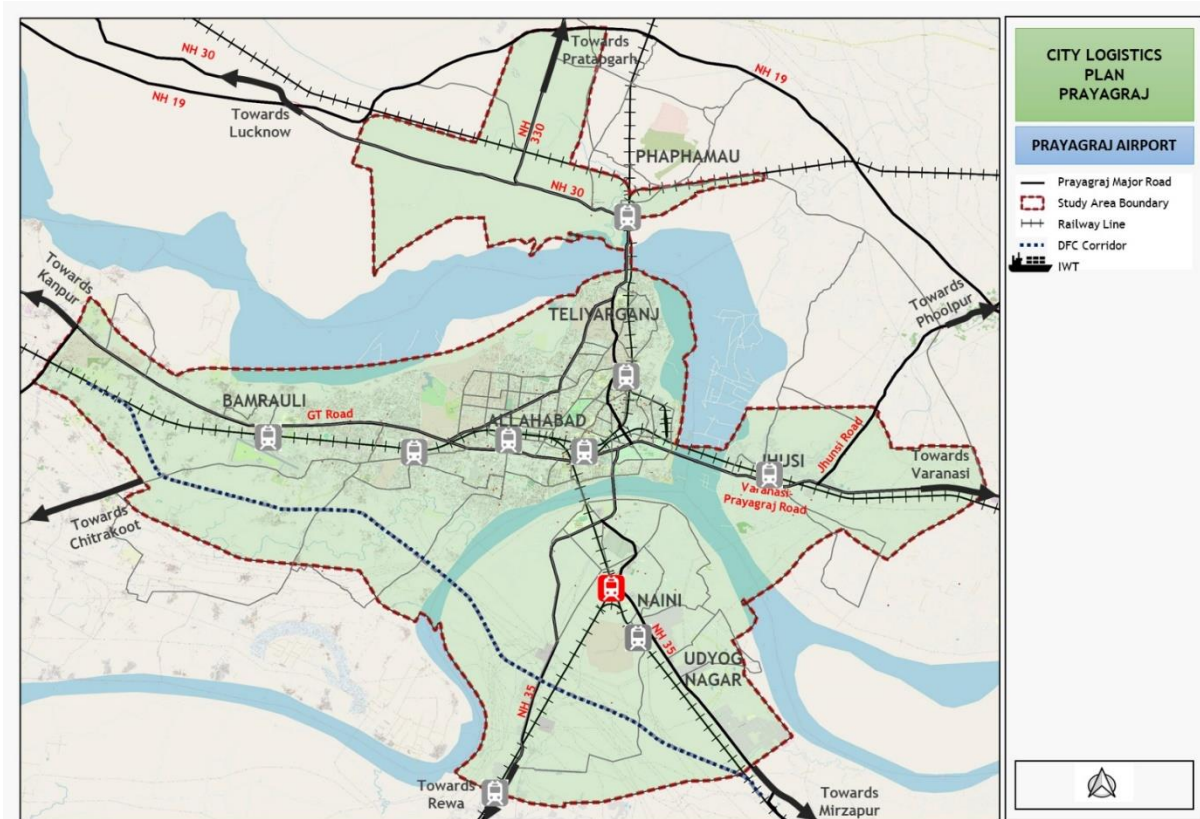
Figure 3-10: Existing Freight Corridors within the Study Area

3.4.2.2 FREIGHT TRANSPORT VIA RAIL

The existing freight movement via rail has been highlighted in this section. There are a total of 10 railway stations in Prayagraj, of which 2 stations have freight movement, while Subedarganj railway station has only one type of cargo i.e. oil for IOCL. Each station has been taken into consideration where goods movement is taking place and major commodities along with their inflow & outflow were captured. The data is collected mainly based on discussions with the respective authorities at the railway stations. The details of these two stations, which account for freight movements, namely Naini & Iradatganj Railway Station is given in the following sections.

3.4.2.2.1 NAINI RAILWAY STATION

Naini Railway Station has the prodigious importance in the goods transport through railways in the city. Its proximity to the Naini industrial area also adds to its importance for freight transport.



Source: Reconnaissance Survey, UMTC

Figure 3-11: Location of Naini Railway Station

The average number of freight trains accessing the station per month are 30. The length of the terminal is 750 m and width 200 m. As per the stakeholder’s consultation majority of cargo trains are towards nearby districts like Fatehpur, Mirzapur etc. The major issue of the terminal is its poor connectivity through access roads, which are not in good condition.

It is an important station for the various commodities’ incoming in the city, of which the major ones are as follows:

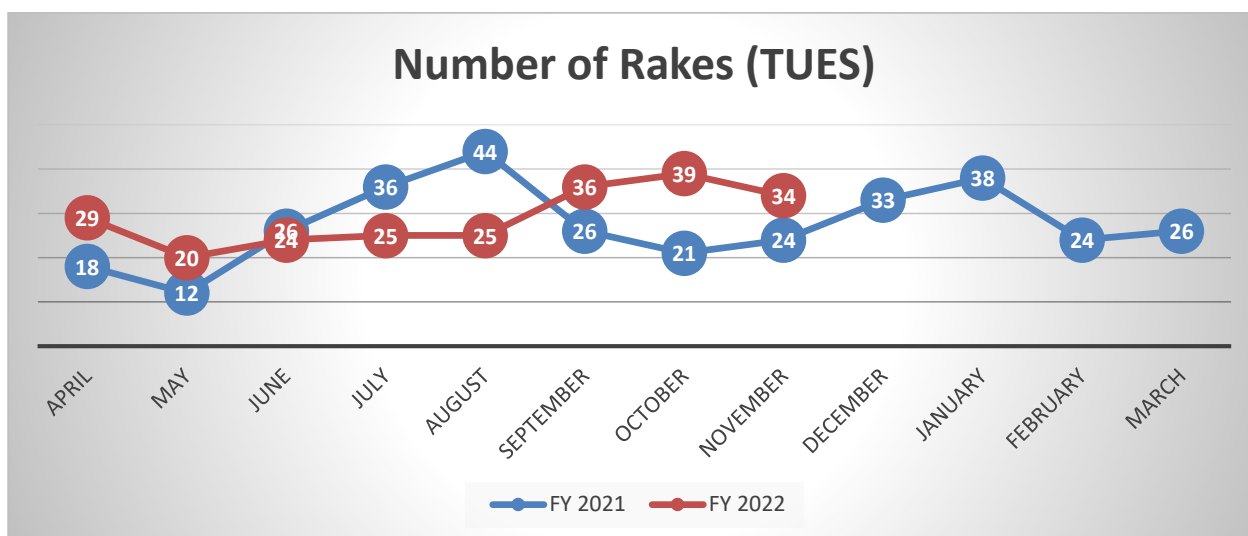
- Food Grains including wheat, rice etc.
- Fertilizers (Phulpur, Gujarat, Howrah, Raibareilly)
- Cement (Jabalpur)
- Salt (Gujrat)

The details of the total number of inward rakes (TUES) at Naini Railway Station is given Table 3-8 below.

Table 3-8:- Inward Train Details

S.No.	Year	Total No of Rakes (TUES)	Average Rakes Movement/ Month	Average Rakes Movement/ day	Total Number of Wagon	Total Tonnage	Month (Max Rakes Movement)
1	FY 2021	328	27.33	0.89	14,455	9,05,923	July, August, December and January
2	FY 2022 (till November)	212	29	0.94	9,839	6,25,570	September, October and November

Source: Stakeholder Interview at Naini Railway Station



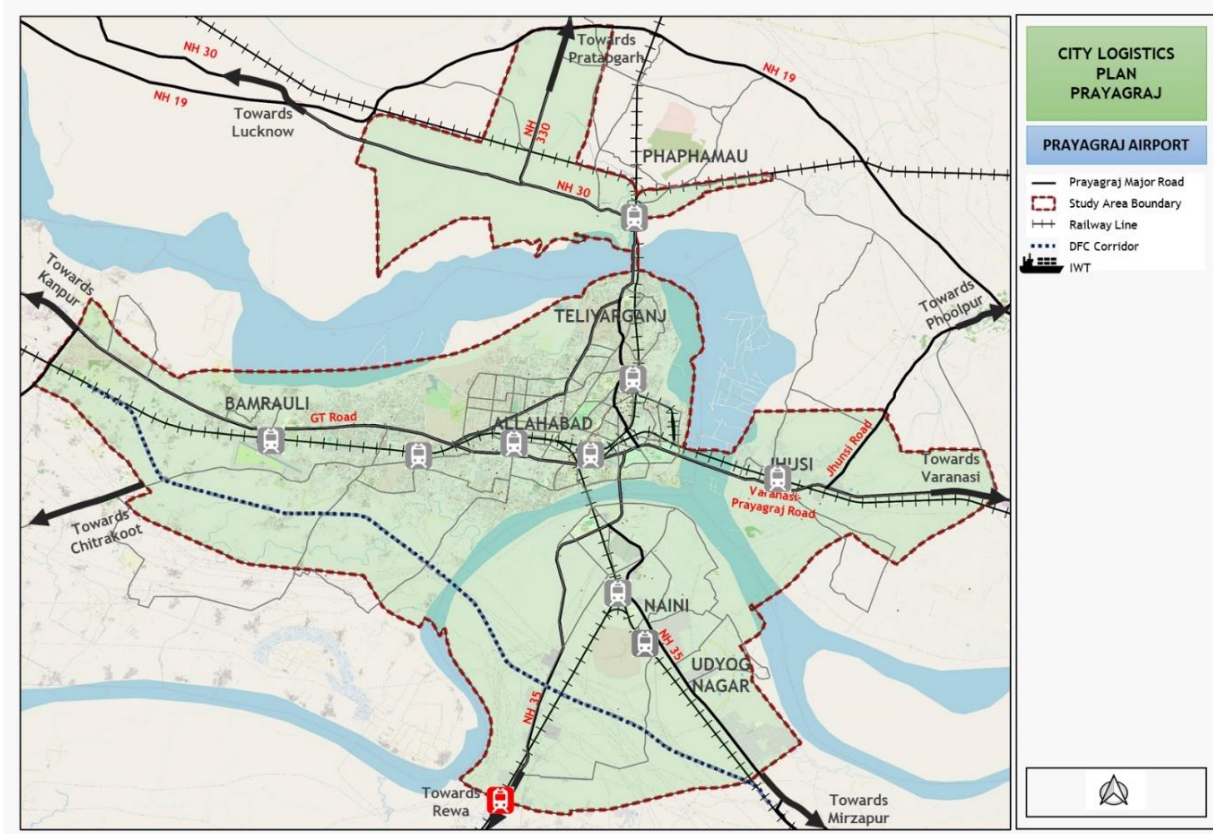
Source: Stakeholder Interview at Naini Railway Station and Primary Analysis, UMTC

Figure 3-12: Number of Rakes (Inward) - Naini Railway Station

The busiest months were observed to be July, August, December and January in 2021 and September, October and November in 2022. The average movement is around 27 - 30 rakes monthly.

3.4.2.2.2 IRADATGANJ RAILWAY STATION

Iradatganj railway station is also an important station for the various commodities' inward movement in the city. **The major commodity inflow on the station is cement.** There is no outward goods movement from this station. There are around 166/year inward rakes movement observed in 2021 at the station in which 4,397 wagons and 3,93,454 Tonne of commodities were handled.



Source: Reconnaissance Survey, UMTC

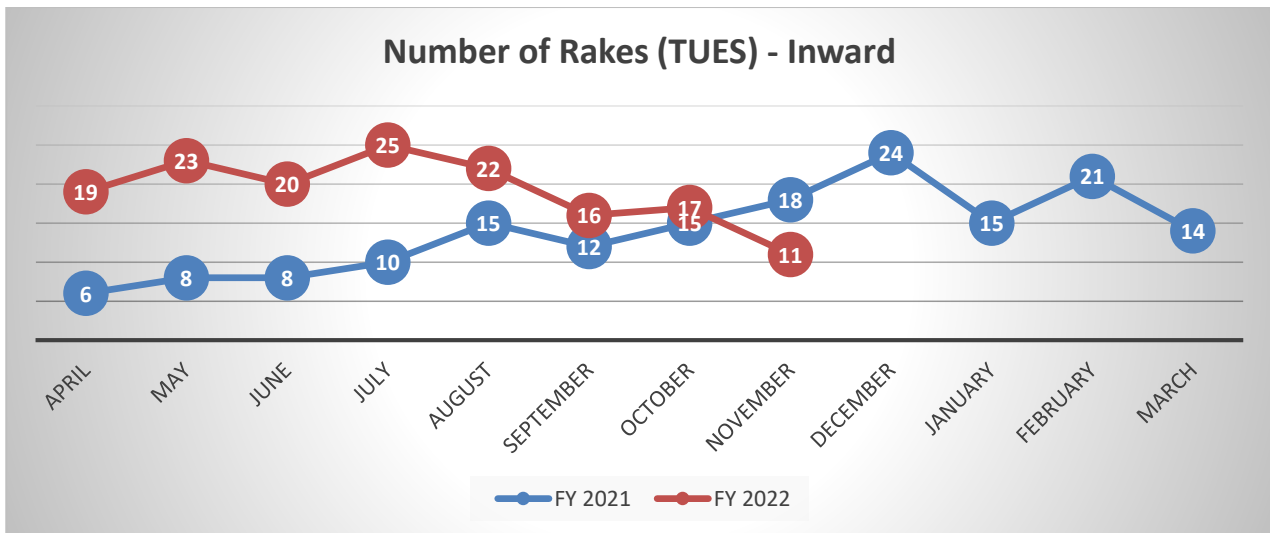
Figure 3-13: Iradatganj Railway Station

The details of Inward & Outward train at Iradatganj Railway Station is given in Table 3-9 & Table 3-10 below.

Table 3-9: Inward Train Details

S.No.	Year	Total No of Rakes (TUES)	Average Rakes Movement/ Month	Average Rakes Movement/ day	Total Number of Wagon	Total Tonnage	Month (Max Rakes Movement)
1	FY 2021	166	14	0.46	4,397	3,93,454	November, December and February
2	FY 2022 (till November)	153	19	0.62	4,329	2,80,966	May, June, July and August

Source: Stakeholder Interview at Iradatganj Railway Station



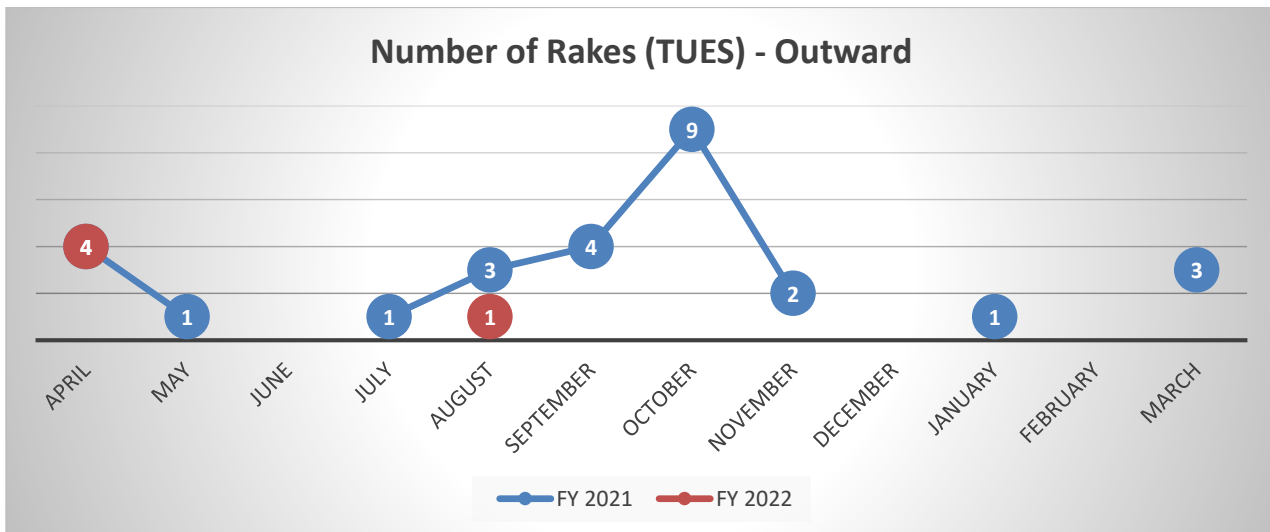
Source: Stakeholder Interview at Iradatganj Railway Station and Primary Analysis, UMTC

Figure 3-14: Number of Rakes (Inward) - Iradatganj Railway Station

Table 3-10: Outward Train Details

S.No.	Year	Total No of Rakes (TUES)	Average Rakes Movement/ Month	Average Rakes Movement/ day	Total Number of Wagon	Total Tonnage	Month (Max Rakes Movement)
1	FY 2021	28	2.3	0.07	1110	66,756	October
2	FY 2022 (till November)	5	0.63	0.02	210	13,252	April

Source: Stakeholder Interview at Iradatganj Railway Station



Source: Stakeholder Interview at Iradatganj Railway Station and Primary Analysis, UMTC

Figure 3-15: Number of Rakes (Outward) - Iradatganj Railway Station

For inward movement, the busiest months are observed during the months of November, December and February in 2021 and May, June, July and August in 2022. The average movement are round 14-19 rakes monthly. The outward movement is negligible.

3.4.2.3 FREIGHT TRANSPORT VIA AIRPORT

The biggest advantage that air transport has is that it takes the least time in transporting goods. Therefore, it is highly recommended for handling high valued and perishable goods. The major disadvantage which is attached to this mode of transport is that it is very expensive and is unsuitable for transportation of bulk commodities. The data collected on the cargo movement at the Prayagraj Airport is given in 3-11 below.

Table 3-11: Total Cargo Movement at Prayagraj Airport

Month	2022 (tons)	2021 (tons)
January	0	0
February	0	0
March	0	0
April	0	0
May	0	0
June	0	0
July	13	0
August	15	0
September	12	0
October	8	0
November	20	0
December	NA	0
Total	68	0

Source: Stakeholder Interview, Prayagraj Airport

The cargo movement at the Prayagraj airport has started in the month of July 2022 by Indigo airlines reaching the peak in November 2022. The cargo being traded through the airport are majorly parcels and does not consist of any specific commodity. The cargo arrives majorly from Delhi, Mumbai, Bangalore and Bhopal and is managed by an agile team at the airport. During the stakeholder consultation it was informed that the cargo demand is not significant at the airport, however, there is a large space allocated for cargo movement at the airport.

3.4.3 PRIMARY SURVEY ANALYSIS

The movement of external freight traffic was collected via volume counts and Origin- destination analysis and the key findings from the data collected is given in paragraphs below:

3.4.3.1 TRAFFIC VOLUMES AT OUTER CORDONS

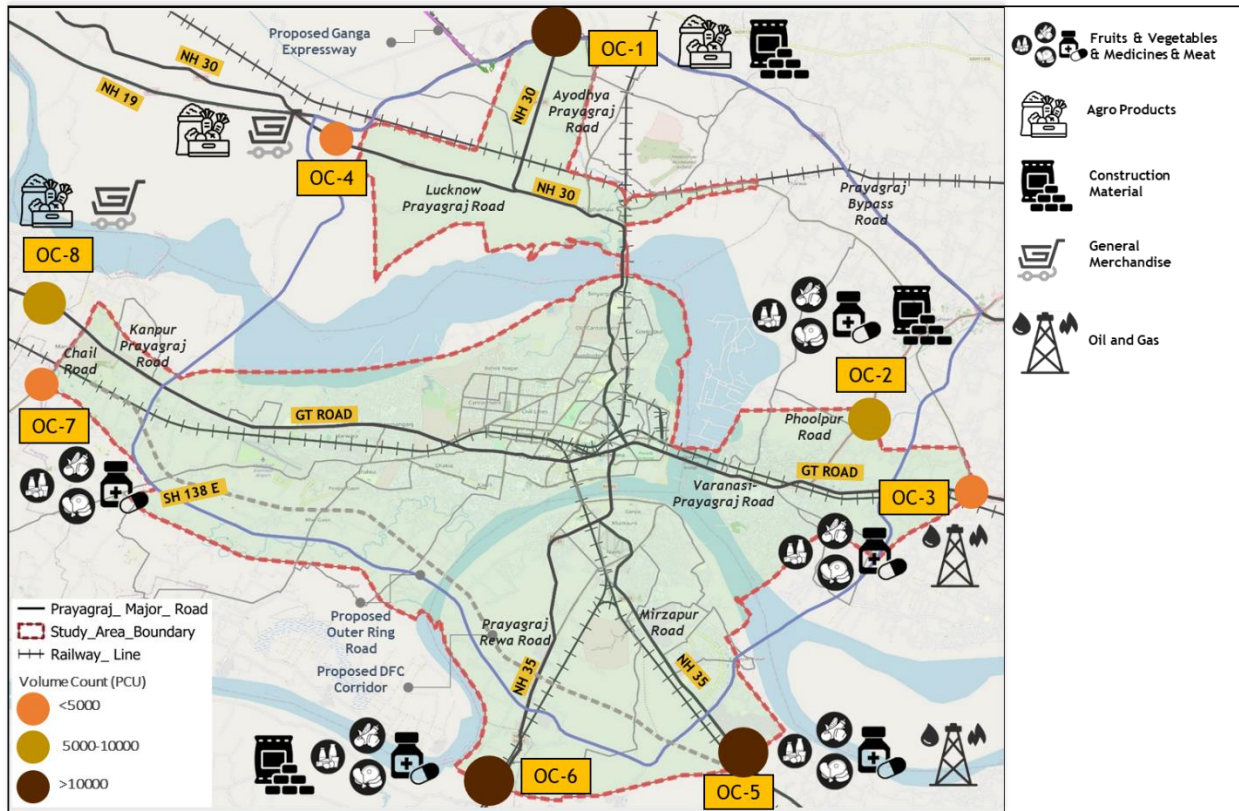
Traffic volume count survey for the freight traffic carried out at the outer codon location of the study area.

Traffic Volume - To understand the total freight traffic coming in and going out of the study area, eight major entry-exit points (Table 3-12) were identified and traffic counts survey was conducted through videography method. The analysis of the classified volume count survey at the cordons is given in the ensuing sub-sections. The total inbound and outbound traffic flow at each of the cordons is presented in Figure 3-16.

Table 3-12: Traffic Volume at Outer Cordons - Freight Vehicles

Locations	Direction	Vehicles	PCUs	Total Freight Vehicles per day	Total PCU per day	Peak Hour	PCU (Peak Hour)																																																																								
OC-1 Ayodhya Prayagraj Road (Holagarh Road)	Mau Aima to Diha	1,636	4,859	3,384	10,282	05:00-06:00	943																																																																								
	Diha to Mau Aima	1,748	5,423					OC-2 Phoolpur Road	Phulpur to Sahson	1,561	4,091	3,023	7,854	02:00-03:00	643	Sahson to Phulpur	1,462	3,763	OC-3 Prayagraj Bypass (Toll Road)	Prayagraj to Banaras	219	639	601	1,804	03:00-04:00	120	Banaras to Prayagraj	382	1,165	OC-4 Lucknow Prayagraj (NH 30)	Prayagraj to Lucknow	1,910	5,900	3,921	11,969	03:00-04:00	575	Lucknow to Prayagraj	2,011	6,069	OC-5 Prayagraj Kuwarpatti Road (Near Rampur Tiraha)	Naini Chowk to Rampur Tiraha	2,056	6,155	4,238	12,685	01:00-02:00	1,500	Rampur Tiraha to Naini Chowk	2,182	6,530	OC-6 Prayagraj Road (Near Ghurpur)	Ghurpur to Naini Chowk	2,322	7,245	4,647	14,554	01:00-02:00	2,037	Naini Chowk to Ghurpur	2,325	7,309	OC-7 Chail Road (Near Payri)	Jayantpur to Chail	590	1,389	1,200	2,704	15:00-16:00	235	Chail To Jayantpur	610	1,316	OC-8 Kanpur Prayagraj Rd (Near Puramufti)	Muratganj to Prayagraj	1,970	4,001	3,977	8,287
OC-2 Phoolpur Road	Phulpur to Sahson	1,561	4,091	3,023	7,854	02:00-03:00	643																																																																								
	Sahson to Phulpur	1,462	3,763					OC-3 Prayagraj Bypass (Toll Road)	Prayagraj to Banaras	219	639	601	1,804	03:00-04:00	120	Banaras to Prayagraj	382	1,165	OC-4 Lucknow Prayagraj (NH 30)	Prayagraj to Lucknow	1,910	5,900	3,921	11,969	03:00-04:00	575	Lucknow to Prayagraj	2,011	6,069	OC-5 Prayagraj Kuwarpatti Road (Near Rampur Tiraha)	Naini Chowk to Rampur Tiraha	2,056	6,155	4,238	12,685	01:00-02:00	1,500	Rampur Tiraha to Naini Chowk	2,182	6,530	OC-6 Prayagraj Road (Near Ghurpur)	Ghurpur to Naini Chowk	2,322	7,245	4,647	14,554	01:00-02:00	2,037	Naini Chowk to Ghurpur	2,325	7,309	OC-7 Chail Road (Near Payri)	Jayantpur to Chail	590	1,389	1,200	2,704	15:00-16:00	235	Chail To Jayantpur	610	1,316	OC-8 Kanpur Prayagraj Rd (Near Puramufti)	Muratganj to Prayagraj	1,970	4,001	3,977	8,287	01:00-02:00	646	Prayagraj to Muratganj	2,007	4,286						
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	Rampur Tiraha to Naini Chowk	2,182	6,530					OC-6 Prayagraj Road (Near Ghurpur)	Ghurpur to Naini Chowk	2,322	7,245	4,647	14,554	01:00-02:00	2,037	Naini Chowk to Ghurpur	2,325	7,309	OC-7 Chail Road (Near Payri)	Jayantpur to Chail	590	1,389	1,200	2,704	15:00-16:00	235	Chail To Jayantpur	610	1,316	OC-8 Kanpur Prayagraj Rd (Near Puramufti)	Muratganj to Prayagraj	1,970	4,001	3,977	8,287	01:00-02:00	646	Prayagraj to Muratganj	2,007	4,286																																							
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	Prayagraj to Muratganj	2,007	4,286																																																																												

Source: Primary Analysis, UMTC



Source: Primary Analysis, UMTC

Figure 3-16: Freight Traffic Volume Count (PCU) at Outer Cordons

From the data analysis at outer cordons of the study area, it was observed that maximum freight traffic was recorded at the Outer Cordon 6 located at NH-35 Prayagraj Road (Near Rampur Ghurpur). At OC-6, the traffic is coming from the Rewa to Prayagraj direction and vice versa, more than 14,000 PCU of freight traffic come in and out of the city from this particular location during 24-hour duration.

The total number of freight vehicles and PCU volumes are shown in the Figure: 3-17, which depicts that maximum freight traffic is observed at OC-6 (NH 35 towards Rewa), followed, by OC-5 (Mirzapur Road) and OC-1 (Ayodhya Road).

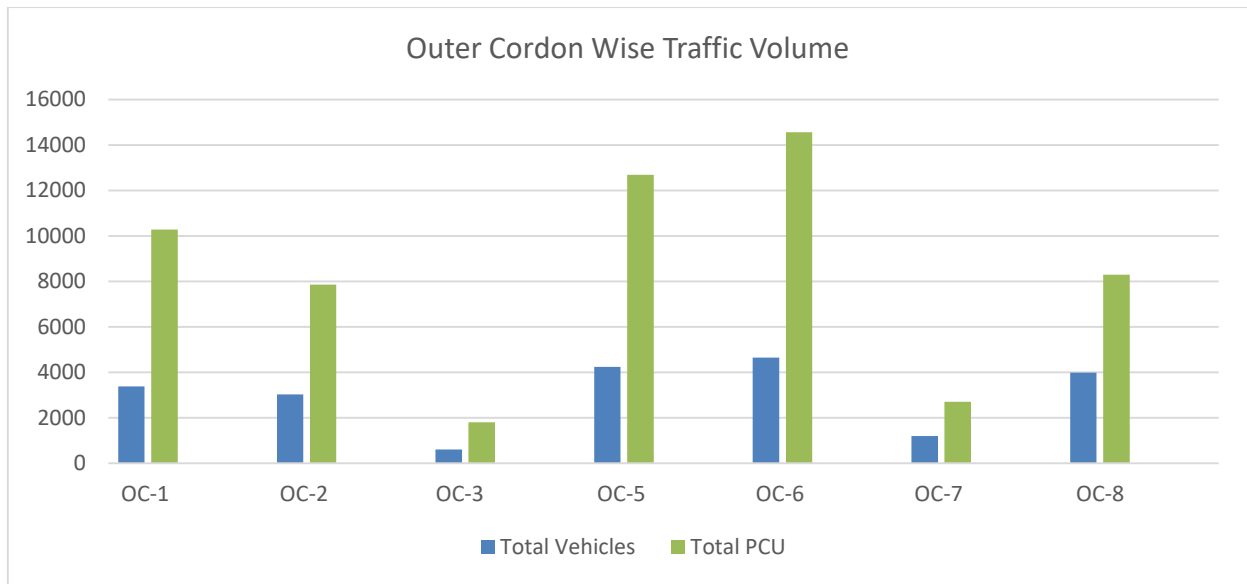
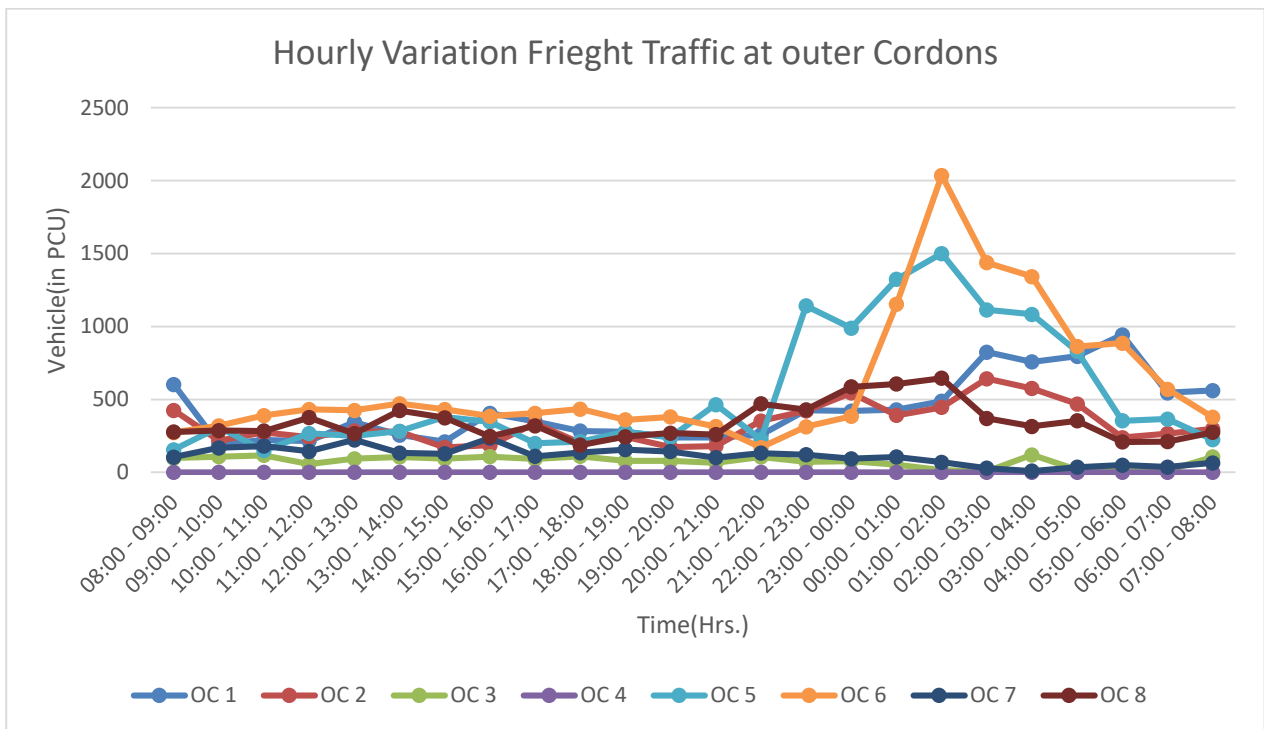


Figure 3-17: Outer Cordon Wise Traffic Volume

Hourly Variation - The hourly variation of traffic volume at all the selected outer cordons is shown in Figure: 3-18, it can be inferred that the peak hour of freight traffic at OC-6 is between 01:00-02:00. Majority of freight traffic at all locations was recorded during the night time and the peak is detected after 21:00 in the evening.



Source: Primary Analysis, UMTC

Figure 3-18: Hourly Freight Traffic Variation at Outer Cordons

Composition of Traffic - As given in the figure below, majority of the trips captured at the Outer Cordons were being performed by MAV (36%), followed by 29% LCV, 20% Three-Axle Truck, 14% Two-Axle Truck and 1% Tractor.

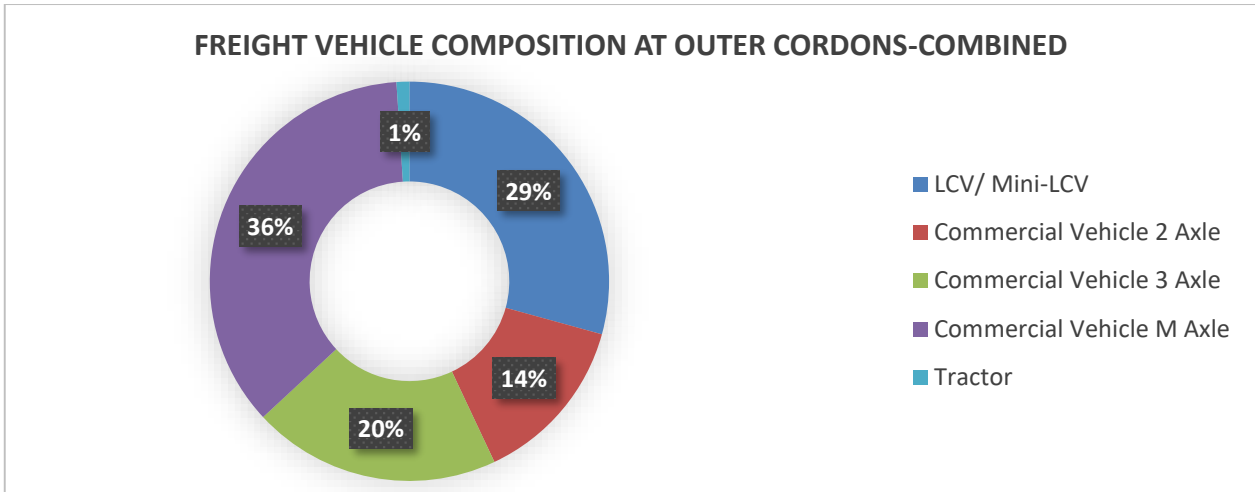


Figure 3-19: Traffic Composition at Outer Cordon

Share of External - Internal Traffic at Outer Cordons - the Share of external, internal and bypassing traffic at various outer cordon locations is given in figure below. As seen in the figure, the majority of traffic at each outer cordon is external to external traffic i.e. traffic which is just bypassing the city.

From the primary data analysis, it can be inferred that the share of external-to-external trips (bypass traffic) is 48%, while external-internal and internal-external trips share is 27% and 25%, respectively.

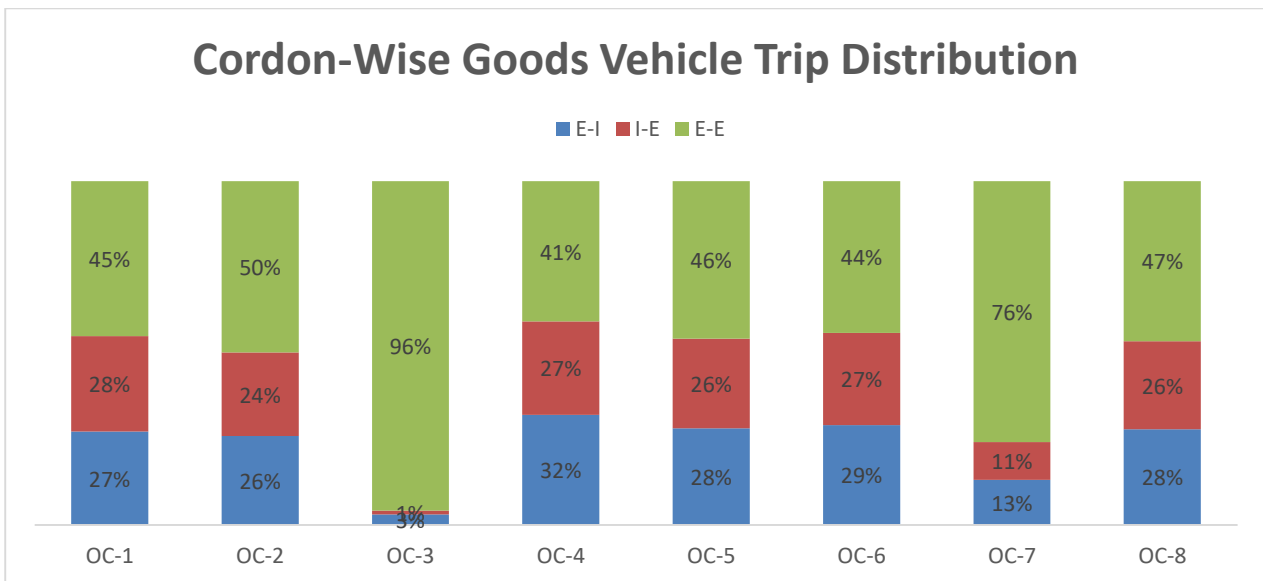


Figure 3-20: Share of External - Internal Traffic at Outer Cordons

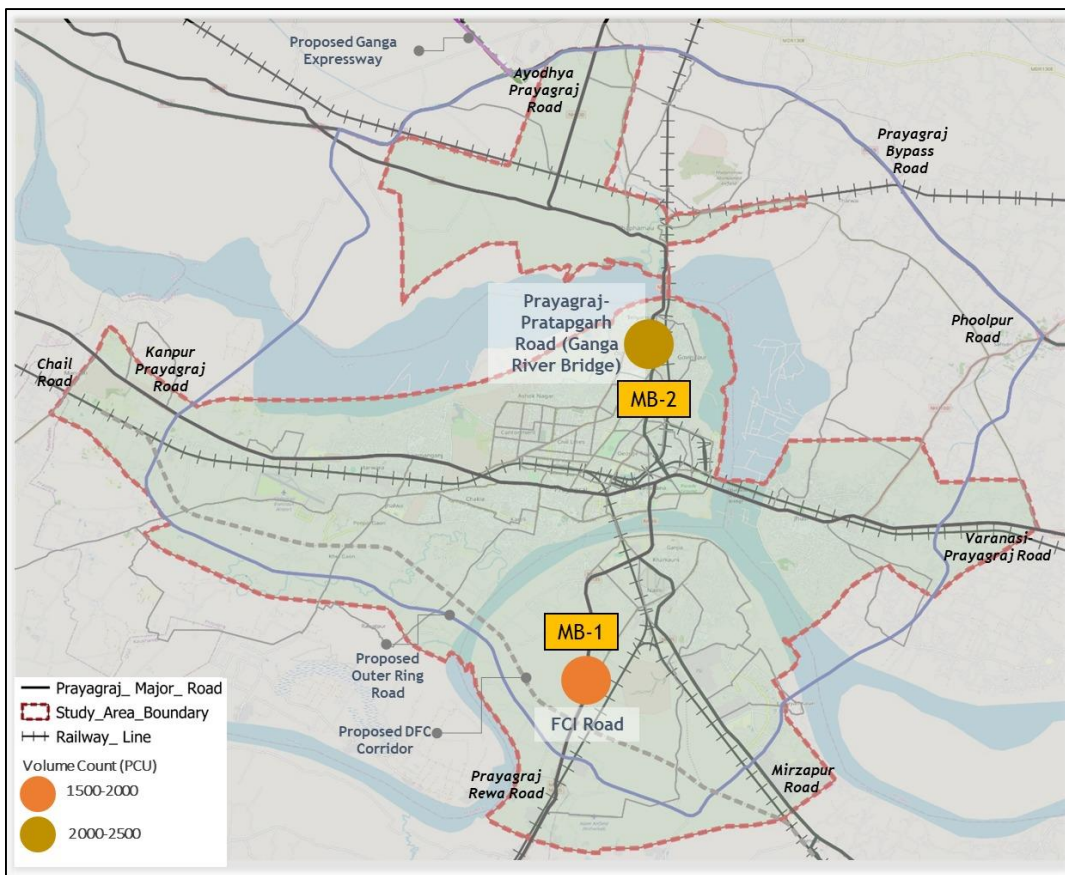
3.4.3.2 TRAFFIC VOLUMES AT MID-BLOCK LOCATIONS

To understand the total freight traffic movement on major arterial in the study area, two major mid-block survey points were identified and traffic count survey was conducted through videography method. The analysis of the classified volume count survey at the cordons is given in the ensuing sub-sections. The total inbound and outbound traffic flow at each of the location is presented in Table 3-13 and Figure 3-21.

Table 3-13: Traffic Volume per day at Mid-Block Locations- Freight Vehicles

Locations	Direction	Vehicles	PCUs	Total Vehicles	Total PCU
MB-1 FCI Road	Naini to Iradatganj	564	807	1,208	1,737
	Iradatganj to Naini	644	930		
MB-2 Prayagraj - Pratapgarh Road (Ganga River Bridge)	Teliarganj To Phaphamau	642	1,212	1,321	2,481
	Phaphamau To Teliarganj	679	1,269		

Source: Primary Analysis, UMTC

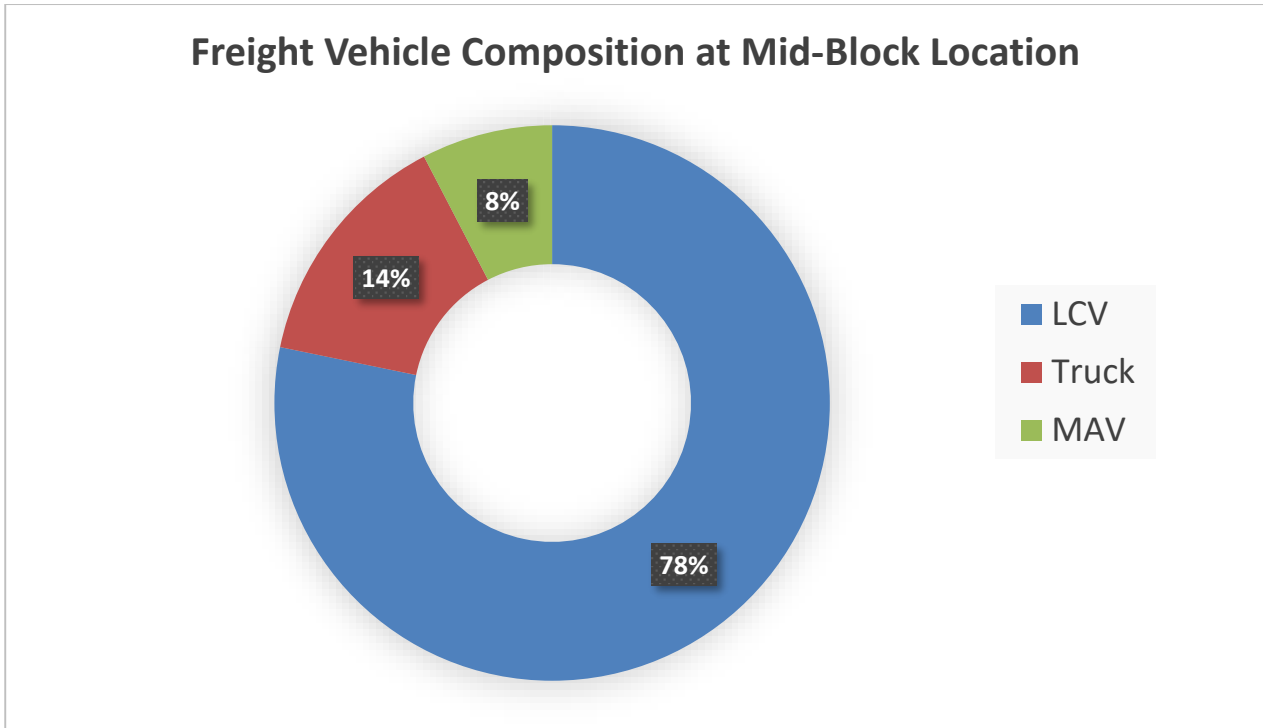


Source: Primary Analysis, UMTC

Figure 3-21: Freight Traffic Volume Count (PCU) at Mid-Block Locations

From the data analysis of mid-block counts, it was observed that maximum freight traffic was recorded at the Mid-Block Location 2 located at Prayagraj - Pratapgarh Road (Ganga River Bridge). At MB-2, the traffic to & from Teliarganj - Phaphamau has been recorded as 2,481 PCUs during peak hour of freight traffic.

The overall goods vehicle composition of the Mid Blocks is shown in Figure 3-22. This depicts LCV has the maximum share of 78% in the freight traffic coming inside and going outside from study area. It is followed by 14% share of trucks and 8% share of MAV.



Source: Primary Analysis, UMTC

Figure 3-22: Freight Vehicle Composition at Mid-Block Location

The Figure 3-23 shows the freight vehicle composition at each Mid-Block Location.



Source: Primary Analysis, UMTC

Figure 3-23: Freight Vehicle Composition at each Mid-Block Location

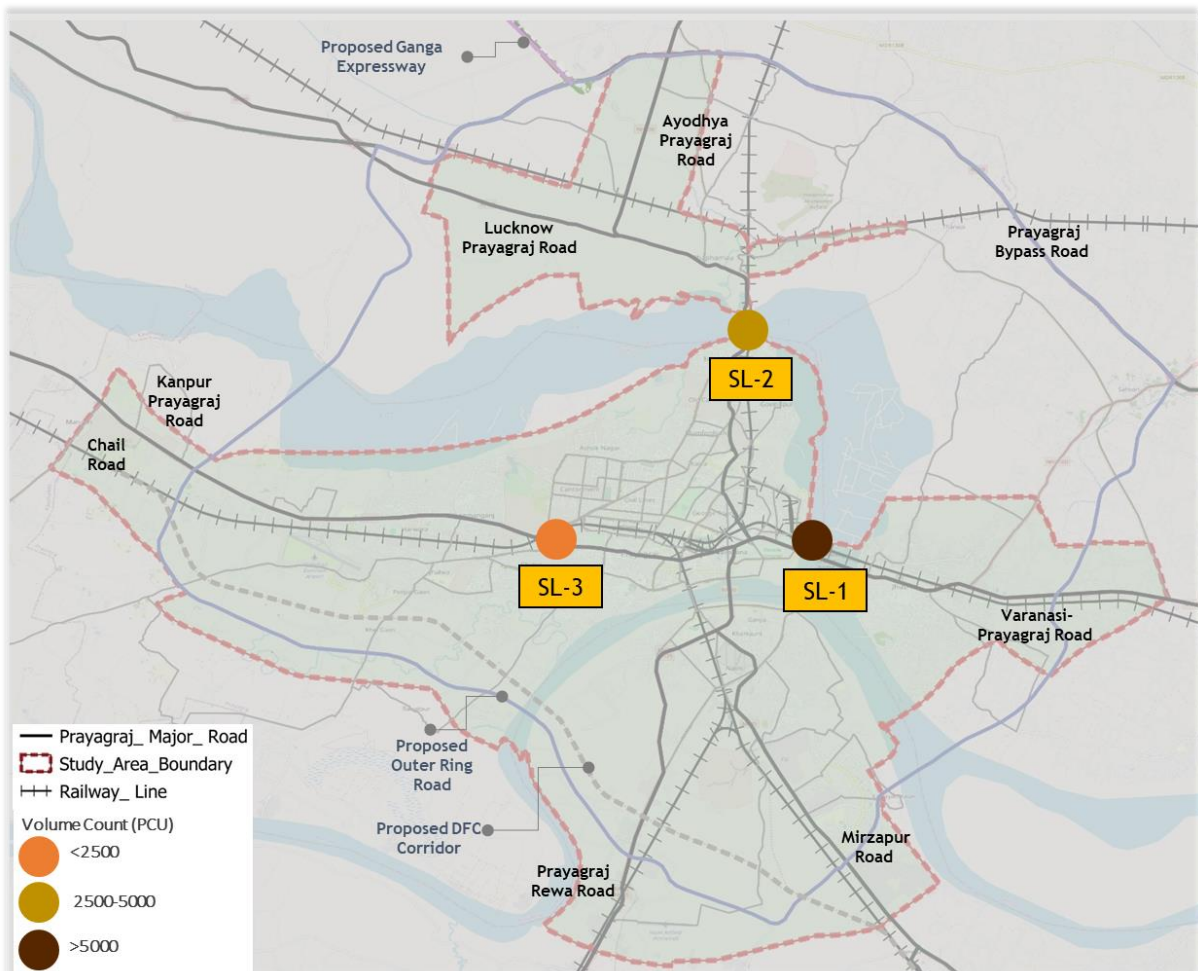
3.4.3.3 TRAFFIC VOLUMES SCEENLINE LOCATIONS

Maximum traffic (5,347) was observed at SL 1 followed by other screen-line location SL 2 with 2,836 PCU. Both the locations are the river bridge from where the city’s traffic enter or exit on daily basis (Refer Figure 3-24)

Table 3-14: Traffic Volume at Outer Cordons - Freight Vehicles

Locations	Direction	Vehicles	PCUs	Total Freight Vehicles per day	Total PCU per day	Peak Hour	PCU (Peak Hour)
SL-1	Chungi to Jhunsi	1,648	2,717	3,293	5,347	17:00-18:00	515
	Jhunsi to Chungi	1,645	2,630				
SL-2	Old Katra to Phaphamau	1,358	1,617	2,328	2,836	15:00-16:00	236
	Phaphamau to Old Katra	970	1,220				
SL-3	Zero Road to Bamrauli	607	716	1,419	1,621	15:00-16:00	135
	Bamrauli to Zero Road	812	905				

Source: Primary Analysis, UMTC



Source: Primary Analysis, UMTC

Figure 3-24: Freight Traffic Volume Count (PCU) at Screen Line

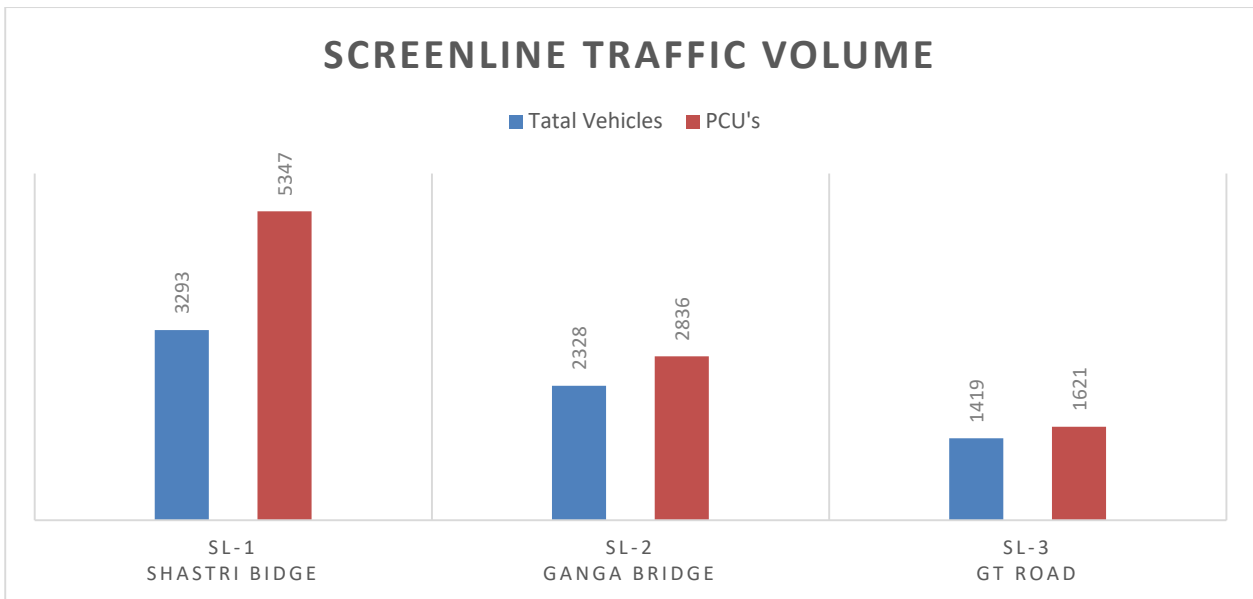
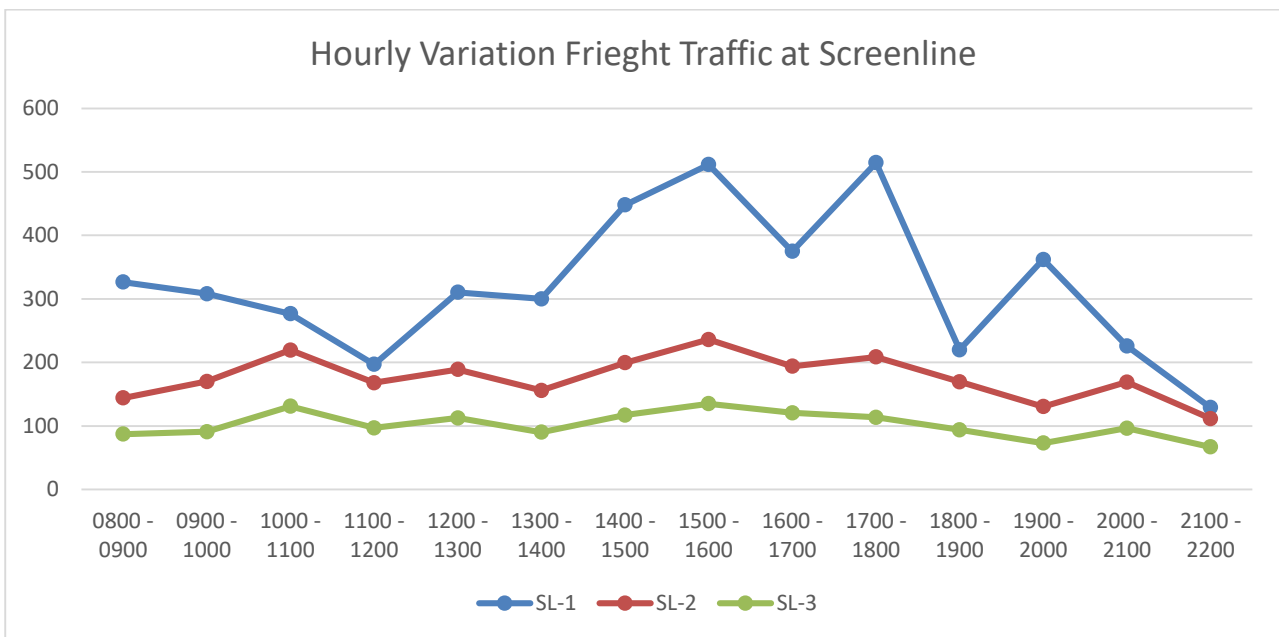


Figure 3-25: Screen Line Wise Traffic Volume

Hourly Variation - The hourly variation of traffic volume at all the selected screen line is shown in Figure: 3-18. Majority of freight traffic at all locations was recorded between 15:00-18:00



Source: Primary Analysis, UMTC

Figure 3-26: Hourly Freight Traffic Variation at Screen Line

Composition of Traffic - The figure presented below indicates that most of the trips recorded at the screen line were carried out by pick-up vehicles, accounting for 76% of the total. The remaining 24% were completed by goods auto, LCV, 2Axle, MAV, and Tractor.

