



August 2021

CITY PROFILE AND DIAGNOSTIC REPORT

Sustainable Cities Integrated Approach Pilot (SCIAP)



PREPARED FOR:



Jaipur Nagar Nigam

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PROJECT DONORS:



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Jaipur

CITY PROFILE AND DIAGNOSTIC REPORT

Sustainable Cities Integrated Approach Pilot (SCIAP)

Component 1: Sustainable Urban Planning And Management

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Jaipur

City Profile and Diagnostic Report





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List of Acronyms

AFOLU	Agriculture, Forestry, and Other Land Use
AMRUT	Atal Mission for Rejuvenation and Urban Transformation
CAA	Constitutional Amendment Act
CAGR	Compounded Annual Growth Rate
CCTV	Closed-Circuit Television
CDP	City Development Plan
CGWB	Central Ground Water Board
CPCB	Central Pollution Control Board
CRISIL	Credit Rating Information Services of India Limited
CTTS	Comprehensive Traffic and Transportation Study
DoIT&C	Department of Information Technology and Communication
DPR	Detailed Project Report
ELU	Existing Land Use
EOL	Ease of Living Index
FSSM	Faecal Sludge and Septage Management
GDP	Gross Domestic Product
GEF	Global Environment Facility
GHG	Greenhouse Gas
GIS	Geographical Information System
GoR	Government of Rajasthan
GPSC	Global Platform for Sustainable Cities
Ha	Hectare
INR	Indian Rupee
INTACH	Indian National Trust for Art and Cultural Heritage
IPPU	Industrial Processes & Product use
IPT	Intermediate Public Transport
JCTSL	Jaipur City Transport Services Limited
JDA	Jaipur Development Authority
JMC	Jaipur Municipal Corporation
JMRC	Jaipur Metro Rail Corporation
JVVNL	Jaipur Vidyut Vitran Nigam Limited
LED	Light-Emitting Diode
LPCD	Litres Per Capita Per Day
LSG	Local Self Government Department
MDP	Master Development Plan
MLD	Million Litres per Day
MoHUA	Ministry of Housing and Urban Affairs
MPI	Municipal Performance Index
MTCO _{2e}	Metric Tonnes of Carbon Dioxide equivalent
NH	National Highway
NIUA	National Institute of Urban Affairs
NMT	Non-Motorised Transport
NRW	Non-Revenue Water
ODF	Open Defecation Free
OSM	Open Street Maps
PHED	Public Health and Engineering Department

PMAY-U	Pradhan Mantri Awas Yojana - Urban
PPH	Persons Per Hectare
RSPCB	Rajasthan State Pollution Control Board
RSRTC	Rajasthan State Road Transport Corporation
RUIDP	Rajasthan Urban Infrastructure Development Project
SBM	Swachh Bharat Mission
SCIAP	Sustainable Cities – Integrated Approach Pilot
SCS	Sustainable City Strategies
SH	State Highway
SLB	Service Level Benchmark
STP	Sewage Treatment Plant
sqkm	Square Kilometre
TPD	Tonnes Per Day
ULB	Urban Local Body
UDH	Urban Development and Housing Department
UNDP	United Nations Development Programme
UNEP	United Nations Environment Programme
UNESCO	United Nations Educational, Scientific and Cultural Organization
UN-HABITAT	United Nations Human Settlements Programme
UN-HABITAT ROAP	United Nations Human Settlements Programme Regional Office for Asia & the Pacific
UNIDO	United Nations Industrial Development Organization
URDPFI	Urban and Regional Development Plans Formulation and Implementation
USAF	Urban Sustainability Assessment Framework
WPPR	Workforce Participation Rate
ZDP	Zonal Development Plan



Introduction

1.1 REPORT OBJECTIVES

The city profile and diagnostic report situates Jaipur in its regional context and provides a comprehensive outlook of the city's performance by applying the Urban Sustainability Assessment Framework (USAF)¹. In addition, it builds on the desk review of existing plans, policy documents and development proposals by the state and local government to present a complete picture of each sector of the city. It also puts forth a cross-sectoral analysis to arrive at key issues and challenges that the city currently faces.