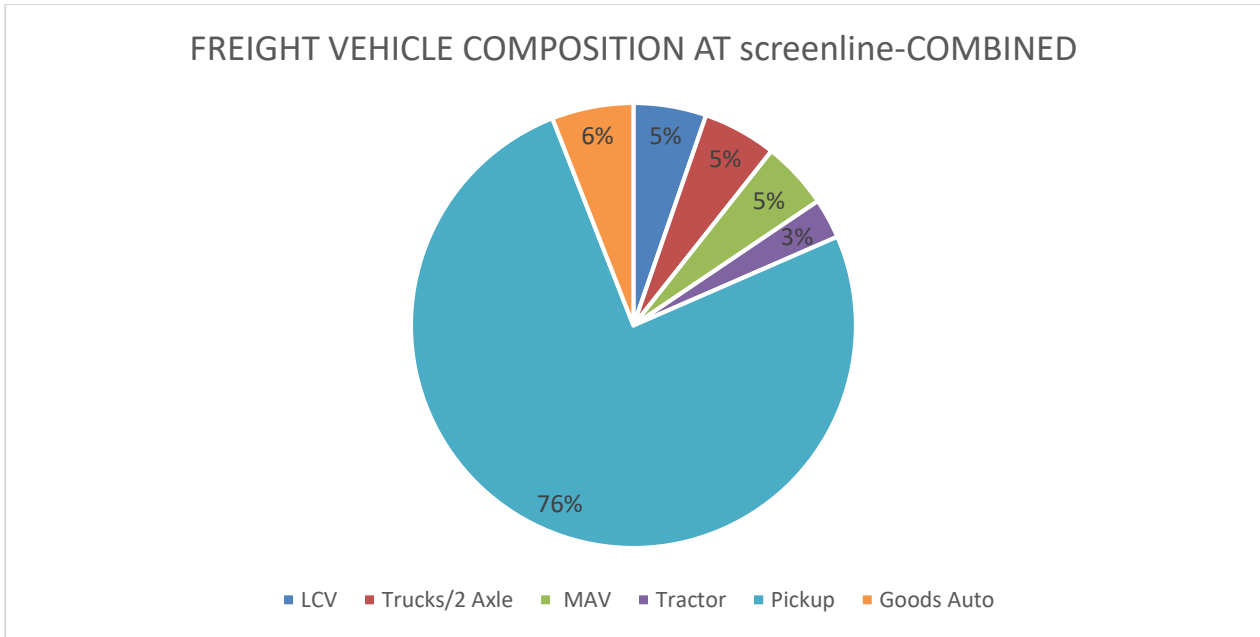


Figure 3-27: Traffic Composition at Screen Line

3.4.3.4 OPERATOR SURVEY

The operator survey indicates the fleet of vehicles used by the operators for movement of goods. As indicated, more than 50% of the fleet consists of Mini LCV and LCV.

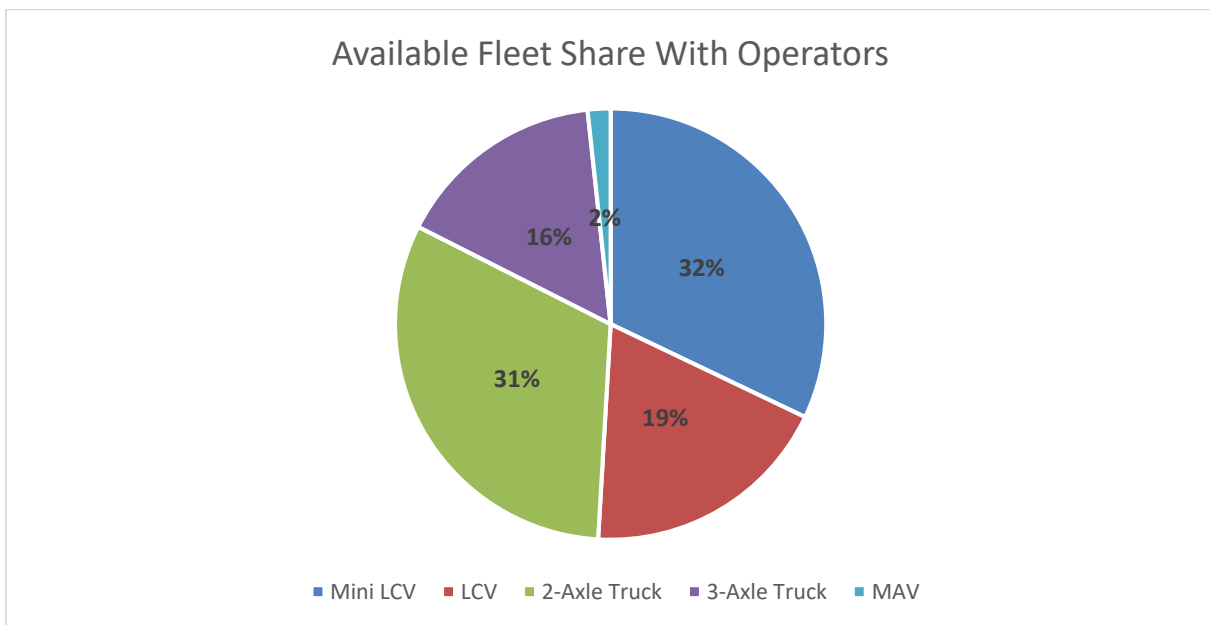


Figure 3-28 Fleet Ownership in the City

a. Major Commodities

Major commodities in the city include fruits, vegetables, meat and Medicines followed by agro products such as wheat, rice etc. and then construction material.

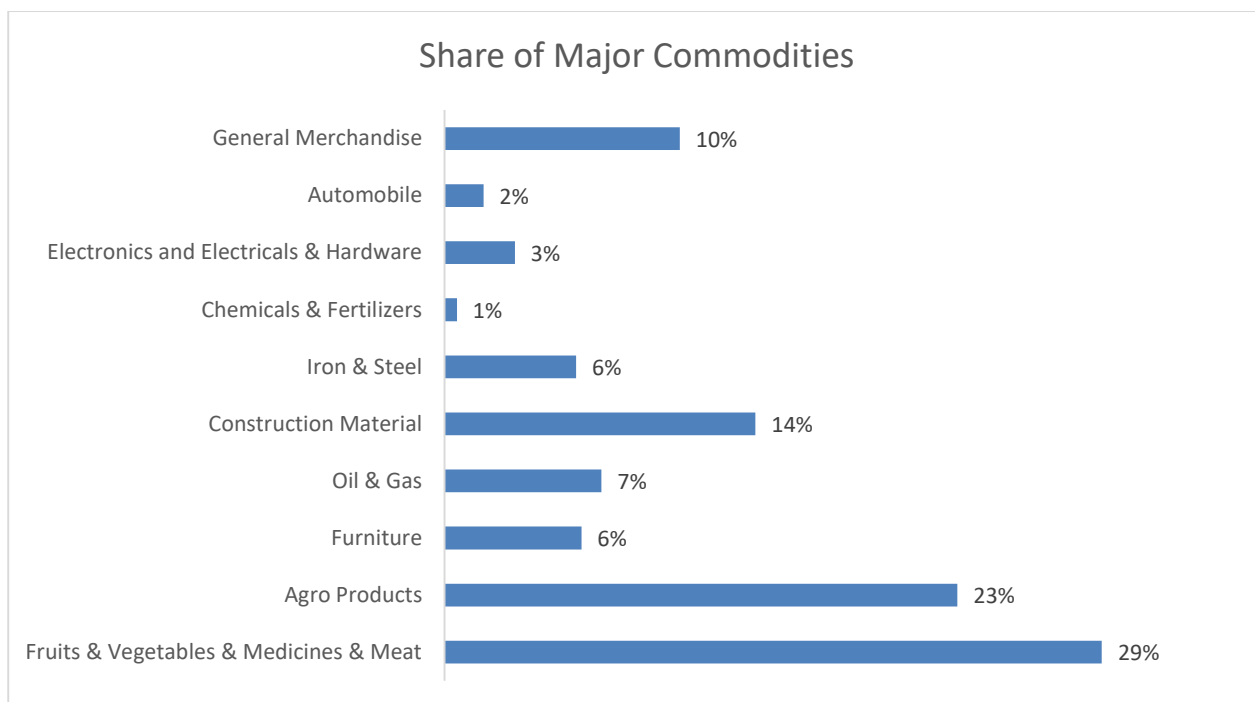


Table 3-14 Commodity wise Load in Tonnage

S.no.	Commodity Type	Commodity wise total load in tons
1	Fruits & Vegetables & Medicines & Meat	29,920
2	Agro Products	23,350
3	Furniture	6,230
4	Oil & Gas	7,140
5	Construction Material	14,150
6	Iron & Steel	5,990
7	Chemicals & Fertilizers	560
8	Electronics and Electricals & Hardware	3,200
9	Automobile	1,770
10	General Merchandise	10,710
Total Load		1,03,020 tons

3.5 EXISTING MODES OF TRANSPORT

Understanding of Transport modes used in the urban freight plays vital role in logistic planning and policy decisions. Type of vehicle uses for the intercity freight movement are primary heavy vehicle with having multi-Axle base, while within the urban area or city limits Light goods vehicle are being used for the lightweight movement and for the shorter distance. Three-wheelers are widely used for the last mile level goods because of their better manoeuvring. Various transport mode uses in the freight carriage is shown in Table 3-15.

Table 3-15: Various Modes Used for Lucknow Freight Transport

Modes	Description	Modes	Description
	Heavy Bulk freight moves typically in the Multi Axle Trucks and Dumpers		Perishable and Non-perishable goods may be transported in similar vehicles or in light or medium duty refrigerated or climate-controlled ones.
	Manufactured goods or pallets traveling long distances to and from distribution centers or factories in a city will typically move in heavy enclosed trucks or tractor-trailers.		Typically uses for freight transportation within the urban core using light trucks.
	Non-perishables moving from distribution centers or wholesale markets to points of sale in the urban core will often be transported in medium or light trucks, depending on the density of the goods.		Transportation within the urban core using the goods three-wheeler and for the last mile or first mile goods delivery and collections
	Transportation within the urban core using e-battery rickshaw for the last mile or first mile and light weights goods delivery and collections		



Figure 3-29: Types of Vehicles used in Prayagraj

3.6 CLUSTERING POINTS AND ROUTES

The figure below shows the major routes taken by freight traffic to access the city. As indicated, the majority of traffic ingress the city from Rewa Road, followed by Mirzapur road. Majority of traffic is destined to warehousing, industrial and commercial clusters including Transport Nagar, Naini Industrial Area, Teliyarganj, Mutthiganj/ Hatthiya Chauraha, Prayagraj core city, Jhusi, etc.

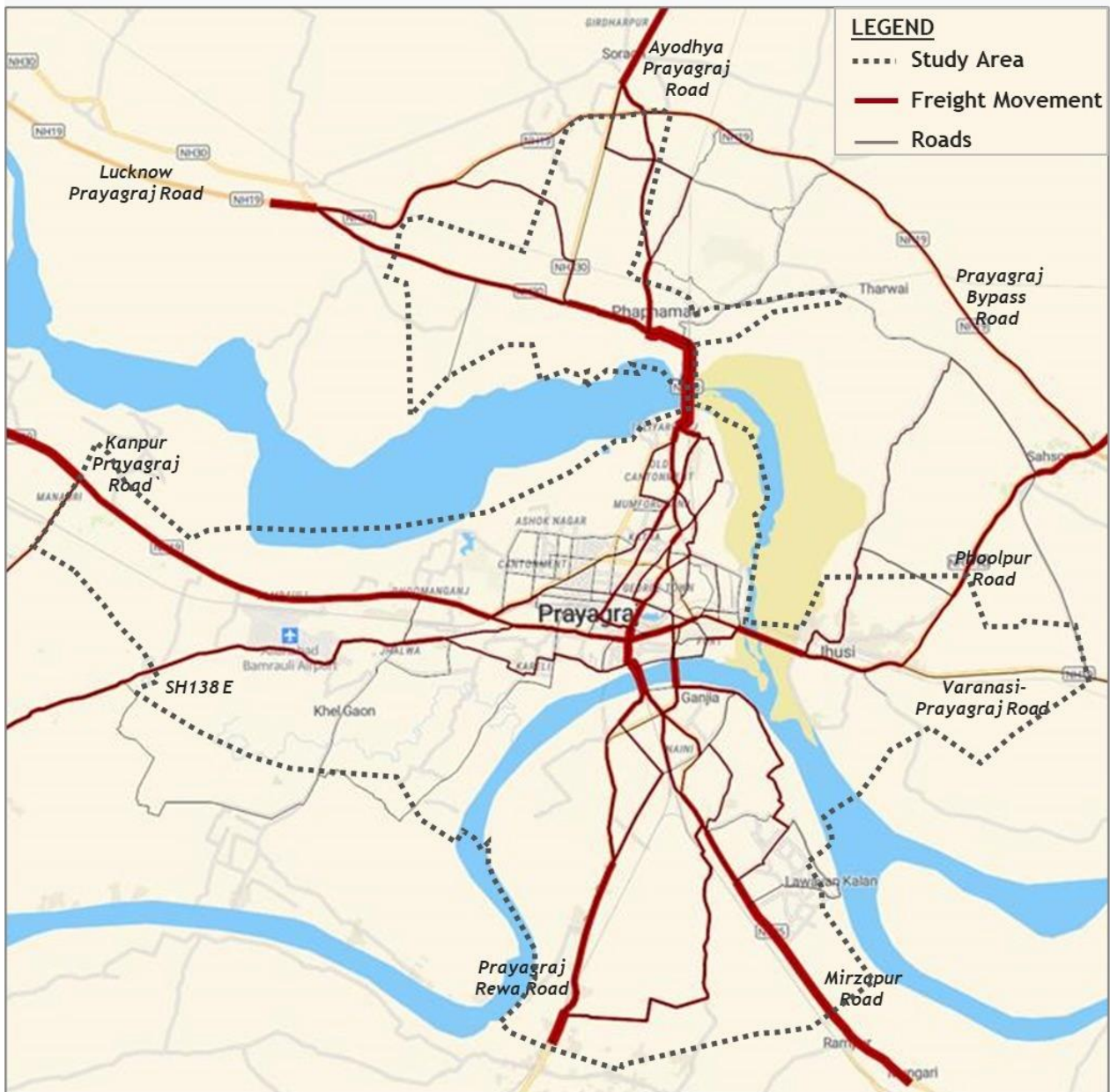


Figure 3-30: Freight movement across the city of Prayagraj

3.7 MAJOR CHALLENGES FACED BY THE CITY

This section deals with various key issues identified in the study area during the primary & secondary surveys. The identified issues are in particular with the freight traffic, vehicle type, lack of freight infrastructure and logistics management in the study area. Key issues collected from the study area provide a broader prospective about the problems associated with the freight or freight traffic or associated with the concerned stakeholders as listed below.



Source: Site Reconnaissance Survey

Figure 3-31: No dedicated Parking area available for Goods vehicle in Transport Nagar

- Lack of dedicated parking space for the freight vehicles, which are presently being parked along the road on earthen shoulders or along the median of the road due to which the goods vehicle drivers and operators face many challenges (refer Figure 3-28).
- In the absence of designated parking spaces, the on-street parking along the roads lead to unsafe parking.
- The unorganised parking carried out presently is deemed unsafe to vehicles as there are complaints of thefts of vehicle parts.





Source: Site Reconnaissance Survey

Figure 3-32: Issues along Madhwapur Sabzi Mandi (Bahraina) Road

- Poor road surface results in the vehicle damage and the delay in delivery of goods as well.
- Lack of loading unloading space for the freight vehicles along Bahraina road leads to encroachment of main carriageway.
- Conflict points have been observed between the general traffic and the freight traffic, when the freight vehicles enter or exit to and from the road side establishments.



Source: Site Reconnaissance Survey

Figure 3-33: Roadside shoulder encroached by the trucks in Transport Nagar Area & Wholesale Markets

- Road side shoulders are encroached by the shopkeepers as shown in Figure 3-33. Heavy instruments are left open along the road which pose safety threat to the general traffic. Further, this arrangement attracts on-street parking for loading and unloading of the vehicles which further encroaches the main carriageway.



Source: Site Reconnaissance Survey

Figure 3-34: On Street Parked Goods Vehicle in Transport Nagar

- Lack of dedicated parking space in Transport Nagar results in the on-street parking of the freight vehicles, which reduces the effective carriageway width and leads to traffic congestion during the day time which also affects the general traffic. (refer Figure 3-34)
- Loading/ unloading activities also takes place at the main road creating a chaotic & haphazard situation.



Source: Site Reconnaissance Survey

Figure 3-35: Poor Condition of Existing Roads in Transport Nagar

- Poor condition of existing roads in Transport Nagar (refer figure: 3-31) leads to increased maintenance of the freight vehicle. Parking of vehicles alongside the road can be observed as there is no dedicated parking space within the terminal.



Source: Site Reconnaissance Survey

Figure 3-36: Roadside Sabzi mandi in Naini



CHAPTER 4

PROPOSED SCENARIO AND CITY LOGISTIC PLAN

4. PROPOSED SCENARIO AND CITY LOGISTIC PLAN

This section details out the assessment of the total commodity demand and truck trips in the base year and the scenarios for the horizon year. Scenario results are compared for total truck vehicle km and their impact on the transport supply to analyse the impact of the proposed strategies. In the end of the chapter the key issues are discussed.

4.1 VISION OF THE CITY LOGISTIC PLAN

Vision for Prayagraj City's freight logistics system is to create technologically enabled, integrated, cost-efficient, sustainable and resilient transport network to reduce congestion and emissions, provide a safe environment for the citizens and enable high-level efficiency for logistic industry.

4.2 SCENARIO DEVELOPMENT

To achieve the defined objectives and goals, following scenarios were developed, as follows:

- **Scenario 1:** Business as Usual Scenario
- **Scenario 2:** Sustainable Urban Freight Transport Scenario (**Scenario 1 + Proposed Projects** from this study discussed in **chapter 5**)

The horizon year for the projections is taken as year 2042.

Development of the commodity-based demand is one of the critical activities under the study. It will help evaluate the formulated strategies. The model aims to integrate major freight activities, land use pattern, commodity flow, and the regional economic characteristics of the study area and will use the four-stage demand modelling process. In this section, the methodology for the development of the demand model is discussed, along with the validation results for external trips for the base year.

4.3 COMMODITY BASED MODELLING

4.3.1 ZONING

Based on the extensive primary and secondary data collected as part of the study, the transport model has been developed. The study area boundary for development of the model has been taken to be the metropolitan area boundary. The identified Traffic Analysis Zones (TAZs) include total 184 internal zones and 8 external zones. Internal zones consist of the villages and the wards falling inside the metropolitan area boundary.

Figure 4-1 below provides snapshot of the traffic analysis zones.



Figure 4-1 Map Showing the FTAZ

4.3.1.1 DEMAND GENERATION

The process of converting the demand data from outer cordon surveys, establishment and drivers' surveys to an origin-destination (OD) matrix involves the following steps:

Define the study area: The first step is to define the study area and the boundary of the model. This includes identifying the outer cordon and the internal zones within the study area.

Estimate the total demand: The next step is to estimate the total demand for each commodity and trip purpose within the study area. This is done by analysing the data collected from the traffic volume counts, establishment and drivers' surveys. Once data has been collected from these surveys, an origin-destination (OD) matrix is generated. The OD matrix shows the flow of goods between different locations within the study area and is used to estimate the overall demand for freight movements. The matrix is typically created by combining data from the different surveys, using statistical methods to estimate the number of trips between different locations based on the available data.

Keeping in view the importance of data collected through primary sources/primary surveys to arrive at Base Year demand of various commodities inside the study area and that transiting through, is given as Annexure 4.1.

Demand validation involves comparing the number of vehicles at the outer cordon vs model volumes generated from surveys with the model's matrix.

Table 4-1 summaries the commodity wise total production and attraction for the base year 2022.

Table 4-1: Commodity wise Base Year Estimated Demand (Tonnes)

Sr. No.	Commodity	Production		Attraction	
		2022-23			
1	Fruits & Vegetables & Medicines & Meat	47,32,612		51,40,988	
2	Agro Products	36,93,399		40,12,101	
3	Furniture	9,85,434		10,70,466	
4	Oil & Gas	11,29,373		12,26,827	
5	Construction Material	22,38,184		24,31,316	
6	Iron & Steel	9,47,471		10,29,229	
7	Chemicals & Fertilizers	88,578		96,222	
8	Electronics and Electricals & Hardware	5,06,162		5,49,838	
9	Automobile	2,79,971		3,04,129	
10	General Merchandise	16,94,060		18,40,240	
	Total	1,62,95,243		1,77,01,357	

The convert total yearly commodities to daily, a factor is used, and further load factor from each vehicle is applied as per the primary survey data. Figure below shows the estimated distribution of the commodity production for the year 2022. The total production and attraction is distributed among different zones based on the land use characteristic.

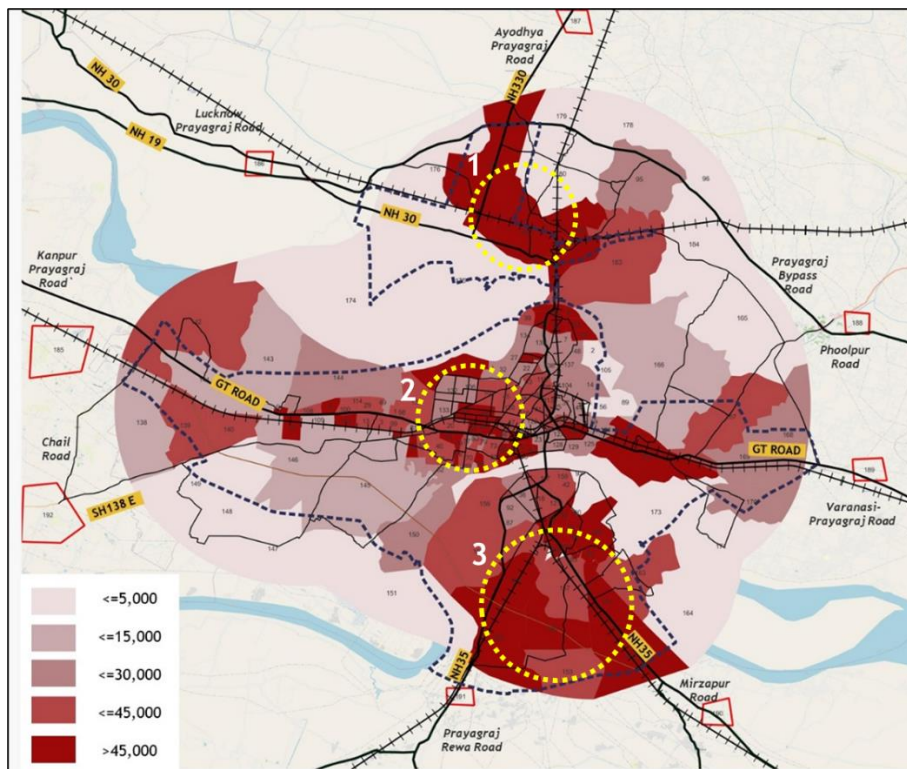


Figure 4-2 Commodity Production and attraction for year BAU 2022 (SOURCE: UMTC Analysis)

1. High Freight Movement due to high volume of cargo (majorly fruits & vegetables) arriving from Lucknow and Ayodhya.
2. High Freight Movement due to high volume of cargo moving from inside the city (E-E) and location of wholesale activities inside the city.

- 3. High Freight Movement due to high volume of cargo due to industrial activity and freight from Rewa Road and Mirzapur Road.

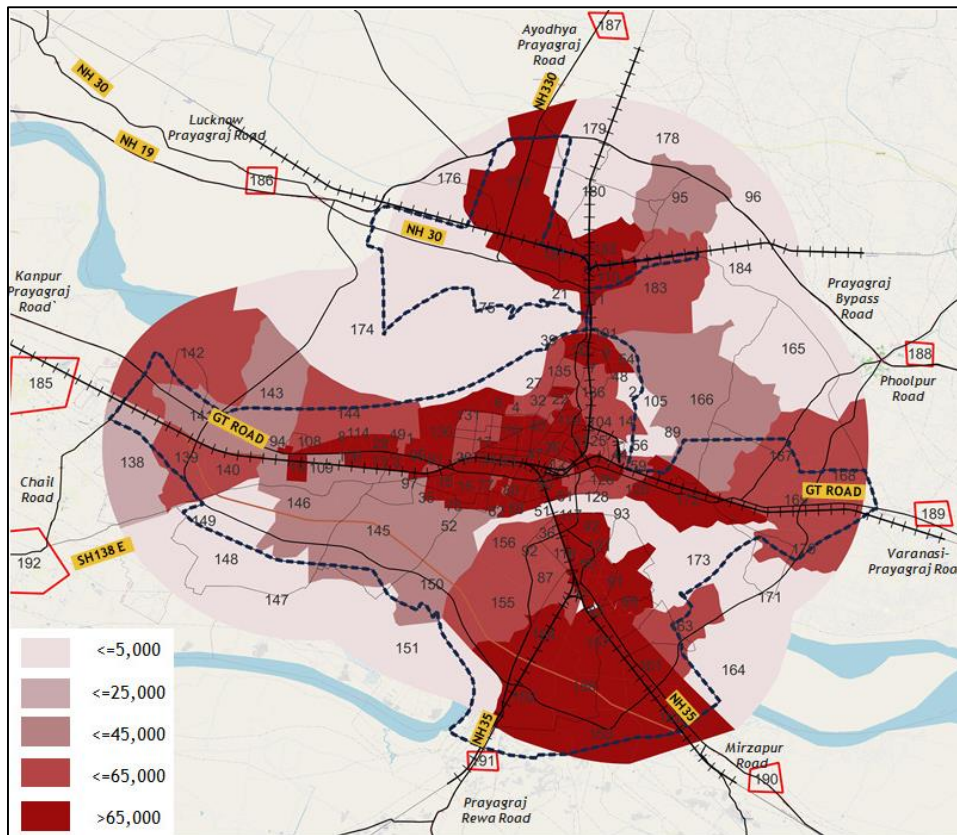


Figure 4-3 Cargo Production for BAU Scenario (2042) (SOURCE: UMTC Analysis)

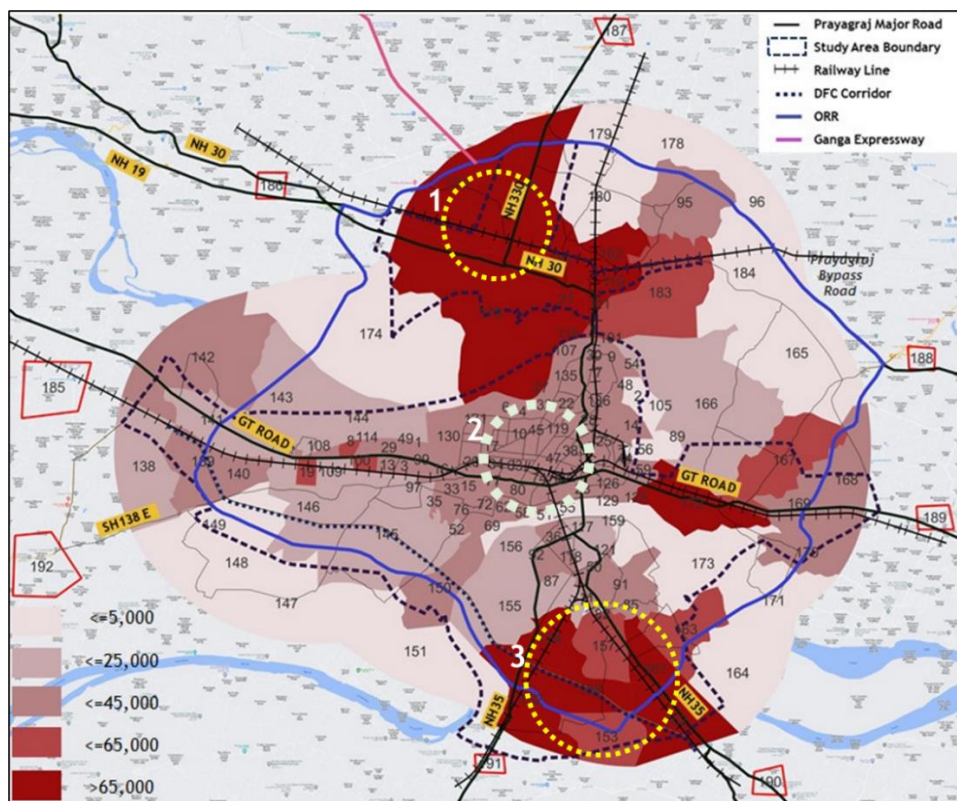


Figure 4-4 Commodity Production for year Sustainable 2042 Scenario (SOURCE: UMTC Analysis)

1. Increase in freight movement in the area due to proposed facilities like warehouses, cold storage and transport nagar etc.
2. Area decongested due to relocation of wholesale and warehousing activities. Due to proposed ring road the E-E movement from core of city is reduced tremendously.
3. High Freight Movement due to proposed industrial activity warehousing and DFC Station.

4.3.1.2 DEMAND DISTRIBUTION

The demand is distributed based on the OD data, primary count data, and industry land use data for the base year and establishment survey collected from the primary surveys only, as GST data was not available for the commodity flow. The Gravity Model has been used for the present study due to data availability and its better applicability in the future. The Gravity Model is a heuristically derived expression for synthesizing trip interchanges. The basic premise of the Gravity Model is that the trip magnitude between two zones i and j is directly proportional to the number of trips produced in the zone, i.e., the number of trips attracted to zone j , and inversely proportional to some function of the spatial separation of the two zones. Multiple trips for any mode are not considered due to lack of data.

The basic aim is to relate productions and attractions of different zones with the quantum of trip modelling between individual zone pairs.

$$T_{ij} = R_i C_j P_i A_j f(W_{ij})$$

Where, T_{ij} = Trips between zonal pairs i and j

$$P_i = \text{Trip Production at zone } i = \sum_j T_{ij}$$

$$A_j = \text{Trip Attractions at zone } j = \sum_i T_{ij}$$

$f(W_{ij})$ = A function that separates zonal pairs i and j , typically known as Friction Factor

R_i and C_j = Constants of proportionality

For this study the Gravity Model used is the production constrained type. The **Production Constrained Gravity Model** is of the form

$$T_{ij} = \frac{P_i A_j f(W_{ij})}{\sum_j A_j f(W_{ij})}$$

This ensures that, when summed across the rows of the model T_{ij} matrix, the individual zone trip origin totals equal the corresponding observed trip totals.

Determination of each of the constants in the distribution model is termed as calibration. To estimate the calibration parameters of the gravity model, purpose-wise Trip Length Frequency Distribution (TLFD) is extracted from the O-D matrix generated from the OD data and establishment survey/driver survey data.

The top 100 OD pairs with internal-internal, internal-external, and external-internal demand, along with the intensity of traffic volume between these pairs, are presented below for the base year.

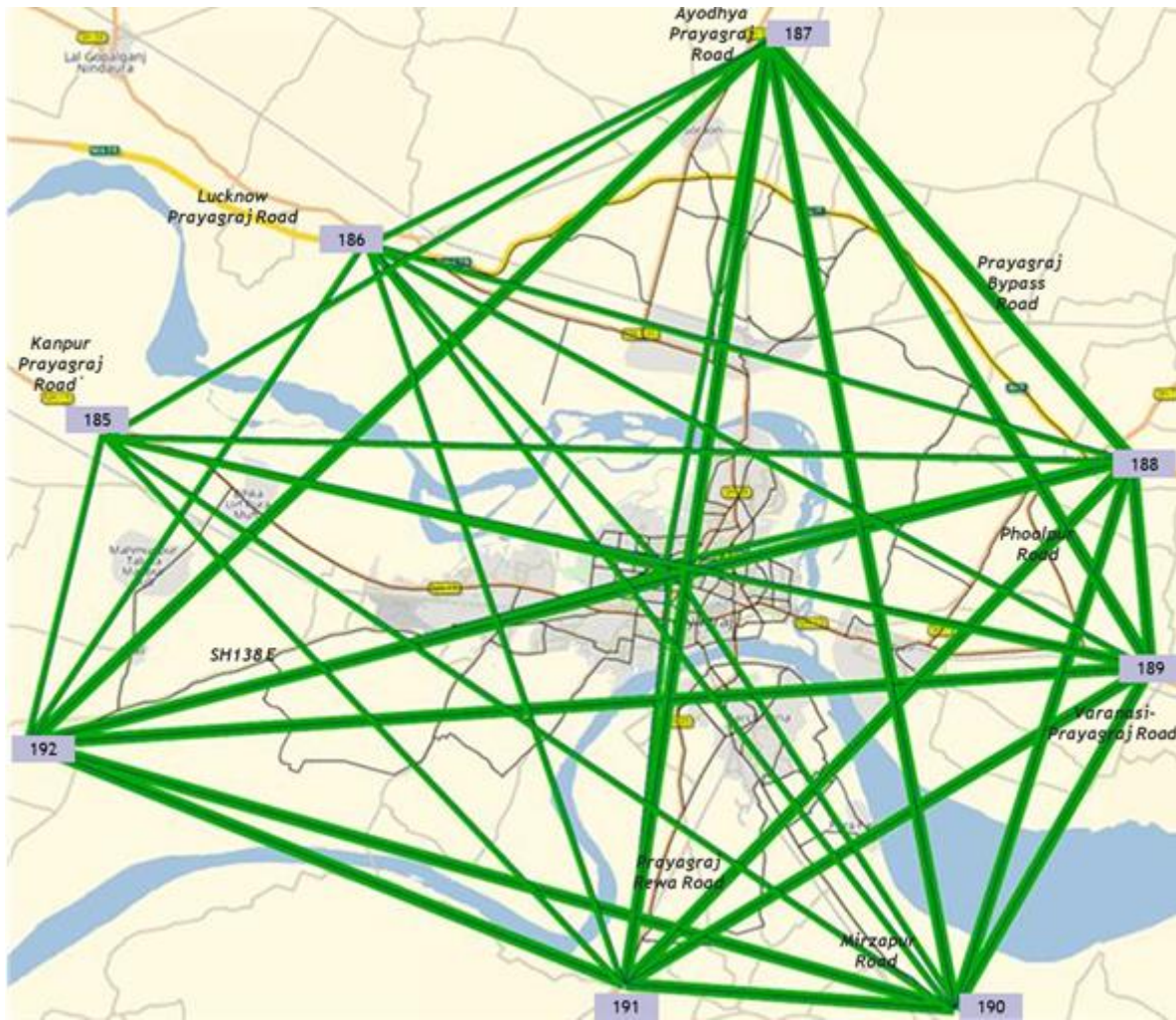


Figure 4-5: Base Year Transiting Goods Traffic Desire Line (SOURCE: UMTC Analysis)

Figure 4-5 above shows the freight movement between external zones. Approximately 48% of the vehicles are traveling from external-to-external zones, i.e. traffic that needs to bypass the city.

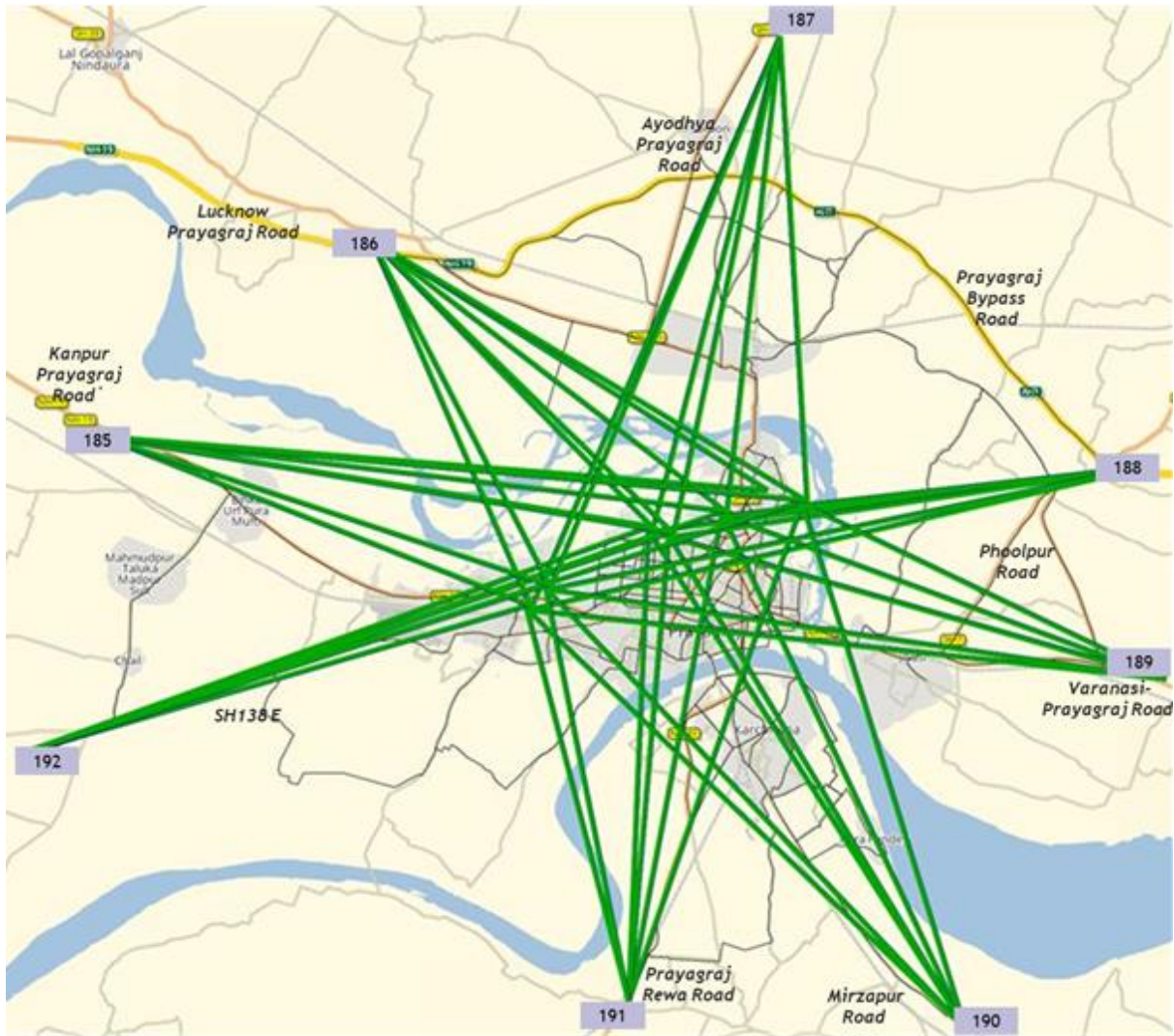


Figure 4-6: Base Year Incoming (Terminating) Goods Traffic Desire Line (SOURCE: UMTC Analysis)

Figure 4-6 above shows the freight movement that occurs from outside the city to different zones within the city and vice-versa.

Around 48% of the vehicles are commuting between external and external zones, with 25% of these trips being from internal to external zones, and 27% being from external to internal zones. (Refer Figure below). The Freight distribution analysed from the above analysis is depicted in the chart below:

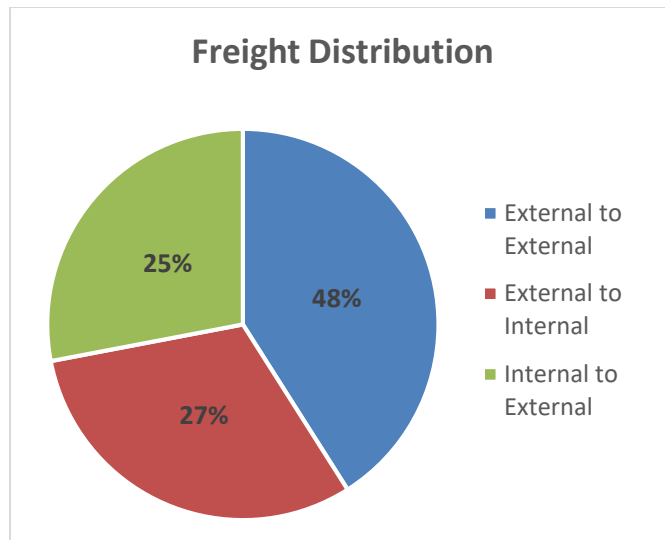


Figure 4-7: Freight Distribution at outer cordons (SOURCE: UMTC Analysis)

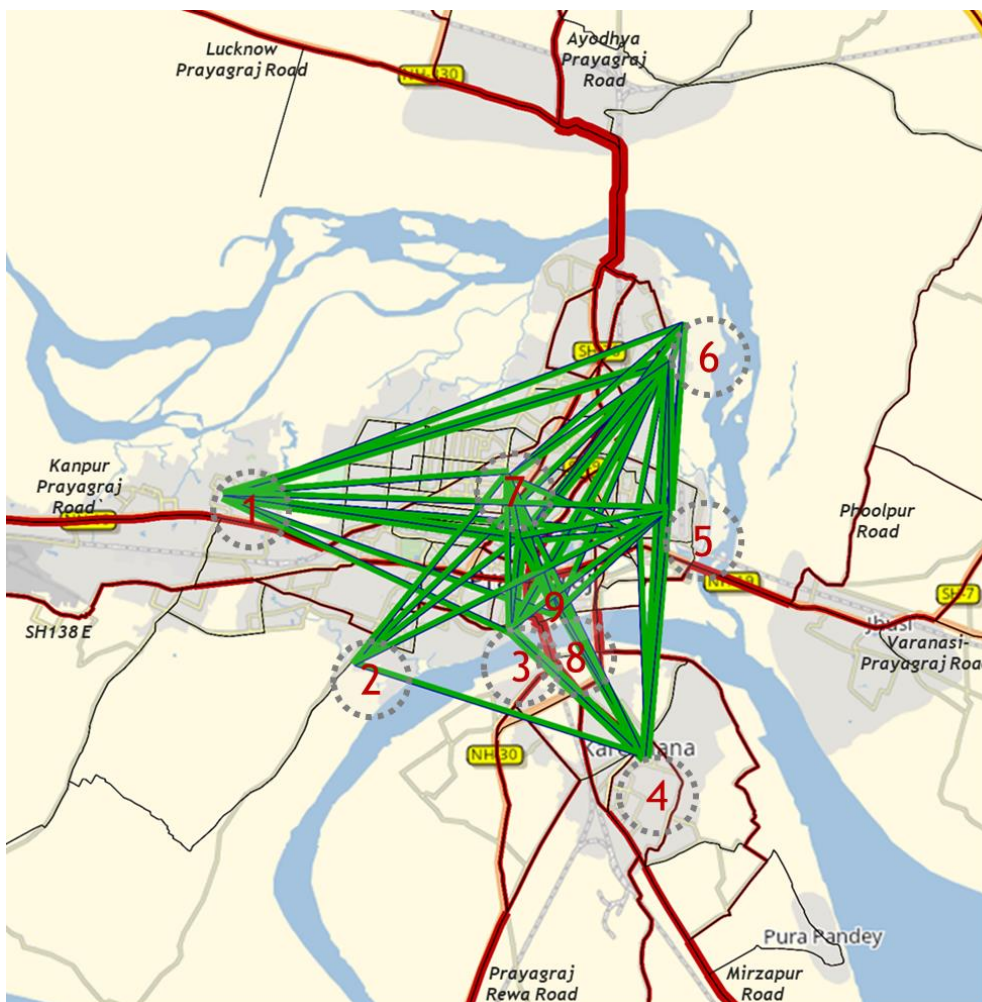


Figure 4-8: Intra-Study Area Goods Traffic Desire Line (SOURCE: UMTC Analysis)

Figure 4-8 above, shows the freight movement that occurs within the city, from one zone to another. Relevant information elicited through sample surveys. The average trip length for these desire lines is between 5.3 km to 8.6 km, which suggests that there is a relatively high demand

for freight movement within the city at shorter distances. The major areas in Prayagraj where internal movement of goods occurs are as follows:

1. Transport Nagar
2. Meerapur
3. Mutthiganj/ Hatthiya Chauraha
4. Naini
5. Daryaganj
6. Teliyarganj
7. Civil Lines
8. Kydganj
9. Prayagraj Core City

4.3.1.3 MODAL CHOICE AND ASSIGNMENT

The modal choice within the city is primarily by LCV and Mini LCV, whereas MAV are used for external trips. Total distributed commodity is further distributed mode wise based on the average trips as observed in the primary survey. Based on the primary count data, the derived OD matrices for the goods vehicles based on the production and attraction is corrected using the T-Flow fuzzy matrix correction procedure to match the observed count.

Modal Choice:

The modal choice refers to the percentage of demand or traffic that is allocated to each mode of transportation in a logistics plan. In this case, the modal split for the logistics plan includes LCVs, MAVs, and Trucks with percentages described below.

Each mode of transportation has its own advantages and disadvantages, and the modal split is typically determined based on factors such as distance, volume, speed, reliability, cost, and environmental impact.

LCVs (Light Commercial Vehicles):

LCVs are typically small vehicles with a payload capacity of up to 5 tonnes. They are often used for short-distance transportation of small to medium-sized goods and are preferred for their flexibility and agility in navigating urban areas. The modal split for LCVs in this logistics plan is 30%, indicating that LCVs are an important mode of transportation for the logistics operations with an average tonnage of 5 tonnes.

MAVs (Medium and Heavy Commercial Vehicles):

MAVs are medium to large trucks with a payload capacity of 10 to 40 tonnes. They are often used for medium to long-distance transportation of larger goods and are preferred for their efficiency and reliability. The modal split for MAVs in this logistics plan is 36%, indicating that they are a significant mode of transportation for the logistics operations. Average tonnage is 16 tonnes.

Trucks:

Trucks refer to heavy-duty vehicles. They are often used for long-distance transportation of bulk goods and are preferred for their capacity and efficiency. The modal split for trucks in this logistics plan is 34%. Average tonnage is 10 tonnes. These include 2-Axle Trucks only.

Overall, the modal split for the logistics plan includes a mix of different modes of transportation that are suited for different types of goods and transportation distances. By allocating demand or traffic to different modes based on their strengths and weaknesses, the logistics plan can be optimized for efficiency and cost-effectiveness while meeting the required delivery times and environmental considerations.

Table 4-2: Modal Split

	LCV	MAV	Truck
% Share	30%	36%	34%

Freight Traffic- Modal Split (PCU's/ day)

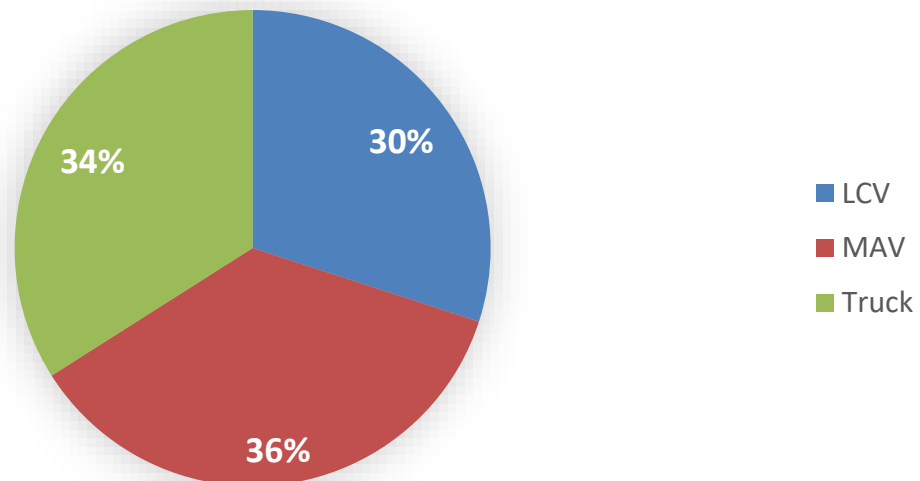


Figure 4-9: Modal Split at Outer Cordons

The Trip Assignment is done by using Equilibrium Assignment. The process of assigning trips and validating the results is carried out using the Geoffrey E. Havers formula, which compares the observed traffic volumes at the outer cordons with the modelled volumes. This formula is used to evaluate the accuracy of the trip distribution model and to adjust it accordingly. The aim is to ensure that the model accurately reflects the observed traffic volumes and that it can be used to make reliable predictions about future traffic patterns. The modelling methodology and validation results are given in the paragraphs below.