In this context, the main objectives of this report are:

- To build an understanding of the city's current performance across 12 sectors
- To assess intra-city spatial equity for each sector
- To employ an evidence-based approach to ascertain key cross-sectoral challenges and strategic opportunities
- To inform sectoral priorities, a strategic development plan and resource allocation for the sustainable and resilient development of the city

1.2 APPROACH AND METHODOLOGY

The evidence-based planning approach creates an all-encompassing, rich understanding of the spatial dynamics of an urban area. This is achieved by combining and comparing urban datasets such as

demography, land use, natural features, accessibility analysis and service delivery parameters. The evidence (data) is collected as inputs for the USAF indicators, which are assessed against best practices, as well as global and national benchmarks for sustainable urban development. This brings to light the main developmental issues by sometimes quantifying them, and at other times by recording the availability of effective planning tools and instruments, presence of legal and institutional mechanisms and the financial soundness of the city. Such an approach can also help to assess future development projects by feeding their information as inputs to the indicators applied in the analysis.

The following elements are used in this evidence-based approach:

- Review of relevant existing plans, policies, and development proposals
- USAF performance by the city (indicator assessment)
- Spatial analyses of indicators to conduct granular, cross-sectoral analysis to investigate trends, causes and effects

The methodology adopted analyses the interplay of socio-economic, spatial and environmental factors, first at a city scale and then at a more granular, ward-level scale to understand the degrees of influence. This helps to decipher the interdependencies within the city's physical development pattern and seeks the reasons for such interdependence to improve the functioning of that city.

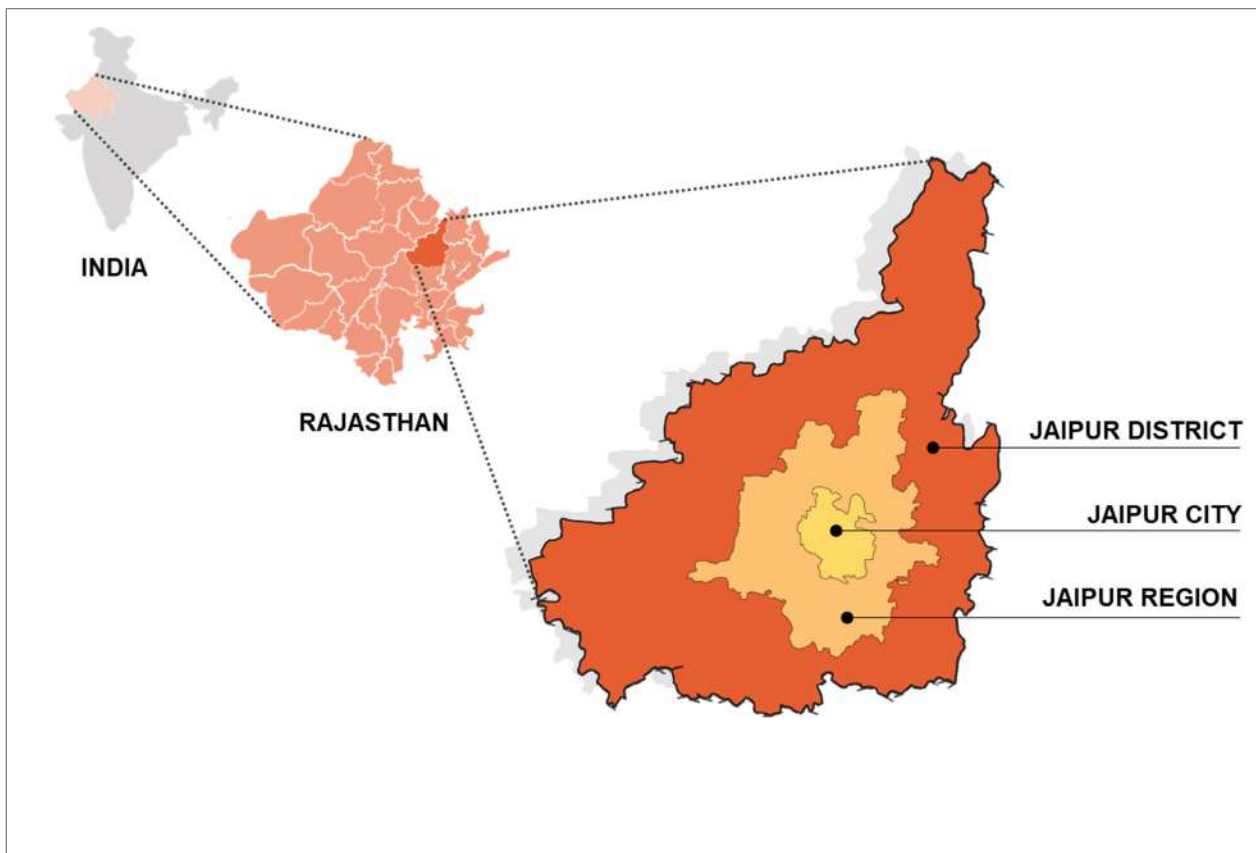
¹ The Urban Sustainability Assessment Framework was developed by UN-Habitat India as a part of the SCIAp project. Further details are available in the Urban Sustainability Assessment Framework Report.