4.4 COMPARING SCENARIO RESULTS

Based on the transport model analysis, for the scenario 2, following targets have been considered based on expert judgement for estimated key performance indicators

- 25% reduction in trips to due to additional storage availability at warehouses and terminals by the year 2033.
- Shift to MAV from 2 axle and 3 axle for external trips by year 2033
- 40% of external traffic to be shifted to the proposed multi modal logistic hub by the year 2043.
- Up to 70% reduction in empty trips due to joint delivery, utilization of cargo capacity for vehicle types of use of ITS and impact of containerization, and 25% reduction in cost by the year 2043.

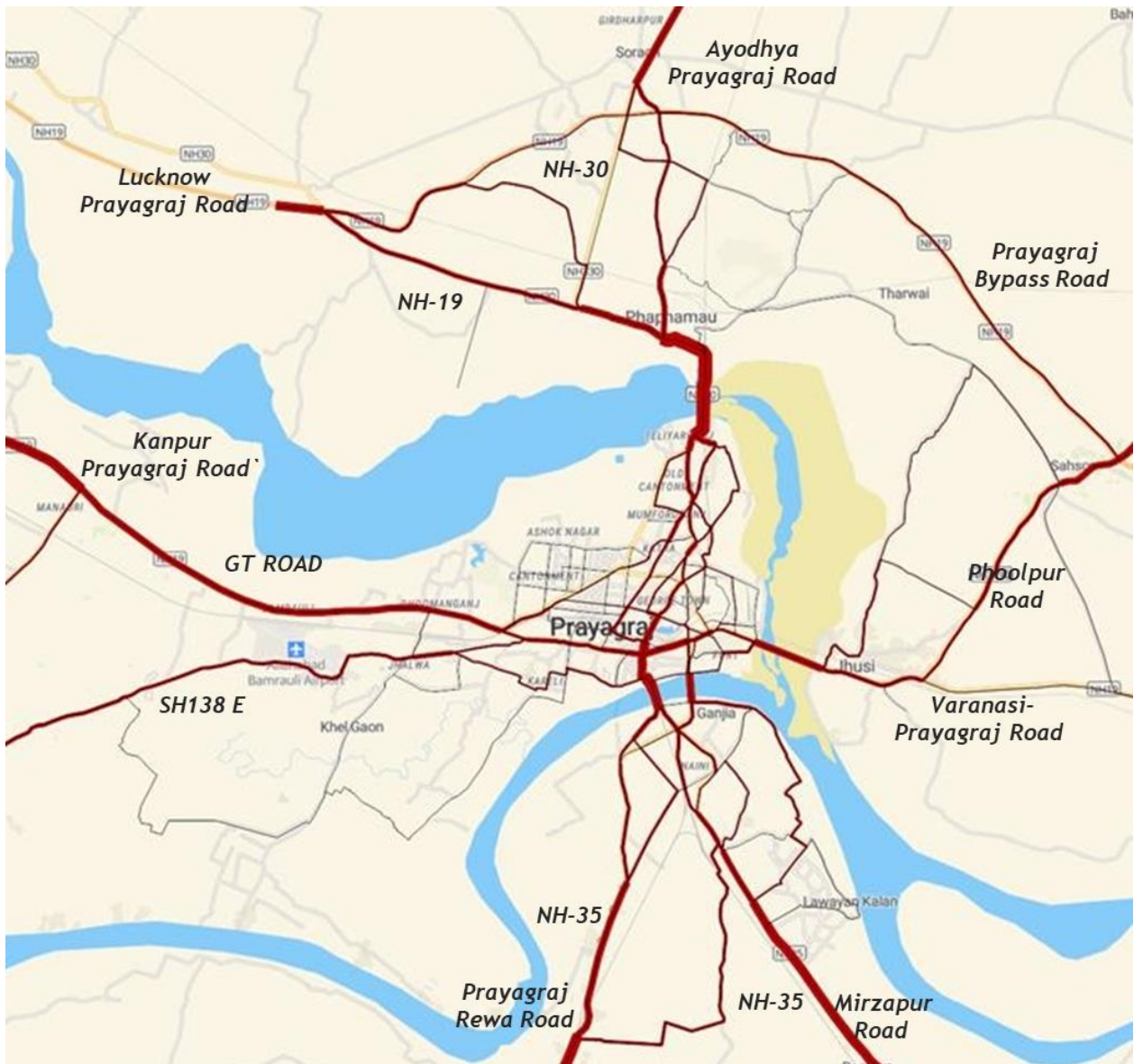


Figure 4-10: Existing Freight Vehicle assignment (based on Freight Vehicle PCU's)

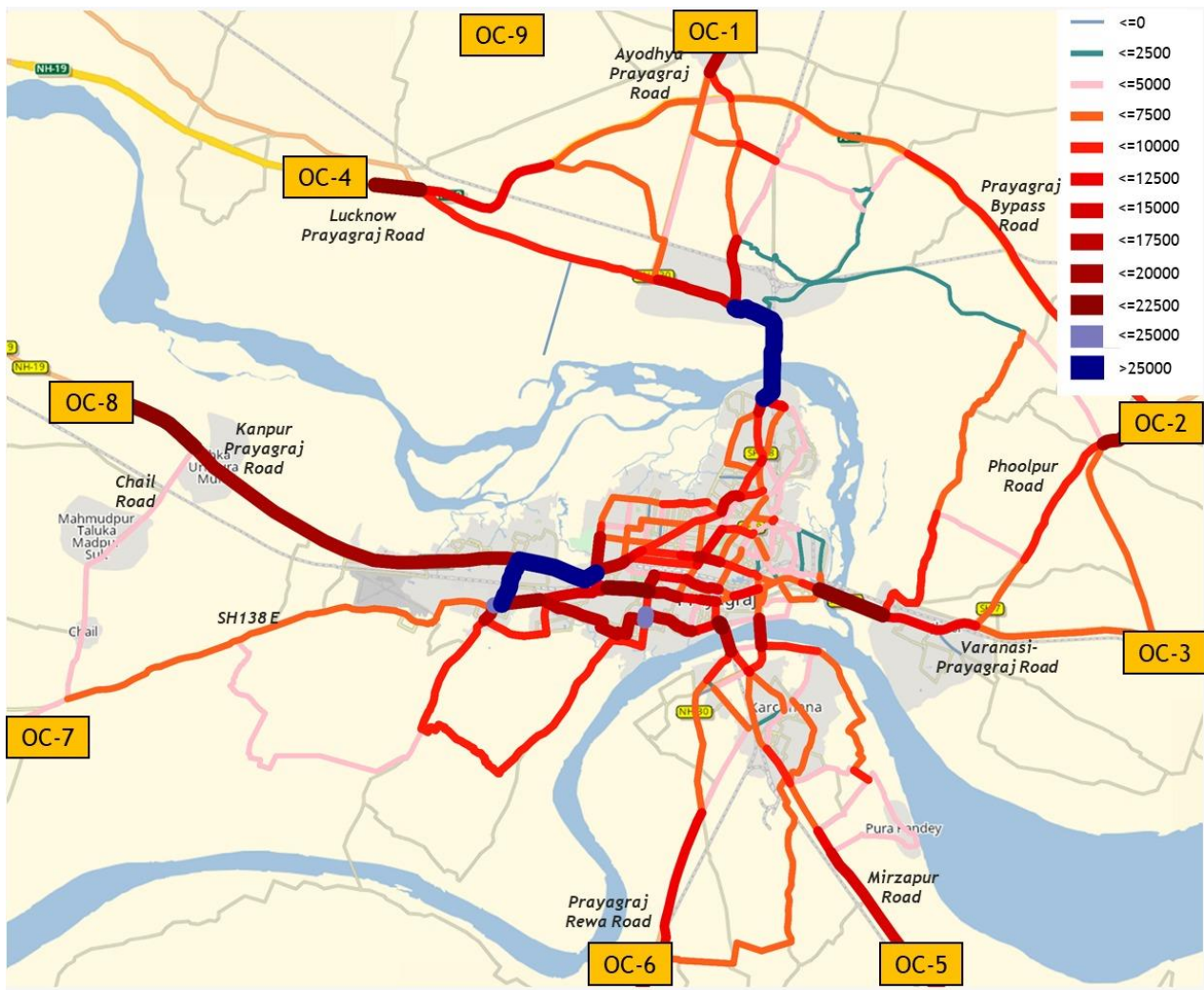


Figure 4-11: Freight Assignment for Base Year (in Tonnes) (SOURCE: UMTC Analysis)

The Varanasi-Prayagraj Road experiences the lowest amount of freight traffic compared to other routes. On the other hand, vehicles traveling from Varanasi towards Lucknow, Kanpur and Mirzapur tend to take alternative routes such as the NH19 bypass and NH35.

Table 4-3: Freight (tonnage) movement at Outer Cordons for BAU 2022

BASE YEAR 2022		Freight (in Tonnes)		
Outer Cordon	Road Name	Total Tonnage	Agro Based Commodity	Non- Agro Based Commodity
OC-1	Ayodhya- Prayagraj (NH-330)	15,440	9,060	6,380
OC-2	Phoolpur Road	10,220	4,760	5,460
OC-3	Varanasi- Prayagraj (GT Road)	230	110	120
OC-4	Lucknow- Prayagraj (NH-19)	20,410	11,200	9,210
OC-5	Mirzapur Road (NH-35)	14,550	6,640	7,910
OC-6	Prayagraj Rewa Road (NH-30)	18,200	8,950	9,250
OC-7	State Highway 138 E	3,050	2,510	540
OC-8	Kanpur- Prayagraj (GT Road)	20,920	10,040	10,880

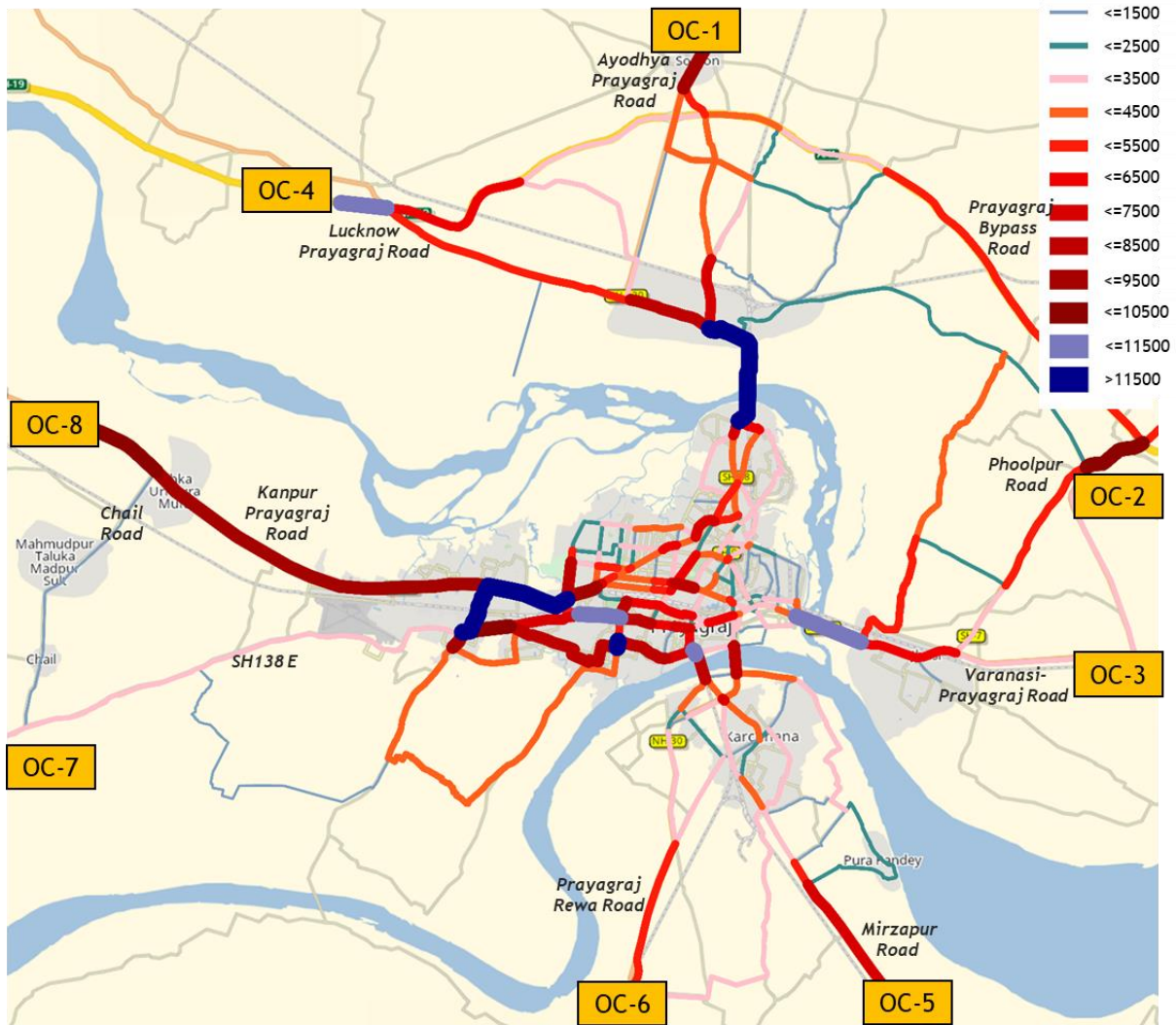


Figure 4-12 Freight Assignment for BAU Scenario 2022 in tonnes for Agro based commodities

OC 4 has the highest flow of agro-based commodities, which amounts to 11,200 tonnes. This data is important for providing locations of warehouses and cold storage facilities. Agro & food-based commodities comprise of 51.7% of total freight cargo.

Types of Argo based commodities:

1. Wheat
2. Rice
3. Fruits
4. Vegetables etc.

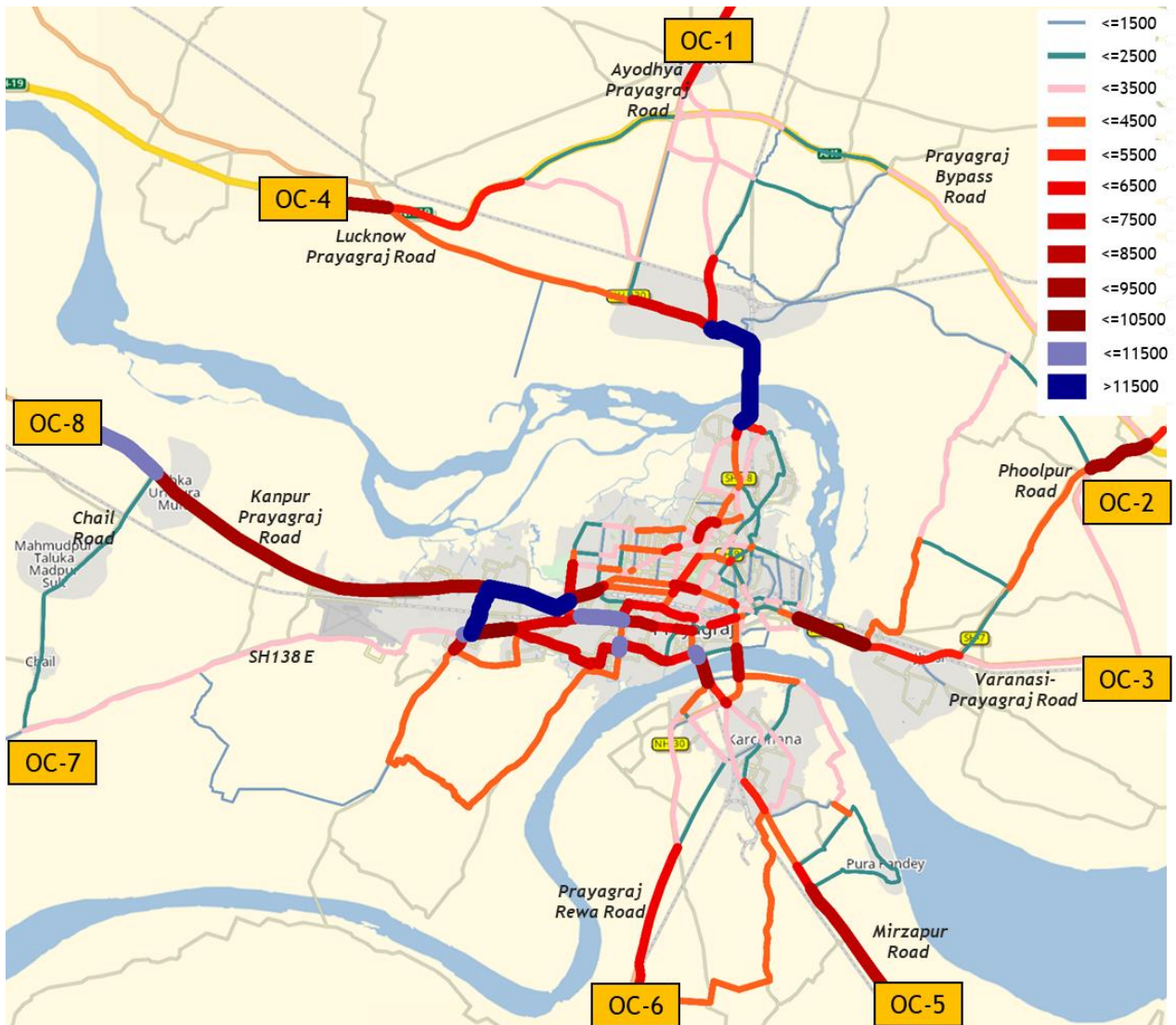


Figure 4-13: Non-Agro based commodities - Freight Assignment for BAU Scenario 2022

Since OC-8 has the highest flow of non-agro based commodities, which amounts to 10,880 tonnes.

Types of Non-Agro based commodities:

1. Furniture
2. Oil & Gas
3. Construction Material (including cement)
4. Iron & Steel
5. Chemicals & Fertilizers
6. Electronics, Electricals & Hardware
7. Automobile
8. General Merchandise

To counter the above indicated behaviour and bring high level of efficiency in freight movement along with decongestion in the city, a sustainable scenario has been developed for future years consisting of a mix of proposals tested under modelling exercise as indicated in the snapshot

below. The proposals incorporated to derive sustainable modelling approach is discussed in the next chapter.

Table 4-4: Freight movement at Outer Cordons for BAU Scenario 2027, 2032, 2042

	BAU Scenario 2027	BAU Scenario 2032	BAU Scenario 2042
Total Freight under BAU Scenario (Tonnes)	1,11,244	1,25,532	1,51,380

Table 4-5: Freight movement at Outer Cordons for Sustainable Scenario 2027, 2032, 2042 (T/day)

Outer Cordon	Road Name	Sustainable Scenario 2027	Sustainable Scenario 2032	Sustainable Scenario 2042
OC-1	Ayodhya- Prayagraj (NH-330)	10,250	11,592	13,966
OC-2	Phoolpur Road	15,749	17,813	21,461
OC-3	Varanasi- Prayagraj (GT Road)	407	460	667
OC-4	Lucknow- Prayagraj (NH-19)	9,034	10,218	12,317
OC-5	Mirzapur Road (NH-35)	22,045	24,933	30,039
OC-6	Prayagraj Rewa Road (NH-30)	26,846	30,370	36,589
OC-7	State Highway 138 E	3,520	3,693	4,450
OC-8	Kanpur- Prayagraj (GT Road)	9,226	10,434	12,590
	Ganga Expressway	14,167	16,019	19,301
	TOTAL	1,11,244	1,25,532	1,51,380

Without ORR, only 9% of the traffic from the 48% of external-to-external trips will be using the bypass, while the remaining 39% of the traffic will be entering the city. However, after the construction of the Outer Ring Road, 48% of external-to-external trips will be redirected to Outer Ring Road.



Figure 4-14: Freight Assignment for Sustainable Scenario in 2027 (in Tonnes)

The year 2032 scenario has been presented with recommended developments (Outer Ring Road and Ganga Expressway).



Figure 4-15: Freight Assignment for Sustainable Scenario in 2032 (in Tonnes)



Figure 4-16: Freight Assignment for Sustainable Scenario in 2032 (in PCU's)

For the horizon year 2042, after the implementation of Outer Ring Road, Ganga Expressway and other proposals, the following Freight Assignments have been generated based on tonnes & PCUs. From the analysis below it is inferred that the due to implementation of various proposals the city core area is decongested and there is distribution of freight in various part of city. Although it is to be noted that the area of Mundera Mandi being the main mandi of the city will have high freight volume.



Figure 4-17: Freight Assignment for Sustainable Scenario in 2042 (in Tonnes)



Figure 4-18: Freight Assignment for Sustainable Scenario in 2042 (in PCU's)

4.5 KEY FINDINGS

Total estimated Daily Demand for freight traffic across different Scenario in 2022, 2027, 2032 and 2042 are presented in table below:

Year	Total Freight Traffic (Tonnage)	Total Goods Vehicle (Km)
2022	1,03,020	2,57,14,930
2027	1,07,410	2,84,27,855
2032	1,12,995	3,09,99,348
2042	1,21,987	3,74,62,712

The important commodities transported include:

- Fruits & Vegetables, Medicines & Meat
- Agro Products
- Furniture
- Oil & Gas
- Construction Material
- Iron & Steel
- Chemicals & Fertilizers
- Electronics and Electricals & Hardware
- Automobile
- General Merchandise

Top 10 Commodities Distribution

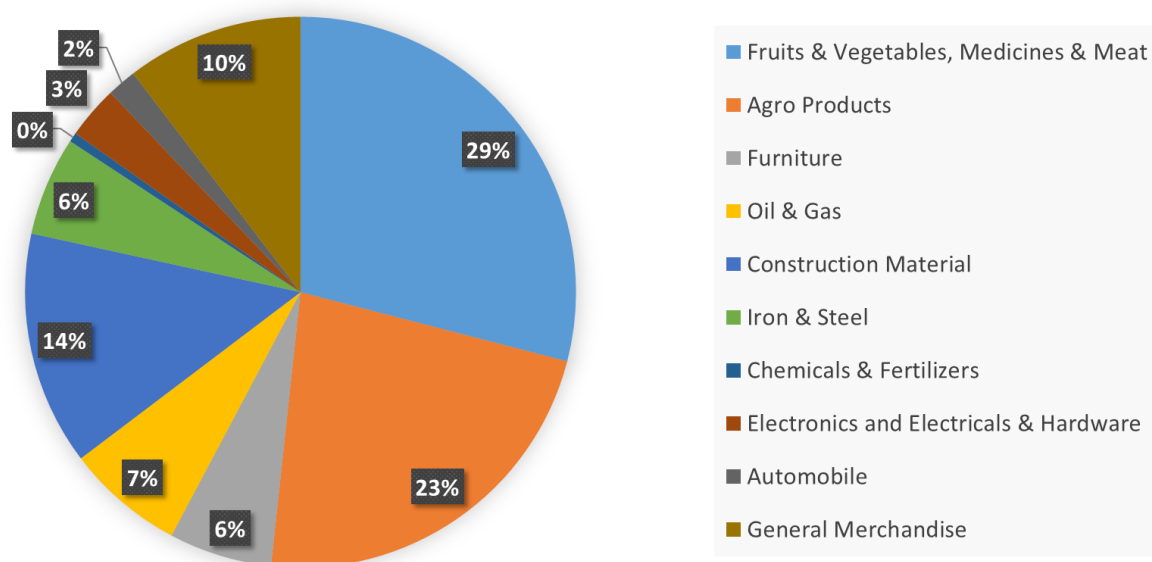


Figure 4-19: Top 10 Commodities Distribution

Figure 4-19 shows the distribution of the top 10 commodities being transported. The largest share, accounting for 29%, is occupied by fruits and vegetables. Agro products follow closely behind with 23% of the share, while construction materials make up 14%. General merchandise

claims a 10% share, while oil and gas occupy 7%. Furniture and iron and steel each represent 6% of the share. The remaining 5% is comprised of electronics, electrical and hardware, automobile, and chemical fertilizer.

The major directions for movement recorded are: Mirzapur Road, Rewa Road, Kanpur Road and Prayagraj-Lucknow Road.

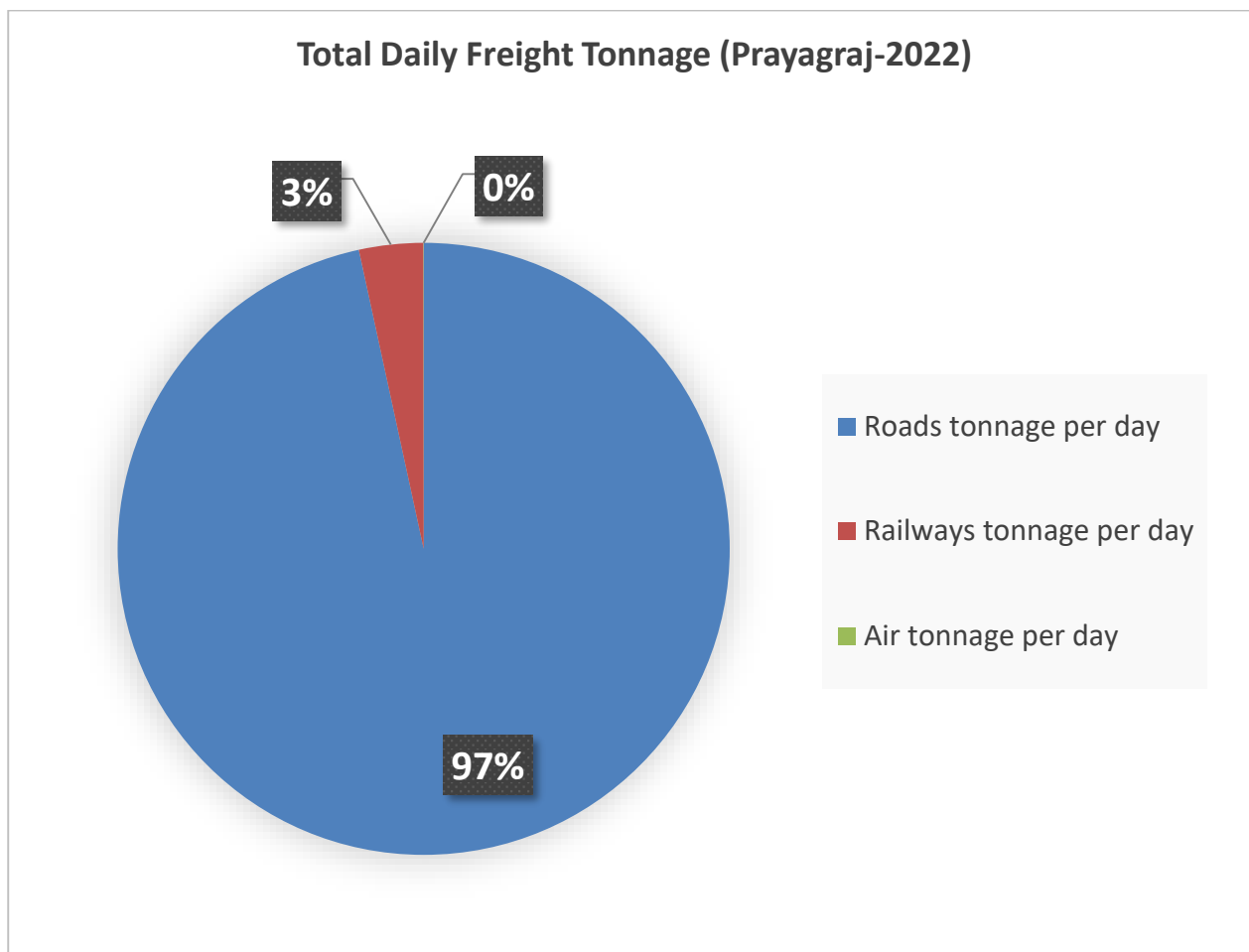


Figure 4-20: Total Daily Freight Tonnage (Prayagraj-2022)

In Prayagraj, approximately 97% of the freight tonnage is carried through road transportation, with only around 3% being transported by railways. The amount of freight transported by air is negligible. Table 4-6 shows the commodity wise traffic projection till 2042.

Table 4-6: Commodity Wise Traffic Projections

S.No.	Commodity Type	Tonnage per day (2022)	Tonnage per day (2032)	Tonnage per day (2042)
A	TOTAL HIGHWAYS	1,03,020	1,23,746	1,49,080
1	Fruits & Vegetables, Medicines & Meat	29,920	35,939	43,297
2	Agro Products	23,350	28,048	33,790
3	Oil & Gas	6,230	7,483	9,015
4	Construction Material	7,140	8,576	10,332

5	Iron & Steel	14,150	16,997	20,477
6	Chemicals & Fertilizers	5,990	7,195	8,668
7	Furniture	560	673	810
8	Electronics and Electricals & Hardware	3,200	3,844	4,631
9	Automobile	1,770	2,126	2,561
10	General Merchandise	10,710	12,865	15,499
B	Railways tonnage per day (All commodities)	3,609	4,335	5,223
C	Air tonnage per day	20	24	29
D	GRAND TOTAL	1,06,649	1,28,105	1,54,332

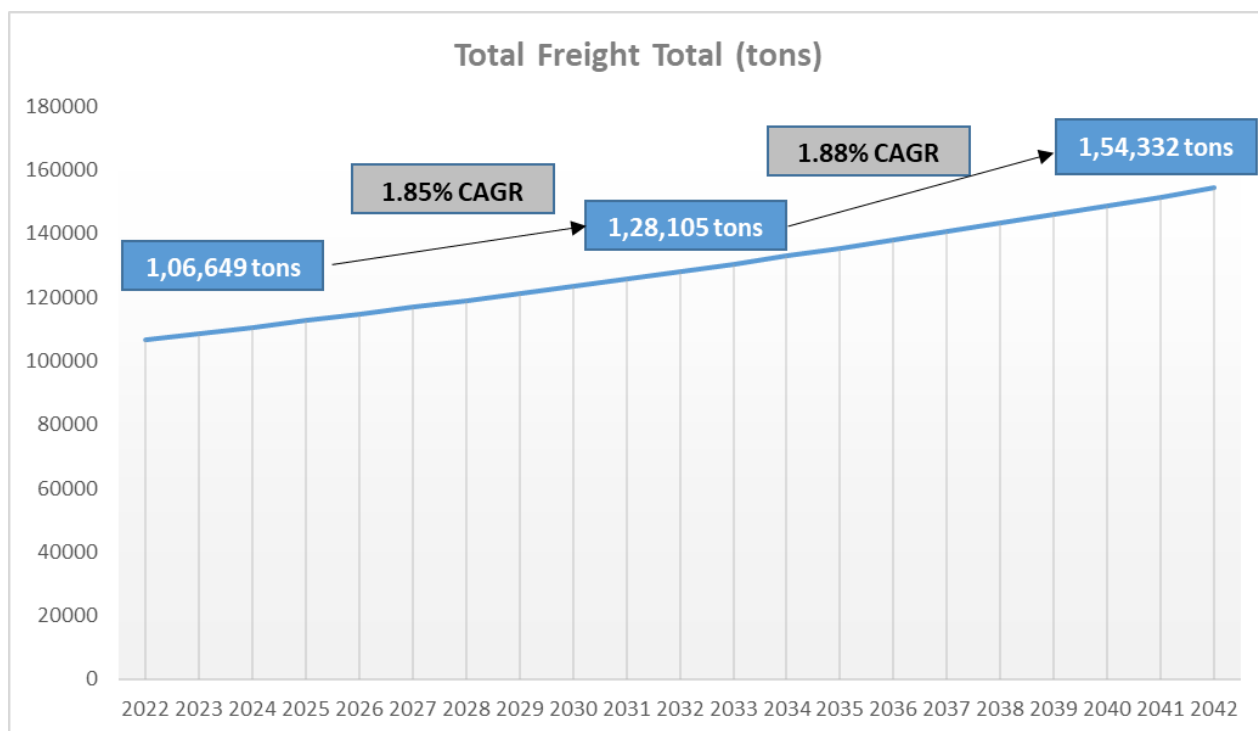


Figure 4-21: Freight Tonnage Per Day (All modes)

The CAGR for 2022-2032 and 2032–2042 is 1.85% and 1.88% respectively.

CHAPTER 5

STRATEGIES AND PROJECTS IDENTIFIED

5. STRATEGIES AND PROJECTS IDENTIFIED

This section focuses on the various strategies formulation for the freight Transport and logistics management in the city. It covers the key Network strategies, Freight Terminal facilities, Truck Routing and Time restrictions, Provisions of ITS and technology trends, supply chain optimization, loading/unloading management, freight vehicle parking management measures and other collaborative delivery measures. This section also provides an overview of key step to be taken for the setup of the institutional measures. Figure 5-1: below provides the overall process for the proposal's formulation.

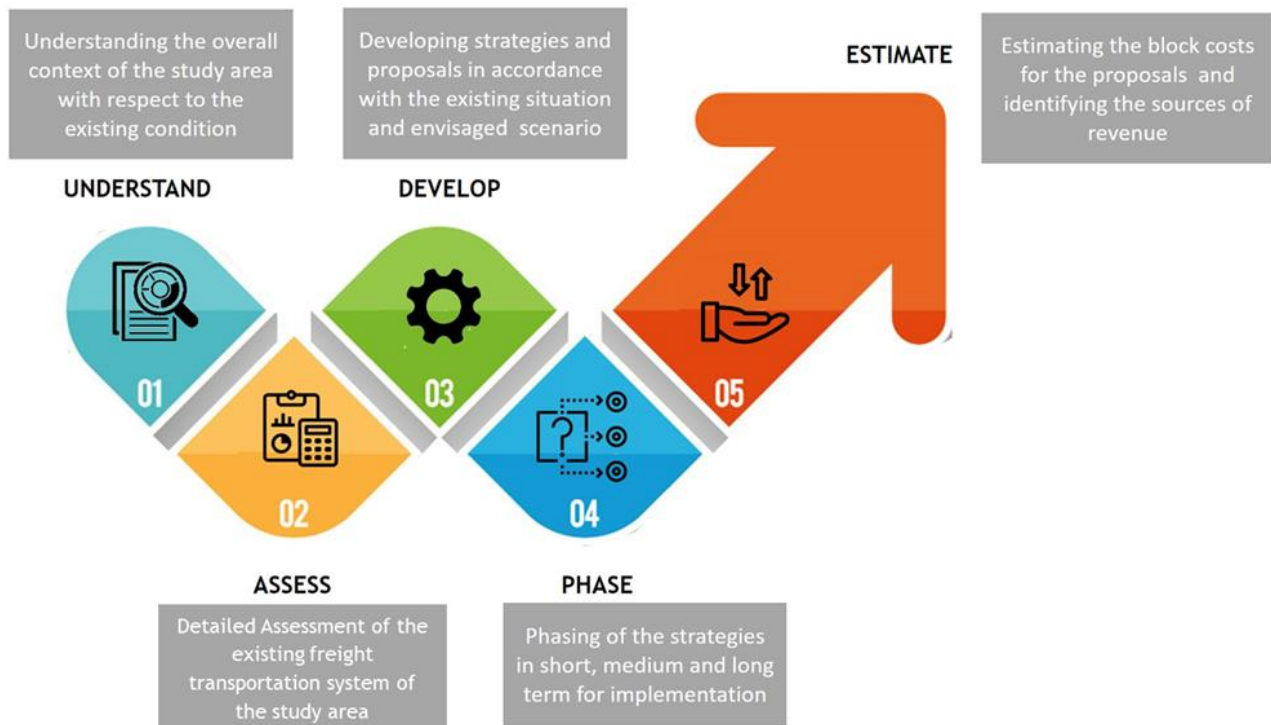


Figure 5-1 Proposal Process

5.1 GOALS

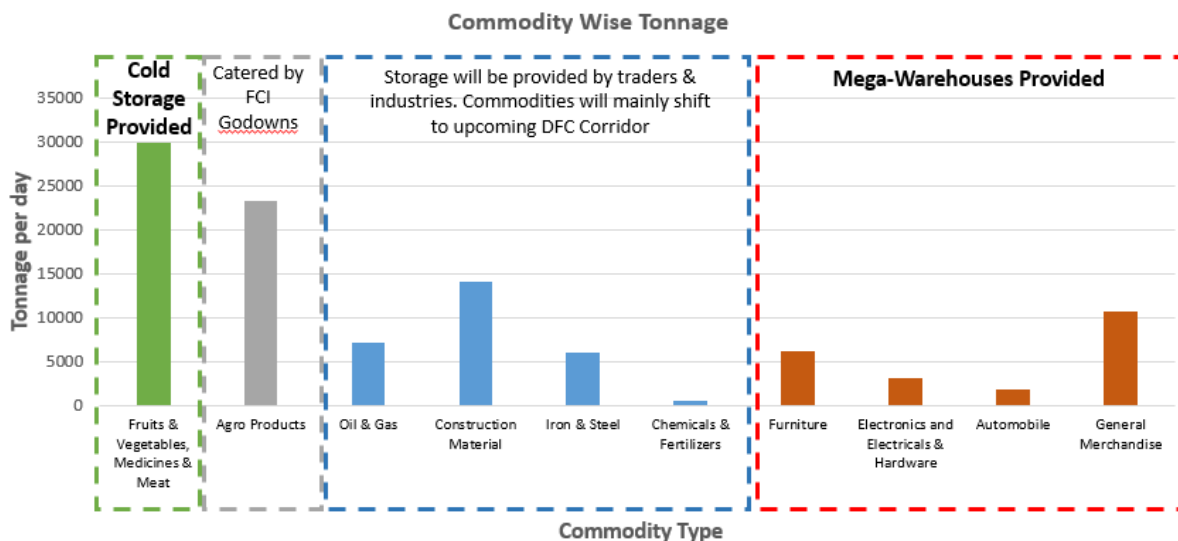
On the basis of the CLP vision various goals are set for the horizon year with a focus to optimize the freight movement and its impact on the transport supply. These include:

1. Reducing freight movement cost/time - Providing a 24/7 window for trucks to access the terminals for storage, loading/unloading activities.
2. Discouraging movement of heavy trucks with the core urban area of the city.
3. Reducing the overall trips length between production units and freight facilities.
4. Introduction to freight ITS to optimize journey starts and avoid waiting times for the trucks.
5. Reducing empty deliveries/pick up and introduce Multimodal transport options to enhance the inclusive growth of the manufacturing sector.
6. Shift to electric for freight mobility - Incentives operators to shift to environment freight modes for their fleets with target of 80% shift in 20-year horizon year period especially for fleet used in the urban area for last mile connectivity.

5.2 ASSUMPTIONS & PLANNING CONSIDERATIONS

Following are the assumptions and planning considerations adopted in the study:

- Common User Facilities: Warehousing & Cold storage planned for MSME and Small Traders.
- Currently there are 3 FCI godowns with a total handling capacity of 65,951 tonnes, however, the current capacity utilization is only about 35% (current demand 23,350 tons). Thus, these godowns would be able to cater to the demand till 2042. Thus, it is proposed that agriculture-based products such as Wheat, Rice etc. will be stored and catered by FCI (Food Corporation of India) and other established agencies.
- Proposed Cold Storage facilities are recommended for commodities such as fruits, vegetables, meat, milk & milk products, and medicines which are traded by MSME sector of City.
- Parking facilities are proposed to avoid roadside parking of freight vehicles.
- The major industries like Alstrom have their own storage facilities. The large traders such as Amazon, Flipkart, Big Bazaar etc. will have their own facilities - not considered in demand estimation.
- POL Products are usually traded by big industries like IOCL, have their own storage & Truck parking facilities.
- Dirty cargo such as coal, cement and chemicals are not considered for common warehousing facility.



5.3 GUIDING PRINCIPALS

The City Logistic Plan for Prayagraj is guided by several principles and objectives to address the challenges and optimize the urban freight transport system.

1. **Improving Logistics Efficiency:** The plan aims to enhance the efficiency of the logistics operations in Prayagraj. This involves streamlining the movement of goods, reducing unnecessary delays and bottlenecks, and optimizing the utilization of transportation resources. By improving logistics efficiency, the plan seeks to ensure faster and more reliable delivery of goods, thereby benefiting businesses and the overall economy.

2. **Reducing Logistics Costs:** Another objective of the plan is to lower logistics costs associated with the transportation of goods in Prayagraj. This can be achieved through various means such as optimizing transport routes, reducing empty trips, promoting multimodal transport options, and implementing efficient storage and handling practices. By reducing logistics costs, the plan aims to enhance the competitiveness of businesses and attract investments to the city.
3. **Decongest the city:** Prayagraj, like many urban areas, faces issues of traffic congestion, particularly caused by freight vehicles. The plan focuses on decongesting the city by implementing measures to divert heavy vehicle traffic away from the city center, providing alternative routes, and improving traffic management systems. By reducing congestion, the plan aims to enhance the overall livability and mobility within Prayagraj.
4. **Segregation of freight and passenger movement:** To ensure smoother and more efficient transportation, the plan emphasizes the segregation of freight and passenger movement. This involves separating the flow of goods-carrying vehicles from public transportation routes, ensuring dedicated infrastructure and routes for freight transport. By segregating these movements, the plan aims to minimize conflicts, improve safety, and optimize the flow of both passenger and freight traffic.
5. **Comprehensive Policy and Planning:** The City Logistic Plan adopts a comprehensive approach to address the challenges and opportunities in Prayagraj's urban freight transport system. It emphasizes the importance of integrating various policy measures, planning strategies, and infrastructure development to achieve the desired outcomes. The plan takes into account factors such as economic development, environmental sustainability, and social considerations to ensure a holistic and balanced approach to urban freight logistics.

5.4 PROPOSED NETWORK STRATEGIES

As per the outer cordon origin-destination analysis it was found that 48% of the freight trips are external-to-external. However, as per the existing situation, only one bye-pass link is available for the city which facilitates through traffic movement of freight vehicles to avoid taking the internal routes of the city. However, freight traffic movements from all other peripheral roads of the city are directed to the internal roads of the city and causes congestion as existing internal roads lack enough capacity to handle the through traffic as well as the internal city traffic.

The total freight traffic demand being 25,000 vehicles in the current year, is expected to increase by 2/3rd of vehicles in a 20-year horizon period, which will further increase the load on the existing transport supply.

Figure 5-2 provides the proposed road network to mitigate the existing and expected issues with the increased traffic load.

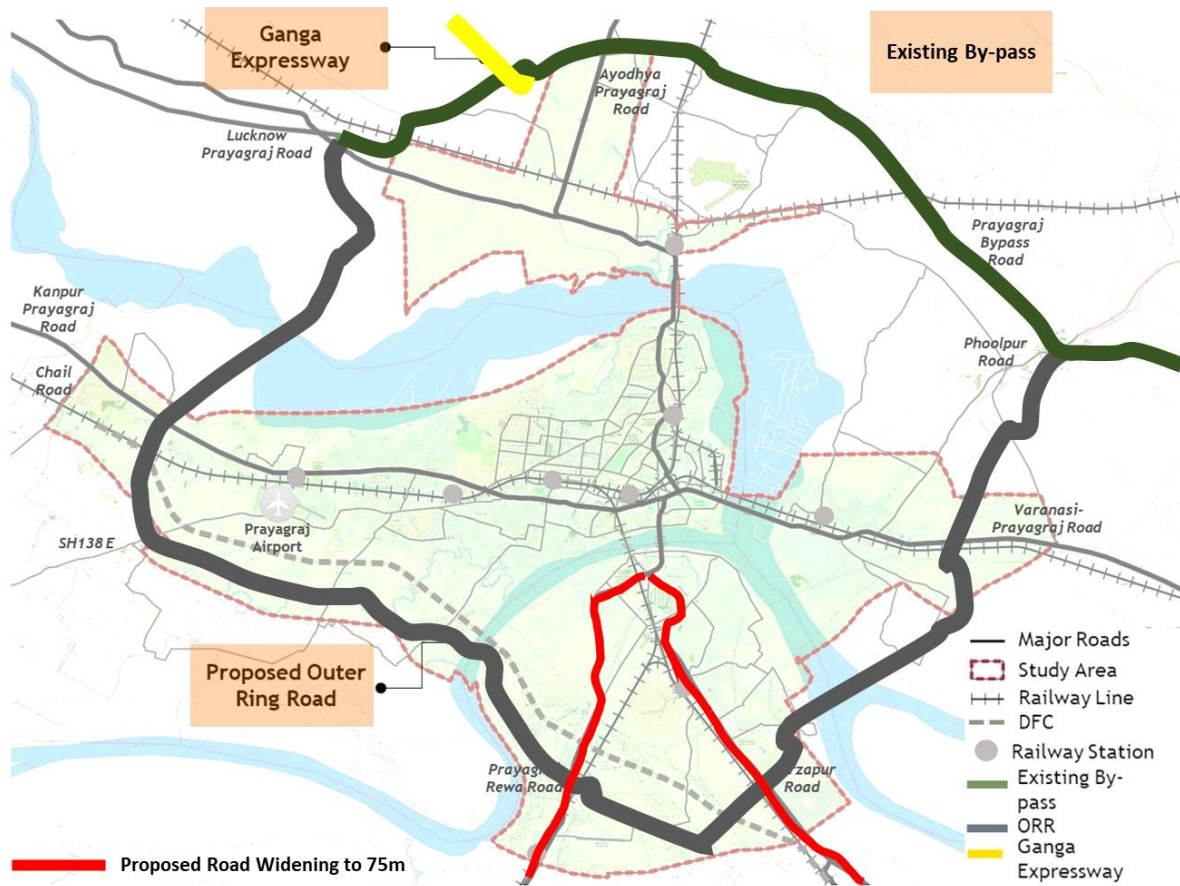


Figure 5-2: Proposed Road Network and Improvements

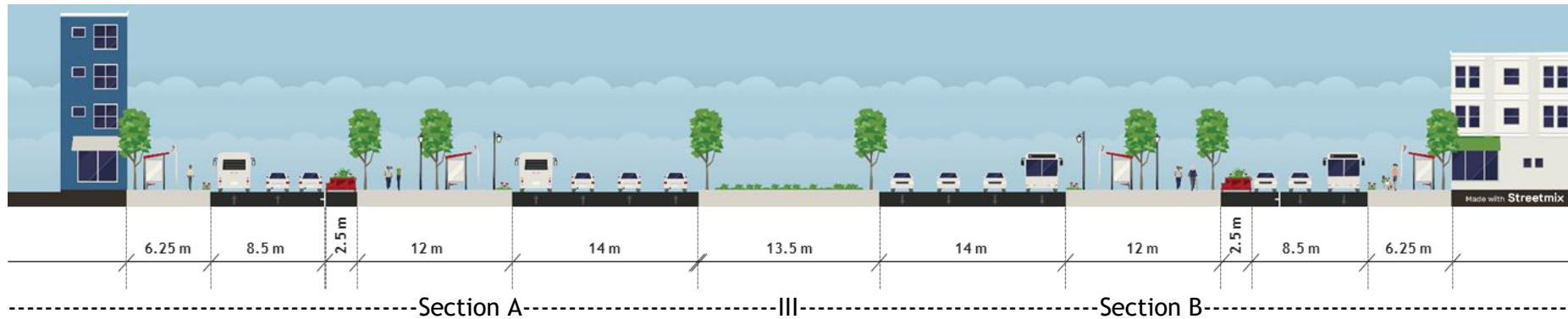
5.4.1 PROPOSED OUTER RING ROAD

Prayagraj master plan 2031 has proposed an Outer Ring Road (ORR) with a Right of Way (ROW) of 60m. The same must be implemented, however the RoW to be increased to 100m to keep provisions for future growth in traffic. Provision of the ring road will facilitate the external-to-external freight traffic passing the city without taking the internal roads. With this provision there will be reduction of heavy freight vehicle flow on the internal roads of city, which would lead to ease the traffic congestion and both noise and air pollution within the city core area.

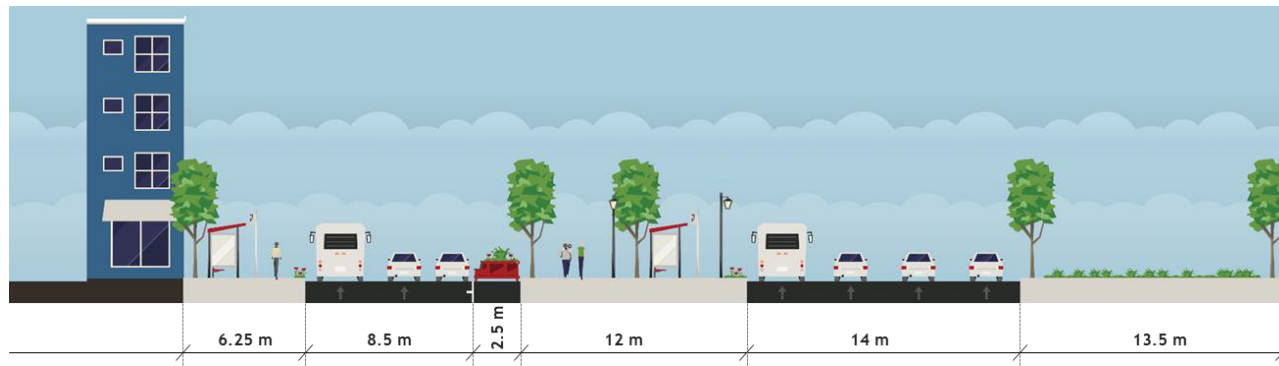
Alignment of proposed Ring Road is shown in the Figure 5-2, which shall be connected to the outer major radial roads of the city. Apart from the through traffic, proposed ring road will also be used for the internal freight movement for the proposed industrial corridors surrounding to this link.

Without ORR, only 9% of the traffic from the 48% of external-to-external trips will be using the bypass, while the remaining 39% of traffic will be entering the city. However, after the construction of the ORR, 48% of external-to-external trips will be redirected to ORR.

Further, the proposed road must have 4 lane service lane on both sides, footpath along the main carriageway and other features as shown in the Figure 5-3 below.



Section A



Section B

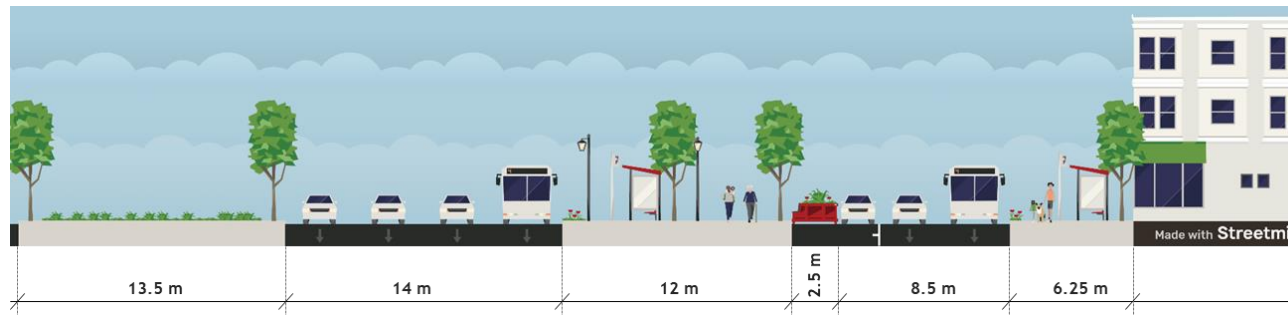


Figure 5-3: Proposed 100 M Cross - section for Ring Road



5.4.2 PROPOSED GANGA EXPRESSWAY

Ganga Expressway is a project of 594 KM approximately. This fully access-controlled Ganga Expressway is proposed to start from NH-334 in Meerut district and will end at Prayagraj bye-pass of (NH-2) in Prayagraj district. It will be six lanes wide (expandable up to eight lanes). The ROW (Right of Way) of the Expressway is proposed as 120 metres, comprising of service road on one side of the Expressway in a staggered form so that residents of nearby villages of the project area may get smooth transportation facility. The expressway is expected to be completed by 2024. Considering as an alternate for freight traffic, it is proposed that the Expressway should have electric vehicles charging facility along with dedicated lane for e-vehicles in future.

5.4.3 PROPOSED WIDENING OF NH-35

Draft Master Plan 2031 of Prayagraj proposes widening of NH-35 (Rewa Road till FCI Road and Mirzapur Road till Naini Chauraha) to 75m. Considering the importance of this road from the perspective of connecting industries and proposed logistics hubs like MMLP, IWT etc., it requires dedicated truck lanes which in future can be developed as e-trucking lanes. The proposed road-cross section for the road is shown below:

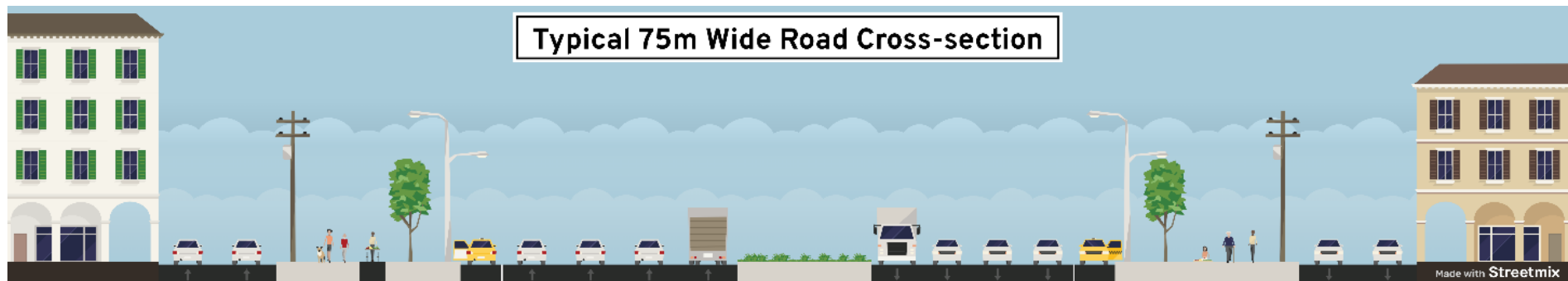


Figure 5-4: Typical Cross-section of 75m wide road

5.4.4 PROPOSED ROAD CROSS-SECTIONS

In Draft Master Plan 2031, of Prayagraj a total of 113.5 km of additional road network is already proposed for the city. The proposed cross-sections are as follows:

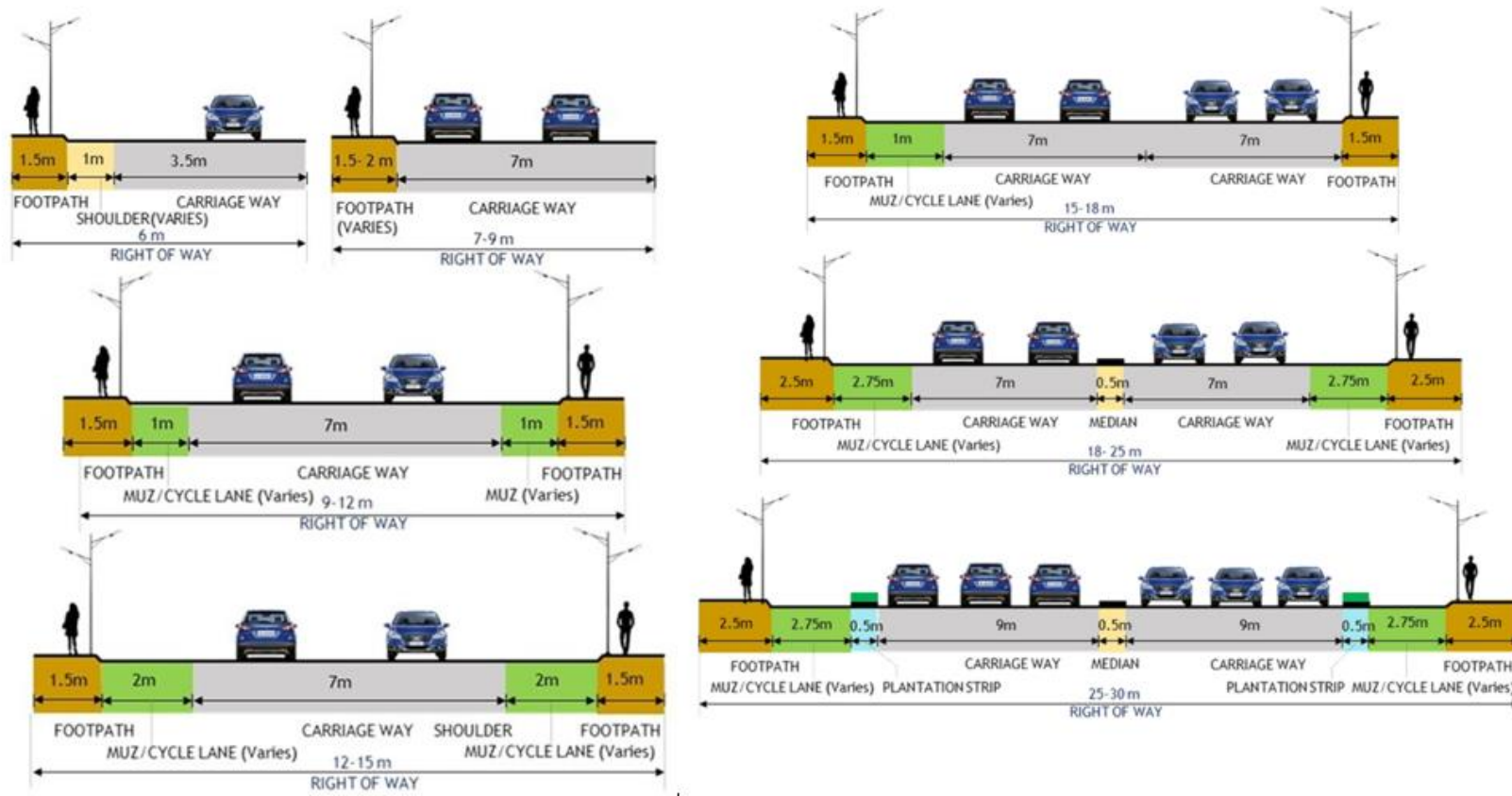


Figure 5-5 Road Improvement Cross-Sections

5.4.5 ROAD WIDENING AND NEW ROAD PROPOSALS

In addition to the Master Plan proposals, the Comprehensive Mobility Plan study being carried out by UMTC proposes approximately 108 km of new road network in order to complete the missing links in the overall city road network as well as provide connectivity to the new land pockets proposed for development in the master plan. Out of which 52 km of length is proposed as sub-arterial network and 56 km is proposed as a collector roads as shown in Figure 5-7. A typical cross section of the proposed road development is shown in Figure 5-6 below.

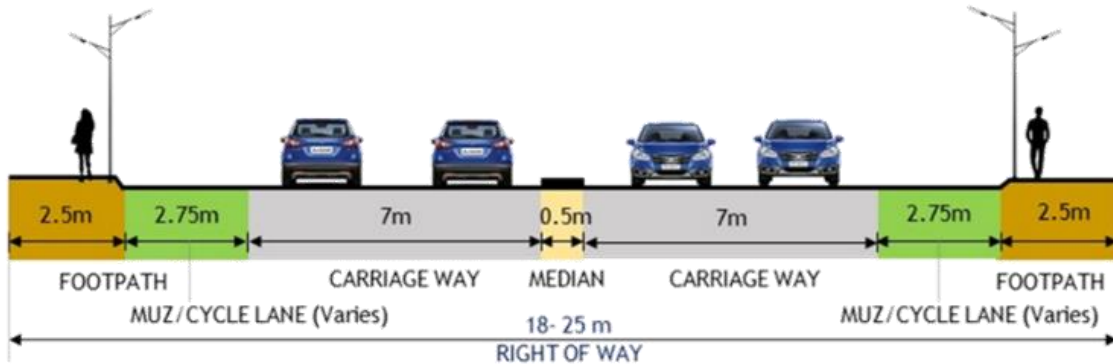


Figure 5-6 Typical Cross-section

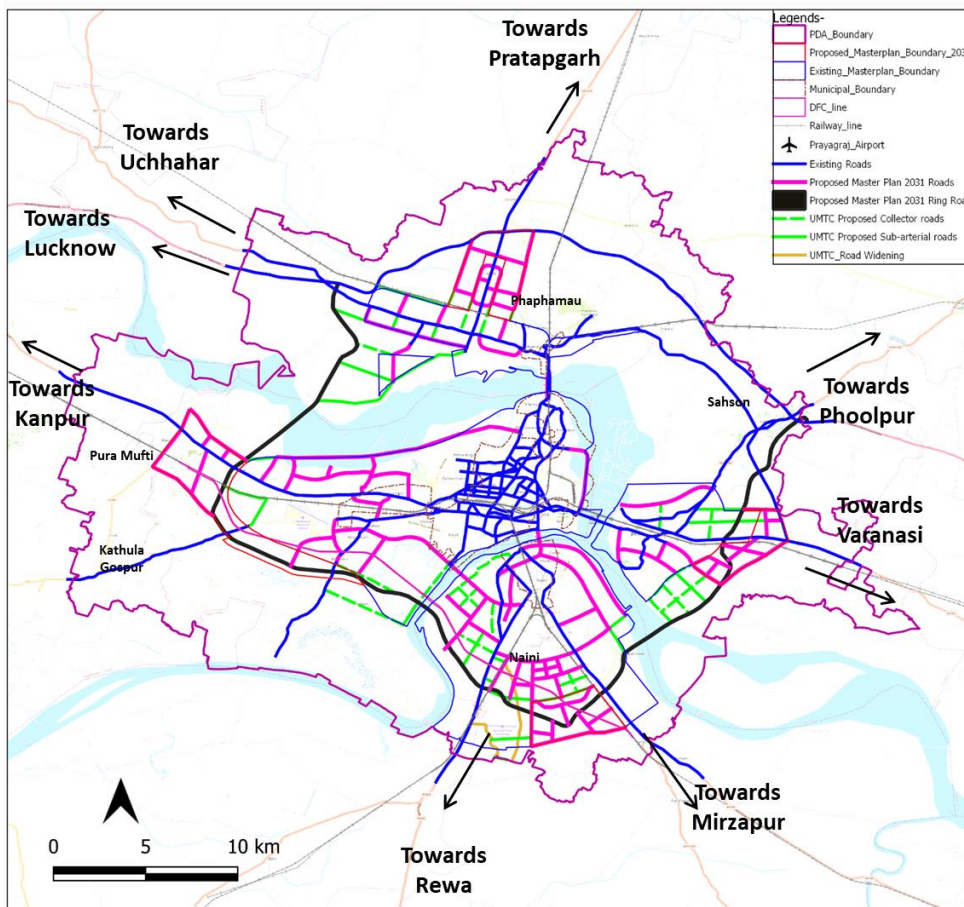


Figure 5-7 Map showing the Proposed Roads

Out of the total city road network studied as part of the CMP study, 109 km are observed to have sufficient ROW to cater freight movement in the city. Thus, improving the overall road network of the city (proposed as part of the CMP Study) will also improve the freight movement within.

5.4.6 JUNCTION IMPROVEMENT NEAR IRADATGANJ RAILWAY STATION

Vehicles traveling from Prayagraj to Iradatganj Goods shed, which is located on the right-hand side, need to make a U-turn (refer Figure 5-8). The same setup is repeated for trucks that have finished loading and are heading towards Rewa; they also need to make a U-turn.

This arrangement causes unnecessary travel for these vehicles, which may lead to increased traffic congestion and longer travel times. To address this issue, it is necessary to intervene and modify the traffic arrangement to minimize the need for U-turns and reduce the travel time for these vehicles. This may involve the construction of a new road or the modification of the existing road to provide a more direct route to the destination without the need for U-turns. Such an intervention could improve the flow of traffic and reduce travel time for these vehicles, making transportation more efficient and cost-effective.



Figure 5-8 Junction Improvement Location

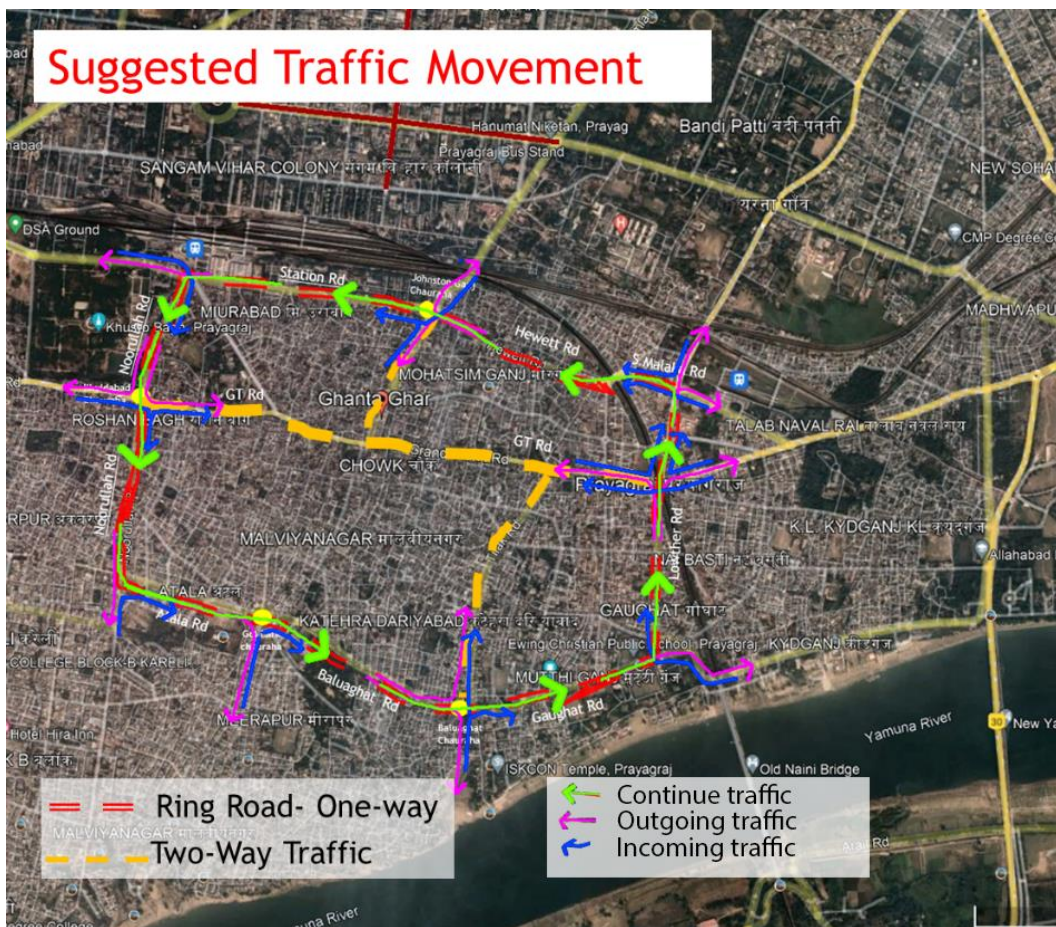
5.4.7 CORE AREA IMPROVEMENT PLAN

The Core area improvement plan lays emphasis on mobility issues in Core area and their improvement. As the Core area consists of narrow roads, and is choked with movement of private modes, combination of strategies has been proposed under the Core area improvement plan.

Core area is the oldest part of Prayagraj. The streets of Core area are not designed to take the current load of motorization in Prayagraj. Major roads as Station Road, Noorullah Road, Atala Road, Baluaghat road, Gaughat road, Lowther Road and Hewett Road. Traffic is also moving on minor streets which were actually designed for NMT movement only. This haphazard movement of traffic is a major cause of congestion in the core area.

To overcome this situation, as a first step, widening and strengthening of major roads is required by widespread removal of encroachment in the core of the city. This will provide us with major mobility corridors of Core Ring Road. All modes of PT, when operated on these corridors, will be able to serve the entire core area with maximum walking distance being not more than 500 m from any given location.

Identification of one way streets, two-way traffic movements in the core is not advisable anymore owing to high influx of motorized traffic, narrow road being the major constraint. To tackle this situation, some corridors of the core city area are designated to be treated as one-way ring road to smoothen the flow of traffic. This arrangement is proposed to reduce the conflicts points at Junctions.



5.5 ESTIMATED INFRASTRUCTURE REQUIREMENTS

To cater to the total freight demand for the city, the following key facilities are required to be provided:

- Parking Facilities
- Warehousing Facilities and
- Cold Storage

Freight facilities such as Transport Nagar, Multimodal Logistic Parks, storage facilities and warehousing units are the primary terminals for any type of freight handling services.

The existing warehousing capacity of Mundera Mandi and FCI godowns is described below:

S.No.	Facility	Existing Area	Existing Capacity	Required Capacity 2022	Required Capacity 2042	Types of Products	Capacity Utilisation
1.	Mundera Mandi	24 hec.	-	29,920 tons	43,297 tons	Fruits & Vegetables & Meat	<30%
2.	FCI Godowns	-	65,951 tons	23,350 tons	27,625 tons	Wheat, Rice, grains etc.	35%

**Poor Quality of Warehouses, need attention*
***per day*

In a view of existing freight terminal issues and as per the National Logistic Policy objectives of logistics efficiency and Multimodal-Transport to enhance the inclusive growth of the manufacturing sector different types of freight facilities have been proposed in the city are discussed in this section. Proposed freight facilities shall be developed along the major roads in order to make it highly accessible and free from the time bound restrictions. Proposed terminal facilities shall be distributed in a decentralised manner in order to enhance terminal accessibility and the facility serving area within the study area.

5.5.1 EXISTING TRANSPORT NAGAR AREA, GT ROAD (KANPUR ROAD)

The existing Transport Nagar is located in the west-side of the city near Kanpur-Prayagraj Highway (GT Road) as shown in Figure: 5-8. Most of the heavy vehicles are parked at Transport Nagar, which is a major loading and unloading centre. At Transport Nagar, it was observed that maximum peak hour accumulation was 155 ECS. Significant issues arise due to the lack of, or mismanagement of parking, loading, and unloading facilities. The Existing Transport Nagar is not planned, lack bounded facility and comprises mostly of mix landuse activities. This is proposed to be redeveloped only in terms of existing infrastructure condition for efficient freight handling. As the Transport Nagar is already in a fully developed area, no increment in the space availability at this facility has been proposed. Therefore, a new planned proposed Transport Nagar is proposed to eventually replace this area as the city's Transport Nagar. Till the New Transport

Nagar is developed, a New Truck Terminal of an area of 8 ha. is proposed along Kanpur Road to cater the logistics traffic of existing transport nagar area.

The Transport Nagar area in Prayagraj, like many other similar areas in cities, suffers from a lack of proper planning and designated land use. It is essential to improve the area's infrastructure and ensure that it functions as a transport hub, given its strategic location and importance for the city's economy. A well-designed Transport Nagar can enhance the overall efficiency of the transport system by providing adequate space for storage and handling of goods, better access to roads and highways, and improved logistics and supply chain management.

The following are some strategies that can be implemented to improve the area:

- **Designated area for movement of vehicles:** The first step would be to demarcate the area for specific vehicle movements. The area should be designed for the movement of smaller vehicles such as LCVs, e-rickshaws, and other vehicles used for intra-city transport. This step would help to prevent congestion and ensure that the area functions as a transport hub.
- **Permitting trucks/ Heavy vehicles during night-time only:** The movement of larger trucks in the area is another major cause of congestion. Hence, it is advisable to permit two-axle trucks only during the night time, between 10 pm and 5 am, to avoid traffic congestion during the day. This would help in reducing traffic, decreasing pollution and noise, and avoiding accidents.
- **Improvement in infrastructure:** The infrastructure of the area should be improved to support the movement of vehicles, including construction and maintenance of roads. Pedestrian-friendly infrastructure should also be provided to ensure safety and convenience for the public.
- **Encouraging use of public transport:** Another crucial step is to encourage the use of public transport in the area. This can be done by providing dedicated bus stops, offering incentives to public transport operators, and promoting awareness about the benefits of public transport.

In conclusion, the Transport Nagar in Prayagraj needs urgent attention to improve its infrastructure and planning. By implementing the above strategies, we can create a sustainable and efficient transport hub that will benefit the economy and the public.

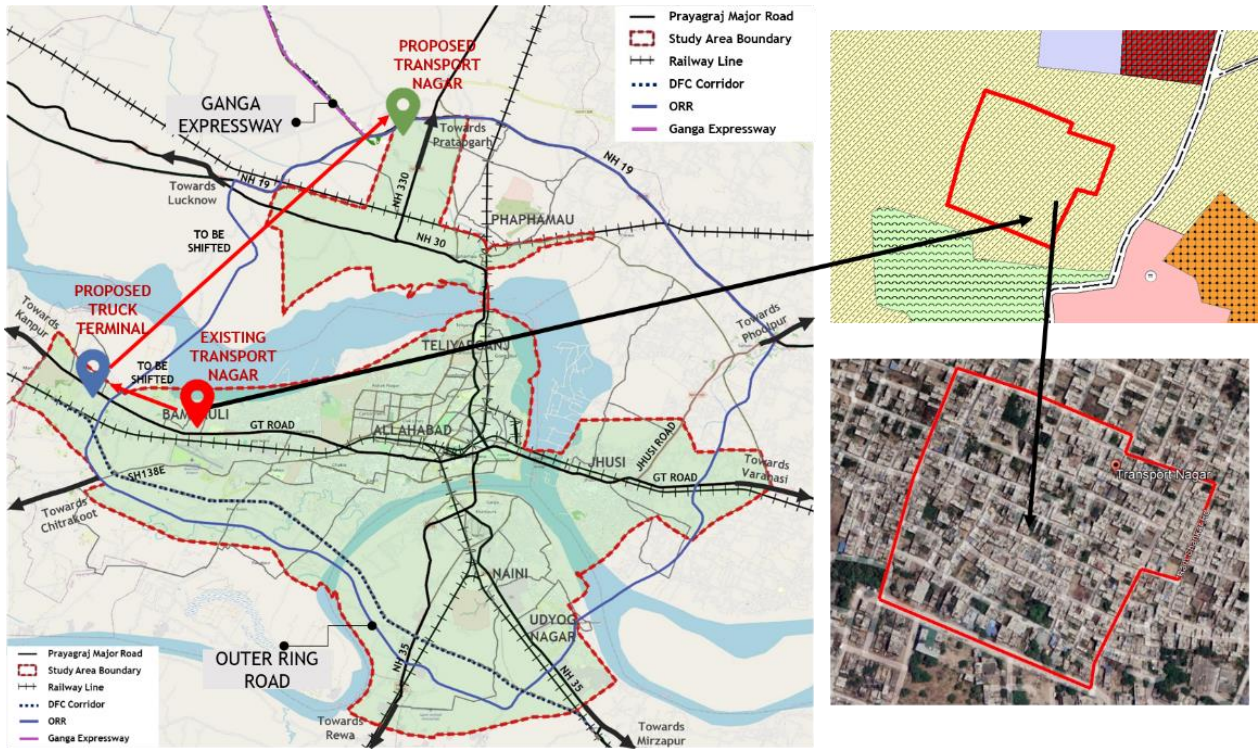


Figure 5-9: Existing Transport Nagar of Prayagraj

5.6 ESTIMATION OF FREIGHT DEMAND

5.6.1 COMMODITY FLOW IN THE CITY

To assess the area required for storage and handling of commodities, an understanding of the amount of commodities in tonnage needs to be identified. Through our estimation it has been computed that, about 1.07 Lakh Tonnes of commodity enters and exits the city daily by various modes (excluding external-external goods movement and empty trucks movement), with at least one end of its journey in the city.

The daily commodity flow (excluding the empty vehicles and external-external traffic) will increase to 1.17 tonnes in next 5 years i.e. by 2027, to about 1.28 Lakh Tonnes in next 10 years i.e. by 2032 and about 1.54 Lakh Tonnes by the year 2042 (CLP horizon). The same has been used to estimate the area requirements for the years 2027, 2032 and 2042.

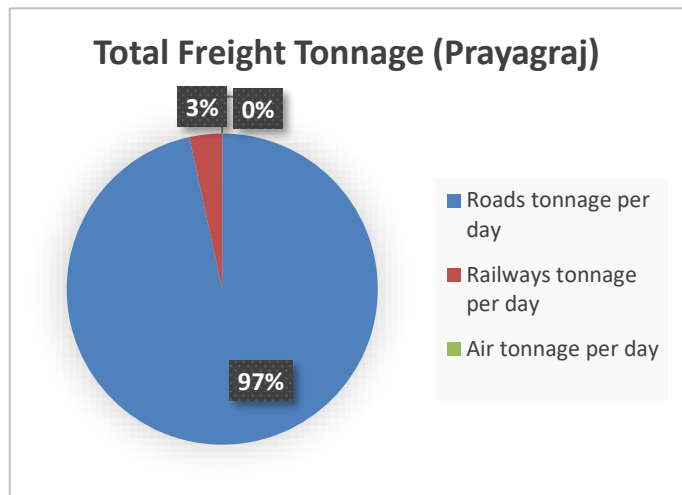


Figure 5-10: Freight Tonnage by mode

Since secondary data were not readily available required to estimate demand for Truck Parking, Warehousing, Cold Storage, Terminal Development etc. requisite information were elicited through primary surveys by canvassing specially designed questionnaires and deploying well

trained man power. Survey results and analysis to arrive at demand for various facilities are presented ANNEXURE-4.1.

5.6.2 AREA REQUIREMENT FOR COMMODITY HANDLING

The area requirement has been calculated for the Base Year (2022), Short Term (2027), Medium Term (2032) and Long Term (2042). The area has been estimated to identify the parking requirements, warehousing facilities and cold storage facilities. To estimate the area for each the following assumptions have been taken:

1. Only commodities i.e., Furniture, Automobile, Electronics and Electricals & Hardware and General Merchandise have been taken for warehousing activities.
2. The Fruits, Vegetables, Meat and Medicines commodities are considered for cold storage activity.
3. Other commodities, which are, Oil & Gas, Construction Material, Iron & Steel, Chemicals & Fertilizers and Electronics, Electricals & Hardware goods are truck load destined goods and are taken care of by the respective industry or activity location. Additionally, these commodities will be catered mostly by Eastern DFC Corridor being built.
4. The turnaround time is taken as 2 days (obtained from primary survey) for the base year 2022. This is done in order to calculate the efficient and reliable area for the future.

Table 5-1: Area requirement of facilities

S.No.	Commodity Type	Tonnage (2042)	Required Facility	Area Requirement Norms/ Assumptions	Area Required per day	Area Required for 2 days cycle
1	Fruits & Vegetables, Medicines & Meat	43,297	Cold Storage	Cold Storage of capacity 15380 tons per hectare ³	2.89 Ha.	4.37 Ha.
2	Agro Products	33,790	Nil	Will be catered by Existing FCI Godowns	-	-
3	Oil & Gas	9,015	Nil	Will be catered by storage facilities provided by traders & industries and upcoming DFC Corridor	-	-
4	Construction Material	10,332	Nil	Will be catered by storage facilities provided by traders & industries and upcoming DFC Corridor	-	-
5	Iron & Steel	20,477	Nil	Will be catered by storage facilities provided by traders & industries and upcoming DFC Corridor	-	-
6	Chemicals & Fertilizers	8,668	Nil	Will be catered by storage facilities provided by traders	-	-

³ Design capacity of Cold Storage as planned by FHCL, CONCOR in Rai Industrial Area, Sonipat, Haryana

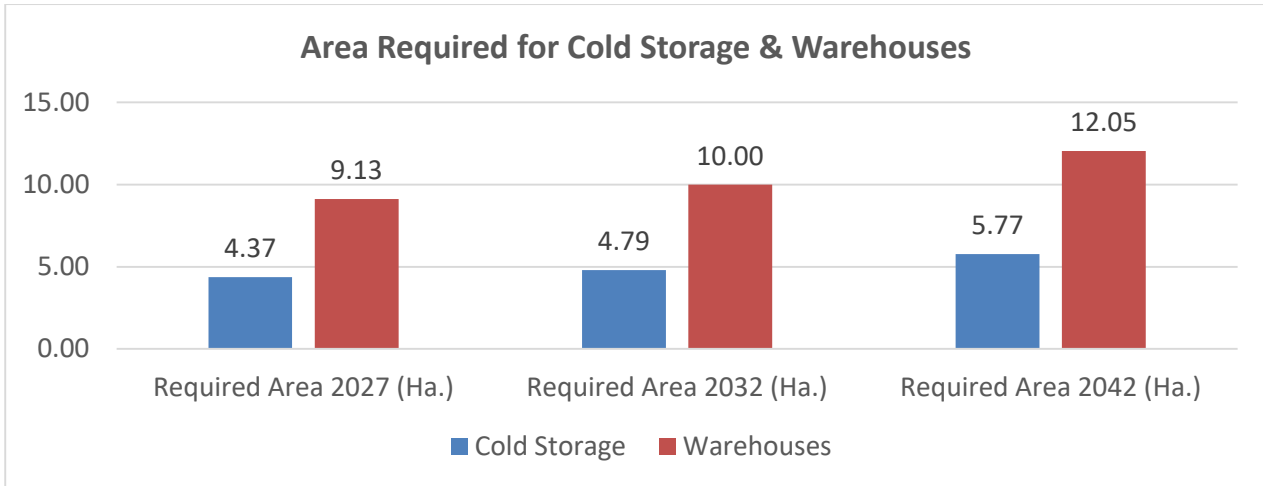
S.No.	Commodity Type	Tonnage (2042)	Required Facility	Area Requirement Norms/ Assumptions	Area Required per day	Area Required for 2 days cycle
				& industries and upcoming DFC Corridor		
7	Furniture	810	Warehousing	Warehouses of capacity 5260 tons per hectares ⁴	6.02 Ha.	12.05 Ha.
8	Electronics and Electricals & Hardware	4,631	Warehousing	Warehouses of capacity 5260 tons per hectares		
9	Automobile	2,561	Warehousing	Warehouses of capacity 5260 tons per hectares		
10	General Merchandise	15,499	Warehousing	Warehouses of capacity 5260 tons per hectares		
	TOTAL	1,49,080				

The Total Area Requirement for the horizon year 2042 for the terminal & its allied facilities detailed below in **Table 5-2**.

Table 5-2: Proposed Area Distribution for Horizon Year 2042

S.No.	Proposal	No. of locations	Total Area (Ha.)	Warehousing Capacity (Tons per day)	Cold Storage Capacity (Tons per day)
1	Cold Storage	1	2	-	30,760
	• Mundera Mandi	1	2		30,760
	• Lucknow Road	1	2		30,760
	• Ayodhya Road	3	6		92,280
	Total				
2	Mega-Warehouses	2	6	31,560	-
	• Naini	1	3	15,780	
	• Lucknow Road	3	9	47,340	
	Total				
3	Warehouses inside Transport Nagar (38% area under parking)	1	1.7 (30 hec. Area of TN)	9,000	-
4	Truck Terminal (8 Ha. Per terminal) (38% area under parking)	3	1.4 (24 hec. Area of TT)	7,200	-
	TOTAL CAPACITY (Tons)			63,540 tons	92,280 tons
	TOTAL PROPOSED AREA (Ha.)			12.08 Ha.	6.00 Ha.
	REQUIRED AREA (Ha.)			12.05 Ha.	5.77 Ha.

⁴ Design capacity of Warehouse as per Toolkit on “Urban Freight Transport Planning & Management”, by MoHUA



- Area Estimated for warehousing @ 5,260 tons per hectares (Source: MoHUA)
- Area Estimated for Cold Storage @ 15,380 tons per hectares (Source: CONCOR)

Figure 5-11: Area Required for Cold Storages and Warehouses

As presented in previous chapter, the key corridors for movement are Rewa Road, Mirzapur Road, and Lucknow Road. The construction of the Ganga Expressway will lead to the significant shift of traffic to this route. Accordingly, to take care of the demand for future the following logistics infrastructure facilities along with tentative locations are proposed below:



Figure 5-12: Proposed Facilities

Table 5-3: Location of Proposed Facilities

S.No.	Proposed Facility	Location
1	Transport Nagar	Ayodhya Road
2	Truck Terminal 1	Rewa Road
3	Truck Terminal 2	Kanpur Road
4	Truck Terminal 3	Jhunsi
5	Warehouse 1	Naini
6	Warehouse 2	Lucknow Road
7	Warehouse 3	Naini
8	Cold Storage 1	Lucknow Road
9	Cold Storage 2	Ayodhya Road
10	Cold Storage 3	Mundera Mandi
11	Multimodal Logistic Park	Naini
12	IWT Terminal	Naini
13	Inland Container Depot (ICD)/ Dry Port	Naini
14	FTWZ/ SEZ	Naini
15	Industrial Park	Lucknow Road
16	Truck Parking (Suberdarganj Railway Station)	Suberdarganj
17	Wholesale Market	Jhunsi

5.6.3 PROPOSED TRANSPORT NAGAR ALONG NH-30 & COLD STORAGE ALONG PRAYAGRAJ BYEPASS NEAR SARAIBHOGI

The proposed location for a Transport Nagar & Cold Storage along NH-30 & Prayagraj Bypass near Saraibhogi area of Prayagraj (refer Figure 5-13) has several advantages:

- 1. Proximity to Existing Prayagraj Bypass and upcoming Ganga Expressway:** The location is in close proximity to the Existing Bypass and the upcoming Ganga Expressway, which will provide easy access to multiple transportation modes and improve connectivity to other parts of the country. This will facilitate smooth movement of goods and reduce transportation costs.
- 2. Catering to freight traffic from Lucknow and Pratapgarh:** The proposed Transport Nagar and cold storage will cater to freight traffic from Lucknow and Pratapgarh, which are major economic hubs in the region. This will help in the efficient distribution of goods and reduce transportation time.
- 3. Enhance the efficiency of supply chain of the city:** The proposed facility will cater to commodities of fruits and vegetables, which will enhance the efficiency of the supply chain of the city. The facility will provide storage solutions for perishable goods, thereby reducing spoilage during transit.

The proposed Transport Nagar & Cold Storage can have the following features:

Parking Area: A designated truck parking area and associated facilities for trucks and other heavy vehicles can be built along with facilities for loading/ unloading of goods and space for operators. This will help in decongesting the highways and reducing accidents caused by fatigued drivers. A centralized booking system can be implemented to streamline the process of loading

and unloading of goods. This system can be integrated with GPS tracking to ensure the timely delivery of goods. Security Measures: The area can be secured with CCTV cameras and other security measures to ensure the safety of goods and vehicles. This will enhance efficiency of freight movement in the city without larger freight vehicles moving inside the city. Since, old Transport Nagar is not planned and does not have a demarcated boundary, this planned proposed facility will provide better logistics infrastructure for the city.

In addition, the following is proposed to be developed in the Transport Nagar,

- Warehouses: Dedicated warehouses of various sizes and types, including cold storage facilities, which can store goods before they are transported to their final destinations.
- Fuel stations: Fuel stations that provide fuel to transporters and logistics companies at competitive prices, eliminating the need for vehicles to leave the Transport Nagar for refuelling.
- Repair workshops: Repair workshops that can provide maintenance and repair services to vehicles, helping reduce downtime and ensure that vehicles are in good condition for transportation.
- Parking areas: Designated parking areas for vehicles, which provides a safe and secure place for vehicles to park.
- Security: Security measures in place to protect goods, vehicles, and people within the premises. This includes CCTV cameras, security personnel, and access control systems.
- Administrative offices: Administrative offices that can provide various services to logistics companies and transporters, including documentation, insurance, and banking.
- Restaurants and rest areas: Restaurants and rest areas, which provide food and beverages to drivers and staff, along with rest areas for drivers to take rest breaks.

Cold Storage Facilities: Cold storage facilities are proposed to be developed to provide storage solutions for goods that require refrigeration or temperature control. This will help in preserving the quality of perishable goods and reduce spoilage during transit.

In conclusion, the proposed Transport Nagar & Cold Storage along NH-30 & Prayagraj Bypass near Saraibhogi has the potential to improve the efficiency of the transportation system, reduce the congestion on highways, and benefit the local economy by creating employment opportunities and boosting the trade in the region.

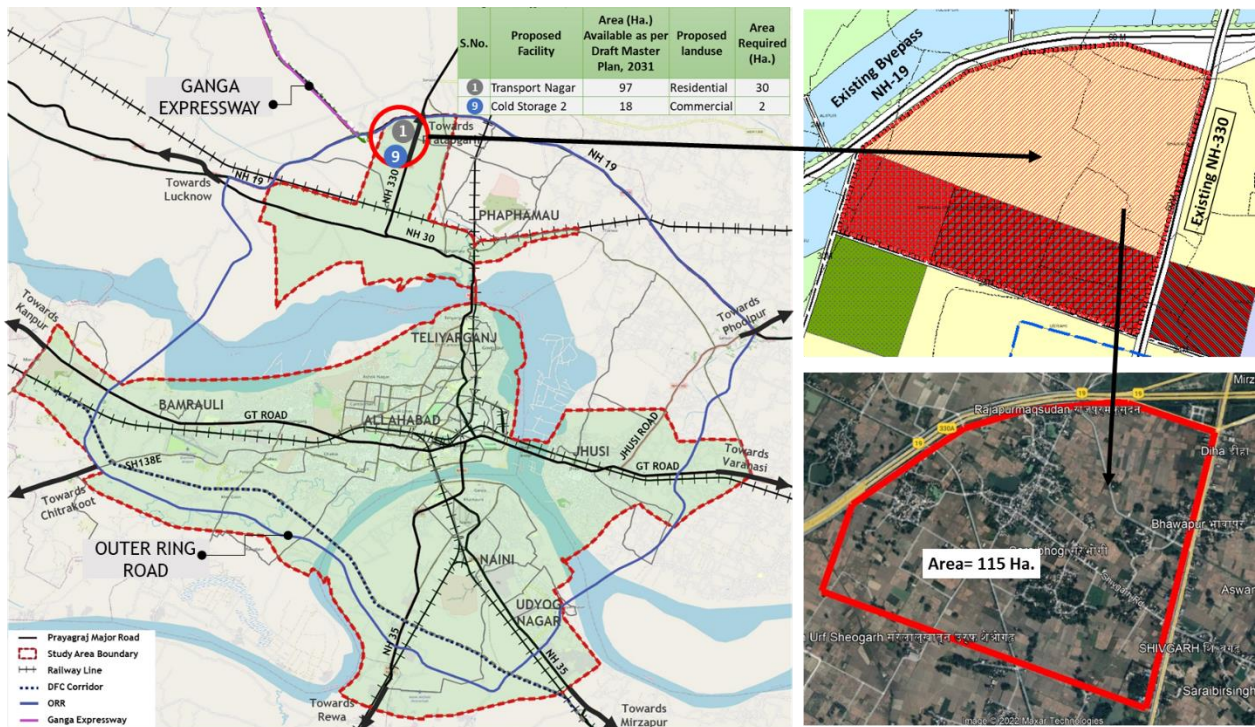


Figure 5-13: Proposed Transport Nagar

In the proposed area a Transport Nagar and cold storage facilities will also be provided to store the high and medium permissible items which will allow traders to store their products for longer periods and reduce wastage. It will cater to commodities such as fruits & vegetables. The total proposed area for the Transport Nagar is 30 Ha.

The current Landuse as per Draft Master Plan of Prayagraj 2031 is presented in Table 5-4.

Table 5-4: Proposed Landuse Distribution as per Draft Master Plan, 2031

S.No.	Proposed Facility	Proposed landuse as per Draft Master Plan, 2031	Area (Ha.) Available as per Draft Master Plan, 2031	Area Required (Ha.)
1	Transport Nagar	Residential	97	30
2	Cold Storage	Commercial	18	2

The phase wise space requirement for the Transport Nagar is presented in Table 5-5.

Table 5-5: Landuse Distribution of Transport Nagar

S.No.	Landuse ⁵	%age Area	Area (Ha.)
1	Transport operators - Office, Godown, Loading/Unloading	50%	15.00
2	Service Industry - Petrol Pump, Service Area, Weigh Bridge, etc.	6%	1.80
3	Public/Semi Public - Police Post, Post office, Telephone, First Aid etc.	3%	0.90
4	Commercial	3%	0.90
5	Parking - Idle, Transit, Other Vehicles	38%	11.40
	Total		30.00

⁵ Norms as per URDPFI Guidelines, 2014. Ministry of Urban Development

The phase wise space requirement for the Cold Storage is presented in Table 5-6.

Table 5-6: Phase wise space requirement for the Cold Storage

S.No.	Landuse	%age Area	Area (Ha.)
1	Cold Storage	60%	1.20
2	Circulation	30%	0.60
3	Others (Loading/ unloading, allied facilities, etc.)	10%	0.20
	Total	100%	2.00 Ha.

5.6.4 PROPOSAL FOR MEGA-WAREHOUSE, COLD STORAGE & INDUSTRIAL PARK

The proposal aims to establish a truck terminal, cold storage, and industrial park in a strategic location. The need for a mega-warehouse, cold storage, and industrial park arises due to the increasing demand for efficient transportation and storage facilities for perishable goods. The location proposed for the development of a truck terminal, cold storage, and industrial park along NH-19 has several advantages that make it potentially viable for economic use. The area consists of facilities like mega-warehouse, cold storage and industrial units covering an area of 3 hectares, 2 hectares and 160 hectares, respectively.

- **Firstly**, the location has high connectivity as it is situated along NH-19, which is a major national highway that connects multiple cities across north India. Additionally, the location is also well connected to the Prayagraj Bypass and the Ganga Expressway, which further enhances its connectivity and accessibility.
- **Secondly**, the proposed location is in proximity to the proposed Transport Nagar, which is a hub for transportation services, including warehousing, logistics, and freight management. The proximity to the proposed Transport Nagar can provide access to a range of facilities and services that can further support the operations of the warehouses, cold storage, and industrial park.
- **Thirdly**, the location is connected by a rail network, which can facilitate the transportation of goods and raw materials. The rail network can provide an additional mode of transportation for certain type of industries.
- **Lastly**, the location can cater to the freight traffic from Lucknow and Pratapgarh, which are major cities in Uttar Pradesh. The proximity to these cities can provide easy access to the proposed facilities, thereby reducing transportation costs and improving logistics efficiency.

In summary, the high connectivity of the location along NH-19, proximity to the proposed Transport Nagar, connectivity through rail network, and potential to cater to freight traffic from Lucknow and Pratapgarh all suggest that the proposed location has potential for economic use, particularly in the context of warehousing, logistics, and freight management.

The proposal will increase transportation efficiency by providing a truck terminal that offers ample space for parking, loading, and unloading of goods. Provide cold storage facilities for perishable goods that require temperature-controlled environments. The project is also expected to generate significant revenue and job opportunities while meeting the increasing demand for efficient transportation and logistics facilities.

The current Landuse as per Draft Master Plan of Prayagraj 2031 is presented in Table 5-7.

Table 5-7: Proposed Landuse Distribution as per Draft Master Plan, 2031

S.No.	Proposed Facility	Proposed landuse as per Draft Master Plan, 2031	Area (Ha.) Available as per Draft Master Plan, 2031	Area Required (Ha.)
1	Warehouse	Warehousing	27	3
2	Cold Storage	Industrial	27	2

The phase wise space requirement for the Warehouse is presented in Table 5-8.

Table 5-8: Space Requirement for the Mega-Warehouse

S.No.	Landuse	%age Area	Area (Ha.)
1	Cold Storage	60%	1.80
2	Circulation	30%	0.90
3	Others (Loading/ unloading, allied facilities, etc.)	10%	0.30
	Total		3.00

The space requirement for the Cold Storage is presented in Table 5-9.

Table 5-9: Space Requirement for the Cold Storage

S.No.	Landuse	%age Area	Area (Ha.)
1	Cold Storage	60%	1.20
2	Circulation	30%	0.60
3	Others (Loading/ unloading, allied facilities, etc.)	10%	0.20
	Total		2.00

The space requirement for the Industrial Park is presented in Table 5-10.

Table 5-10: Space Requirement for the Industrial Park

S.No.	Landuse	%age Area	Area (Ha.)	Phase 1	Phase 2	Phase 3
1	Industries	40%	64	-	-	64
2	Warehouses/ Storage Facilities	14%	22.4	-	-	22.4
3	Residential	20%	32	-	-	32
4	Commercial	5%	8	-	-	8
5	Institutional	1%	1.6	-	-	1.6
6	Roads	10%	16	-	-	16
7	Open spaces	10%	16	-	-	16
	Total	100%	160 Ha.			160 Ha.

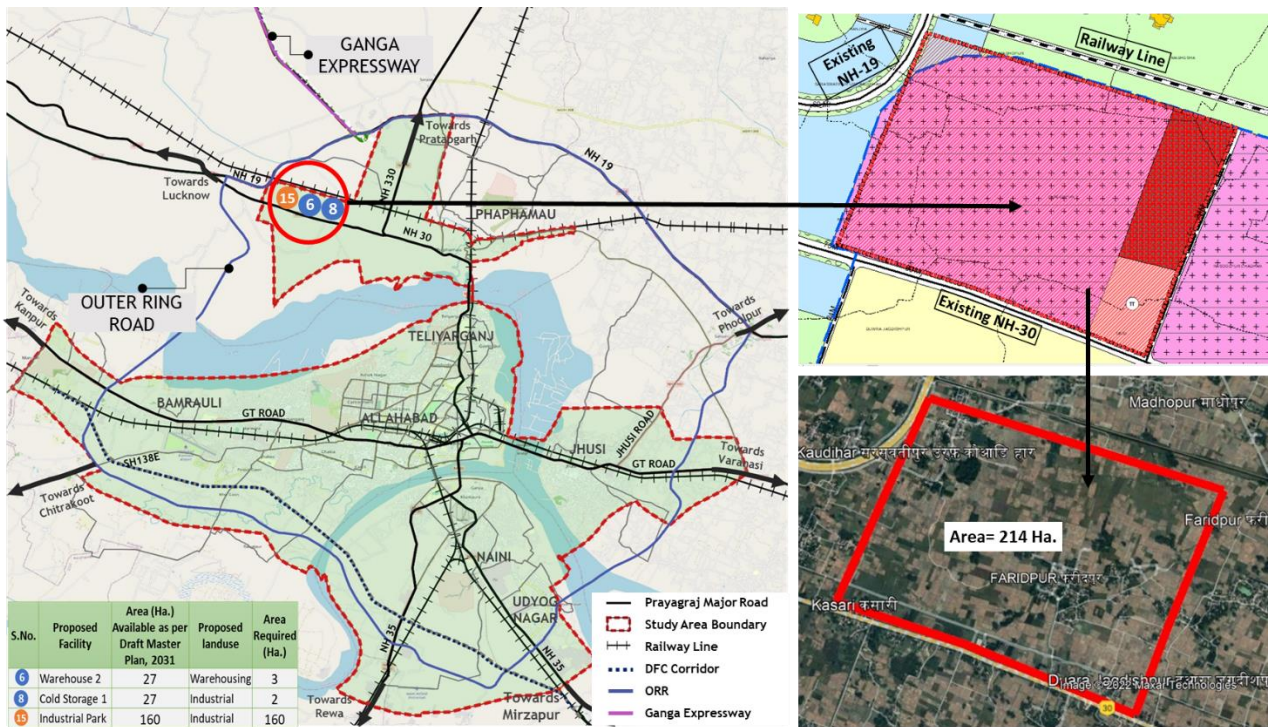


Figure 5-14: Proposed Mega-Warehouse, Cold Storage & Industrial Park Location

5.6.5 PROPOSAL FOR TRUCK TERMINAL ALONG GT ROAD (KANPUR ROAD), REWA ROAD (NH-35) AND VARANASI ROAD

The proposal aims to establish truck terminals of an area of about 8 hectares each in the strategic locations. The need for a truck terminal arises due to the increasing demand for efficient transportation. The proposed location is strategically located on National Highways and Proposed Outer Ring Road. The proposed terminal consists of truck terminal, covering an area of 8 hectares. The area of truck terminal is calculated based on calculations as per Table 5-1 calculated on basis of the Guidelines on Urban Freight Transport Planning and Management by MoHUA. It will cater to freight traffic from all directions and also decongest and provide an alternative to existing Transport Nagar Area. Various features of Truck Terminal are as follows:

- **Designated Truck Terminal:** A designated truck terminal with adequate parking space and facilities for trucks and other heavy vehicles can be built. This terminal can serve as a rest area for drivers, with amenities like restrooms, food courts, and fuel stations. This will help to decongest the highways and reduce accidents caused by fatigued drivers.
- **Centralized Booking System:** A centralized booking system can be implemented to streamline the process of loading and unloading of goods. This system can be integrated with GPS tracking to ensure the timely delivery of goods.
- **Security Measures:** The area can be secured with CCTV cameras and other security measures to ensure the safety of goods and vehicles.
- **Location Considerations:** The proposed location of the truck terminal should be at the intersecting location of the new proposed bypass, FCI road, Iradatganj Railway Station, and Freight Corridor. This will provide easy access to multiple transportation modes and improve connectivity to other parts of the country. The terminal should cater to freight traffic from Rewa, Varanasi, and Mirzapur, which are major economic hubs in the region.

The Land use as per Draft Master Plan of Prayagraj 2031 is presented in Table 5-11.

Table 5-11: Proposed Landuse as per Draft Master Plan, 2031

S.No.	Proposed Facility	Proposed landuse as per Draft Master Plan, 2031	Area (Ha.) Available as per Draft Master Plan, 2031	Area Required (Ha.)
1	Truck Terminal	Residential	12.4	8

Table 5-12: Landuse Distribution of a Truck Terminal

S.No.	Landuse ⁶	%age Area	Area (Ha.)
1	Transport operators - Office, Godown, Loading/ Unloading	50%	4.00
2	Service Industry - Petrol Pump, Service Area, Weigh Bridge, etc.	6%	0.48
3	Public/Semi Public - Police Post, Post office, Telephone, First Aid etc.	3%	0.24
4	Commercial	3%	0.24
5	Parking - Idle, Transit, Other Vehicles	38%	3.04
	Total		8.00

In conclusion, the proposals for a Truck Terminal along National Highways along the Proposed Outer Ring Road will improve the efficiency of the transportation system and reduce the congestion on highways. These proposals will also benefit the local economy by creating employment opportunities and boosting the trade in the region.