02

Regional Context

LOCATION

Jaipur is the capital city and administrative headquarters of the state of Rajasthan and lies in Jaipur District. The city is at an elevation of 442 m above sea-level and is located in the semi-arid region of the state, experiencing a hot and dry climate through most months of the year. Jaipur is located about 280 km from the national capital, New Delhi, and approximately 240 km from the city of Agra in Uttar Pradesh.



Map 2.1: Location of Jaipur

Source: UN-Habitat

2.1 REGIONAL CONNECTIVITY



Road Connectivity

Jaipur is a part of the most important transportation connectivity corridors in the country, such as the Golden Triangle (Delhi–Agra–Jaipur) tourist circuit, the Golden Quadrilateral, the East–West corridor and the North–South corridor.

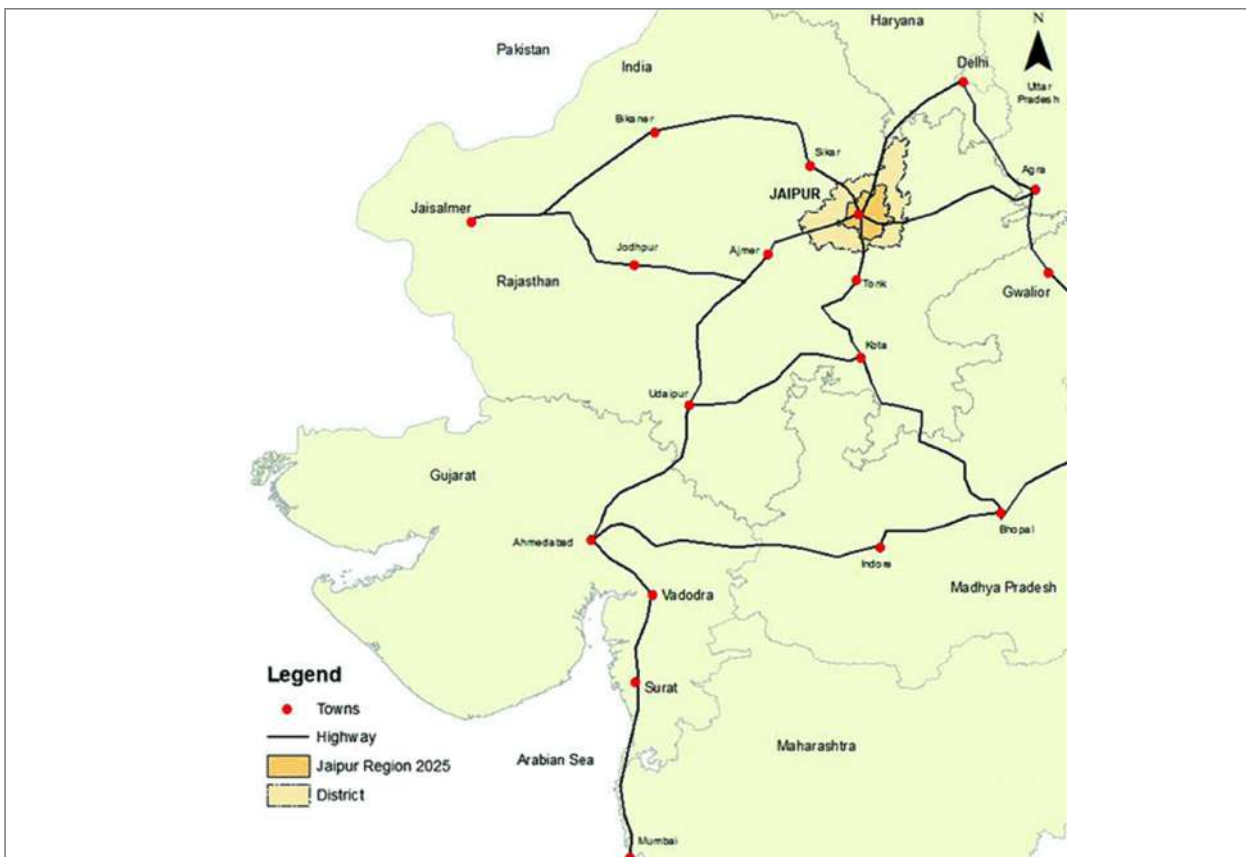
The city is well connected to all the major towns and cities within the state and other areas of the country through the following national and state highways.