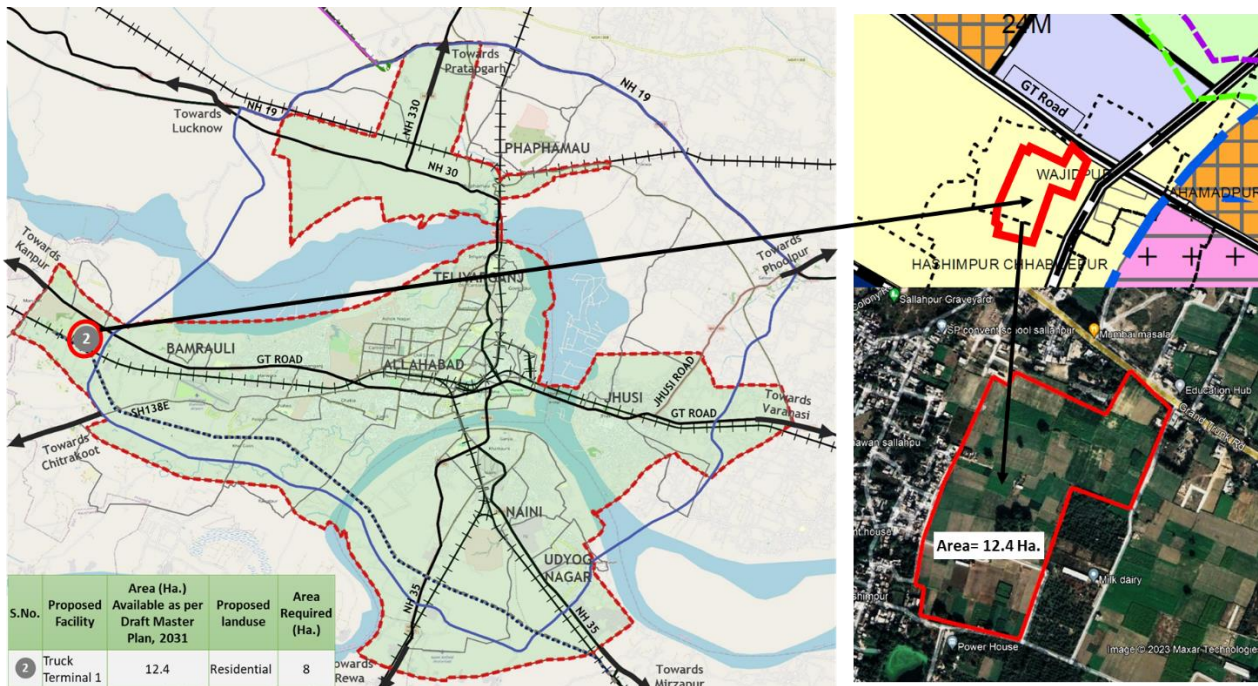


Figure 5-15: Proposed Truck Terminal along Kanpur Road (GT Road)

⁶ Norms as per URDPFI Guidelines, 2014. Ministry of Urban Development

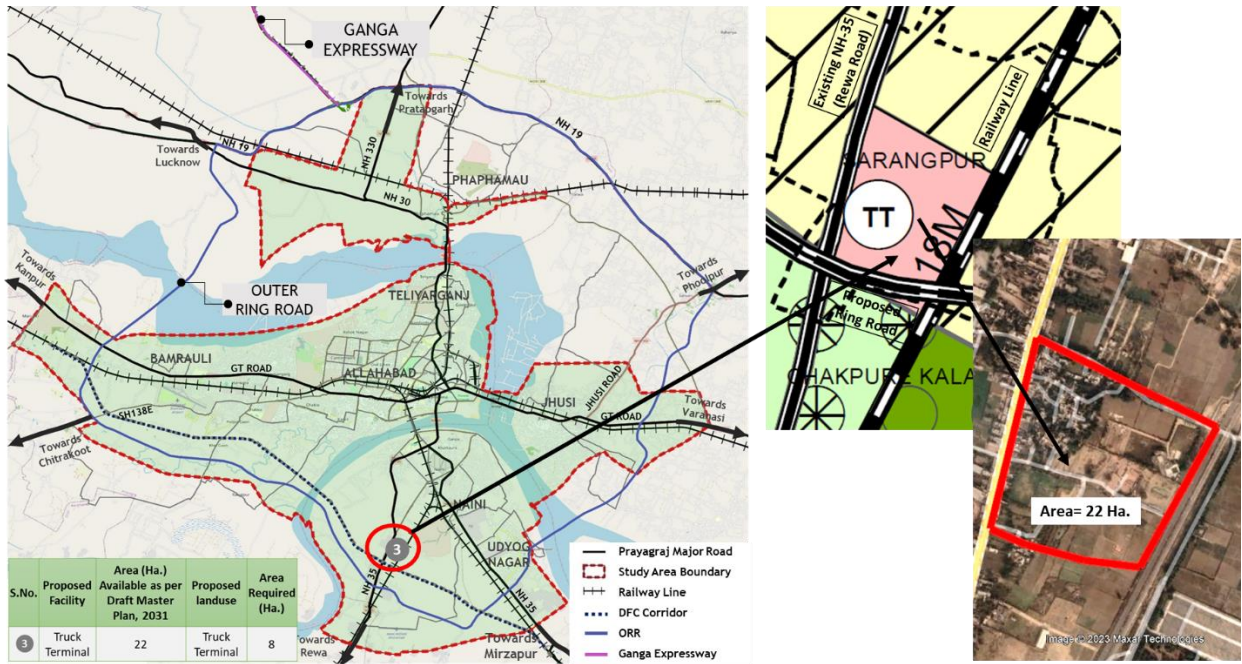


Figure 5-16: Proposed Truck Terminal along Rewa Road

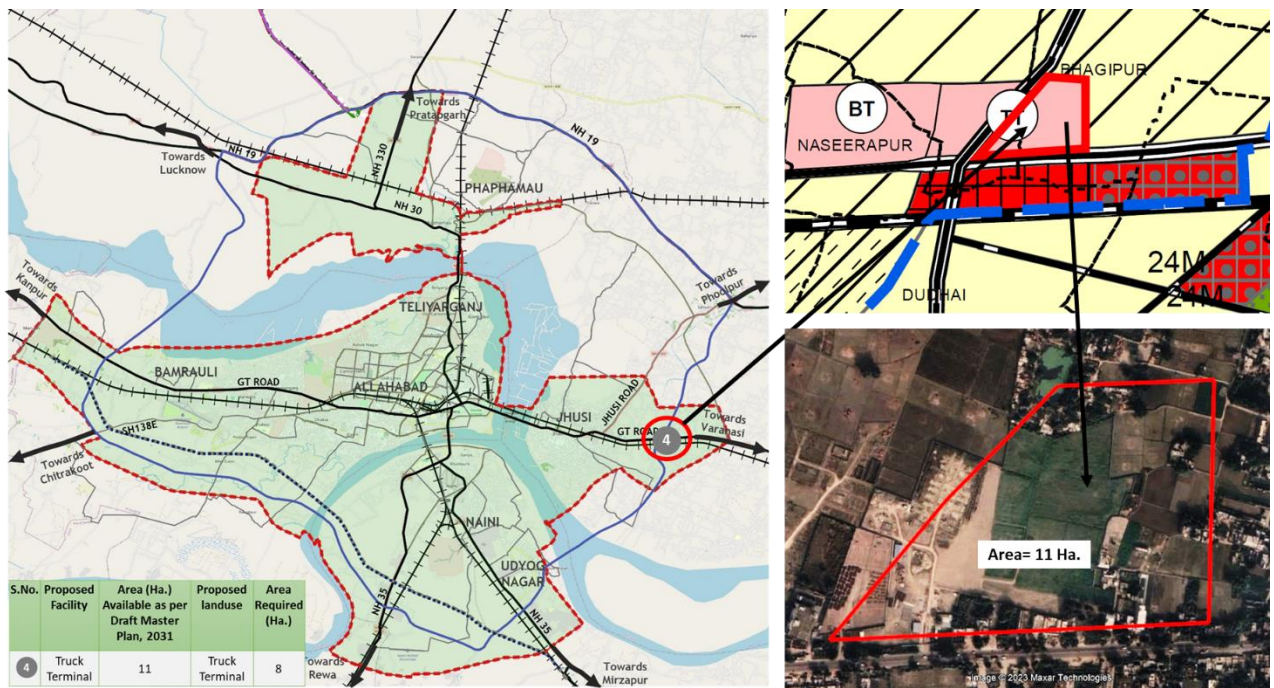


Figure 5-17: Proposed Truck Terminal along Varanasi Road near Andawa

5.6.6 PROPOSAL FOR INLAND CONTAINER DEPOT/ DRY PORT

The proposed Inland Container Depot (ICD) or Dry Port will provide an efficient and cost-effective platform for the movement of goods from ports to inland locations. It will help to reduce congestion and improve the efficiency of operations at ports. The location is selected based on factors such as proximity to major highways and rail lines, availability of land, and ease of access.

An Inland Container Depot (ICD)/ Dry Port in Naini Industrial Area has the potential to be a significant contributor to the city's economic development. The proposed location has several advantages that make it an attractive option for establishing a dry port.

Firstly, the area is adjacent to both the railway station and the national highway on both sides. This provides easy access to the transportation infrastructure required for the transportation of goods. The railway station will be upgraded as a major freight terminal, which will make it easier for goods to be transported to different parts of the country.

Secondly, the location is near the centre of the city, which makes it easier for people and goods to move in and out of the city. This will reduce the time and cost of transportation, which is a significant advantage for businesses.

Thirdly, the proximity to Naini Industrial Area and Naini Sabzi Mandi is another advantage. The industrial area is home to several large and small-scale industries, and the dry port can provide them with the necessary transportation infrastructure to transport their goods. The Sabzi Mandi is a major market for fresh produce, and the dry port can be used to transport these goods to other parts of the country.

Finally, the location is adjacent to Naini Railway Station, which will be upgraded as a major freight terminal. This will provide easy access to the railway network, which is an essential transportation mode for the transportation of goods.

The current Landuse as per Draft Master Plan of Prayagraj 2031 is presented in Table 5-13.

Table 5-13: Proposed Landuse Distribution as per Draft Master Plan, 2031

S.No.	Proposed Facility	Proposed landuse as per Draft Master Plan, 2031	Area (Ha.) Available as per Draft Master Plan, 2031	Area Required (Ha.)
1.	Inland Container Depot (ICD)/ Dry Port	Industrial	19	15

The landuse distribution along with phase wise distribution is described below:

Table 5-14: Landuse distribution of Inland Container Depot (ICD) or Dry Port

S.No.	Activity	Area %age	Area (Ha.)	Phase 1	Phase 2	Phase 3
1.	Railway siding for Dry port and cargo handling areas	30%	4.5	-	4.5	-
2.	Storage areas	25%	3.75	-	3.75	-
3.	Commercial areas	10%	1.5	-	1.5	-
4.	Transportation infrastructure	25%	3.75	-	3.75	-
5.	Other	10%	1.5	-	1.5	-
	Total		15 Ha.		15 Ha.	

In conclusion, the proposed location for an Inland Container Depot (ICD)/ Dry Port in Naini Industrial Area has several advantages. The proximity to transportation infrastructure, the central location, and the presence of the industrial area and Sabzi Mandi makes it an attractive option for businesses looking to transport their goods. The proposed upgradation of Naini Railway

Station as a major freight terminal will further enhance the transportation infrastructure and make the dry port an essential component of the city's economic development.

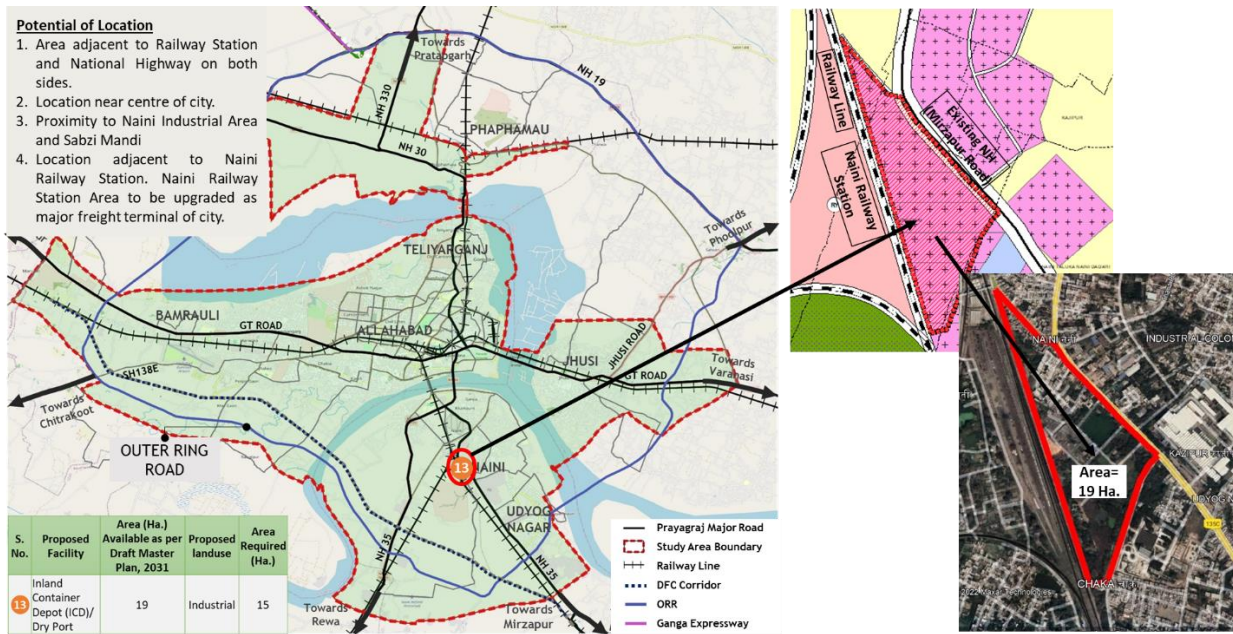


Figure 5-18: Proposed Inland Container Depot (ICD) or Dry Port

5.6.7 PROPOSAL FOR MULTIMODAL LOGISTIC PARK

Multimodal Logistic Park has been proposed near New Karchana DFC station of the upcoming EDFC corridor as shown in the Figure 5-19. The Proposed multimodal logistic terminal shall be facilitating the goods movement through rail and road both. MMLP shall be directly accessible from the proposed ring road in order to make the fast and time saving freight deliveries. Along with this it involves combining different transport modes to reduce cost, simplify the supply chain, ensure on-time delivery, and provide a more efficient transportation solution. Multimodal logistics often includes the use of freight forwarding services, third-party logistics providers, and other applications of technology to ensure the efficient and cost-effective movement of goods.

The MMLP is proposed along Saraswati Hi-tech City, a proposed development project in Naini Industrial Area, covering an area of 1,141 acres. The Multi-Modal Logistics Park (MMLP) is also proposed, covering an area of 231 acres. The MMLP would be a key component of the overall development project, providing much-needed transportation infrastructure to support the industrial and commercial activities in the area. The phase wise development of MMLP is described below which will be developed till 2032.

The proposed MMLP would have access to multiple transportation modes, including road, rail and IWT. The project would be designed to support the efficient and seamless movement of goods, with a focus on reducing transportation costs and improving supply chain efficiency. The MMLP would also provide facilities for warehousing, container handling, customs clearance, and other logistics services.

The MMLP would also create new employment opportunities in the area, both directly and indirectly. The logistics sector is a major employer, and the MMLP would provide jobs in areas

such as warehousing, transportation, and logistics services. The project would also support the growth of existing industries in the area and attract new industries, leading to further job creation.

Overall, the proposed Multi-Modal Logistics Park (MMLP) along with Saraswati Hi-tech City is a key component of the larger development project. The MMLP would provide much-needed transportation infrastructure to support the industrial and commercial activities in the area, while also creating new employment opportunities and driving economic growth. The strategic location of the project and its easy access to major transportation hubs make it an attractive option for businesses looking to expand their operations in the region.

In the case of this proposed MMLP (Multi-Modal Logistics Park) location, the statement suggests that it has high potential due to its strategic location and excellent connectivity with various modes of transportation.

Firstly, the location is well connected by a railway line, which means that it can easily receive and transport goods via rail. This is a significant advantage as railways are a cost-effective and efficient means of transportation, particularly for long-distance transportation of bulky goods.

Secondly, the location is in close proximity to the Naini Industrial Area, which is a well-established industrial hub. This means that the MMLP can serve as a key logistical hub for the industrial area, facilitating the movement of goods to and from the area.

Thirdly, the location is well connected to a National Highway, which provides easy access to other parts of the country. This means that the MMLP can serve as a gateway for goods entering or leaving the region, which can potentially boost economic growth in the area.

Fourthly, there is a proposed ring road that would further improve the connectivity of the location. This would help to reduce traffic congestion and improve the efficiency of transportation in the area.

Lastly, the location is also connected to the Eastern Dedicated Freight Corridor (EDFC) corridor, which is a high-speed rail freight corridor connecting Delhi with Eastern India. This would provide the MMLP with access to a fast and efficient mode of transportation for goods, which can further boost economic activity in the region.

Overall, the combination of these factors makes the proposed MMLP location an attractive proposition with high potential for economic use of the land. The excellent connectivity and access to various modes of transportation can help to reduce transportation costs and increase the efficiency of the logistics network in the area, which can potentially attract more businesses and industries to the region.

The current Landuse as per Draft Master Plan of Prayagraj 2031 is presented in Table 5-15.

Table 5-15: Proposed Landuse Distribution as per Draft Master Plan, 2031

S.No.	Proposed Facility	Proposed landuse as per Draft Master Plan, 2031	Area Required (Ha.)
1.	Multimodal Logistic Park (MMLP)	Industrial	93.5 Ha.

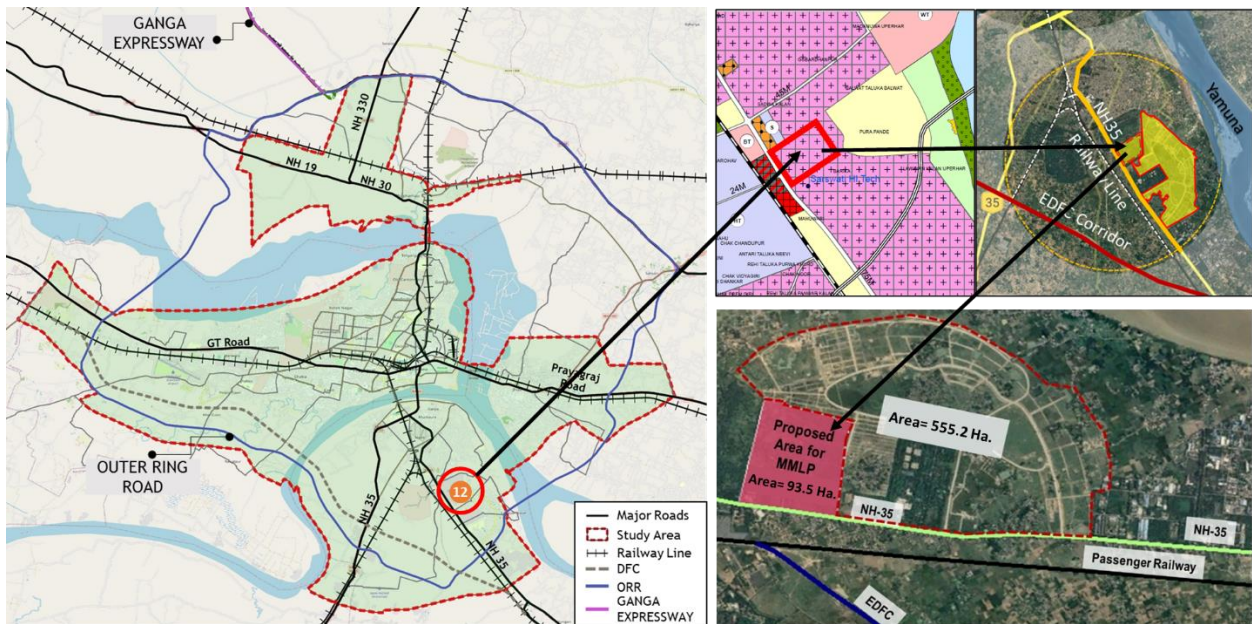


Figure 5-19: Proposed Multimodal Logistic Park

5.6.8 PROPOSAL FOR WAREHOUSES/ SEZI/ FTWZ

Proposed warehouses, SEZ/ FTWZ in strategic locations will improve supply chain efficiency, reducing transportation costs, and attracting foreign investment. These proposals are typically designed to promote economic growth and create jobs, while also addressing environmental concerns and improving sustainability.

Improved logistics with the presence of a warehouse in an industrial city, businesses will benefit from improved logistics solutions, providing them with faster delivery times and reduced costs. The provision of a warehouse in the city will help to strengthen the freight infrastructure for the manufacturing units, along with this provision of warehouse close to the source of production, supply chain efficiency will be enhanced.

The proposed location for the development of warehouses, SEZ or FTWZ near Naini has several advantages that make it potentially viable for economic use:

1. The site is well connected by a railway line, EDFC Corridor (if required, a stoppage can be built), and Naini Industrial area. The railway line and EDFC Corridor can facilitate the movement of goods and raw materials, while the proximity to Naini Industrial Area can provide access to a range of industries that can potentially benefit from the proposed facilities.
2. The site is also well connected by roads, including the proposed ring road. This can further enhance accessibility and connectivity to the proposed facilities.

The proposed freight facilities include:

1. Two Mega-warehousing facilities sprawling in an area of about 3 hectares each are proposed assuming the minimum size of Mega-warehouses is 2 hectares but here since demand is more 2 facilities of 3 ha. each are proposed. These warehouses include value addition facilities like packaging and delivery facilities. This suggests that the proposed

facilities can support the storage and distribution of goods, and potentially add value to the products through packaging and delivery services.

2. Proposal for Special Export/Economic Zone (SEZ) or Free Trade and Warehousing Zone (FTWZ). The proposal for an SEZ or FTWZ can provide benefits such as tax incentives and streamlined procedures for exporting and importing goods, which can potentially attract investment and generate employment opportunities.

The facilities will cater to commodities of metal and electronics. This implies that the proposed facilities can cater to specific industries and potentially support the manufacturing and trading of these commodities. The phase wise development of SEZ/ FTWZ is described below:

Table 5-16: Phase Wise Development of SEZ/ FTWZ

S.No.	Activity	Area %age	Area (Ha.)	Phase 1	Phase 2	Phase 3
1.	Wholesale Market	35	17.5	-	17.5	-
2.	Warehousing	8	4	-	4	-
3.	Booking Agencies	2	1	-	1	-
4.	Commercial & Public/Semi-Public	5	2.5	-	2.5	-
5.	Utilities & Services	3	1.5	-	1.5	-
6.	Service Industry	4	2	-	2	-
7.	Parking	12	6	-	6	-
8.	Circulation	25	12.5	-	12.5	-
9.	Others	6	3	-	3	-
	Total	100%	50 Ha.		50 Ha.	

In summary, the location's connectivity through railway lines, EDFC Corridor, and Naini Industrial Area, as well as its connectivity through roads including the proposed ring road, along with the proposed freight facilities, suggest that the proposed location has the potential for economic use, particularly in the context of warehousing, logistics, and trade of specific commodities such as metal and electronics.

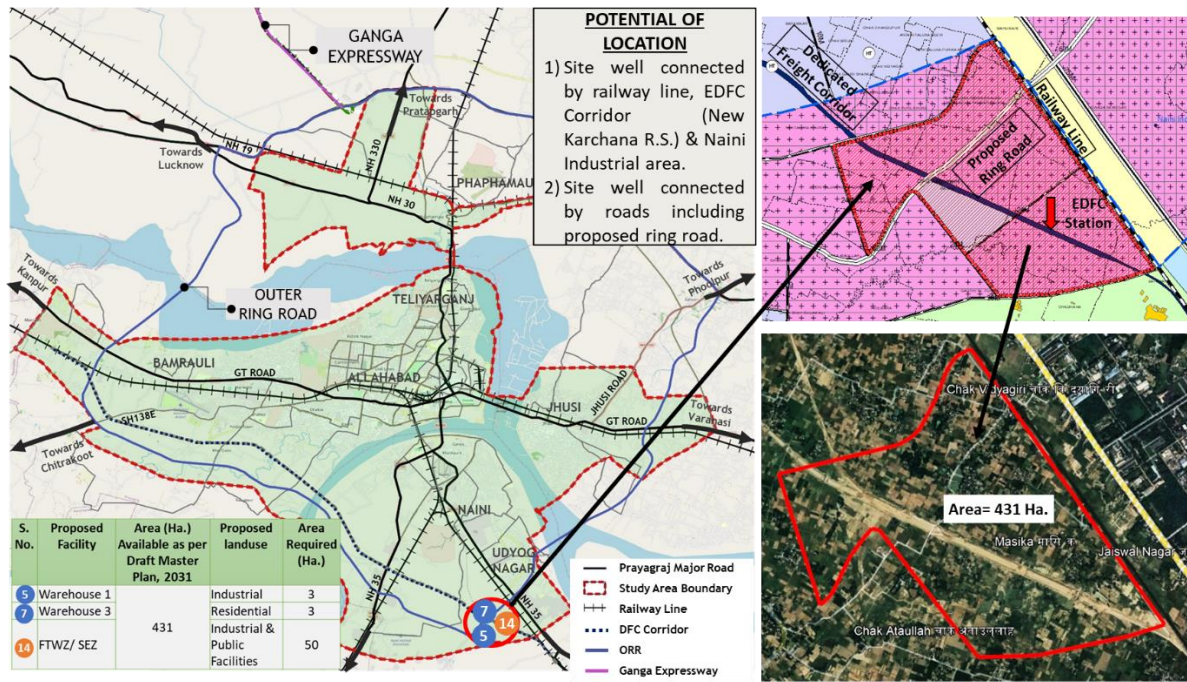


Figure 5-20: Proposed Warehouses/ SEZ/ FTWZ

5.6.9 IWT TERMINAL UPGRADATION

The location being deemed feasible during the trial run for NW-1 (National Waterway-1), which is a major inland waterway in India connecting Haldia in West Bengal to Varanasi in Uttar Pradesh. It is the longest waterway in the country, with a length of 1,620 km. It passes through four states, including West Bengal, Jharkhand, Bihar, and Uttar Pradesh, and potentially serves the major cities of Haldia, Howrah, Kolkata, Bhagalpur, Patna, Ghazipur, Varanasi and Prayagraj, their industrial hinterlands, and several industries located along the Ganga basin. This waterway is particularly important due to its strategic location and the benefits it provides to these regions. The trial run would have assessed the navigability and feasibility of the waterway in the proposed location, and based on the results, the location was deemed suitable for development.

The fact that the area has already been acquired by IWAI (Inland Waterways Authority of India) for development further indicates that the location has potential for economic use. The IWAI is a statutory body responsible for the development, maintenance, and regulation of inland waterways for shipping and navigation. Therefore, the fact that IWAI have acquired the area for development implies that there is a potential in the location for facilitating inland waterway transport.

Additionally, the terminal in the location provides a connection till Haldia, which is a major port city in West Bengal. This means that the location has access to a major transportation hub, which can further enhance its potential for economic use. With the development of the terminal and its connection to Haldia, the location can facilitate the movement of goods and raw materials via inland waterways, which can be cost-effective and environmentally sustainable.

The land for IWT terminal is already acquired by IWAI for the development. According to Master Plan 2031, proposed IWT Terminal is 48 hectare. The land use distribution along with phase wise distribution is described below and the same needs to be developed:

Table 5-17: Landuse Distribution for IWT Terminal along with Phase Wise Distribution

S.No.	Activity	%age Area	Area (Ha.)	Phase 1	Phase 2	Phase 3
1.	Berth and cargo handling areas	30%	14.4	7.2	7.2	-
2.	Storage areas	25%	12	6	6	-
3.	Commercial areas	10%	4.8	2.4	2.4	-
4.	Transportation infrastructure	25%	12	6	6	-
5.	Other	10%	4.8	2.4	2.4 <td -	
	Total	100%	48 Ha.	24	24	-

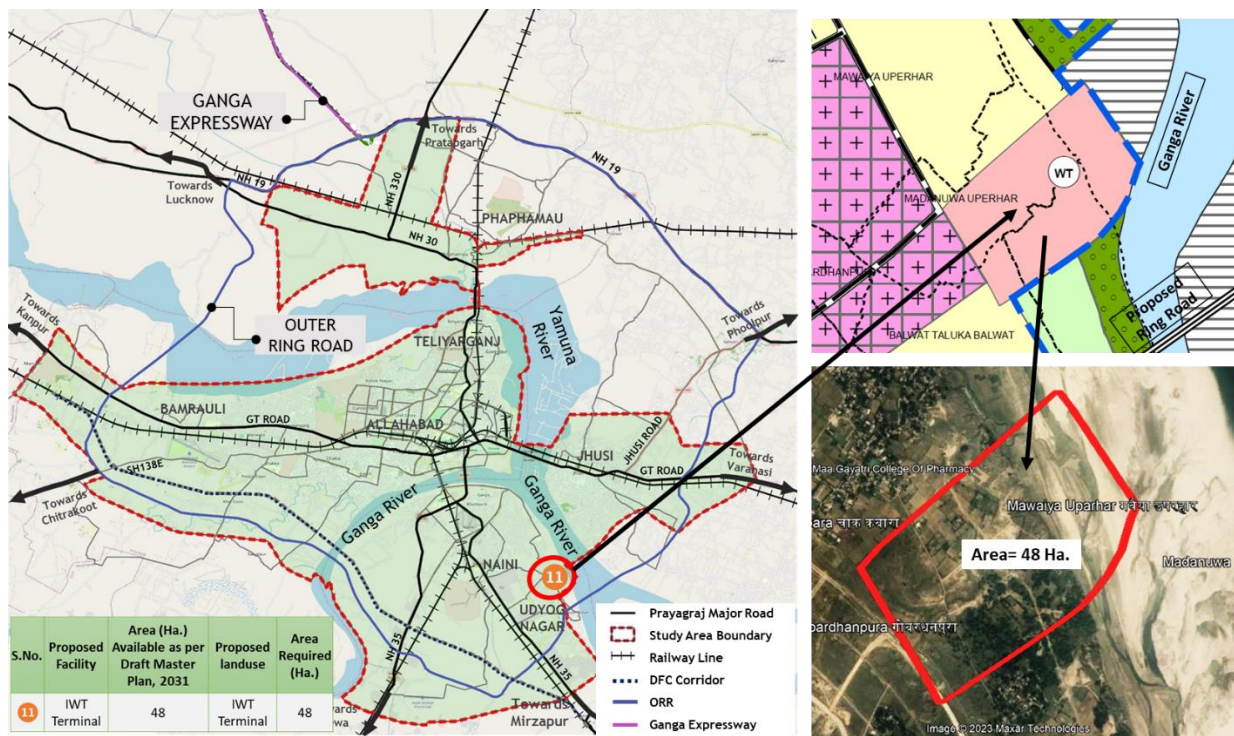


Figure 5-21 IWAI Terminal

5.7 EXISTING AND PROPOSED MANDIS AND WHOLESALE MARKET

5.7.1 WHOLESALE MARKET NEAR JHUSI RAILWAY STATION

Proposed Wholesale Market have close proximity with Jhusi Railway Station and National Highway connecting Varanasi. This terminal will cater to freight from Varanasi but since as per existing traffic analysis since quantum of freight from Varanasi is less this facility can be proposed at the later stage. As per Master Plan district town centre covers an area of 11 hectares, this area can is proposed for new wholesale market as an alternative to Mutti Ganj and Hatiya Chauraha.

There are several advantages of location of Wholesale Market near Jhusi Railway Station. Some of the major benefits are:

- **Easy Access to Transportation:** The proposed location has close proximity to Jhusi Railway Station and National Highway, which provides easy access to transportation.
- **Improved Efficiency:** The proposed location will allow for the consolidation of various wholesale markets. This will help to streamline the distribution process and improve the efficiency of the supply chain. The terminal can also provide modern storage facilities that are lacking in the old markets like Hatiya Chauraha and Muthiganj.
- **Reduced Traffic Congestion:** The relocation of wholesale markets from the congested city areas to the outskirts will help reduce traffic congestion. This will benefit the local community by decreasing pollution and improving traffic flow.
- **Better Infrastructure:** The proposed location will allow for the development of better infrastructure, including roads, parking lots, and storage facilities. This will provide a more organized and structured environment for wholesale business operations, benefiting both the buyers and the sellers.
- **Boost to the Local Economy:** The proposed wholesale market will create employment opportunities for the local community. Additionally, it will attract businesses from nearby areas, resulting in increased economic activity and growth in the area.

Table 5-18: Proposed Landuse Distribution of Wholesale Market

S.No.	Landuse	%age Area	Area	Phase 1	Phase 2	Phase 3
1	Wholesale Market	30%	3.30	-	-	3.30
2	Warehousing	8%	0.88	-	-	0.88
3	Booking Agencies	2%	0.22	-	-	0.22
4	Commercial & Public/Semi-Public	5%	0.55	-	-	0.55
5	Utilities and Services	3%	0.33	-	-	0.33
6	Service Industry	4%	0.44	-	-	0.44
7	Parking	12%	1.32	-	-	1.32
8	Circulation	25%	2.75	-	-	2.75
9	Others	11%	1.21	-	-	1.21
	Total		11 Ha.			11 Ha.

In conclusion, the location of the Proposed Wholesale Market near Jhusi Railway Station offers many advantages, including easy access to transportation, improved efficiency, reduced traffic congestion, better infrastructure, and a boost to the local economy.

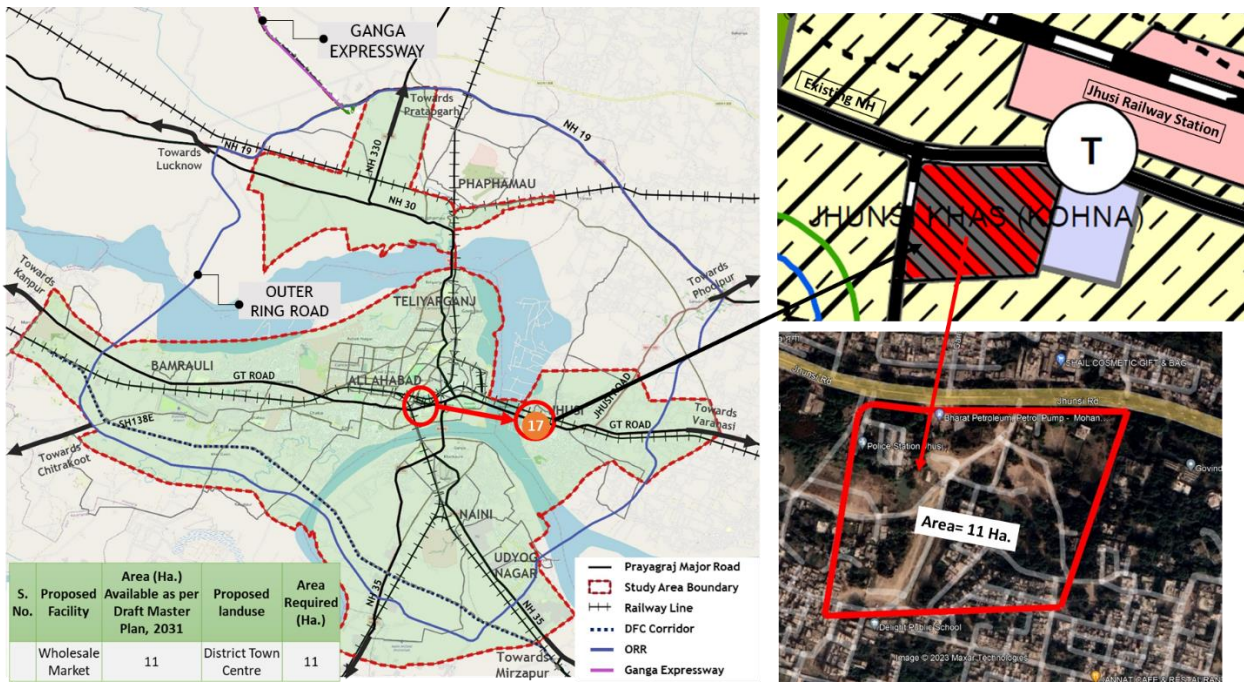


Figure 5-22: Proposed Wholesale Market

5.7.2 PROPOSAL FOR COLD STORAGE FACILITIES-MUNDERA MANDI

Mundera Mandi is an important market hub in Prayagraj, where farmers and traders come to buy and sell agricultural products. According to the proposed Master Plan 2031, the planned area for Mundera Mandi covers an area of 0.24 square kilometres. The existing infrastructure and facilities at Mundera Mandi are not up to the mark, leading to operational challenges and reduced efficiency for businesses. The existing capacity and future capacity requirement are summarised in the table below.

S.No.	Facility	Existing Area	Required Capacity 2022	Required Capacity 2042	Types of Products	Capacity Utilisation
1.	Mundera Mandi	24 hec.	29,920 tons	43,297 tons	Fruits & Vegetables & Meat	18%

It is to be observed that existing space of Mundera mandi is under-utilised and has lots of empty spaces. Thus, the existing space can be used to provide additional facilities.

Following are some strategies for Mundera Mandi:

Strategies

- 1) Upgradation of Mundera Mandi infrastructure facilities such as constructing new roads, tiling of pathways, improving sanitation facilities and drainage and introducing better lighting and security systems, etc.
- 2) Cold Storage facility to be provided inside Mundera Mandi to store and transport perishable goods more efficiently and at a lower cost and extend their shelf life, allowing traders to store their products for longer periods and reduce wastage. It will cater to commodities such as fruits & vegetables.

S.No.	Landuse	%age Area	Area (Ha.)
1	Cold Storage	60%	1.20
2	Circulation	30%	0.60
3	Others (Loading/ unloading, allied facilities, etc.)	10%	0.20
	Total		2.00

3) Technological Upgradation of terminal such as automation of entry and exit gates.

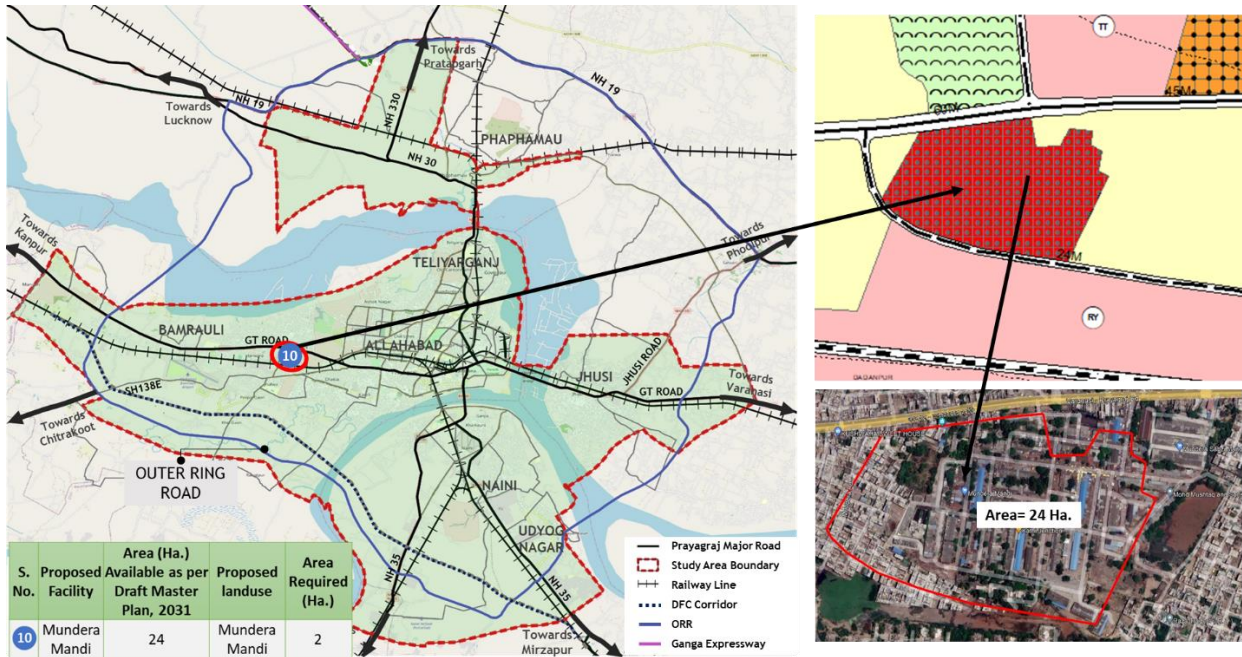


Figure 5-23: Storage Facilities at Mundera Mandi

5.7.3 STRATEGIES FOR WHOLESALE AREAS- MUTHI GANJ & HATIYA CHAURAHA

Mutthi Ganj & Hatiya Chauraha areas is a major wholesale market in Prayagraj providing a platform for manufacturers, distributors, and retailers to connect and trade. By implementing the following strategies outlined in this proposal, wholesale areas can improve their congestion, enhance the customer experience, and promote sustainability.

A wholesale market sprawling to an area of 11 hectares has been proposed for new wholesale market as an alternative to Mutthi Ganj and Hatiya Chauraha. Till the time new wholesale market is developed certain strategies for existing wholesale areas like Muthi Ganj and Hatiya Chauraha to decongest the city and improve efficiency:

Restriction on movement of Heavy vehicles like Trucks/ MAV: One of the proposed strategies is to restrict the movement of heavy vehicles in the area during day and allowing only LCV’s or e-rickshaws for trade activities. This is done considering narrow ROW of roads.

Time Restrictions for Truck Entry: Another strategy is to restrict the entry of 2-axle trucks during peak hours and permit them only during night time from 10 pm to 5 am. This will help to ease traffic congestion during the day and improve the overall flow of traffic in the area.

Relocation of Transporters: The area majorly consists of MSME units and small shops. The transporters located in the area can be encouraged to move near other proposed facilities like near Jhusi or Transport Nagar along Lucknow bypass to decongest the city. This will help in reducing the number of heavy vehicles in the congested city areas and improve traffic flow.

Improvement in Infrastructure: The infrastructure of the area should be improved to ensure smooth traffic flow and movement of goods. This could include repaving of roads, demarcation of loading/ unloading spaces, and installation of traffic signage.

Technology Integration: Technology can be integrated into the system to streamline the process of goods movement. This could include the implementation of GPS tracking for trucks, online booking systems for loading and unloading, and digitization of paperwork to reduce manual processing time.

In conclusion, the proposed strategies for wholesale areas like Muthi Ganj and Hatiya Chauraha can help in reducing congestion, improving traffic flow, and enhancing the overall efficiency of the system. These strategies will not only benefit the wholesale traders and transporters but also the local community by reducing pollution and congestion in the area.

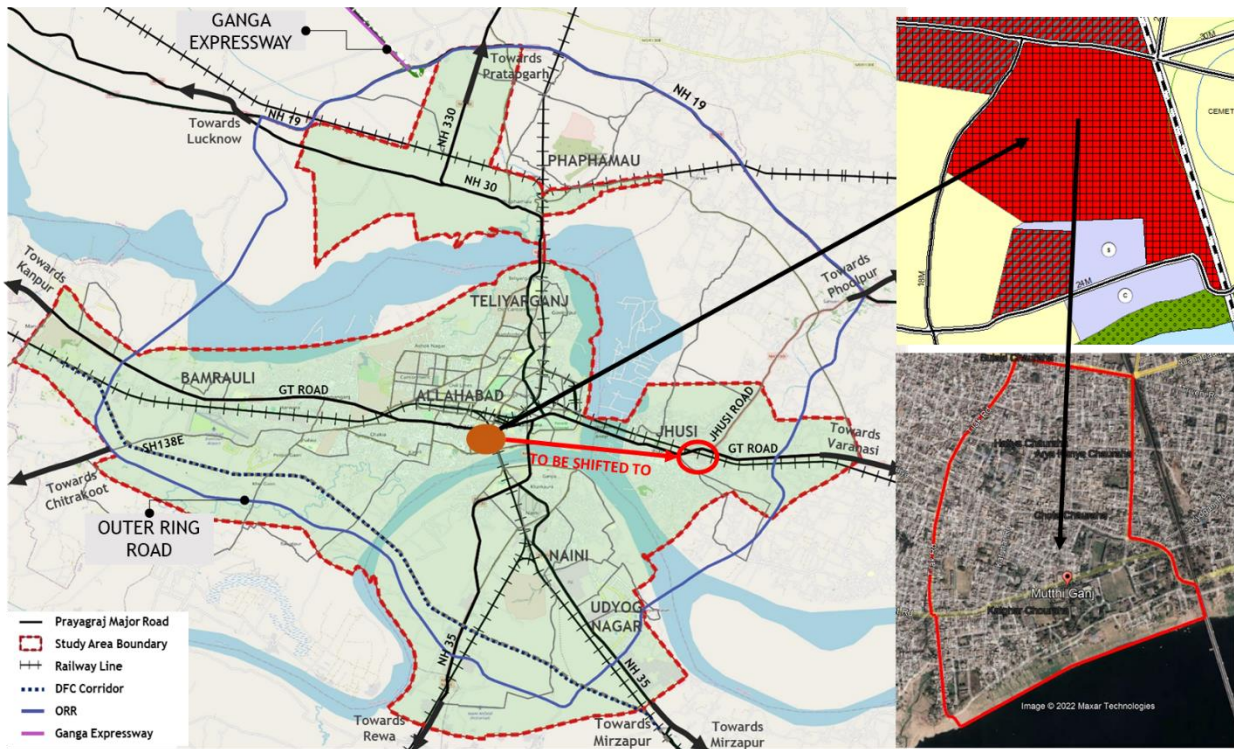


Figure 5-24: Muthiganj and Hatiya Chauraha Wholesale Market

5.8 RAILWAY STATION REDEVELOPMENT

5.8.1 PROPOSAL FOR INCIDENTAL TRUCK PARKING AREA NEAR SUBEDARGANJ RAILWAY STATION

In Prayagraj, there are 3 railway stations where cargo is handled. These include Naini Junction, Iradatganj Railway Station, and Subedarganj Railway Station. The various cargo trains are

received at Naini Junction and Iradatganj Railway Station whereas at Subedarganj Railway Station only cargo trains carrying oil for IOCL are received occasionally.

Naini Junction and Iradatganj Railway Station are located near industrial areas of city thus can be continued to be used for cargo movement. Since Eastern DFC corridor is under-construction in the city. After the starting of operations of the DFC corridor majority of freight traffic arriving at both these railway stations will be shifted to the DFC Corridor. Thus, reducing the congestion and dependency of the city on these stations. This is a major planning consideration of not to plan any expansion facility for these railway station.

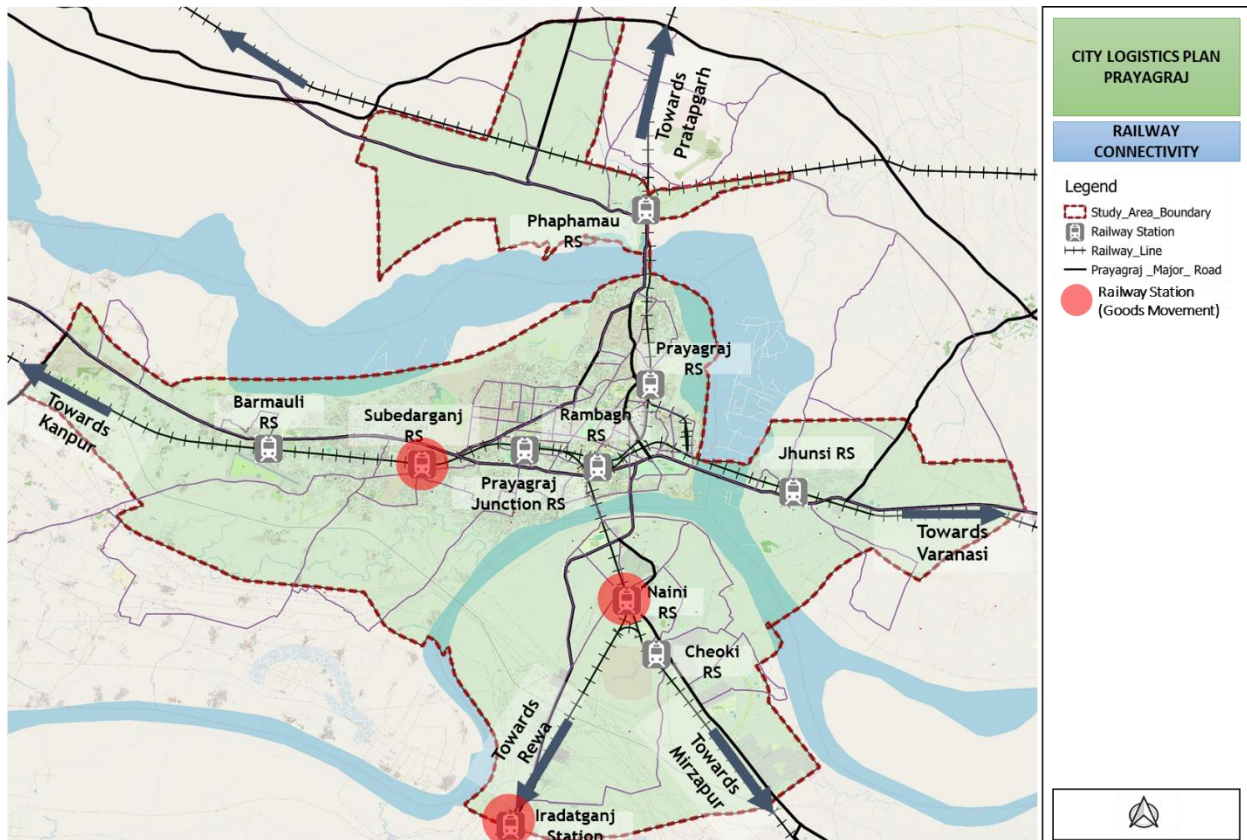


Figure 5-25: Map highlighting Railway Stations with Freight Traffic

Table 5-19: Capacity of Railway Stations

Railway Station	Total Weight (in Tonnes)	Freight (Rs.)
Naini Railway Station (Inbound)	9,05,923	88,00,55,988
Iradatganj (Inbound)	3,93,454	21,91,92,409
Iradatganj (Outbound)	66,755	10,46,74,141
Subedarganj Railway Station	Variable 3,200 KL per train	Not Available

In the case of Subedarganj Railway Station, it was observed that congestion occurs in the area around IOCL Plant and railway station. This is due to the underutilization of existing infrastructure and mismanagement of the parking area available inside the plant. It is also observed that there is a lack of enforcement by the concerned authority which promote the drivers to park their trucks along the road.

Table 5-20: Capacity Analysis of Subedarganj Railway Station

Railway Station Name	Vacant Land Available with Railway Station	Existing Capacity	Peak Accumulation	Capacity Utilized	Requirement 2042
Subedarganj Railway Station	Approx. 3.5 Ha.	350 trucks	150 trucks	Approximate 43%	200 trucks

Thus, it is proposed to redesign and strengthen the existing infrastructure with the help of traffic control devices (eg: road markings, road signage, and supporting road infrastructure). It is also necessary to implement a proper enforcement plan to avoid on-road parking outside the plant and develop existing designated truck parking inside the IOCL plant. This will help in reducing congestion on roads which is presently caused due to trucks parked along roadsides.

It is proposed to develop a new temporary/ incidental truck parking area near Subedarganj Railway Station. The proposed parking area will serve as a safe and secure location for truck drivers to park their vehicles, rest, and refresh themselves before continuing their journey. The proposed truck parking area will also help to reduce traffic congestion on city roads by providing a dedicated parking area for trucks. Also improving road safety by reducing the number of trucks parked on the sides of the road, which can be a hazard for other drivers.

Presently at Subedarganj Railway Station, there is no demarcated parking space for existing truck parking demand. During the arrival of cargo train of IOCL it is observed that on an average 150 trucks are parked at stations to unload the train rack, thus causing congestion in the area. To address this issue, a dedicated truck parking area can be developed near Subedarganj Railway Station. This area can be demarcated and developed with appropriate infrastructure such as lighting, security, and waste disposal facilities. This can help reduce illegal parking, prevent traffic congestion, and ensure the safety of both drivers and pedestrians.

The proposal includes demarcation of truck parking to avoid congestion due to occasional use of IOCL. This suggests that the truck parking area can be used not only by regular truck drivers but also by IOCL trucks for occasional parking needs. This can help ensure that IOCL trucks have access to adequate parking space when they require it, reducing the likelihood of illegal parking and associated issues. It can help ensure that the parking area is used effectively, and the associated issues such as traffic congestion, illegal parking, and safety hazards are mitigated.

Thus, the proposal for a truck parking area near Subedarganj Railway Station can help address the lack of demarcated parking space for existing trucks.

The proposed truck parking facilities might include the following facilities:

- A safe and secure parking area with demarcated spaces for trucks.
- 24-hour security surveillance to ensure the safety and security of the parking area.
- Restrooms, shower facilities, and food outlets to enable truck drivers to rest and refresh themselves before continuing their journey.
- A maintenance facility that will provide truck drivers with basic maintenance and repair services.

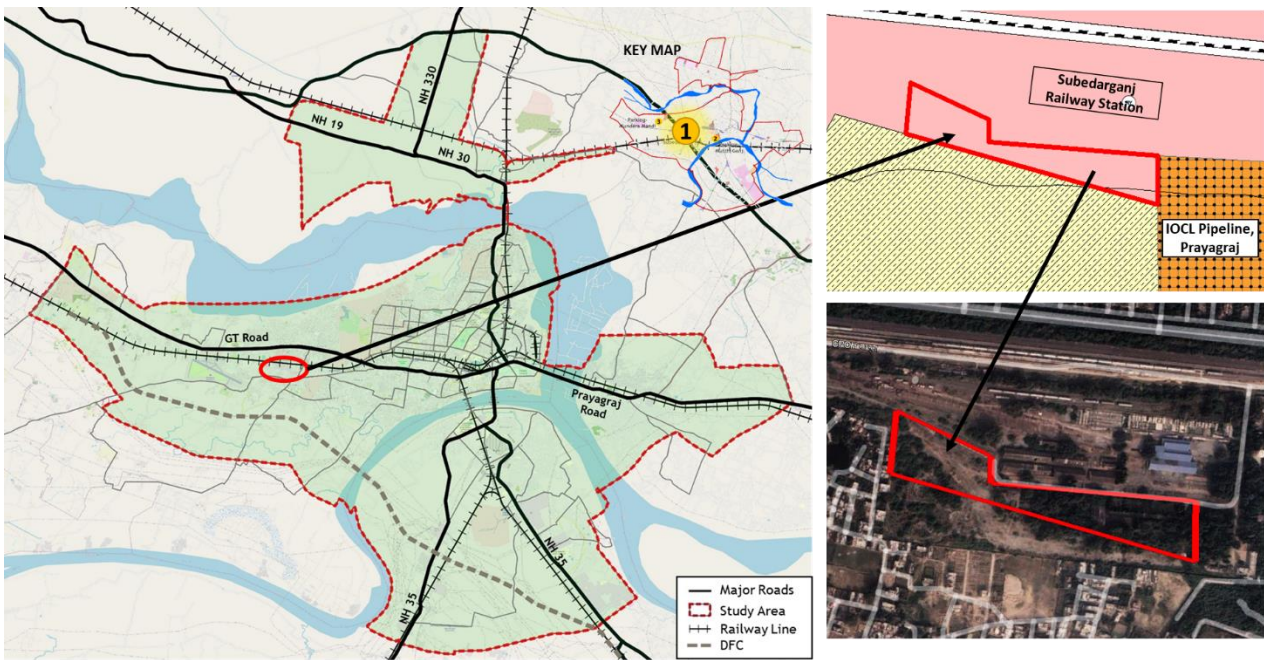


Figure 5-26: Proposed Truck Parking

5.9 INTELLIGENT TRANSPORT SYSTEM (ITS)

In a view of the future growth of the city as one of the primary manufacturing hubs with an objective of cost efficient and time saving deliveries, provision of Intelligent Transport System specifically as the freight ITS, shall be adopted at the city level for the collection and execution of different information and timely decision making for freight mobility. The information types mentioned here represents the various types of transportation information used by freight ITS as per various studies globally. In other words, the application of freight ITS is based on the availability of such information. Each type of information contains sub-types, some of which are mentioned in this section, shall ease the freight mobility. Following points include the most common types of transportation information frequently used or supported by freight ITS.

- **Traffic and infrastructure information:** Real-time traffic information will help to improve the flow of traffic and the efficient use of roads. This includes information about the location of roads, their conditions such as quality or construction work, what vehicles can use them, restrictions, congestion, and any collisions or other incidents.
- **Vehicle and freight location information:** This type of transportation information enables the tracking and tracing of freight through the transportation network. Such information includes notifications regarding the arrival of freight to any nodes, loading and unloading information for freight shipment, geographical location of freight accessible through vehicle location and condition monitoring systems and location of the freight in the warehouses, terminals.
- **Freight condition information:** Such information is related to the physical attributes of the product during transportation operations, including when the product is stored in warehouses or when it is shipped by vehicles between players in the transportation network. Which will be helpful in aggregating real-time information regarding the temperature level, pressure level, impact, humidity or the level of light in the vehicle

during transportation shall be more useful for the safer and timely delivery of perishable goods.

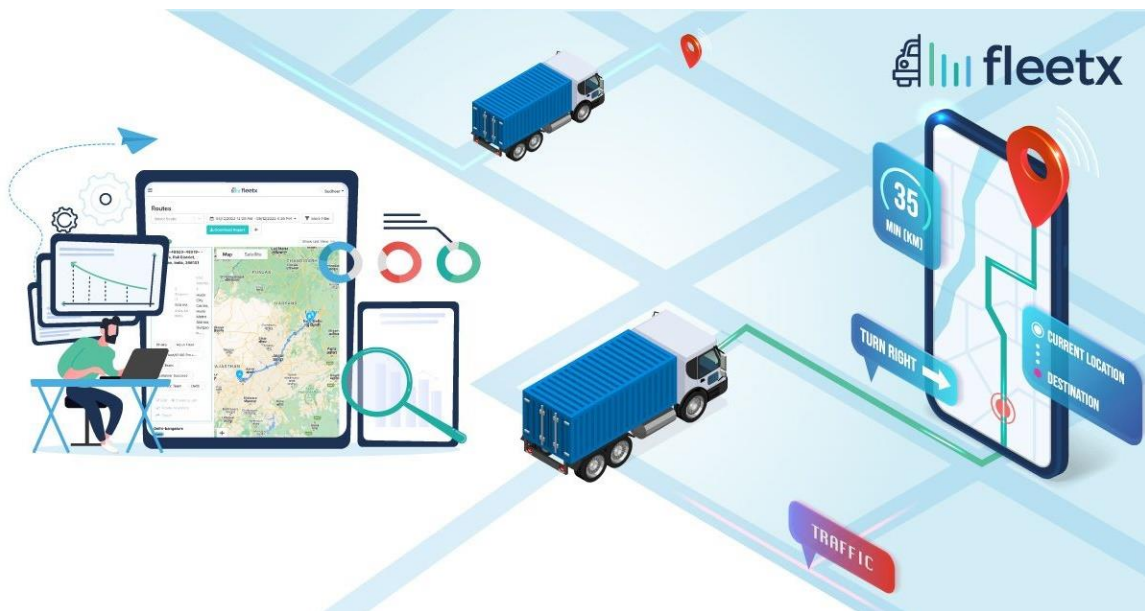


Figure 5-27 Freight ITS Integration Platform

- **Freight positioning information:** Such information is related to the placement and sequencing of the products when they are stored or being shipped. Examples of such information includes information related to the positioning of the products in warehouses, such information will be essential for reliable and efficient warehouse and material handling operations.
- **Warehouse operations and inventory information:** Such transportation information includes information related to the number of items in the warehouses, customers' orders for different items, loading and unloading times for different orders and information about the contents of different warehouses. This will be useful to improve warehouse utility by automating processes and accordingly will help in decision-making.
- **Shipment information:** Information regarding types of shipped items, their attributes (such as model, class, size, colour, weight, price and ID number, as well as other kinds of data that depend on the type of items), sender information, receiver information and information regarding the quantity of shipped items is a significant factor for the control and management of transportation operations. This information shall be useful for transportation operators, transportation companies and terminals and senders and receivers of the cargo, as well as by the local authorities.
- **Vehicle identity information:** Information such as the type and class of vehicles, their registration numbers and other identification information will be beneficial in different transportation operations for transportation resource management. Such information shall also be used by authorities for controlling the security of transportation operations.

5.9.1 PROPOSED FREIGHT ITS

In Prayagraj, at present there is negligible freight ITS infrastructure available which leads to reduced efficiency of transport operation, delayed delivery and poor utilisation of the available fleet. Based on the type of transportation information related with freight ITS, various strategies have been proposed for the smooth operation of freight transportation. The use of each system to support the functions of freight transportation and the contribution of each system to the improvement of different performance dimensions of transportation effectiveness and efficiency, safety and security and environmental performance are listed below, broadly divided into 2 categories, one for action from authority/stakeholder and the other from the operator side.

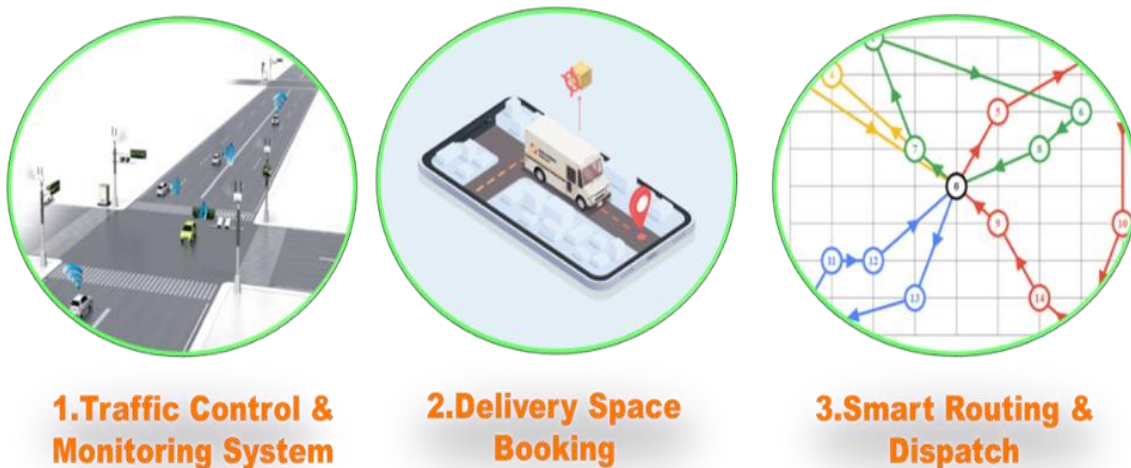


Figure 5-28: Proposed Freight ITS Infrastructure

5.9.2 ITS INFRASTRUCTURE FROM DEVELOPMENT AUTHORITY

- Traffic control and Monitoring systems:** Currently there is no freight control and monitoring system which lead to poor efficiency of freight vehicles. This will be used for controlling the safety and security of transportation operations. Different technologies such as smart traffic lights, variable traffic signs and cameras for plate recognition and speed measurement equipped with sensors shall be used in such information systems.
- Delivery Space booking systems:** As per the present situation assessment freight vehicle are being parked and at the same time loading and unloading activities leads to one of the causes of congestion and delays, specifically along Transport Nagar main road and the minor roads of the core city area. Provision of this system allows the space for parking to be booked for a specific vehicle to load or unload freight during a specific time period. Such systems will be useful to facilitate the urban freight transport system with space limitations resulting from the presence of retailers in city centres. Also, used for the terminals. The application of these systems will reduce the total number of vehicle trips during a specific time period (contributing to environmental performance) and maximises the utilisation of the parking space.

5.9.3 ITS REQUIREMENT FOR OPERATORS

The following measures need to be taken by the operators to make the system fully functional.

- **Smart Routing and Dispatch:** Such systems will be used to plan transportation routes in response to road situations. As a result, the effectiveness of operations will be increased by providing a better level of service to the customers through reducing the potential for delays and waiting times on the road.
- **Real-Time Monitoring and Tracking:** It can be used for freight vehicle real time monitoring and tracking to provide detailed insights into the performance of the freight vehicles, such as fuel consumption, vehicle speed and location. This will enable operators and authorities helping them respond quickly to any issues that occur. Additionally, ITS enabled tracking systems can be used to monitor driver behaviour and ensure compliance with safety protocols. This ensures the safety of the cargo and the delivery personnel. This strategy would be adopted at the operator level through provision of various incentives.

5.9.4 ELECTRIC FREIGHT VEHICLES CHARGING INFRASTRUCTURE

With the evolution and increasing adoption of electric vehicles (EVs) in India, it is important to develop an adequate parking infrastructure to support their adoption. One of the key strategies proposed by Niti Aayog for addressing the charging infrastructure requirements of electric vehicles (EVs) is depot charging. This refers to a charging method where electric vehicles are charged at a central location, such as a truck yard or warehouse, during periods of low usage, such as overnight when the fleet is not operating. These chargers are installed and maintained by private entities, and they are designed to charge multiple electric vehicles at the same time.

One of the key advantages of depot charging is that it supports ideal time charging, allowing electric vehicles to be charged during periods of low usage. This is particularly beneficial for fleets of electric freight vehicles, as it ensures that the vehicles are fully charged and ready to go when they are needed the next day. Depot charging can also align with existing fleet operating schedules.

Another advantage of depot charging is that it can be more cost-effective for EV users. Since depot charging involves charging electric vehicles at a central location during off-peak hours, the cost per charge can be lower compared to on-road charging. This can make electric vehicles more affordable and attractive to fleet operators, who can save money on fuel costs and maintenance expenses.

The above-mentioned charging infrastructure is proposed at all proposed Truck Terminal, Transport Nagar locations where trucks and freight vehicles are parked during idle or resting time. This will provide an attractive location for parking electric as well as charging electric freight vehicles in the future.



Figure 5-29 Snapshot of Electric Freight Vehicle Depot Charging Facility

5.10 FIRST AND LAST MILE CONNECTIVITY

First and last mile freight connectivity in the inner core area of Prayagraj refers to the activity of moving goods from warehouses, factories, and other transportation hubs to stores, homes, and businesses located within the study area. In Prayagraj, this involves utilizing a variety of transportation options such as three-wheeler, Mini LCV, LCV and 2 axle trucks primarily. In addition to these an increase in the usage of e-rickshaws has been observed. The last mile delivery system is currently lacking due to various factors such as empty trips, lack of integration between different operator parties, fragmented deliveries and underutilised vehicle load.

To increase efficiency and reduce the ill impacts of transport in the last mile delivery, it is proposed that at least 80% of the city's ICE based goods fleet should be targeted to be converted to EVs by 2042. Additionally, it is recommended that core area routes should be organized such that it minimizes delivery times, fuel costs, and other expenses while ensuring a speedy and reliable delivery service. Fixed timing and routes for different modes is also proposed under the CLP.

While the use of smaller vehicles and even e-rickshaw is expected to improve the last mile connectivity, the amount of empty trip and lack of coordination leads to multiple trips and overall inefficiency in the system. Figure below shows the identified first and last mile delivery zones and routes. To mitigate the issue, it is recommended to create a common platform for supplies and receiver and encourage joint delivery/pickups like done in e commerce. This measure if taken up by private sector themselves is expected to increase efficiency in following ways:

- Joint delivery and shared freight trips of vehicles would be an effective way to reduce traffic congestion within the city.

- Since, there are substantial amount of freight vehicles on the inner roads of the city. Joint delivery involves multiple customers sharing a single delivery vehicle, reducing the total number of vehicles on the road.
- Shared freight trips involve customers outsource their goods to multiple carriers, maximizing the utilization of each vehicle on the road. This helps reduce the number of vehicles needed to make deliveries resulting in fewer vehicles clogging up the streets.
- Furthermore, shared freight trips can help reduce fuel consumption and environmental pollution. Additionally, shared freight trips and joint delivery can help reduce the cost of transportation. Companies can share resources, reducing their individual operating costs.

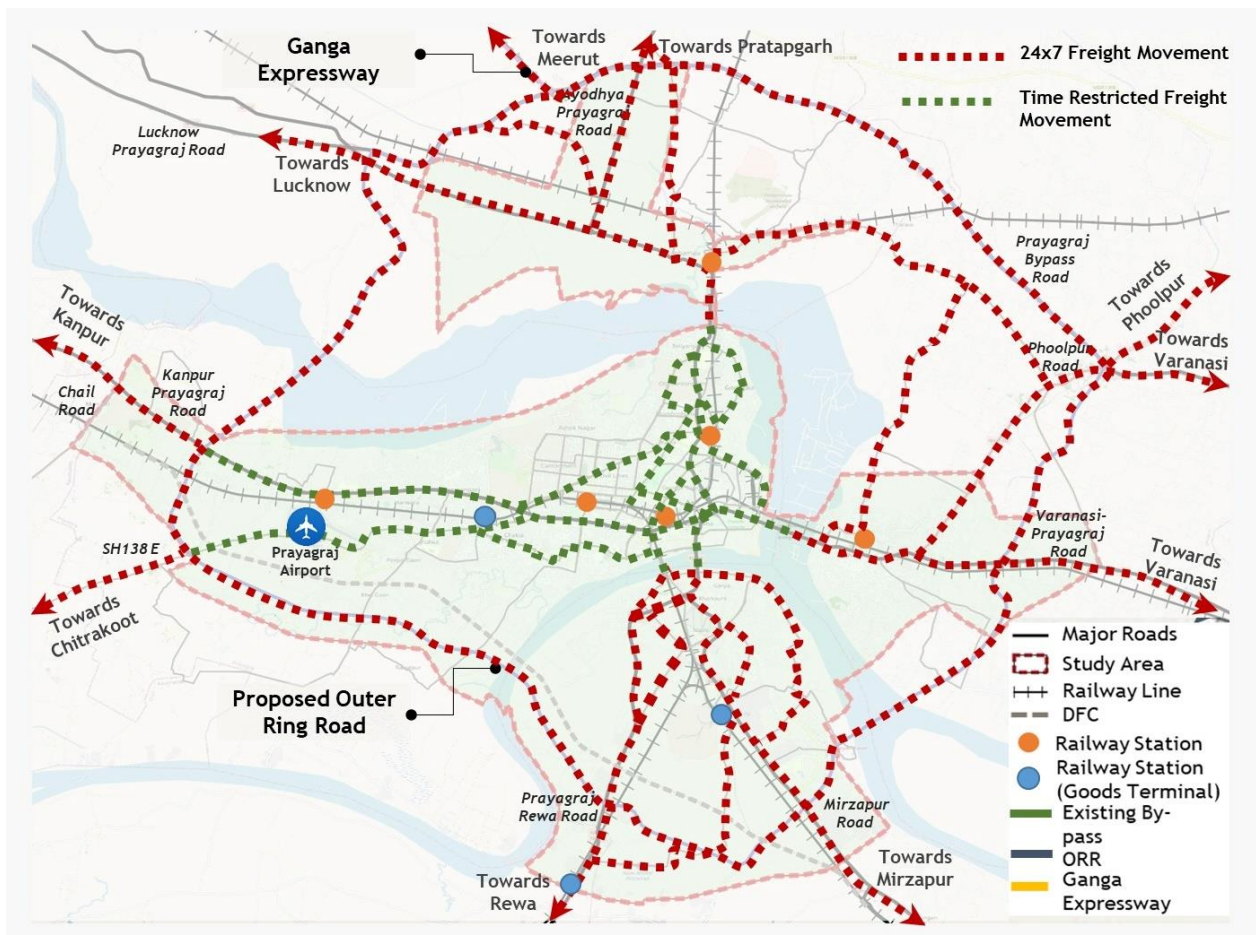


Figure 5-30 Identified First and Last Mile Delivery Zones and Routes

5.10.1 SHIFT FROM ICE TO EVS

As per the present scenario maximum freight vehicles in the city are being operational on the conventional sources of the fuel such as Diesel, Petrol and CNG. This results in the increasing harmful pollutant in air and contaminates the living conditions of city. Thus, there is a need to gradually shift the freight mobility from conventional source to the electric modes and other green energy alternatives. This would entail strong strategical framework and incentives for the smooth transition of shift to green mobility alternatives such as electric freight vehicles. It is proposed that 80% of the entire city’s ICE based fleet should be targeted to be replaced by EVs by 2042. Some of the key strategies proposed to trigger this shift are as below:

- **Reducing road tax⁷:** The RTO can reduce road tax for the electric freight vehicles so as to minimize the overall cost of ownership of the vehicle
- **Ease in the freight movement and timings:** Within the cities electric freight vehicles could be allowed to move at all times of the day for the initial period or increase the mobility time for e-freight vehicles.
- **Demarcation of zero-emission zones:** The city can identify zones in the commercial areas or the trade areas where electric or zero-emission freight vehicles can be given preference
- **Urban E-freight studies:** The municipal corporation can initiate electric vehicle feasibility studies in the city-specific identified freight sector
- **Ease in the registration process:** The registration process should be less cumbersome and should be paced up for the urban freight e-vehicles as this can reduce the time for accessing EMI and finances;
- **Increased awareness among RTO official:** Although policies for registering electric vehicles are in place, the knowledge among RTO officials regarding electric vehicles is low.

Through the implementation of proposed strategies, it should be aimed to shift 30-40% of Fleet to E-vehicles by 2032 and to increase to about 80% by 2042. In order to encourage operators to convert to electric vehicles for freight movement, incentive programs can provide financial support for the purchase and maintenance of electric vehicles. This could include grants or subsidies for purchasing electric vehicles as well as subsidies for charging infrastructure such as electric vehicle chargers. Additionally, tax credits or other financial incentives for regular maintenance and charging could help defray the cost of operating electric vehicles. Such incentives could make the shift to electric mobility for freight movement more financially attractive and thus encourage more operators to switch to electric vehicles.

5.10.2 PROPOSED TENTATIVE ROUTE FOR FREIGHT MOVEMENT

Figure 5-31 shows the tentative proposed route for freight transportation within Prayagraj City. The route has been carefully planned, considering the road width and aiming to connect all internal zones with significant freight movement. Additionally, the route also connects all outer cordon points that link to highways.

⁷ A per report on “Transforming Trucking in India” by NITI Aayog (2022)

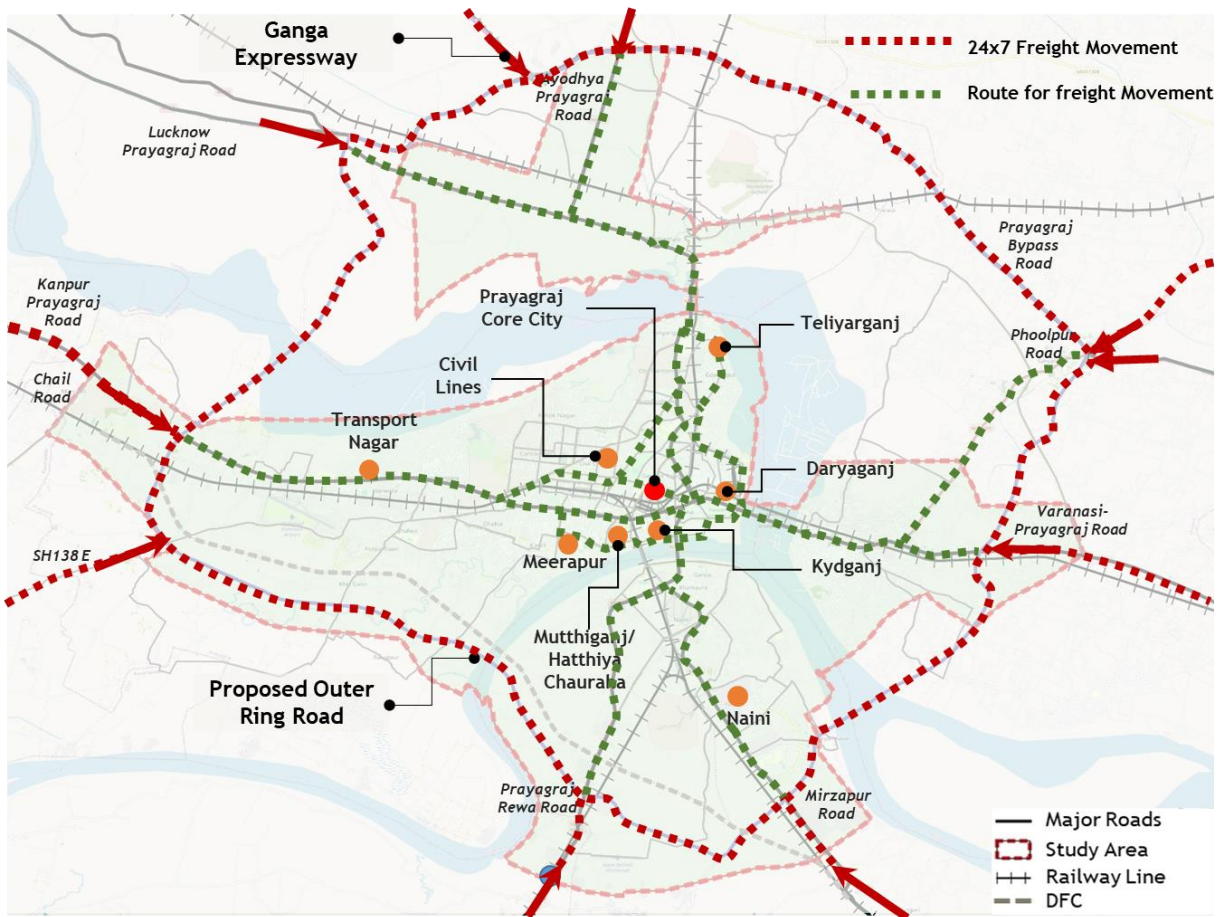


Figure 5-31: Proposed Route for Heavy Truck Freight Movement

5.10.3 DEMARCATED LOW EMISSION ZONES

Low Emission Zones has been demarcated in the city in order to shift from the conventional modes to the green energy sources. These kinds of strategies require strong enforcement for its implementation that would be achieved using the different ITS based cameras and advanced sensors. This will be useful for the smooth transition in the shift to electric based freight mobility and also, led to reduce the air pollution and noise pollution created by the existing conventional freight modes.

Proposed low emission zone are shown in the Figure 5-32. Only vehicles abiding by certain emission standards as per guidelines will be allowed to enter the zones free during the delivery hours. A feasibility study is recommended to study in detail the pricing mechanism for the proposed LEZ. As there is a gradual shift observed from three wheelers towards battery operated mode restriction has to be applied to first and last mile delivery vehicles predominantly Mini LCV and LCV.

This will be in cognizance of the national objective of the shift to clean energy mobility sources and will also support to achieve that goal at the grass root level.

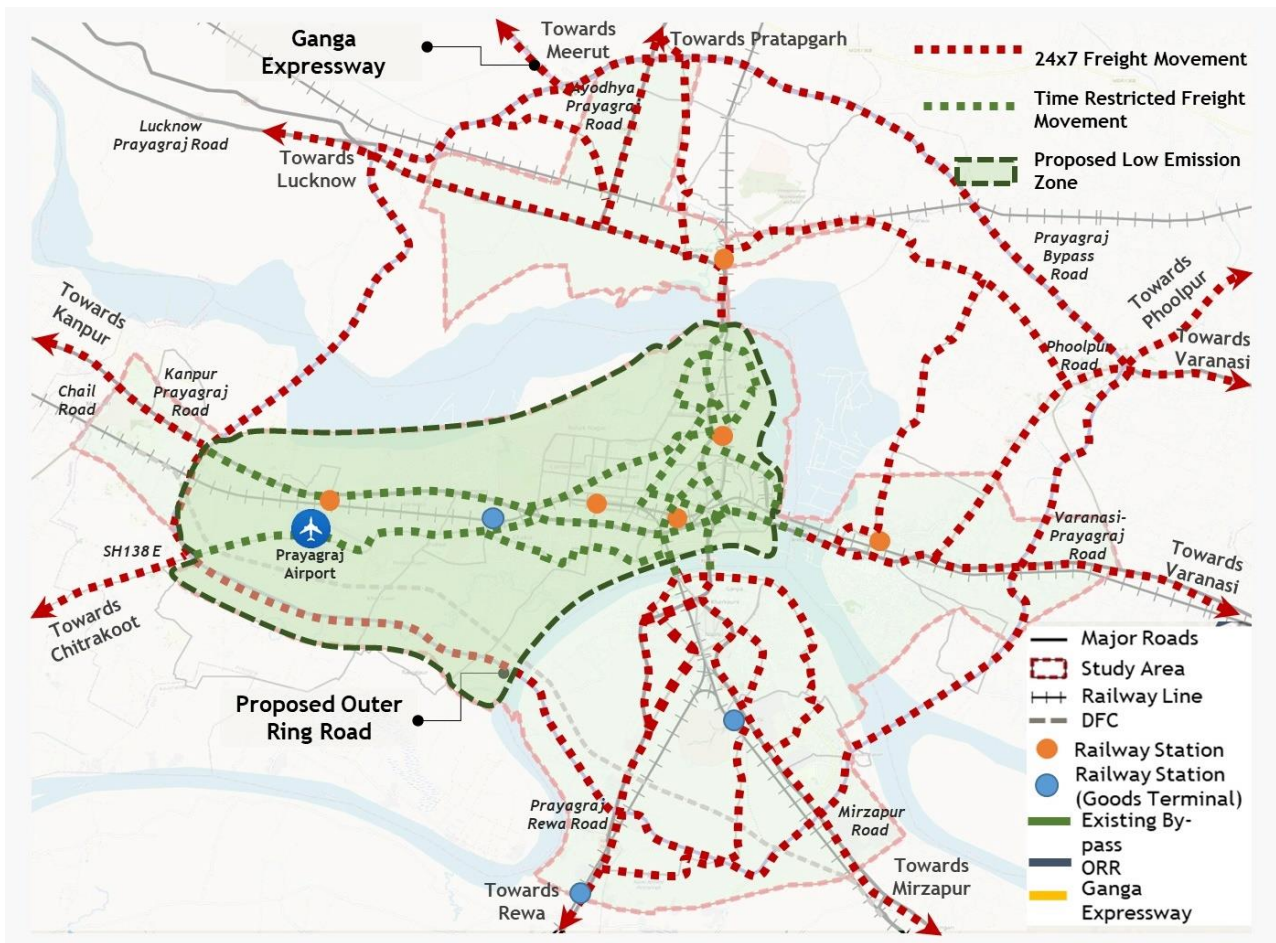


Figure 5-32 Proposed Low Emission Zone

5.11 SUMMATION

Prayagraj city is one of the largest commercial centres in Uttar Pradesh; it also has the second highest per capita income and the third-greatest GDP in the state. The northern part of Prayagraj district, popularly known as Gangapar, is endowed with good fertile soil for cultivation of food grains, pulses, oil seeds and vegetables. As given in above chapters, a business-as-usual scenario will translate into inefficient transport system leading to loss of time and capital as well as will also trigger a poor quality of life for the city’s residents, leading to loss of citizens’ health. In view of this, it is imperative that an early action is taken to improve upon the scenario before it is too late to act. The proposals indicated above are prepared in line with the logistics policy and are curated to Prayagraj’s requirement. It is highly recommended that the above proposals may be incorporated in the Master Plan and an early action should be taken on the same.

The proposals and their area can be summarised as follows:

S.No.	Proposed Facility	Location	Area (Ha.) Available as per Draft Master Plan, 2031	Proposed landuse	Area Required (Ha.)
1	Transport Nagar	Ayodhya Road	97	Residential	30
2	Truck Terminal 1	Rewa Road	22	Truck Terminal	8
3	Truck Terminal 2	Kanpur Road	12.4	Residential	8

S.No.	Proposed Facility	Location	Area (Ha.) Available as per Draft Master Plan, 2031	Proposed landuse	Area Required (Ha.)
4	Truck Terminal 3	Jhunsi	11	Truck Terminal	8
5	Warehouse 1	Naini	431	Industrial	3
6	Warehouse 2	Lucknow Road	27	Warehousing	3
7	Warehouse 3	Naini	431	Residential	3
8	Cold Storage 1	Lucknow Road	27	Industrial	2
9	Cold Storage 2	Ayodhya Road	18	Industrial	2
10	Cold Storage 3	Mundera Mandi	24	Mundera Mandi	2
11	Multimodal Logistic Park	Naini	93.5	Industrial	93.5
12	IWT Terminal	Naini	48	IWT Terminal	48
13	Inland Container Depot (ICD)/ Dry Port	Naini	19	Industrial	15
14	FTWZ/ SEZ	Naini	431	Industrial & Public Facilities	50
15	Industrial Park	Lucknow Road	160	Industrial	160
16	Truck Parking (Suberdarganj Railway Station)	Suberdarganj	3.5	Railway Land	3.5
17	Wholesale Market	Jhunsi	11	District Town Centre	11

The proposals and strategies can thus be concluded as follows:

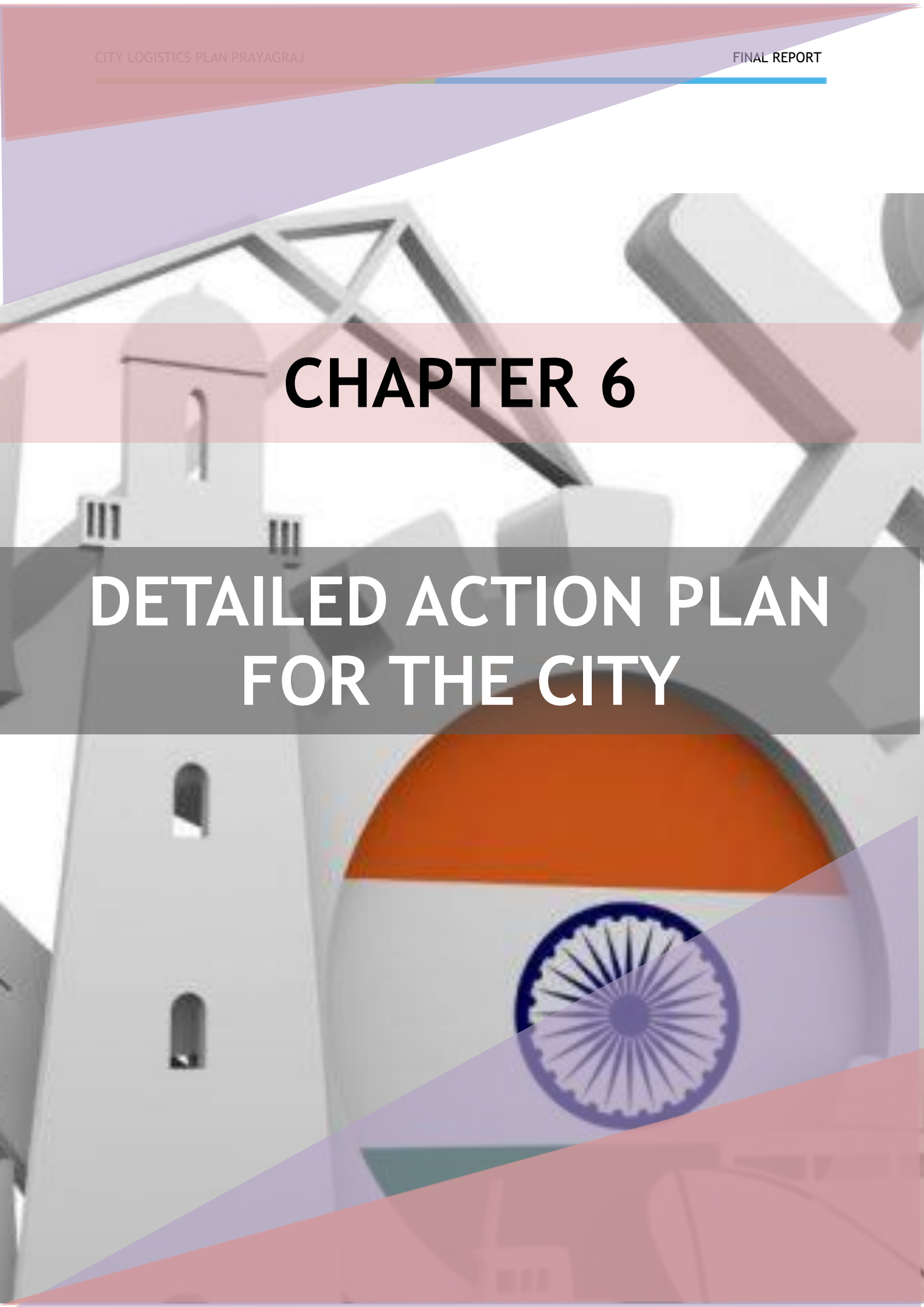
S.No.	Strategies	Proposal
1.	Network strategies	4. Proposal of widening of Outer Ring Road for City to 100m 5. Appropriate use of Ganga-Expressway 6. Proposal of widening of NH-35 to 75m
2.	Parking or Loading Strategies	3. Truck Terminals/ Transport Nagar 4. Truck Parking Area
3.	Location and zoning of land use	1. Cold Storages 2. Warehouses 3. Wholesale Market relocation and decongestion
4.	Licensing and Regulations	1. Night Time entry of freight vehicles 2. Traffic Restrictions for different vehicles in different areas.
5.	Pricing Strategies	1. Encourage & facilitate use of electric freight vehicles
6.	Terminals and Modal Interchange Facilities	1. MMLP 2. Inland Container Depot (ICD)/ Dry Port 3. IWT Terminal
7.	Traffic information Systems	1. Traffic Control & Management System 2. Smart Routing & Dispatch 3. Real Time Monitoring & tracking 4. Vehicle and freight location information 5. Traffic and infrastructure information
8.	Electric Vehicles for Goods	1. Urban E-freight studies 2. Ease in the registration process 3. Reducing Road Tax on electric freight vehicles 4. E-Charging facilities at Truck Terminals & Transport Nagar
9.	Electronic Toll Collection (ETC)	1. Upgradation to State of the art toll collection system such as GPS based toll collection system.

S.No.	Strategies	Proposal
10.	Logistics Information systems	<ol style="list-style-type: none"> 1. Warehouse operations and inventory information 2. Joint Delivery Platform 3. Delivery Space Booking System 4. Vehicle identity information 5. Shipment information
11.	Vehicle Technology Improvements	<ol style="list-style-type: none"> 1. Improvement of e-truck vehicles
12.	Voluntary Cooperation	<ol style="list-style-type: none"> 1. Increased awareness among RTO official for e-vehicles. 2. e-NWR (Electronic Negotiable Warehousing Receipt)- Loans to farmers, traders on goods in warehouses
13	Socio-Economic Development	<ol style="list-style-type: none"> 4. FEZ/ SEZ/ FTWZ 5. Industrial Park 6. Warehousing

The phase wise implementation plan for the above indicated proposals is discussed in Chapter 6 of this report.

CHAPTER 6

DETAILED ACTION PLAN FOR THE CITY



6. DETAILED ACTION PLAN FOR THE CITY

This chapter focuses on the detailed action plan section in light of the proposed freight-related vision, project, and strategy. We will go over the important steps in creating a comprehensive and successful action plan, including the development of specific objectives, the identification of resources, and a timeline for implementation. Additionally, key components of risk management and success measurement will be discussed, as well as suggestions and resources to aid in the development of successful action plans for freight-related projects.

6.1 PHASING AND IMPLEMENTATION FRAMEWORK

The Freight Mobility Projects in Prayagraj are an important infrastructure development project in larger picture of the country, and its successful implementation will provide a major boost to the cost-effective production and timely delivery of goods along with the Provision of the low emissions vehicle usage for the freight mobility. The table below provides the details of the different phases.

Table 6-1: Phasing Plan of various Proposals

S. No	Proposed Elements of CLP Lucknow	Freight Mobility Proposals/Measures	Unit	Proposal Quantity			
				Phase 1 (2027)	Phase 2 (2032)	Phase 3 (2042)	Total Proposal
1	Existing Road Improvements & and New Proposed Roads	Outer Ring Road Development	Km	22	22	22	66 kms
2	Improvements of Existing Terminals and Proposed New Freight Terminals	Multimodal Logistic Park	No.	0	1	0	1
		New Transport Nagar	No.	0	1	0	1
		Truck Terminal	No.	1	1	1	3
		Truck Parking (Suberdarganj Railway Station)	No.	1	0	0	1
		IWT Terminal	No.	1	0	0	1
		Warehouses	No.	1	1	1	3
		Cold Storage	No.	1	1	1	3
		Inland Container Depot (ICD)/ Dry Port	No.	0	1	0	1
		FTWZ/ SEZ	No.	0	1	0	1
		Industrial Park	No.	0	0	1	1
3	Freight ITS Infrastructure	Wholesale Market	No.	0	0	1	1
		Integrated Freight Management System	No.	1	1	0	2
		Joint Delivery Platform	-	1	1	1	3
4	Low Emission Zone	Delivery Space Booking System	-	1	1	0	2
		LEZ in the Core Area	-	1	1	0	2

The various cargo facilities and mandis to be developed in various phases is as follows:

Table 6-2: Development of Various Facilities in Phases

	Short Term Solutions (Till 2027)	Medium Term Solutions (Till 2032)	Long Term Solutions (Till 2042)
	Phase 1	Phase 2	Phase 3
Administrative approvals & acquisition of land	<ol style="list-style-type: none"> List of approved projects Land requirement estimation, location finalisation, design & approval of facility and source of funding Cost Estimation- Activity Wise Acquisition of Land 		
Inter City Freight Movement	<ol style="list-style-type: none"> IWT Terminal (Naini) Outer Ring Road development Warehouse (Mirzapur Road) Cold Storage (Mundera Mandi) Upgradation of infrastructure facilities for Mundera Mandi Truck Terminal (Kanpur Road) 	<ol style="list-style-type: none"> Transport Nagar (Village Bhawapur) Multi-Modal Logistics Park (Naini) Outer Ring Road development Cold Storage (Lucknow Road) Inland Container Depot (ICD)/ Dry Port (Naini) FEZ/ SEZ (Masika) Warehouse (Mirzapur Road) Truck Terminal (Rewa Road) 	<ol style="list-style-type: none"> Truck Terminal (Jhunsi) Warehouse (Lucknow Road) Industrial Park (Fareedpur) Outer Ring Road development Cold Storage (Rewa Road)
Intra City Freight Movement	<ol style="list-style-type: none"> Traffic Regulation and control like Joint Delivery Platform, Delivery Space Booking System and Integrated Freight Management System Truck Parking (Suberdarganj Railway Station) 	<ol style="list-style-type: none"> LEZ in the Core Area 	<ol style="list-style-type: none"> Wholesale Market

6.2 ESTIMATED COST

The estimated cost of the proposed developments is given in Table 6-3 below. A total investment of Rs. 3,615.66 Crore is estimated for development of the identified proposals, of which 16.60% is proposed under Phase 1, 68.20% in Phase 2 and the remaining 15.20% in Phase 3.

Table 6-3: Estimated Cost of Proposed Development

S.	Proposed Freight Mobility Proposals No Elements of CLP Prayagraj	Total Unit Proposal Rate (in Rs. Cr.)	Proposal Cost (in Rs. Cr.)				Total Proposal Cost
			Phase 1 (2027)	Phase 2 (2032)	Phase 3 (2042)	Total	
1	Existing Road Improvements & and New Proposed Roads Outer Ring Road	66 km 14 cr. Per km	308	308	308	924	

S. No	Proposed Elements of CLP Prayagraj	Freight Mobility Proposals	Total Proposal	Unit Rate	Proposal Cost (in Rs. Cr.)			
					(in Rs. Cr.)	Phase 1 (2027)	Phase 2 (2032)	Phase 3 (2042)
2	Proposed Freight Facilities	Multimodal Logistic Park	1	1500	0	1500	0	1500
		Transport Nagar	1	20	0	20	0	20
		Truck Terminal	3	30.72	30.72	30.72	30.72	92.16
		Truck Parking (Suberdarganj Railway Station)	1	10	10	0	0	10
		IWT Terminal ⁸	1	200	200	0	0	200
		Warehouses	3	15	15	15	15	45
		Cold Storage	3	30	30	30	30	90
		Inland Container Depot (ICD)/ Dry Port	1	50	0	50	0	50
		FTWZ/ SEZ ⁹	1	500	0	500	0	500
		Industrial Park	1	130	0	0	130	130
		Wholesale Market	1	30	0	0	30	30
3	Freight ITS Infrastructure	Integrated Freight Management System	2	5	5	5	0	10
		Joint Delivery Platform	3	0.5	0.5	0.5	0.5	1.5
		Delivery Space Booking System	2	0.5	0.5	0.5	0	1
4	Low Emission Zone	LEZ in the Core Area	2	6	0	6	6	12
Grand Total					599.72	2465.72	550.22	3615.66

*Excluding land acquisition cost

Further, the distribution of expenditure under various activities indicates that 16.60% of the investment is in Road Development, 68.20% in freight facilities development and 15.20% in ITS and Low emission zones (refer Figure 6-1).

Proposals Cost Distribution

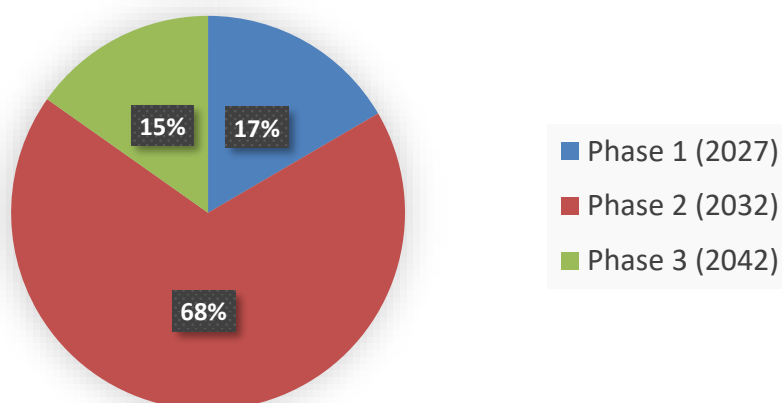


Figure 6-1: Proposals Cost Distribution

⁸ Cost taken similar to IWT Terminal of Varanasi

⁹ Costing on basis on minimum investment required as per Special Economic Zones Act, 2005

6.3 FUNDING MECHANISM

The Prayagraj hosts a large number of small and medium scale industries that manufacture a wide variety of products including electrical goods, chemicals and furniture. Prayagraj is also home to storage plants for IOCL, Adani Wilmar, SAIL etc. The city is an important centre for the production of agricultural products and transit centre for freight traffic in the region.

Prayagraj has been facing challenges related to freight transportation due to inadequate transport infrastructure and lack of access to resources. The inadequate road, rail and other freight transportation networks and freight facilities such as terminal and storage in the city have resulted in high transportation costs and delays, which lacks to provide the supportive environment to the development of freight and logistics businesses. To address these issues, and to support the local authorities in identifying different source of funding to implement such provision which will strengthen, improve and expand freight transportation network. Such potential sources are outlined in the following sections.

The Government of Uttar Pradesh supports the implementation, operation and maintenance of freight transport assets through various programs and missions, aiming to enhance freight transport operations in Prayagraj. These programs and missions are specially designed to promote the cost efficient and to provide the supportive environment for the smoother operation of urban freight mobility. Along with this other National Level Initiatives are expected to significantly increase the efficiency and reliability of freight transport operations in the city, thereby contributing to the overall economy are listed here as:

Table 6-4: Front End Incentives by State Government to Develop Logistic Park¹⁰

Head	Incentives
Stamp Duty exemption	Exemption of Stamp Duty shall be provided on land purchased or taken on lease (for a period of at least 10years) at the rate of 100% for setting up Logistics Park anywhere in the State. The Exemption shall be provided on submission of Bank Guarantee of equivalent amount of the exemption to Stamp & Registration Department, which shall be released on commencement of commercial operations within the admissible period.
Concession of Land use conversion charges	75% of the Land use conversion charges shall be waived off. The Concession shall be provided on submission of Bank Guarantee of equivalent amount of the concession to the relevant State Authority/ Agency, which shall be released on commencement of commercial operations within the admissible period.
Exemption in Development Charges	75% of the Development Charges shall be exempted. The Exemption shall be provided on submission of Bank Guarantee of equivalent amount of the exemption to the relevant State Authority/ Agency, which shall be released on commencement of commercial operations within the admissible period.
Ground Coverage	A Logistics Park project will be allowed overall Ground Coverage of 60% subject to setback and fire safety and other FSI regulations.

¹⁰Uttar Pradesh Warehousing and Logistics Policy 2022

- **Public-private partnerships (PPP):** Indian cities can leverage PPP models to fund urban freight logistics infrastructure and services. This involves partnerships between the government and private entities to finance, build, and operate logistics infrastructure.
- **Grants and Subsidies:** The grants and subsidies provided by the policy aim to support the development of logistics infrastructure and foster creative solutions for efficient operations. The grants will be issued to support investments in last-mile delivery capabilities, such as delivery robots, drones, and autonomous vehicles, as well as developing cold chain facilities to ensure the safe storage and transportation of temperature-sensitive goods. The subsidies will provide financial assistance to expand warehouses and upgrade technology in order to deliver goods more quickly and efficiently. In addition, the policy encourages the research and development of advanced technologies related to the logistics sector.
- **Ministry of Road Transport and Highways (MoRTH):** MoRTH provides grants and subsidies to support the development of truck terminals, freight villages, and logistic parks in India.
- **Ministry of Micro, Small and Medium Enterprises (MSME):** The MSME Ministry provides subsidies to micro, small, and medium enterprises (MSMEs) to support the development of their logistics infrastructure and services
- **National Cooperative Development Corporation (NCDC):** NCDC provides subsidies and financing to support the development of cooperatives involved in logistics and warehousing activities.
- **Ministry of Food Processing Industries (MoFPI):** MoFPI provides subsidies to support the development of food processing units, cold chain facilities, and logistics infrastructure in India.
- **National Bank for Agriculture and Rural Development (NABARD):** NABARD provides subsidies and financing to support the development of rural logistics infrastructure and services, including cold chain facilities and warehouses.

Other measures include:

- **Corporate social responsibility (CSR) initiatives:** This measure recognizes the role that companies can play in supporting the development of the logistics sector through their CSR initiatives.
- **User fees:** This suggests the imposition of user fees on logistics providers to fund logistics infrastructure and services, such as road maintenance and the development of truck terminals.
- **Innovative financing:** This policy proposes the use of innovative financing mechanisms, such as green bonds and impact investing, to support the development of the logistics sector in India

6.4 INSTITUTIONAL FRAMEWORK

To ensure that urban freight and logistics planning is effective and efficient, it is important to clearly define the roles and responsibilities of the different stakeholders involved in order to eliminate any ambiguity. This will also ensure that there is no duplication of efforts and resources are used in an optimal way. Furthermore, coordination between agencies should be improved to ensure that all activities are integrated with each other. This will help to create a harmonious balance between the various aspects of urban transport and provide for a much more efficient system for freight and logistics. All decisions relating to this should be taken after consulting with all the relevant stakeholders, such as planners, regulators, operators, and users.

Finally, a single institution should be established that has the responsibility of ultimately guiding the urban freight and logistics planning of the city, so that all the stakeholders can work in unison to achieve the ultimate goal of providing an efficient urban transport system.

In terms of institutional setup framework, at the city level, City Logistics Cells (CLCs) is recommended to be established that will be headed by the Mayor/equivalent or his/her nominee and will include members from the local governments, logistics providers, and other stakeholders. These bodies will be responsible for developing strategies to improve logistics efficiency and supply chain management in their respective areas.

The City Logistics Cell (CLC) setup would involve setting up a body comprising members from the local bodies, logistics providers, and other relevant stakeholders such as freight operators, cargo owners, automotive manufacturers, transport associations, financial institutions etc. This body would be headed by the Prayagraj Mayor or his/her nominee. The CLC would then work towards improving collaboration between stakeholders to reduce costs and delays associated with freight movement within Prayagraj and facilitate implementation of innovative mobility solutions and data-driven decision-making in urban freight planning. Figure 6-2 defines various benefits of the proposed unified body for Freight mobility management.

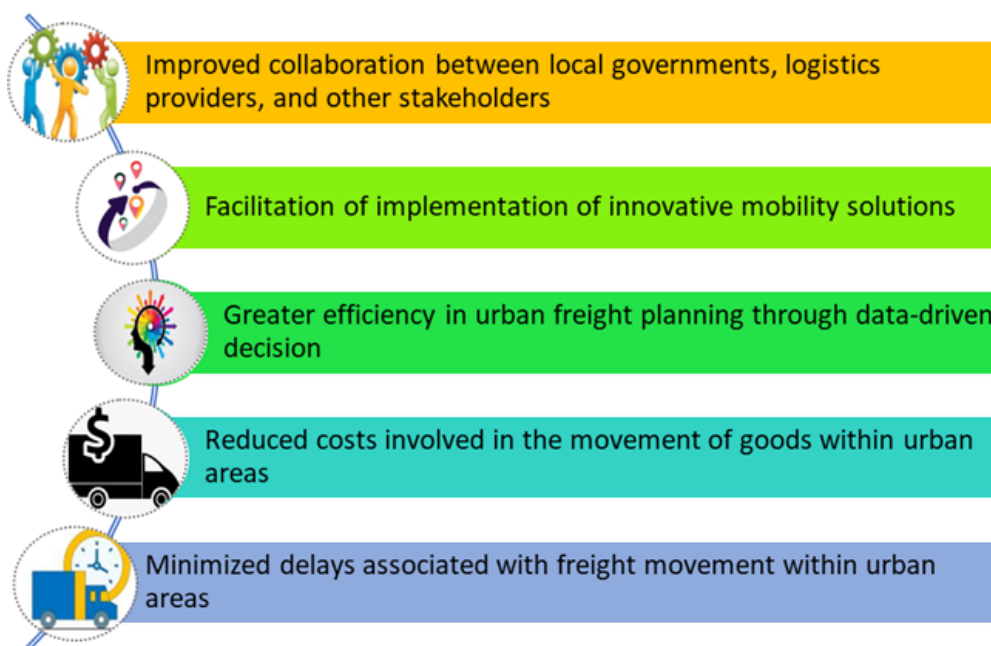


Figure 6-2 : Benefits of Setting up City Logistic Cell

Primary function of the setting of the Unified Body as “CLC” for urban Freight management will be the coordination amongst the local bodies at city level. Proposed unified body shall be functioning the task for Planning and implementation of projects related with urban freight mobility. Also, such an institution will be acting as the leading agency to demonstrate and decision making for the improvements and addressing existing issue for the urban freight management. Formulation of various strategies and reduction of delays for the efficient movement of goods with in development area boundary. List below provides an overview of the responsibilities of the CLC:

1. **Freight transportation:** It functions to help plan and implement efficient transportation networks for the delivery of goods and materials, including both public and private transportation systems.
2. **Sustainable logistics:** Main aim will be to reduce the environmental impact of freight transportation, including reducing emissions and reducing energy consumption.
3. **Warehouse management:** It may be responsible for managing public warehouses and distribution centres within the city.
4. **Public-private partnerships:** The CLC will collaborate with private companies to improve logistics operations in the city, including improving delivery times and reducing costs.
5. **Data analysis:** The City Logistics Cell may use data analysis tools and techniques to identify areas for improvement in the logistics system and to measure the effectiveness of logistics operations.
6. **Emergency response:** The City Logistics Cell may play a role in coordinating logistics activities in response to natural disasters or other emergencies.

6.5 KEY STAKEHOLDERS

The key stakeholder authorities involved in various aspects of logistics infrastructure development in Prayagraj are:

1. Logistics Infrastructure Development Authorities:
 - Prayagraj Development Authority (PDA)
 - Nagar Nigam (Municipal Corporation)
 - Uttar Pradesh State Warehousing Corporation
 - Mundera Mandi
 - Prayagraj Smart City Limited (PSCL)
 - Jal Nigam (Water & Sanitation Department)
 - Irrigation Department/ Ganga Pollution Control Unit (GPCU)
2. Road Infrastructure Development Authorities:
 - National Highways Authority of India (NHAI)
 - Public Works Department (PWD)
 - Uttar Pradesh State Highways Authority
3. Rail Infrastructure Development Authorities:
 - Indian Railways
 - Dedicated Freight Corridor Corporation of India Limited (DFCCIL)
4. Industrial Development Authorities:
 - Uttar Pradesh State Industrial Development Authority (UPSIDA)
 - District Industrial Centre
5. Licensing Authorities:

- Uttar Pradesh Pollution Control Board
 - Town and Country Planning Department
 - Regional Transport Office (RTO)
6. Air and Water Infrastructure Development Authorities:
- Inland Waterways Authority of India (IWAI)
 - Airports Authority of India (AAI)
7. Regulatory Authorities:
- Traffic Police
 - Regional Transport Office (RTO)
8. Other stakeholders:
- State Goods and Services Tax (SGST)/Central Goods and Services Tax (CGST) Department
 - Labour Commissioner Office
 - Uttar Pradesh State Industries Association (UPSIA)

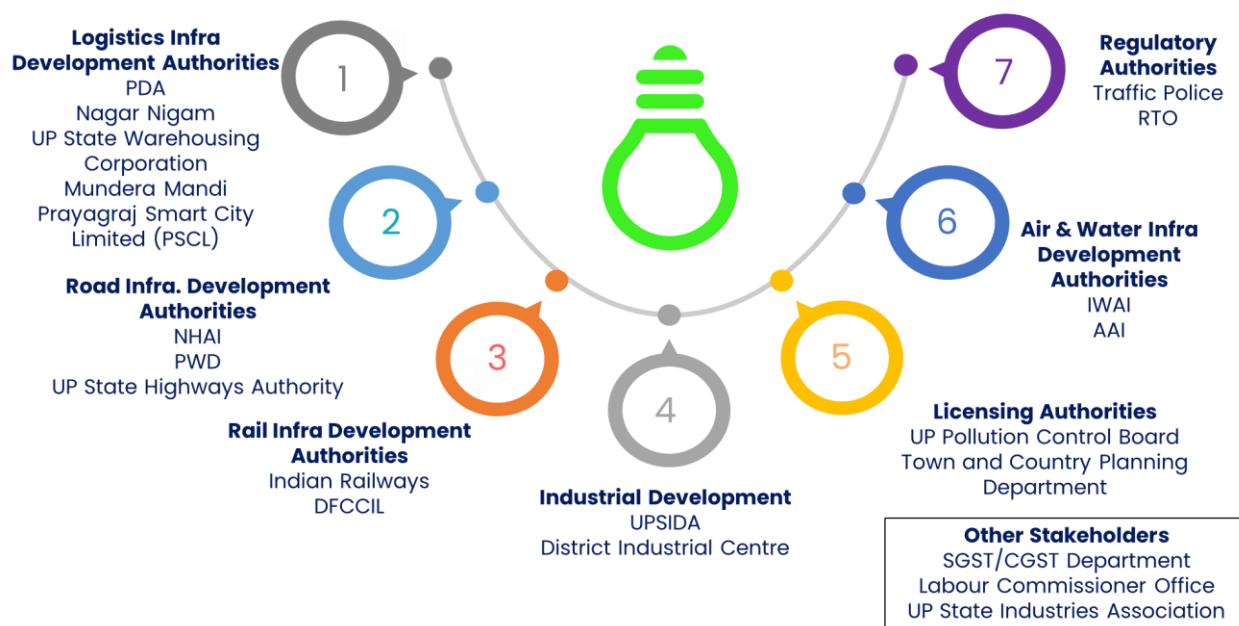


Figure 6-3: Key Stakeholders



CHAPTER 7

CONCLUSIONS & RECOMMENDATIONS

7. CONCLUSIONS AND RECOMMENDATIONS

Prayagraj faces a number of challenges in urban freight and logistics. To address these challenges and optimize freight movement, a City Logistic Plan of Prayagraj has been prepared. The plan includes network strategies, freight terminal facilities, truck routing and time restrictions, provisions of intelligent transportation systems (ITS) and technology trends, supply chain optimization, loading/unloading management, freight vehicle parking management measures, and collaborative delivery measures.

CLP aims to promote sustainable urban freight transport by reducing trips, shifting to multimodal transport options, and adopting electric freight mobility. By 2042, the total freight traffic is projected to reach 1.21 lakh tonnes, and the plan sets targets for reducing trips, shifting to more efficient vehicles, and reducing empty trips.

Proposed facilities include Transport Nagar, truck terminals, warehouses, cold storages, multimodal logistic parks and truck parking. The plan also takes into consideration the construction of an Outer Ring Road, Ganga Expressway, widening of NH-35, and creation of new road networks to handle through traffic and internal city traffic.

A. LOGISTICS INFRASTRUCTURE PROPOSALS:

1. Mega-Warehouses:

- The proposal includes the construction of 3 large-scale warehouses.
- The estimated investment required for this project is 45 crore rupees.
- These warehouses will be equipped with advanced storage and handling capabilities to meet the growing demand for storage and distribution facilities.

2. Cold Storage Facilities:

- The plan involves establishing 3 cold storage facilities.
- The estimated investment for this initiative is 90 crore rupees.
- These specialized storage facilities will have controlled temperature and humidity settings to preserve perishable goods, catering to the needs of cold chain logistics.

3. Transport Nagar:

- The proposal includes the development of a single transport hub.
- The estimated investment required for this project is 20 crore rupees.
- This dedicated location will provide necessary infrastructure and facilities to support the efficient movement of goods and offer services for transport operators.

4. Truck Terminal:

- The plan entails the construction of 3 truck terminals.
- The estimated investment for this initiative is 92.16 crore rupees.
- These terminals will feature amenities and services for truck drivers, including parking spaces, rest areas, fuel stations, and repair facilities, enhancing logistics operations and driver welfare.

5. Multimodal Logistics Park (MMLP):

- The proposal involves establishing a single MMLP.
- The estimated investment required for this project is 1500 crore rupees.
- This park will serve as a hub for various transportation modes, enabling efficient intermodal logistics operations and promoting seamless connectivity.

6. Truck Parking:

- The plan includes the development of a single truck parking facility.

- The estimated investment for this initiative is 10 crore rupees.
 - This dedicated parking area will provide secure and organized parking spaces for trucks, addressing the need for proper parking infrastructure.
- 7. Widening of Outer Ring Road & Other Road Improvements:**
- The proposal involves widening the Outer Ring Road and making other road improvements.
 - The project aims to increase the road width from 60m to 100m.
 - The estimated investment required for this is 924 crore rupees.
 - These road enhancements will enhance transportation efficiency, reduce congestion, and improve connectivity within the logistics network.

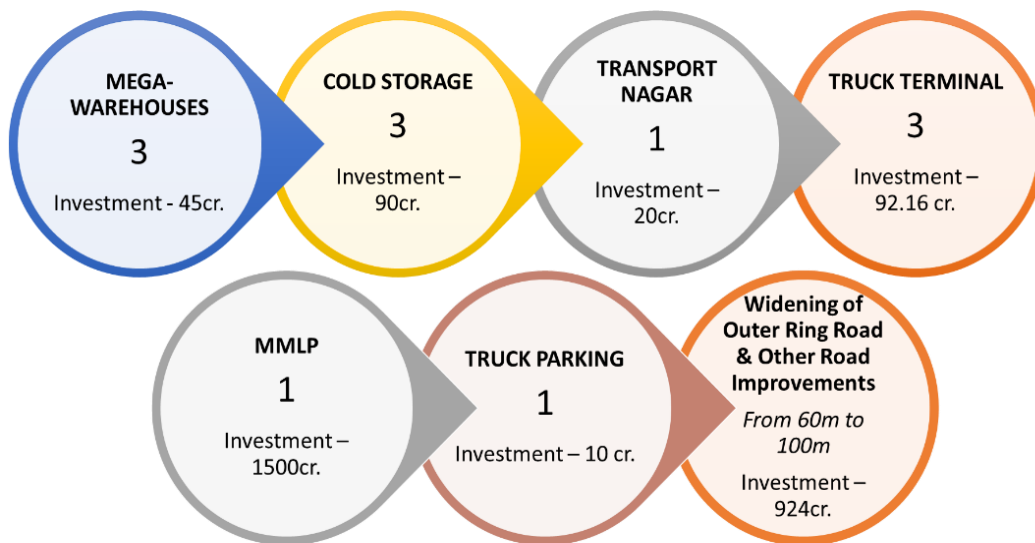


Figure 7-1: Logistics Infrastructure Proposals

B. ECONOMIC INFRA. DEVELOPMENT PROPOSALS:

1. Inland Container Depot (ICD) or Dry Port:

- Estimated investment of 50 crore rupees.
- Establishing a dedicated facility for the handling and storage of containers, improving logistics efficiency and facilitating international trade.

2. Free Trade and Warehousing Zone (FTWZ) or Special Economic Zone (SEZ):

- Estimated investment of 500 crore rupees.
- Creating a designated area that offers tax incentives and streamlined procedures for businesses involved in international trade and warehousing activities.

3. Industrial Park:

- Estimated investment of 130 crore rupees.
- Developing an area specifically designed to attract and accommodate industrial activities, promoting economic growth and job creation.

4. Wholesale Market:

- Estimated investment of 30 crore rupees.
- Establishing a centralized marketplace for bulk trading of goods, facilitating efficient distribution and reducing transaction costs for businesses.

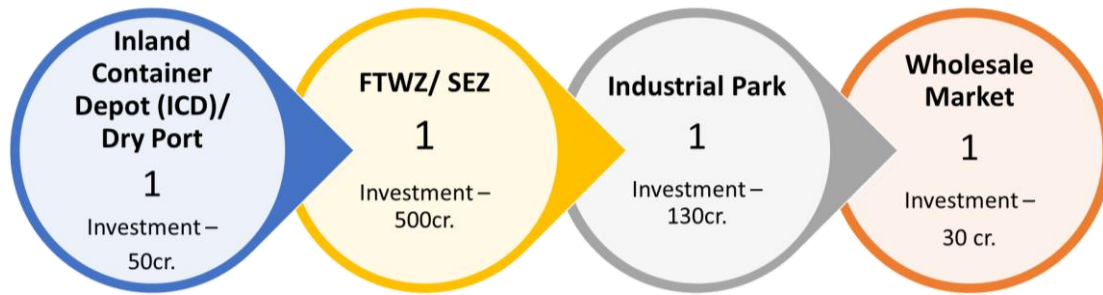


Figure 7-2: Economic Infra. Development Proposals

C. ITS & REGULATORY PROPOSALS

1. Integrated Freight Management System:

- The estimated investment required for this project is 5 crore rupees.
- This system will streamline and optimize the management of freight operations, improving efficiency and coordination within the logistics network.

2. Joint Delivery Platform:

- The estimated investment for this initiative is 0.5 crore rupees.
- This platform will facilitate collaboration and information sharing among stakeholders involved in the delivery process, enhancing coordination and reducing delays.

3. Delivery Space Booking System:

- The estimated investment required for this project is 0.5 crore rupees.
- This system will enable efficient booking and utilization of delivery spaces, optimizing resource allocation and reducing congestion in delivery areas.

4. Low Emission Zone (LEZ) in the Core Area:

- The estimated investment for this initiative is 6 crore rupees.
- This zone will enforce regulations to restrict or reduce emissions from vehicles, improving air quality and promoting sustainable transportation practices.

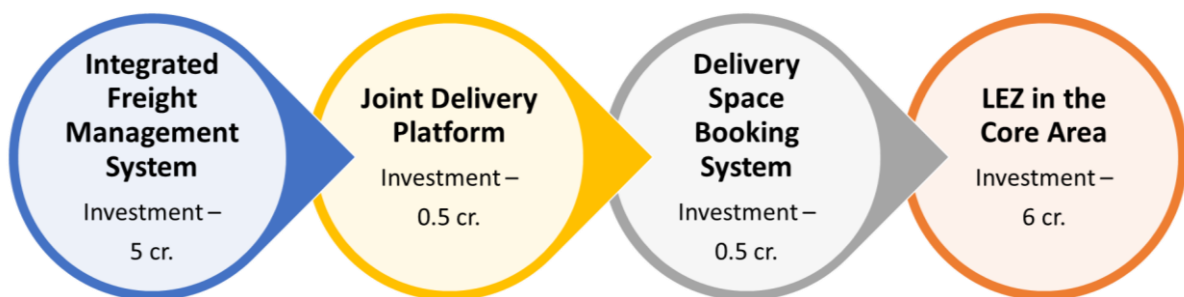


Figure 7-3: ITS & Regulatory Proposals

Overall, the proposed strategies and projects aim to improve efficiency, sustainability and management of urban freight transport in Prayagraj, thereby reducing congestion, air pollution, and other negative impacts on the city's transportation system.

7.1 PROJECTS & ESTIMATED COST

The proposed projects are summarized below along with their estimated costs:

S. No	Proposed Elements of CLP Prayagraj	Freight Mobility Proposals	Total Proposal	Unit Rate (in Rs. Cr.)	Estimated Cost (in Rs. Cr.)	Administrative/ Funding Agency	
1	Existing Road Improvements & New Proposed Roads	Outer Ring Road	66 km	14 cr. Per km	924	NHAI	
2	Proposed Freight Facilities	Multimodal Logistic Park	1	1500	1500	NHIDCL	
		Transport Nagar	1	20	20	PDA	
		Truck Terminal	3	30.72	92.16	PDA	
		Truck Parking (Suberdarganj Railway Station)	1	10	10	Railways	
		IWT Terminal	1	200	200	IWAI	
		Warehouses	3	15	45	UPSWC/ CWC/ PDA/ Private Agencies	
		Cold Storage	3	30	90	UPSWC/ CWC/ PDA/ Private Agencies	
		Inland Container Depot (ICD)/ Dry Port	1	50	50	Railways/ NHIDCL/ UPSIDA	
		FTWZ/ SEZ	1	500	500	UPSIDA/ NHIDCL	
3	Freight Infrastructure	Industrial Park	1	130	130	PDA/ UPSIDA	
		Wholesale Market	1	30	30	PDA/ Nagar Nigam/ Private Agencies	
		ITS	Integrated Freight Management System	2	5	10	Uttar Pradesh State Government (Policy Decision)
			Joint Delivery Platform	3	0.5	1.5	
Delivery Space Booking System	2		0.5	1			
4	Low Emission Zone	LEZ in the Core Area	2	6	12	RTO/ Traffic Police	
Grand Total					3615.66		
Projects to be implemented by PDA			12	407.16 cr.			

The image features a background of a grayscale aerial photograph showing a city's street grid and building footprints. A prominent dark grey horizontal band is centered across the image, containing the word 'ANNEXURES' in white, bold, uppercase letters. The top and bottom corners of the image are partially covered by semi-transparent, overlapping colored shapes: a purple shape in the top-left and bottom-right, and a reddish-brown shape in the top-right and bottom-left.

ANNEXURES

ANNEXURE 1-1

LIST OF TAZ'S

	S.NO.	TAZ Name	Code
ITAZ	1	Intra Study Area TAZ	1-300
	2	Agra	301
ETAZ UP Districts	3	Aligarh	302
	4	Allahabad	303
	5	Ambedkar Nagar	304
	6	Amethi	305
	7	Amroha	306
	8	Auraiya	307
	9	Azamgarh	308
	10	Baghpat	309
	11	Bahraich	310
	12	Ballia	311
	13	Balrampur	312
	14	Banda	313
	15	Barabanki	314
	16	Bareilly	315
	17	Basti	316
	18	Bijnor	317
	19	Budaun	318
	20	Bulandshahr	319
	21	Chandauli (Excluding Mughalsarai Tehsil)	320
	22	Chitrakoot	321
	23	Deoria	322
	24	Etah	323
	25	Etawah	324
	26	Faizabad	325
	27	Farrukhabad	326
	28	Fatehpur	327
	29	Firozabad	328
	30	Gautam Buddha Nagar	329
	31	Ghaziabad	330
	32	Ghazipur	331
	33	Gonda	332
	34	Gorakhpur	333
	35	Hamirpur	334
	36	Hardoi	335
	37	Hathras (Mahamaya Nagar)	336
	38	Jalaun	337
	39	Jaunpur	338

S.NO.	TAZ Name	Code	
40	Jhansi	339	
41	Jyotiba Phule Nagar	340	
42	Kannauj	341	
43	Kanpur Dehat (Ramabai Nagar)	342	
44	Kanpur Nagar	343	
45	Kanshiram Nagar	344	
46	Kaushambi	345	
47	Kheri	346	
48	Kushinagar	347	
49	Lalitpur	348	
50	Lucknow	349	
51	Maharajganj	350	
52	Mahoba	351	
53	Mainpuri	352	
54	Mathura	353	
55	Mau	354	
56	Meerut	355	
57	Mirzapur	356	
58	Moradabad	357	
59	Muzaffarnagar	358	
60	Panchsheel Nagar district (Hapur)	359	
61	Pilibhit	360	
62	Pratapgarh	361	
63	Raebareli	362	
64	Rampur	363	
65	Saharanpur	364	
66	Sant Kabir Nagar	365	
67	Sant Ravidas Nagar	366	
68	Shahjahanpur	367	
69	Shamli	368	
70	Shravasti	369	
71	Siddharthnagar	370	
72	Sitapur	371	
73	Sonbhadra	372	
74	Sultanpur	373	
75	Unnao	374	
76	Varanasi (Excluding Sadar Tehsil)	375	
ETAZ Rest of India	77	Andhra Pradesh	401
	78	Arunachal Pradesh	402
	79	Assam	403
	80	Bihar	404
	81	Chhattisgarh	405
	82	Goa	406

S.NO.	TAZ Name	Code
83	Gujarat	407
84	Haryana	408
85	Himachal Pradesh	409
86	Jharkhand	410
87	Karnataka	411
88	Kerala	412
89	Madhya Pradesh	413
90	Maharashtra	414
91	Manipur	415
92	Meghalaya	416
93	Mizoram	417
94	Nagaland	418
95	Odisha	419
96	Punjab	420
97	Rajasthan	421
98	Sikkim	422
99	Tamil Nadu	423
100	Telangana	424
101	Tripura	425
102	Uttarakhand	426
103	West Bengal	427
104	Andaman and Nicobar Islands	428
105	Chandigarh	429
106	Dadra Nagar Haveli and Daman Diu	430
107	Delhi	431
108	Jammu and Kashmir	432
109	Ladakh	433
110	Lakshadweep	434
111	Puducherry	435

ANNEXURE 1-2

GROUP OF COMMODITIES

CODE	NAME
1	RICE (ALL TYPES)
2	WHEAT AND WHEAT FLOUR
3	OTHER FOOD GRAINS
4	GRAMS & PULSES
5	SUGAR AND KHANDSARI
6	SUGAR CANE
7	OIL SEEDS (ALL TYPES)
8	COTTON (RAW & MANUFACTURED)
9	JUTE AND COIR (RAW & MANUFACTURED)
10	RUBBER (RAW & PRODUCTS)
11	FODDER
12	FRUITS AND VEGETABLES
13	TEA AND COFFEE
14	TOBACCO & TOBACCO PRODUCTS
15	WOOD, TIMBER, PLYWOOD, ETC.
16	IRON ORE
17	ORES OTHER THAN IRON
18	COAL
19	POL PRODUCTS (LIQUID)
20	COALTAR AND BITUMEN
21	LIMESTONE & DOLOMITE
22	SALT
23	GRANITE, MARBLES & OTHER SPECIFIED STONES
24	CEMENT AND CEMENT STRUCTURES
25	BLDG.MATRL (BRICKS, EARTH, SAND, STONE, STONE CHIPS, ETC.)
26	CHEMICAL MANURES & FERTILISERS
27	IRON & STEEL (ALL TYPES)
28	METALS OTHER THAN IRON AND STEEL
29	EDIBLE OILS
30	CHEMICALS (POWDER AND LIQUID ALL TYPES)
31	PAINTS & DYES
32	ELECTRICAL GOODS (INCL. ELECTRICAL WIRES)
33	CLOTHS & CLOTH MANUFACTURED
34	LEATHER & GOODS (INCL. BONES)
35	GAS CYLINDER - ALL TYPES (FILLED & EMPTY)
36	PAPER & PAPER PRODUCTS
37	PLASTIC & PLASTIC GOODS
38	CAR, VANS, ETC.

39	CYCLE & CYCLE PARTS
40	HEAVY MACHINERY, TRACTORS, ETC. (INCL. AGR. EQUIP.)
41	THREE WHEELERS
42	TWO WHEELERS
43	TYRE AND TUBES
44	SPARE PARTS (ALL TYPES)
45	EMPTY TINS, BOTTELS, DRUMS, ETC.
46	PROVISIONS & HOUSEHOLD GOODS
47	CONTAINERS (LOADED & EMPTY)
48	FISH/EGG/MEAT
49	LIVESTOCK
50	MILK & PRODUCTS
51	SCRAP (ALL METALS)
52	PARCELS, MISC, OTHERS, ETC.

ANNEXURE-4.1

PRIMARY DATA ANALYSIS (FROM INTERIM REPORT)

This section gives an account of the primary surveys conducted in the study area and the detailed analysis of each survey conducted for the preparation of city logistics plan of Prayagraj city. The primary survey and its data collection is the most important and fundamental stage to formulate the initial structure of any type of transport planning project. This section deals with data collection of various study parameters & its assessment within the study area such as traffic characteristics of freight vehicles at outer cordon & screen lines/ mid-block section and TMC which has been conducted to record the turning movement at the junctions.

The travel patterns of freight transport commodity wise shall be the guiding principles in determining the system's need and its growth. The data shall also be used to develop the urban freight transport demand model of the study area.

Along with these and other supporting surveys carried out to meet the above objectives.

Table: List & Quantity of Primary Surveys

S.No.	Particulars of Survey	Unit	Number	Duration of Survey (hours)
1	Classified Volume Counts at Cordon Locations	Location	8	24
2	Road Side Interview at Cordon Locations	Location	8	16
3	Truck Driver Survey (9 Locations)	Sample	400	16
4	Establishment Survey (14 Locations)	Sample	525	16
5	Operator Survey (8 Locations)	Sample	200	16
6	Parking Survey (Off-street/On-street (km))	Location	13	24
7	Terminal Survey (Volume in/ Out)	Location	3	16
8	Classified Volume Count Surveys at Screen Line/ Mid-Blocks Locations	Location	4	24

Source: UMTC

All the surveys mentioned above were conducted on the normal days when markets are open avoiding public holidays.

TRAFFIC CHARACTERISTICS

Objective of Survey: Surveys were conducted at critical identified locations within the city.

Scope of Survey: Counting of goods vehicles, classified by the type of vehicle, at selected outer cordon locations.

Conduct: Video graphic traffic counts were carried out at each identified location, both directional mode wise goods vehicle counts were recorded. As this study shall only be focussed on freight traffic, so different modes used for the freight carriage is considered in the further analysis. The vehicles counted were converted to Passenger Car Units (PCU) by adopting equivalent PCUs. The PCUs corresponding to urban roads as per IRC: 106-1990 is used and the values adopted are given in Table.

Table: PCU values for different categories of vehicles

Vehicle Type	PCU Values	
	Urban	
	Up to 5%	> 5%
Bus	2.2	3.7
Car/Jeep/Van/Taxi	1	1
Two-Wheeler	0.5	0.75
E-Rickshaw	1.2	2
Auto-Rickshaw	1.2	2
Truck	2.2	3.7

MAV	4	5
LCV	1.4	2
Cycle	0.4	0.5
Tractor	4	5
Cart	2	3
Cycle Rickshaw	1.5	2

Source: IRC:106-1990

TRAFFIC VOLUMES AT OUTER CORDONS

OBJECTIVE

- To evaluate the total volume of freight traffic coming inside and going outside from the study area.

METHOD

- Traffic counts were carried out on a typical working day for 24 hours per day covering both peak and off-peak periods using videographic surveys.
- At each identified station, both directional counts will be carried out for freight vehicle type, i.e. Goods Three Wheeler, LCV, Mini LCV, 2Axle, 3Axle, MAV's, tractors and other Goods carriages are included.

OUTPUT

- Traffic volume by vehicle type.
- Hourly distribution of traffic.

Traffic volume count survey for the freight traffic carried out at the outer codon location of the study area.

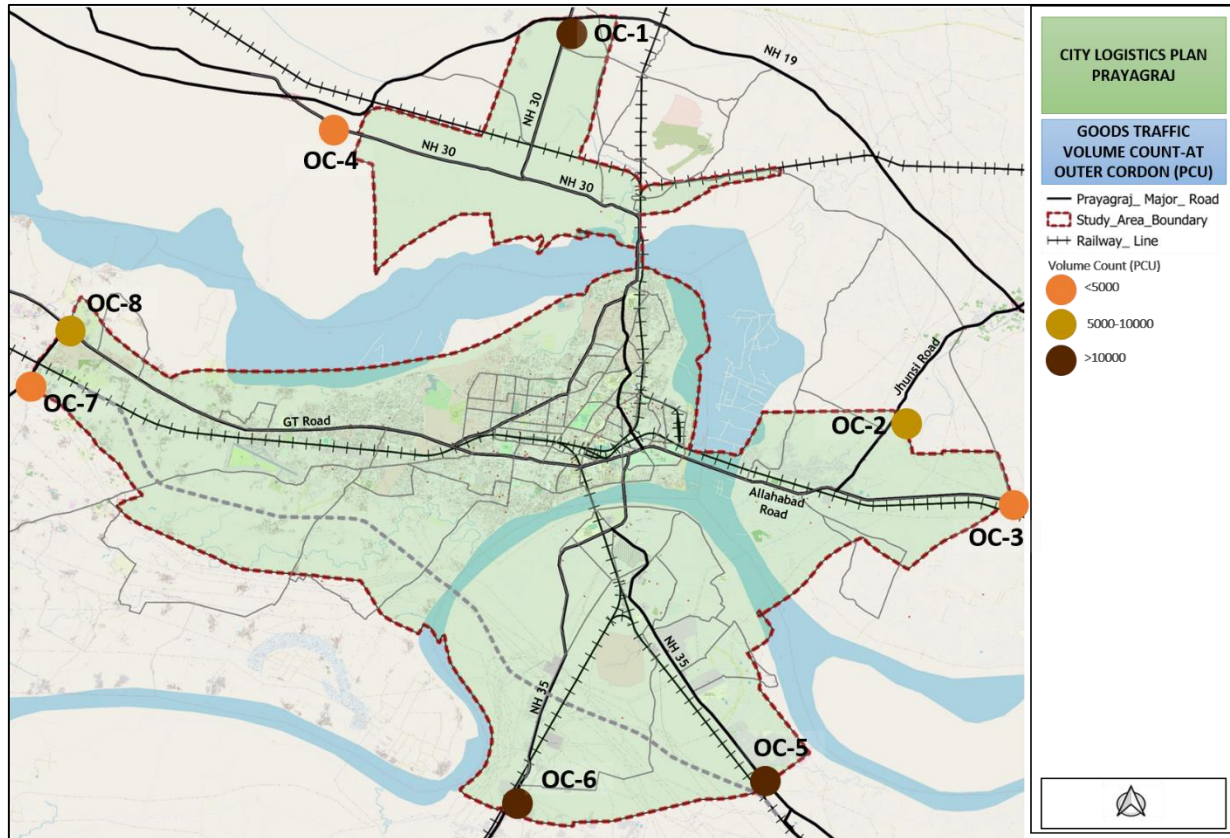
To understand the total freight traffic coming in and going out of the study area, eight major entry-exit points (refer Figure) were identified and traffic count survey was conducted through videographic method. The analysis of the classified volume count survey at the cordons is given in the ensuing sub-sections. The total inbound and outbound traffic flow at each of the cordons is presented in **Table**.

Table: Traffic Volume at Outer Cordons - Freight Vehicles

Locations	Direction	Vehicles	PCUs	Total Freight Vehicles per day	Total PCU per day	Peak Hour	PCU (Peak Hour)
OC-1 Ayodhya Road (Holagarh Road)	Mau Aima to Diha	1636	4859	3384	10282	05:00-06:00	943
	Diha to Mau Aima	1748	5423				
OC-2 Phoolpur Road	Phulpur to Sahson	1561	4091	3023	7854	02:00-03:00	643
	Sahson to Phulpur	1462	3763				
OC-3 Prayagraj Bypass (Toll Road)	Prayagraj to Banaras	219	639	601	1804	03:00-04:00	120
	Banaras to Prayagraj	382	1165				
OC-4 Lucknow Prayagraj (NH 30)	Prayagraj to Lucknow	1910	5900	3921	11969	03:00-04:00	575
	Lucknow to Prayagraj	2011	6069				
OC-5 Prayagraj Kuwarpatti Road (Near Rampur Tiraha)	Naini Chowk to Rampur Tiraha	2056	6155	4238	12685	01:00-02:00	1500
	Rampur Tiraha to Naini Chowk	2182	6530				
OC-6 Prayagraj Road (Near Ghurpur)	Ghurpur to Naini Chowk	2322	7245	4647	14554	01:00-02:00	2037
	Naini Chowk to Ghurpur	2325	7309				
	Jayantpur to Chail	590	1389				

Locations	Direction	Vehicles	PCUs	Total Freight Vehicles per day	Total PCU per day	Peak Hour	PCU (Peak Hour)
OC-7 Chail Road (Near Payri)	Chail To Jayantpur	610	1316			15:00-16:00	
OC-8 Kanpur Prayagraj Rd (Near Puramufti)	Muratganj to Prayagraj	1970	4001	3977	8287	01:00-02:00	646
	Prayagraj to Muratganj	2007	4286				

Source: Primary Analysis, UMTC



Source: Primary Analysis, UMTC

Figure: Freight Traffic Volume Count (PCU) at Outer Cordons

From the data analysis at outer cordon of the study area, it was observed that maximum freight traffic was recorded at the Outer Cordon 6 located at NH-35 Prayagraj Road (Near Rampur Ghurpur). At OC-6, the traffic is coming from the Rewa to Prayagraj direction and vice versa, more than 14,000 PCU of freight traffic come in and out of the city from this particular location during 24-hour duration.

Table : Traffic Volume at Outer Cordons - Freight Vehicles

Locations	Direction	Vehicles	PCUs	Total Freight Vehicles per day	Total PCU per day	Peak Hour	PCU (Peak Hour)
OC-1 Ayodhya Prayagraj Road (Holagarh Road)	Mau Aima to Diha	1636	4859	3384	10282	05:00-06:00	943
	Diha to Mau Aima	1748	5423				
OC-2 Phoolpur Road	Phulpur to Sahson	1561	4091	3023	7854	02:00-03:00	643
	Sahson to Phulpur	1462	3763				
	Prayagraj to Banaras	219	639				

Locations	Direction	Vehicles	PCUs	Total Freight Vehicles per day	Total PCU per day	Peak Hour	PCU (Peak Hour)
OC-3 Prayagraj Bypass (Toll Road)	Banaras to Prayagraj	382	1165			03:00-04:00	
OC-4 Lucknow Prayagraj (NH 30)	Prayagraj to Lucknow	1910	5900	3921	11969	03:00-04:00	575
	Lucknow to Prayagraj	2011	6069				
OC-5 Prayagraj Kuwarpatti Road (Near Rampur Tiraha)	Naini Chowk to Rampur Tiraha	2056	6155	4238	12685	01:00-02:00	1500
	Rampur Tiraha to Naini Chowk	2182	6530				
OC-6 Prayagraj Road (Near Ghurpur)	Ghurpur to Naini Chowk	2322	7245	4647	14554	01:00-02:00	2037
	Naini Chowk to Ghurpur	2325	7309				
OC-7 Chail Road (Near Payri)	Jayantpur to Chail	590	1389	1200	2704	15:00-16:00	235
	Chail To Jayantpur	610	1316				
OC-8 Kanpur Prayagraj Rd (Near Puramufti)	Muratganj to Prayagraj	1970	4001	3977	8287	01:00-02:00	646
	Prayagraj to Muratganj	2007	4286				

Source: Primary Analysis, UMTC

TRAFFIC VOLUMES AT SCREENLINE/ MID-BLOCK LOCATIONS

OBJECTIVE

- To evaluate the total volume of freight traffic coming inside and going outside from the survey locations.

METHOD

- Traffic counts were carried out on a typical working day for 24 hours per day covering both peak and off-peak periods using videographic surveys.
- At each identified station, both directional counts will be carried out for freight vehicle type, i.e. Goods Three Wheeler, LCV, Mini LCV, 2Axle, 3Axle, MAV's, tractors and other Goods carriages are included.

OUTPUT

- Traffic volume by vehicle type.
- Hourly distribution of traffic.

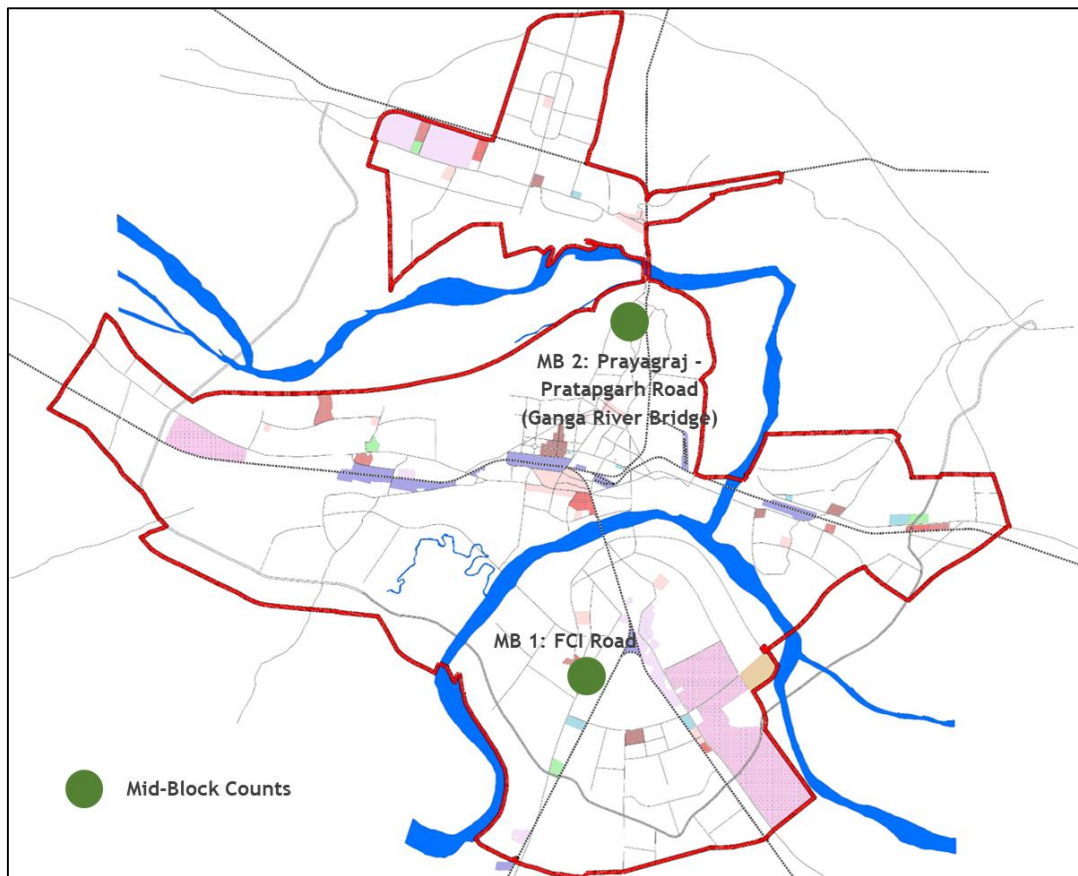
Traffic volume count survey for the freight traffic carried out at the Mid-Block locations of the study area.

To understand the total freight traffic coming in and going out of the study area, two major entry-exit points were identified and traffic count survey was conducted through videographic method. The analysis of the classified volume count survey at the cordons is given in the ensuing sub-sections. The total inbound and outbound traffic flow at each of the location is presented in table below.

Table: Traffic Volume at Mid-Block Locations Mid-Block Locations- Freight Vehicles

Locations	Direction	Vehicles	PCUs	Total Vehicles	Total PCU
MB-1 FCI Road	Naini to Iradatganj	564	807	1208	1737
	Iradatganj to Naini	644	930		
MB-2 Prayagraj - Pratapgarh Road (Ganga River Bridge)	Teliarganj To Phaphamau	642	1212	1321	2481
	Phaphamau To Teliarganj	679	1269		

Source: Primary Analysis, UMTC



Source: Primary Analysis, UMTC

Figure: Freight Traffic Volume Count (PCU) at Mid-Block Locations

From the data analysis at mid-block count of the location, it was observed that maximum freight traffic was recorded at the Mid-Block Location 2 located at Prayagraj - Pratapgarh Road (Ganga River Bridge). At MB-2, the traffic is coming from the Teliarganj to Phaphamau direction and vice versa, 2481 PCUs during peak hour of freight traffic come in and out moving from this particular location during peak hour.

TRAFFIC VOLUMES SCENELINE LOCATIONS

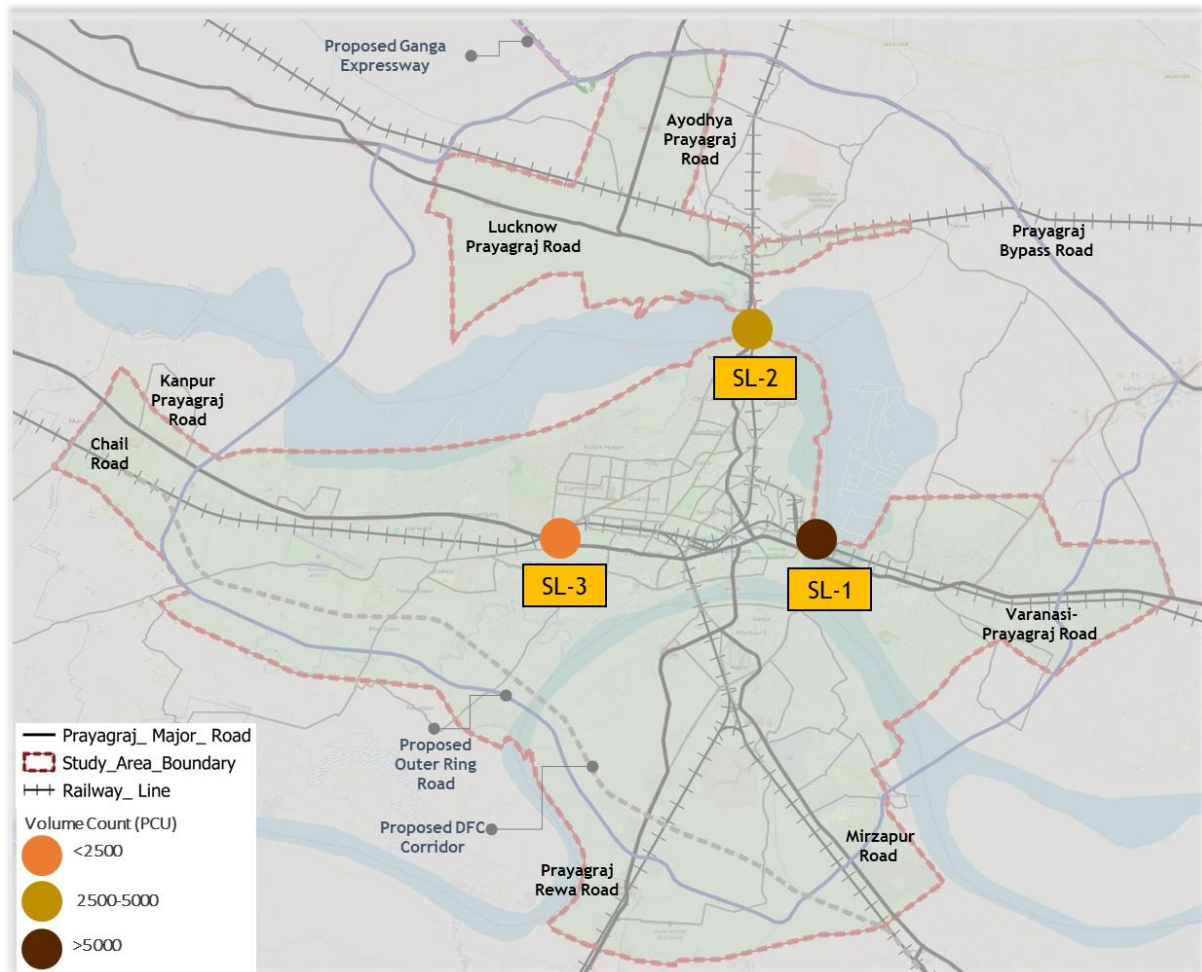
Maximum traffic (5,347) was observed at SL 1 followed by other screen-line location SL 2 with 2,836 PCU. Both the locations are the river bridge from where the city’s traffic enter or exit on daily basis.

Table: Traffic Volume at Outer Cordons - Freight Vehicles

Locations	Direction	Vehicles	PCUs	Total Freight Vehicles per day	Total PCU per day	Peak Hour	PCU (Peak Hour)
SL-1	Chungi to Jhunsi	1,648	2,717	3,293	5,347	17:00-18:00	515
	Jhunsi to Chungi	1,645	2,630				
SL-2	Old Katra to Phaphamau	1,358	1,617	2,328	2,836	15:00-16:00	236
	Phaphamau to Old Katra	970	1,220				
SL-3	Zero Road to Bamrauli	607	716	1,419	1,621	15:00-16:00	135
	Bamrauli to Zero Road	812	905				

Source: Primary Analysis, UMTC





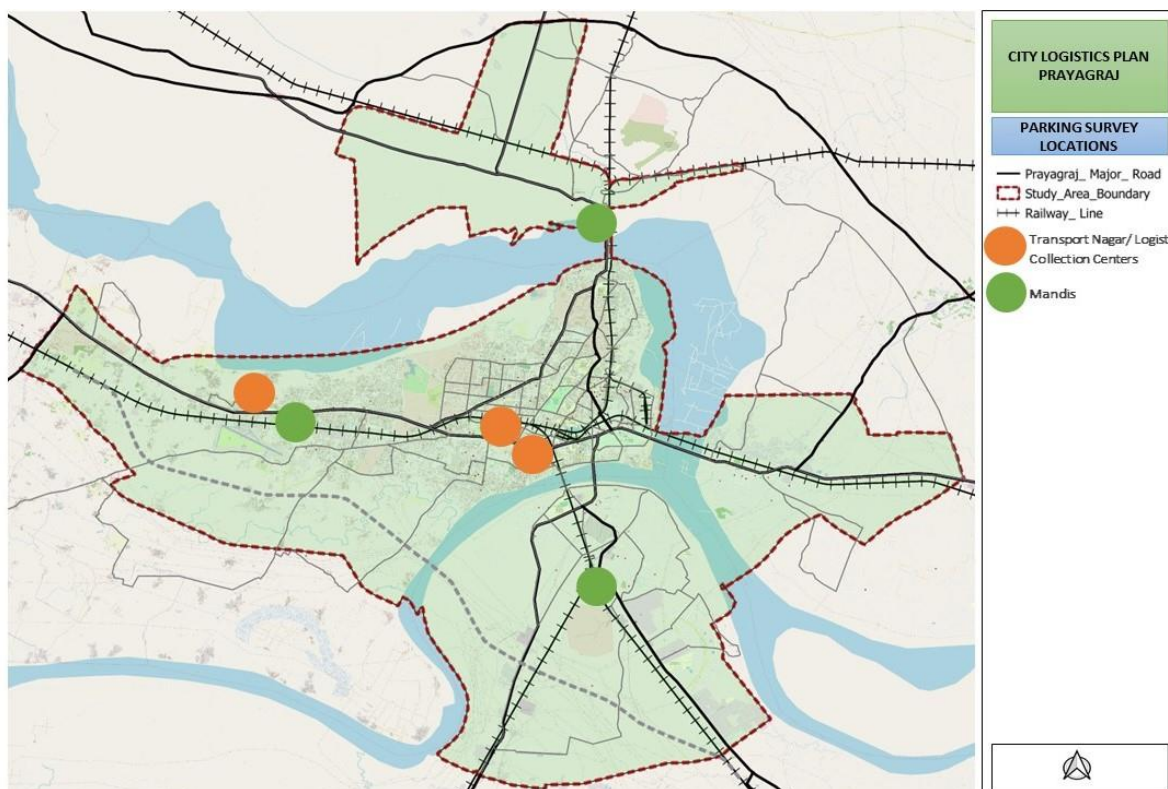
Source: Primary Analysis, UMTC

PARKING SURVEY ANALYSIS

Objective of Survey: The primary objective of the study is to assess the demand for freight vehicle parking and characteristics of the parked freight vehicles.

OBJECTIVE	<ul style="list-style-type: none"> • To assess the freight vehicle parking demand.
METHOD	<ul style="list-style-type: none"> • Parking surveys were carried out for a period of 24 hours at major terminals, wholesale market, Vegetable & fruit market and in retail market. • Enumerators are asked to note the vehicle type and registration number of parked vehicles every half an hour.
OUTPUT	<ul style="list-style-type: none"> • Parking accumulation peak and off-peak demand at identified locations. • Parking space turn over.

The freight vehicle parking survey was conducted at Transport Nagar, major Mandis and logistic collection centres. The survey locations are shown in the Figure below. The survey was carried out for the opening hours at all the identified locations.



Source: Primary Survey, UMTC

Figure: Parking Locations Map

A. ON-STREET PARKING

On-street parking, though being perceived as favourable for local businesses, accumulates organically near the points of attraction. On-street parking with higher vehicle accumulation causes carriageway encroachment, this further results in delay of goods delivery to their destination. The unauthorised and unorganised on-street parking creates chaotic conditions for the movement of the general traffic and makes difficult for pedestrians as well.

On-street parking surveys were conducted at all the potential freight attraction and generation points in the study area, such as Transport Nagar, Hatiya Chauraha, Mutthi ganj and fruit and vegetable markets. The table below summarizes the peak accumulation at the different surveyed parking locations.

Table: Freight Vehicles Parking Accumulation

Location	Abutting Land Use	Type of Parking	Peak Accumulation (ECS)	Peak Hour
Hatiya Chauraha	Commercial, Residential	Haphazard	18	1200 TO 1300
Mutthiganj	Commercial, Residential	Haphazard	35	1200 TO 1300
Transport Nagar	Commercial	Haphazard	155	0400 TO 0500
Madhawpur Sabji Mandi	Commercial, Residential	Haphazard	3	1300 TO 1400
Naini Sabji Mandi	Commercial, Residential	Haphazard	17	0010 TO 0011
Phapahamau Sabji Mandi	Commercial, Residential	Haphazard	15	0007 TO 0008

Source: Primary Survey, UMTC

From the primary survey analysis, it was observed that there is no dedicated space for the parking of vehicles in Transport Nagar whereas the maximum peak hour accumulations is observed there amounting to 155 ECS. The survey also showed that mini-LCVs and two-axle trucks were the most common types of parked vehicles in Transport Nagar, accounting for 31% and 28% respectively.

From the primary survey analysis, at Hatiya Chauraha it was observed that maximum share is of Mini LCV 83%, followed by LCV and two-axle vehicles at 11% and 6% respectively. Hourly parking accumulation data analysis maximum accumulation was observed between 12:00-13:00 Hours.

At Mutthiganj, maximum share of 32% of Two Axle Trucks and 30% LCV were parked on the road for the loading and unloading activities. These were followed by three-axle vehicles at 24% and mini-LCVs at 14%. Hourly parking accumulation data analysis maximum accumulation was observed between 12:00-14:00 Hours.

According to the survey, Madhwapur, Naini, and Phaphamau Sabji Mandi were found to only receive mini-LCVs, with the maximum accumulation being 3 ECS, 17 ECS, and 15 ECS in each location, respectively. These Mandis are only open for 4-6 hours per day.

From the parking survey analysis, it is inferred that peak accumulation is observed at the Transport Nagar main road with 155 ECS. Lack of dedicated parking space for goods vehicles results in the unauthorised and unorganised on-street parking especially at roads around the Transport Nagar. Similarly, in Mutthiganj, Hatiya chauraha goods vehicles were being parked along the road in haphazard manner.

B. OFF-STREET PARKING

Off-street parking, is the optimum parking required for every commercial and industrial development but is only available in planned areas. Off-street parking survey was conducted at Mundera Mandi as it is the only bounded planned freight attraction facility in the city. The Table below summarizes the peak accumulation at the different surveyed parking locations.

Table: Freight Vehicles Parking Accumulation

Location	Abutting Land Use	Type of Parking	Peak Accumulation (ECS)	Peak Hour
Mundera Mandi	Commercial	In-front of shops	107	00:00 midnight to 01:00

Source: Primary Survey, UMTC

From the primary survey analysis, it was observed that parking at Mundera Mandi happens in front of shops with in Transport Nagar whereas maximum peak hour accumulations is observed there amounting to 107 ECS. The survey also showed that two-axle trucks were the most common types of parked vehicles in Mundera Mandi, accounting for 69% of ECS. Hourly parking accumulation data analysis indicates maximum accumulation was observed between 4:00 am-5:00 am in the morning which might be due the fact that according to the goods movement gets banned in particular parts of the city between 6 am to 8 pm. This Mandi operates for 24 hours of the day.

From the parking survey analysis, it is inferred that peak accumulation is observed in the Mundera Mandi is 107 ECS which comprises of trucks and mini-LCV's. The area needs to be managed and replanned to accommodate more vehicles.

ROADSIDE INTERVIEW SURVEY AT OUTER CORDON

To plan the facilities for freight movement, both the number of goods vehicles entering and exiting the city and the type of commodity being transported have to be analysed critically. The road-side interviews, which were conducted at the outer cordon locations, gathered information regarding the type and quantity of commodities moved.

A. GOODS VEHICLE INTERVIEWS

Roadside interviews were carried out on a sample basis to understand the characteristics of the external freight trips. The captured details including trip purpose, modes, origin-destination, commodity carried etc.

OBJECTIVE	<ul style="list-style-type: none"> • To derive the travel pattern of the freight vehicles • These surveys will be aimed at analysing the movement between the study area and external zones.
METHOD	<ul style="list-style-type: none"> • Interviews were carried out on a sample basis for 24 hours by stopping the vehicles.
OUTPUT	<ul style="list-style-type: none"> • Information such as origin and destination of commodities, goods vehicles their type and tonnage.

The total of eight outer cordon locations was selected, and interview survey of goods vehicle driver has been conducted at all those locations which is discussed in details in these sections. The list of 8 locations to be surveyed is given in Table below and the locations are described in the Figure below.

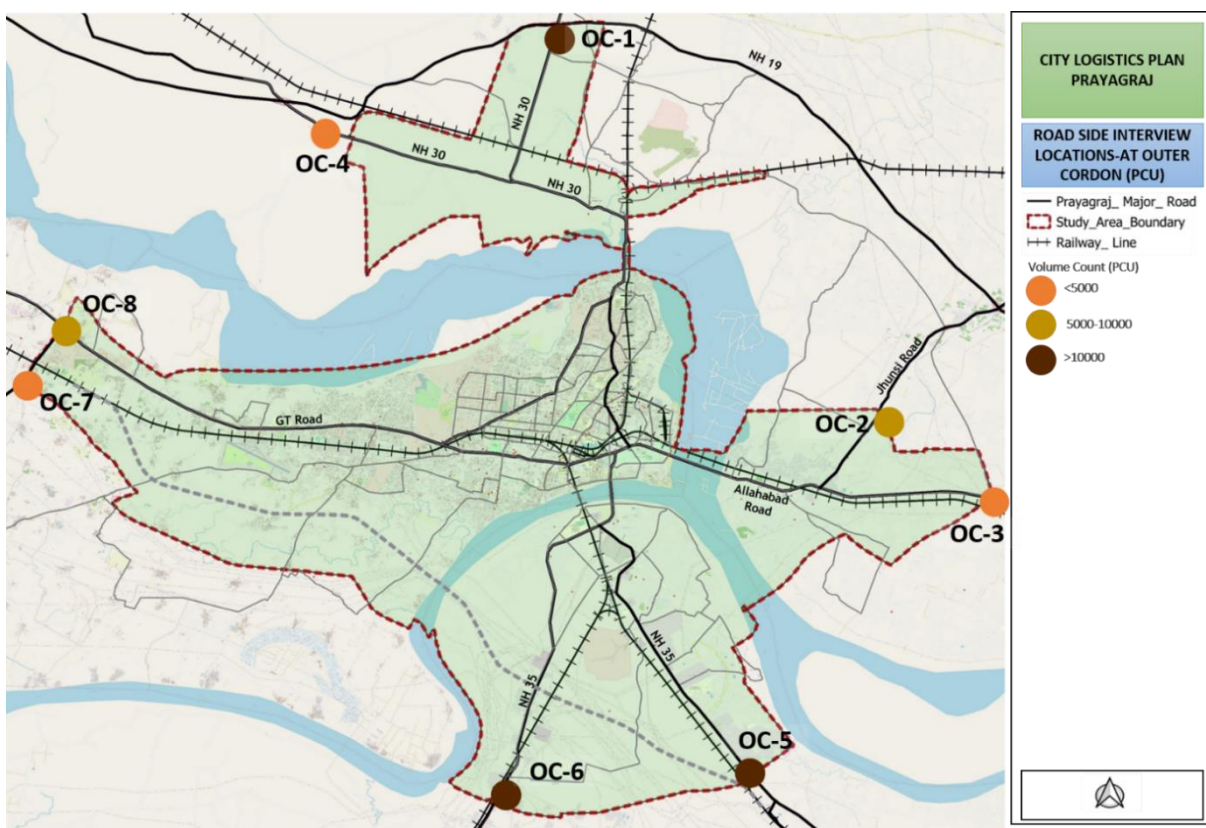


Figure: Road Side Interview Survey Locations

Source: Site Reconnaissance Surveys

Table: List of Roadside Interview Survey Locations

S.No.	Location	S.no.	Location
OC 1	Ayodhya Prayagraj Road (Holagarh Road)	OC 5	Prayagraj Kuwarpatti Road (Near Rampur Tiraha)
OC 2	Phoolpur Road	OC 6	Prayagraj Road (Near Ghurpur)
OC 3	Prayagraj Bypass (Toll Road)	OC 7	Chail Road (Near Payri)
OC 4	Lucknow Prayagraj Road (NH-30)	OC 8	Kanpur Prayagraj Rd (Near Puramufti)

Source: Site Reconnaissance Survey

B. GOODS VEHICLE AT OUTER CORDONS

As discussed, the total number of 20,688 goods vehicles were recorded at outer cordons. From the primary data analysis, it can be inferred that the share of external-to-external trips is 27%, while external-internal and internal-external trips share is 42% and 31%, respectively.

The overall goods vehicle composition of all outer cordons depicts MAV has the maximum share of 36% in the freight traffic coming inside and going outside from study area. It is followed by 29 % share of LCV/ Mini-LCV, 20% share of 2-Axle trucks, 14% share of 3-Axle trucks. Tractor have the least share at 1% respectively.

It is analyzed that majority of trips are from within Uttar Pradesh. The Table below shows the locations of trips origin at outer cordon.

Table: %age of Locations of Origin of Trips

S.No.	Origin	%age of Trips
1.	Kanpur	17.92%
2.	Lucknow	5.21%
3.	Varanasi	11.89%
4.	Delhi	6.35%
5.	Rewa	3.91%
6.	Mirzapur	4.07%
7.	Sahson	3.58%
8.	Phulpur	3.09%
9.	Pratpgarh	7.82%
10.	Kaurihar Bazar	2.28%
11.	Rest of Uttar Pradesh	14.50%
12.	Rest of India	19.38%

Source: Primary Analysis, UMTC

Cordon wise in and out quantity of the goods is shown in the Figure below. This critical analysis indicates from which direction maximum goods quantity are incoming and outgoing to/from the study area. It was observed that maximum no. of goods vehicles are coming from Kanpur followed by Varanasi.

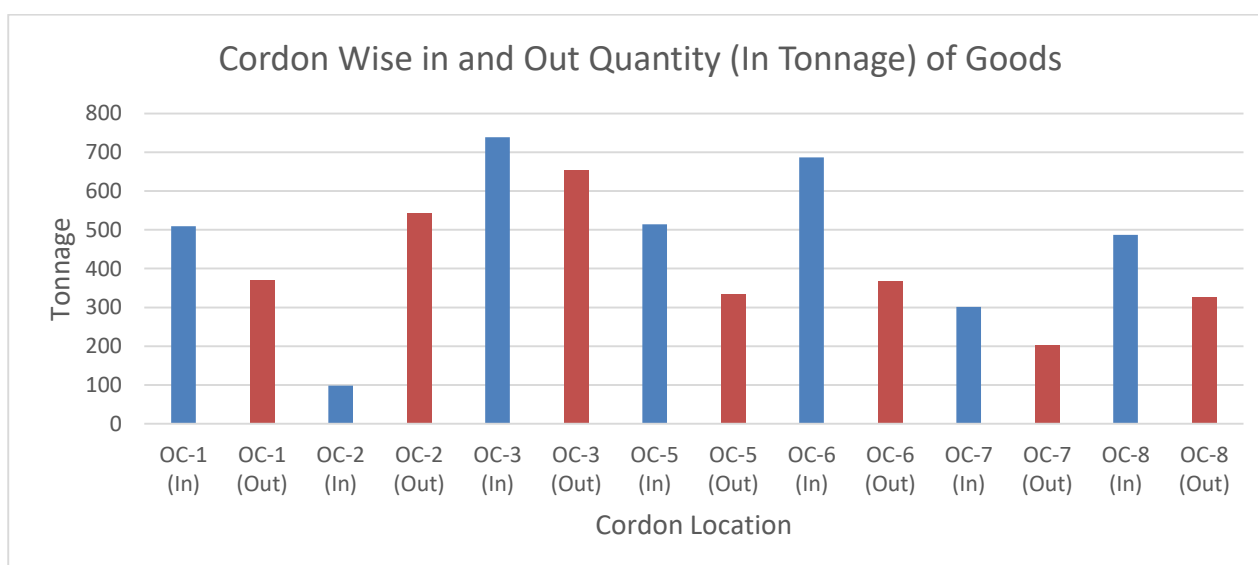


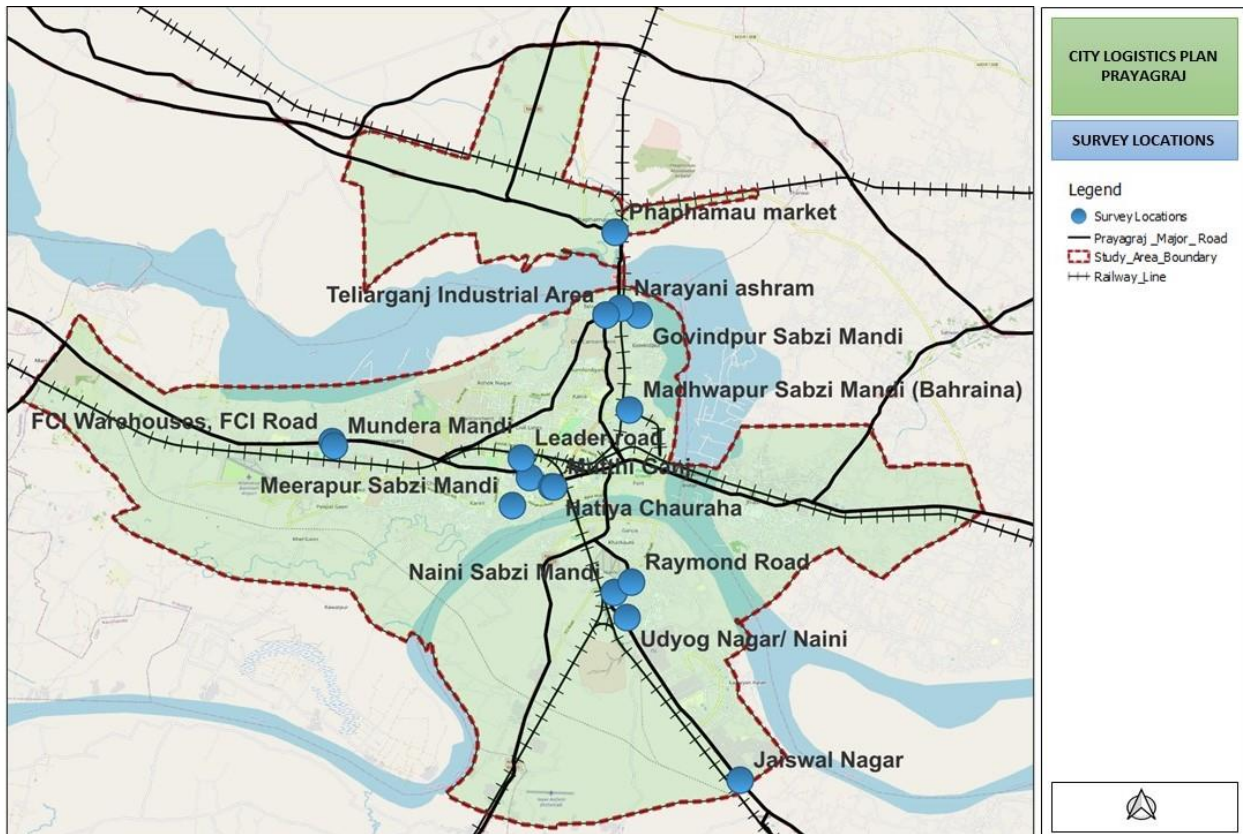
Figure: Cordon Wise in and Out Quantity (In Tonnage) of Goods

Source- Primary Survey

From the above figure is it observed that maximum inbound and outbound goods quantity is from OC-3 (Prayagraj Bypass (Toll Road)) i.e. freight vehicles coming from Varanasi.

DRIVER SURVEY ANALYSIS

In freight and logistic planning, goods vehicle driver is one of the key stakeholders. In order to assess the existing travel pattern of the different commodities, goods vehicle driver’s survey was carried out at several locations such as at Transport Nagar, fruit and vegetable market, logistics collection centres (Mutthi Ganj and Hatiya Chauraha), important commercial locations (Teliyarganj and Katra Bazar) and Raymond Mode recording their delivery and collection, loading/unloading time and average waiting etc. This survey was conducted by trained enumerators who had good knowledge of information collection using the interview survey method. The driver survey locations are shown in the Figure below.



Source: Primary Survey, UMTC

Figure: Driver Survey Locations

The goods vehicle type distribution shows that the percentage of mini-LCV (44%) is the highest for transporting the goods from/to Prayagraj, followed by 2-Axle (28%), LCV (18%) and 3-Axle (9%). MAV has the least share.

As per the drivers’ opinion, 55% say there is not enough parking space available for the delivery and collection of goods.

A. COMMODITY WISE MODE SHARE

The commodity wise mode share analysis from the driver survey illustrates that Mini LCV was observed as the dominant goods carriage vehicle in the study area for each commodity type except that of the electronics and electrical, footwear and plastic products.

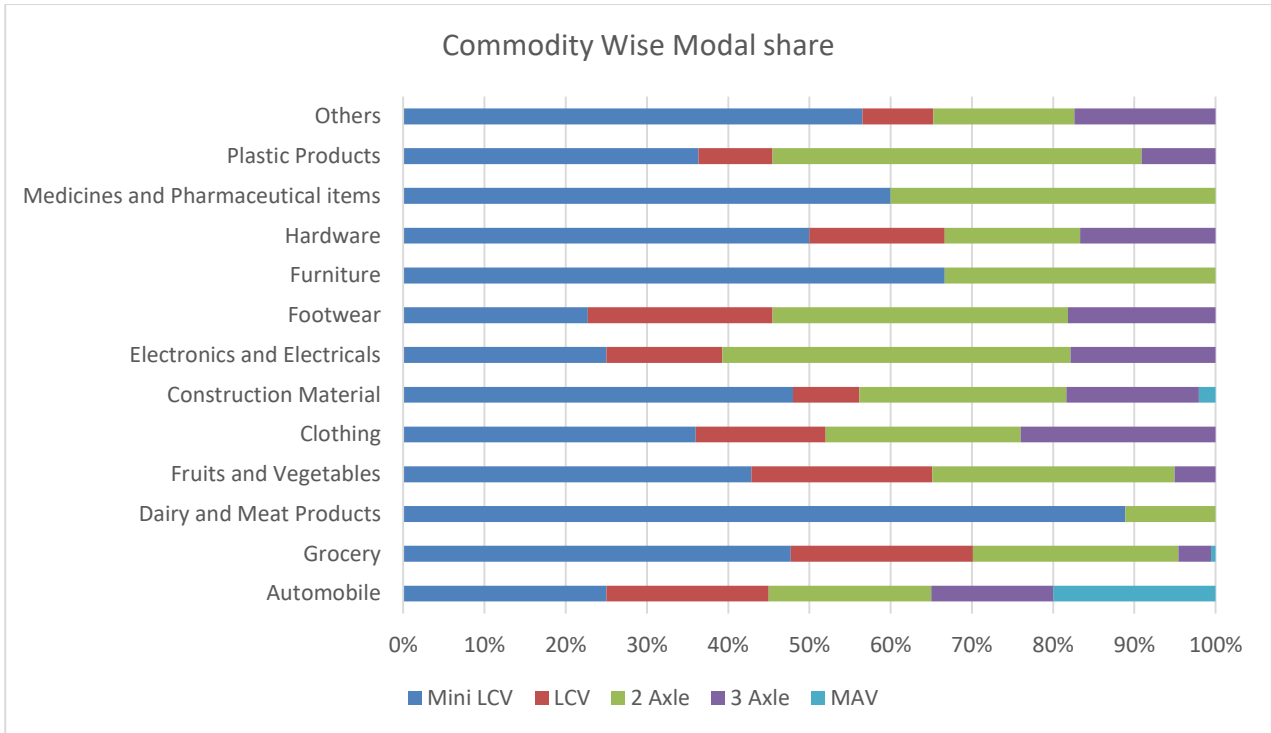


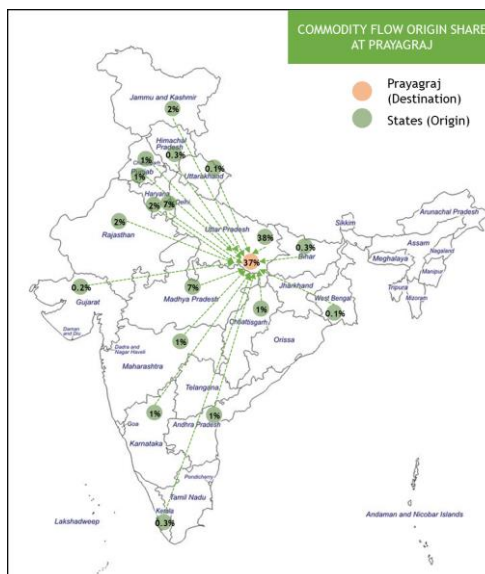
Figure: Commodity Wise Mode Share

Source: Primary Analysis, UMTC

The 2 Axle vehicle transports most of plastic products followed by Electrical and Electronics products. The 3 Axle vehicle transports most of clothing followed by Electrical & Electronics and footwear. The MAV transports most of the Automobiles and construction materials.

B. SHARE OF COMMODITY FLOW ORIGIN

Goods vehicle delivery coming to the Transport Nagar, fruit and vegetable market, logistics collection centres (Mutthi Ganj and Hatiya Chauraha), important commercial locations (Teliyarganj and Katra Bazar) and Raymond Mode has been analysed in this section and represented below as:



Source: Primary Analysis, UMTC

Figure: Commodity Flow Origin Share

Maximum delivery of the goods was observed from Uttar-Pradesh being 38% which is then followed by the 37% local from Prayagraj District as shown in the Figure above Delhi and Madhya Pradesh with share of 7% each, rest of the import consignments are from Rajasthan, Jammu and Kashmir, Haryana, Punjab, Maharashtra, Karnataka, Chhattisgarh, Andhra Pradesh, Kerala, Himachal Pradesh, Bihar, Gujarat and Uttarakhand in descending order.

Prayagraj depends on the neighbouring states for majority of the resources including food items. Major categories of consumption centric food and related cargo are given below.

Table: Goods Transported per Week (in Tons) - Food Related

Item/ Commodity	Perishability	Amount of Goods Transported per week (in Tons)
Cereals and Cereal products	Low	102
Pulses and Pulses Products	Medium	30
Milk and milk products	High	12
Edible oils	Medium	31
Egg, fish, and meat	High	1
Vegetables	High	261
Fruits	High	97
Dry Fruits	Low	4
Sugar	Low	29
Spices	Low	26
Miscellaneous Products (Bakery, Beverages, etc.)	Medium	11
Others confectionery items	Medium	8
Total		613

Source: Primary Survey, UMTC

The Table above shows the quantity of goods transported in Tons. Most transported commodity is vegetable with 261 tons, followed by cereal and fruits.

From the primary survey data for food related goods transport per week, we can infer that the highest amount of goods transported per week is vegetables with 261 Tons which is highly perishable, followed by cereal and its products with 102 Tons of low perishable products. There are in total 613 tons of commodity that are transported per week which consists of 161 tons of low perishable products, 80 tons of medium perishable commodity, and 371 tons of highly perishable product. The low perishable goods consist of commodity like cereals and its products, Dry Fruits, Sugar & Spices. The medium perishable products includes pulses and its products, edible oil, confectionery items and other miscellaneous items. The high perishable products include milk and its product, fruits and vegetable.

Table: Goods Transported per Week (in Tons) - Non-Food Related

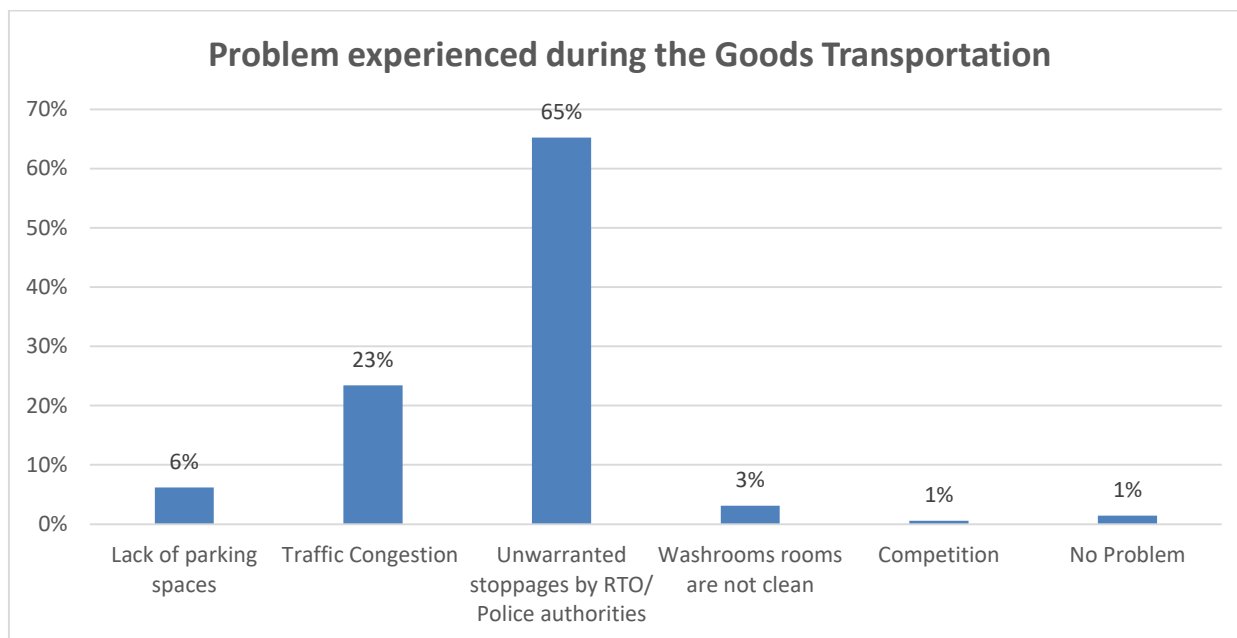
Item/ Commodity	Perishability	Amount of Goods Transported per week (in Tons)	%Share
Automobile	Low	28	8%
Clothing	Low	32	9%
Construction Material	Low	155	44%
Electronics and Electricals	Low	42	12%
Footwear	Low	34	10%
Furniture	Low	4	1%
Hardware	Low	9	3%
Medicines	Medium	8	2%
Plastic Products	Low	13	4%
Prints and education	Low	17	5%
Miscellaneous Products (Pooja items, scrap dealer, clay items, etc.)	Low	12	3%
Flowers	High	0	0.1%

Source: Primary Survey, UMTC

The Table above shows, the quantity of goods transported in Tons. Highest transported commodity is construction materials with 155 tons, followed by electronic and electrical items, footwear, clothing and automobile.

C. FEEDBACK FROM DRIVER SURVEY

Apart from quantitative information related to the different commodity and vehicles, some qualitative parameters have been assessed from the drivers in terms of the problems experiences by them are shown in the Figure 5-50.



Source: Primary Analysis, UMTC

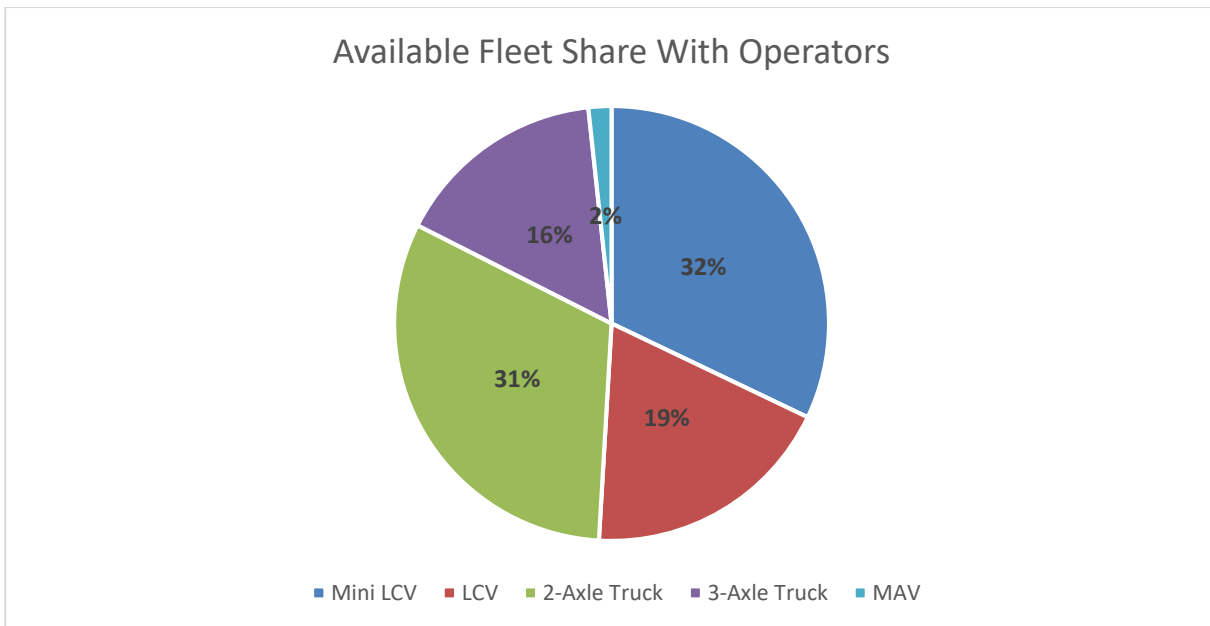
Figure: Various Issue Experienced by Drivers

According to the Figure above, the most common issue experienced during transport was unwarranted stoppages by RTO and police authorities constituting to 65%. Traffic congestion during transport was the second most common issue with a share of 23%, while problems such as lack of parking space, lack of washroom facilities, and competition accounted for 6%, 3%, and 1% respectively. The remaining respondents reported no problems during transportation.

OPERATOR SURVEY

The operator survey was performed to check the current scenario of the transport services available in the city and highlights the gaps that are causing hurdles in the efficiency of the freight mobility. In the survey various operators under whom various goods vehicle are functioning were interviewed and both quantitative and qualitative aspects were recorded.

The major locations where the operator survey have been carried out are Transport Nagar, Mundera Sabji mandi & Mutthiganj. The survey was done by trained enumerators who extracted the necessary information using interview method. In the captured sample vehicle categorisation in the city used in goods movement are reflected as 51% of Mini LCV/LCV followed by 47% of 2 Axle/3 Axle trucks and only 2% of MAVs are used in urban freight movement of the Prayagraj city as shown in Figure below.



Source: Primary Analysis, UMTC

Figure: Vehicle Categorisation in Operator Survey

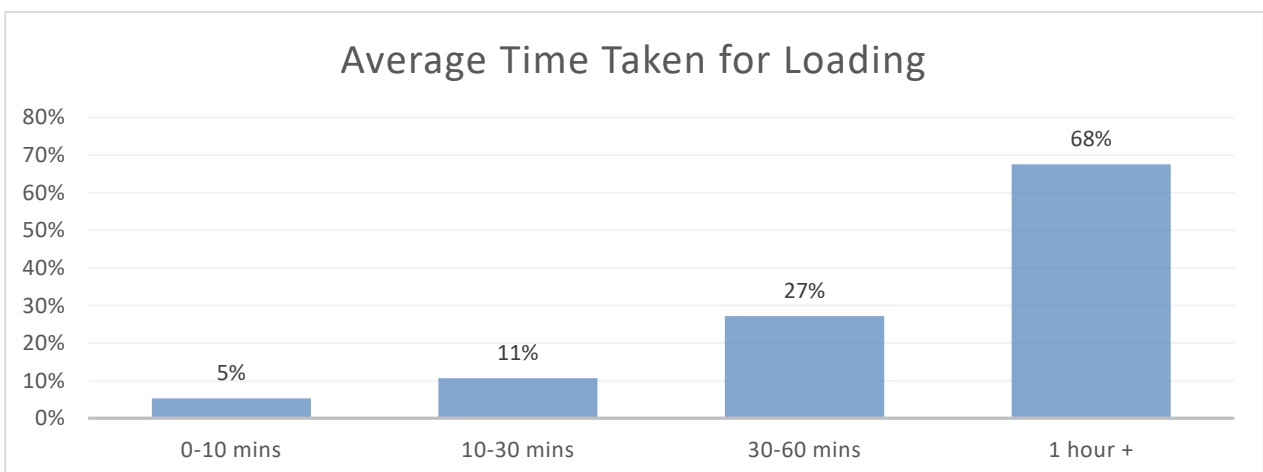
The operational cost associated with each vehicle type is as shown in **Table below**.

Table: Monthly Operational Cost - Mode wise

Mode	Monthly operational Cost in INR
Mini LCV	54,000
LCV	74,872
2 Axle	71,692
3 Axle	1,16,882
MAV	90,000

Source: Primary Analysis, UMTC

The Figure below shows the Average Time Taken for Loading carried by the different goods vehicle. The Average Time Taken for Loading activity is more than 1 hour which is very high and needs to be reduced, to improve the efficiency of infrastructure and goods movement.

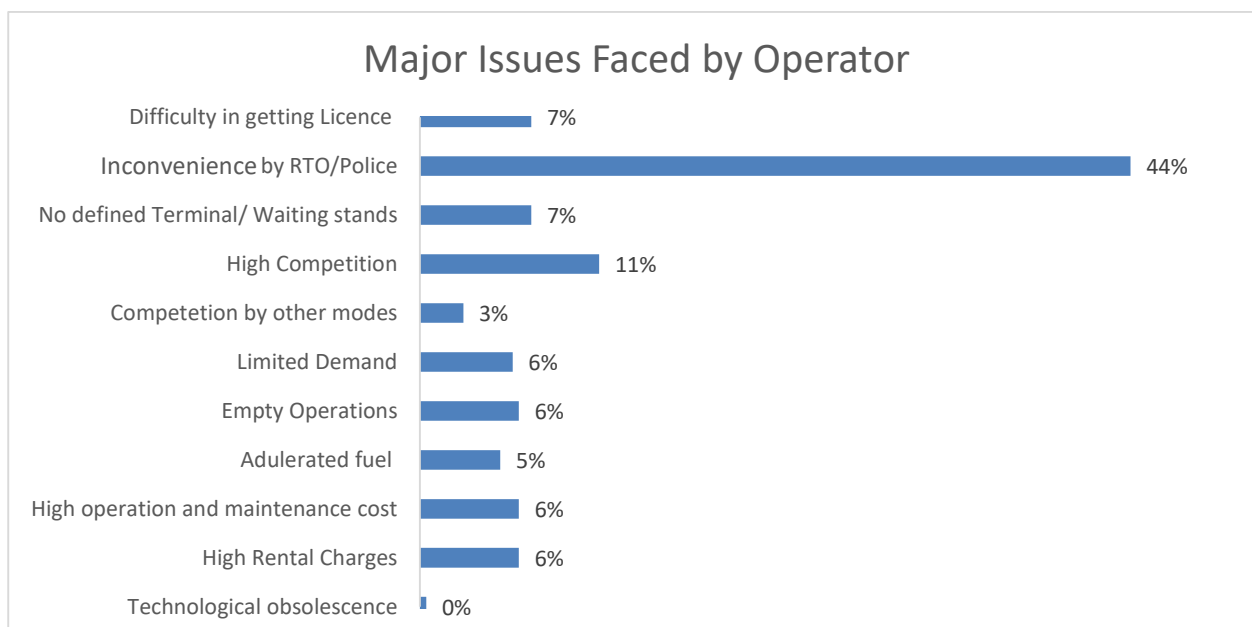


Source: Primary Analysis, UMTC

Figure: Average Time Taken for Loading

The goods vehicles running under these operators' firms mostly use diesel as their fuel when it comes to a heavy vehicle, while Mini LCVs/LCVs have started using eco-friendly technology like CNG (2% Mini LCVs & 6% LCVs).

The feedback of different operators is recorded which highlights the various issues currently being faced by them and seeking their suggestions on the same. The Figure below shows the qualitative analysis of the major issues faced by these operators in the city. Around 44% of the operators said that obstructions/restrictions created by RTO/ police was the biggest practical obstacle in shipping goods through various modes.



Source: Primary Analysis, UMTC

Figure: Major issues faced by the operator

In order to ease the existing issues, various measures are suggested by the operators,

- Operators are keen to eliminate all the informal charges that will act as restriction in efficient freight mobility.
- The goods vehicle licencing process must be simplified so that illegal driving activity will reduce.
- The parking issue is a major one causing encroachment of road space as goods vehicle parking is done on-street, hence proper dedicated parking spaces must be provided in the city for freight vehicles.
- The operators showed interest in getting the proper assistance/subsidy for technology upgradation.

GOODS TERMINAL SURVEY

Study area comprising only 7 terminals to facilitate the logistic vehicles in the Prayagraj. Currently all the freight movement coming inside and going from the city are handled from majorly Transport Nagar and 3 Railway Stations of Prayagraj. The freight movement via airport is very limited while from IWT terminal is nil.

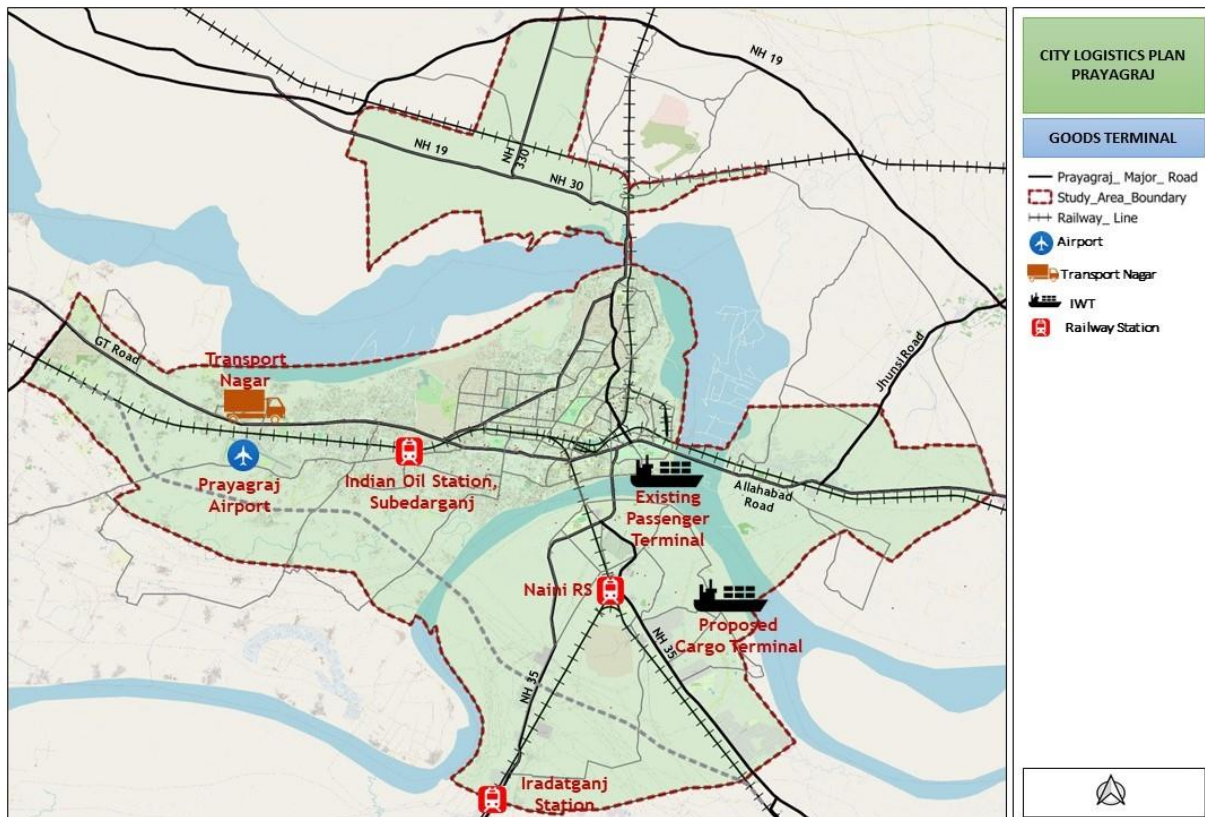
Objective of the Survey: To evaluate the total numbers of freight vehicle using the terminal during entire day and in the peak period as well, also to assess the different type of modes are used for the freight carrier in the study area.

Scope: To record the movement of goods vehicle from the terminal, along with this the magnitude of goods.

Conduct: To capture the movement pattern, mode and the total number of vehicles inside the terminal.

OBJECTIVE	<ul style="list-style-type: none"> • To evaluate the total numbers of freight vehicle using the terminal.
METHOD	<ul style="list-style-type: none"> • Record the movement of goods vehicle from the terminal, along with this the magnitude of goods through questionnaire survey.
OUTPUT	<ul style="list-style-type: none"> • To assess the terminal utilisation and its existng infrastructural facilities

The study area includes three railway stations, a truck terminal, and an airport, which all work together to facilitate the movement of freight in and out of the Prayagraj City as shown in Figure below.



Source: Primary Survey, UMTC

Figure: Goods Terminal

A. RAILWAY STATION

○ **Naini Railway Station**

There are around 328/year inward rakes movement observed during in FY 2021 at the station in which 14,455 wagons and 9,05,923 Tonne of commodities are handled.

○ **Iradatganj Railway Station**

Iradatganj Railway Station is also an important station for the various commodities’ inward movement. The major commodity inflow at the station is cement. There is no outward goods movement from this station. There are around 166/year inward rakes movement observed during in FY 2021 at the station in which 4,397 wagons and 3,93,454 Tonnes of commodities are handled.

○ **Indian Oil Station, Subedarganj**

The plant has a capacity of 39,544 KL. Average frequency in the terminal is 16 trains having capacity of 3200 KL per train and average daily truck movement inside the terminal is 150.

Main outbound locations are as follows:

- Kaushambhi
- Allahpur
- Jaunpur
- Pratapgarh
- Chitrakoot
- Mirzapur
- Sonbhadra
- Raebareli
- Partapgarh
- Fatehpur
- Airport

Major Issues faced in transportation are as follows:

- On the Airport route, a location called Mandir Modh is a blind spot.
- Entry restrictions to the plant are one of the major issues causing delay. Oil trucks should be exempted from no entry under the essential commodity act.
- Parking outside the plant in haphazard way leads to the congestion on the road.

B. AIRPORT

The Prayagraj Airport is managed by the Airport Authority of India and is located 11 kilometers from the Prayagraj Junction. In 2022, the airport saw a total of 7052 flights. It began handling freight in July 2022 and the highest quantity of freight was handled in November 2022 amounting to a total of 20 metric tons. Most of the cargo movement at the airport is handled by Indigo airlines. Despite this, the terminal is not being utilized to its full capacity.

C. Indian Waterways Terminal

As per the stakeholder consultation, the present IWT is not being used for the movement of cargo.

D. Transport Nagar

It was observed that in Transport Nagar there is no dedicated space for the parking of vehicles, the maximum peak hour accumulations observed at 155 ECS. The survey also showed that mini-LCVs and two-axle trucks have the maximum share at Transport Nagar, accounting for 31% and 28% respectively. The 3-axle vehicles, cars and LCV made up smaller shares of 19%, 11% and 10% respectively.

From hourly parking accumulation data analysis, maximum accumulation was observed between 4:00 am-5:00 am in the morning which might be due the fact that according to the goods movement gets banned in particular parts of the city between 6 am to 8 pm.

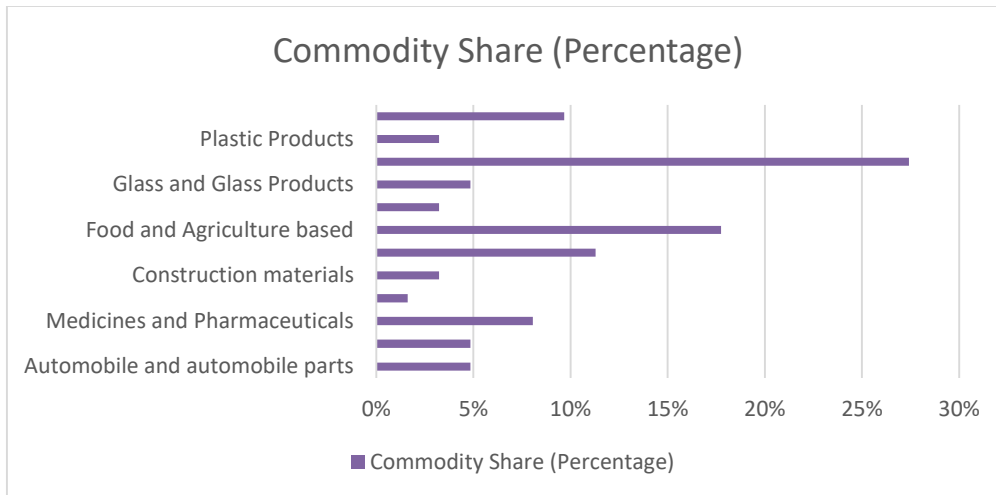
ESTABLISHMENT SURVEY ANALYSIS

The establishment survey helps us in understanding the types of activities occurring in a place along with employment, the total inbound & outbound shipment per week, major export/import areas etc. The survey also helps us to understand average loading/unloading time, busiest time of the day, distribution of vehicle with a return load and the month where maximum deliveries happen. The survey has been done based on the establishment size, major commodities inflow, and outflow in the cities.

The survey has been done at the major industrial areas of the city in which the sample is taken in a way that all major commodities manufactured in the city are captured. The inflow and outflow of the commodities will give the total trips generated from each establishment. The qualitative data is also captured in terms of their feedback.

The survey is done manually by trained enumerators, who visited the various industries and captured existing operational scenario and feedback. The trained enumerators took 525 samples across the city which cover all major commodities manufactured in the city.

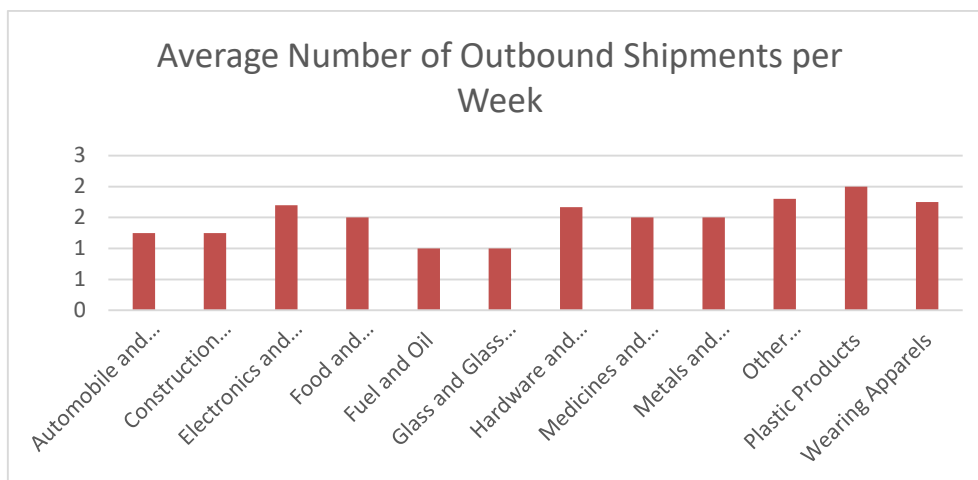
The captured samples consist of 27% of metal and metal product industries followed by 18% of food & agriculture-based industries, 11% of electronics and electrical industries (mainly transformers and solar panels) and 8% of medicines and pharmaceuticals industries as shown in Figure 5-60.



Source: Primary Analysis, UMTC

Figure: Type of Industries Captured in the Survey

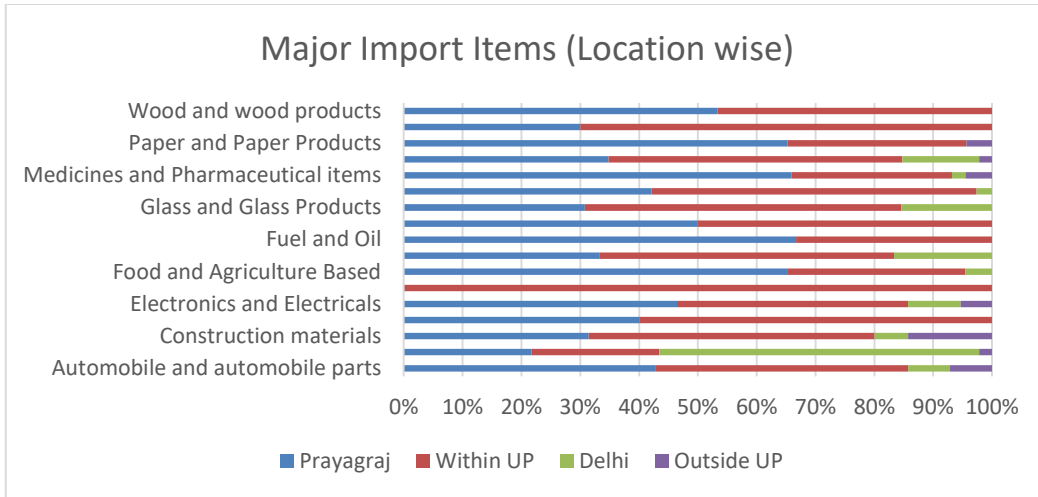
The average number of outbound shipments per week is observed from sports manufacturing with 19 shipments per week as shown in Figure 5-61.



Source: Primary Analysis, UMTC

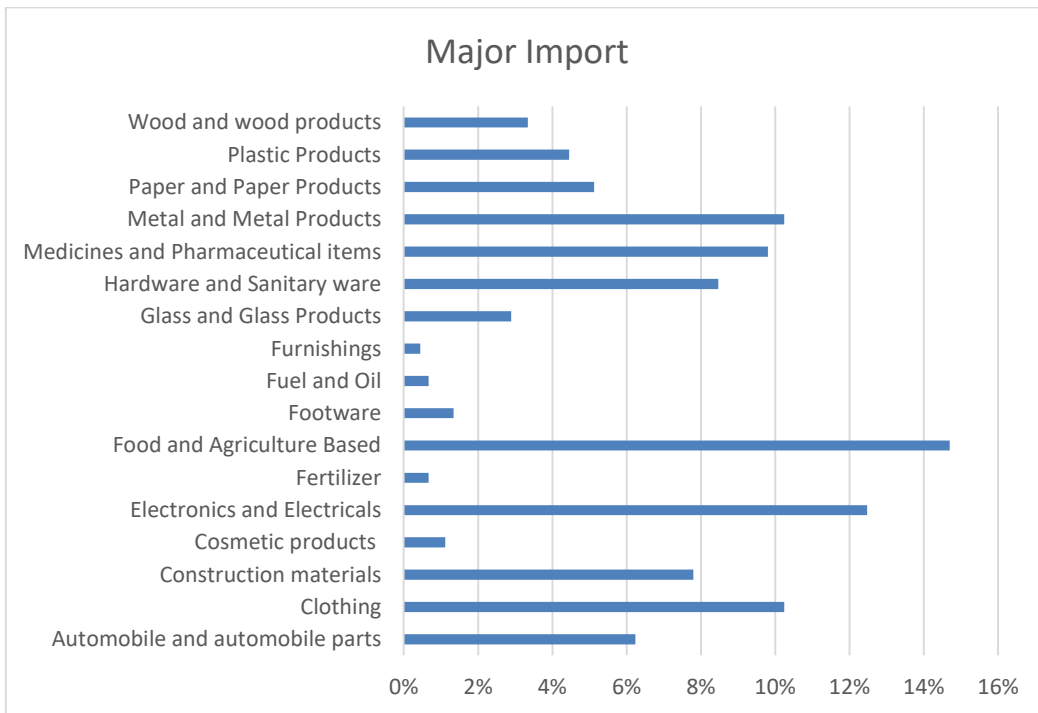
Figure: Average Outbound Shipments

As indicated in Figure above, the majority of local imports into the city are 45%, followed by import from within the state of Uttar Pradesh accounting for 41% of imports. The third highest source of imports is from the state of Delhi with a share of 11%. The remaining share of import comes from other states, including Karnataka, Haryana, Rajasthan, Tamil Nadu, West Bengal, and Madhya Pradesh, accounting for 3% of the total imports.



Source: Primary Analysis, UMTC

Figure: Major Import (Location wise)



Source: Primary Analysis, UMTC

Figure: Major Import

The Figure above illustrates that the food and agriculture-based establishments are the most with 15% of share, followed by the Electrical and Electronic goods with a share of 12%. Metal and metal products, Clothing and medicines have a share of 10% each.

It can be inferred that half an hour or more is the general time taken for loading having the majority share of around 61%. About 24% of the times the average time taken for loading is around 10 min to 30 min. A significant 10% of times, average time taken for loading is more than an hour and at very few instances it is less than 10 mins.

It is observed that lack of parking spaces at the destination locations cause a major issue in efficient freight management in the city (35%) followed by issues like goods delivery time restrictions and congestion on the road network.

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