- **NH 48/248:** Delhi to Mumbai via Jaipur
- **NH 12:** Jaipur to Jabalpur
- **NH 21:** Jaipur to Agra

- **NH 52:** Jaipur to Hisar
- **NH 148:** Jaipur to Dausa
- **SH 2C:** Kalwar Road
- **SH 12:** Diggsi Malpura Road
- **SH 19:** Jahota Moriija Road
- **SH 37:** Chomu–Churu Road
- **SH 24:** Toonga Road
- **SH 55:** Jamwa Ramgarh Road

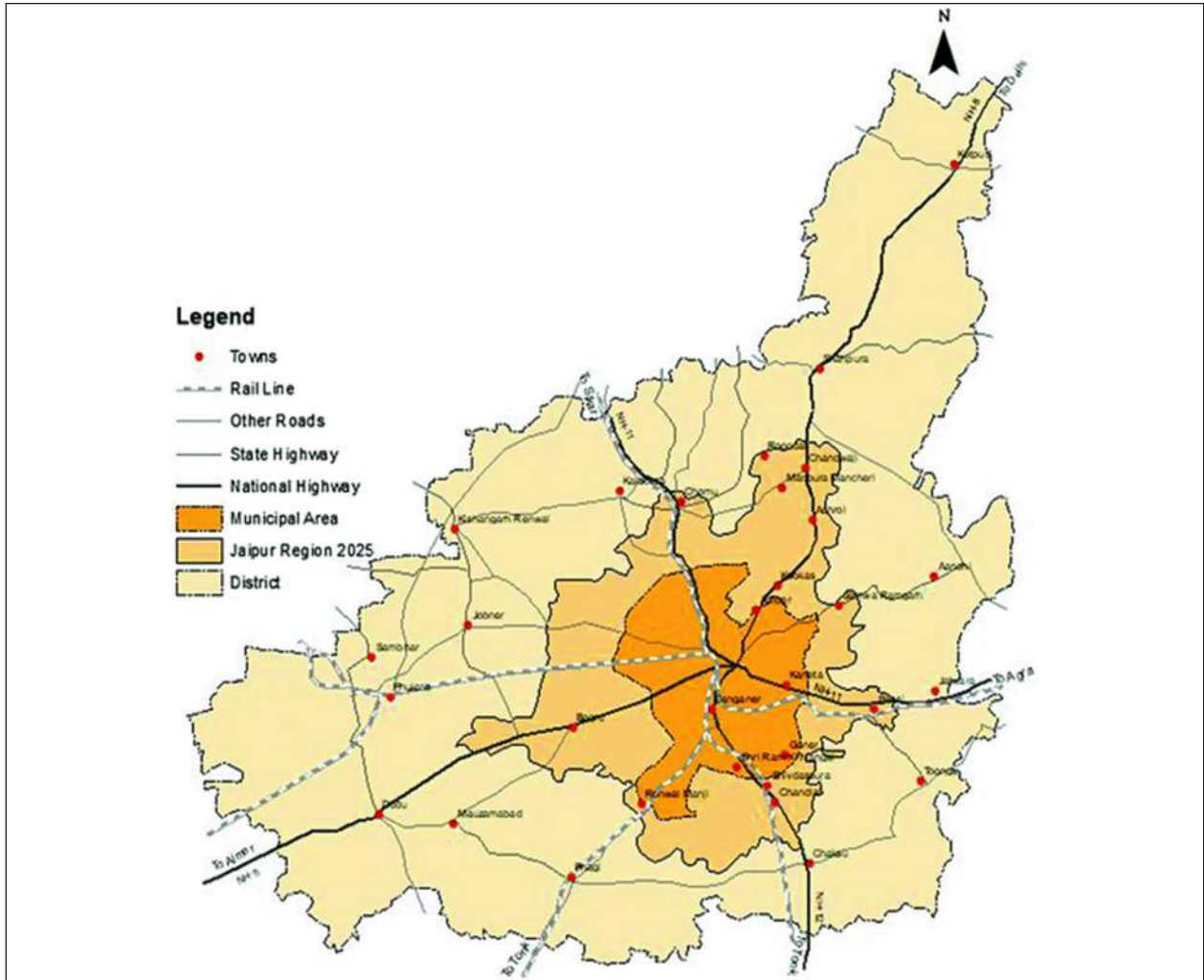
See Map 2.2 for the location of National and State Highways passing through the city.

The inter-city bus traffic is handled by the Rajasthan State Road Transport Corporation (RSRTC). Three main bus depots are operational in the city; Sindhi Camp, Vaishali Nagar and Shastri Nagar. There is also a small bus terminal at Ghat ki Ghuni. The buses originating from these points typically ply to cities such as Delhi, Agra, Ajmer, Alwar, Tonk and Sikar.



Map 2.2: Major Highway Linkages to Jaipur

Source: Jaipur MDP 2025



Map 2.3: Jaipur Regional Connectivity Map

Source: Jaipur MDP 2025



Rail Connectivity

Jaipur is the headquarters of the North Western Zone of the Indian Railways and Jaipur Junction is the primary station, located less than a kilometre away from the walled city area. Due to its popularity as a tourist city and its connectivity to the National Capital, it is one of the busiest railways stations of Rajasthan.

Other than the main station, Jaipur has nine other railway stations within its municipal boundary, namely Gandhinagar, Bais Godam, Sanganer, Khatipura, Kanakpura, Durgapura, Nindhar Benar, Jagatpura and Dahar-ka-Balaji.



Air Connectivity

Located in Sanganer, the Jaipur International Airport is approximately 13 km from the city centre, making it highly convenient for residents and tourists alike. It connects the city to the major airports of the country, such as New Delhi, Mumbai, Chennai, Bengaluru, Hyderabad, and Kolkata.

2.2 REGIONAL URBAN FUNCTION

Jaipur is categorized as a Class I town and ranks 10th in the list of the most populous cities in India.² The main economic drivers of the city are tourism, textile, cloth dyeing, precious stones, jewellery and handicrafts.

Within a 300 km radius of Jaipur, as per the Census town classification, lies one mega city, Delhi, and several important metropolitan cities—such as Kota, an education hub, Ajmer, a handicrafts trade hub, Alwar, a hub for mineral and stone manufacturing, and Bharatpur, an agricultural hub. They form an ecosystem

that supports and complements the economic activities of Jaipur. Other cities in the vicinity, such as Agra, Jodhpur and Udaipur, are tourism hubs that are often clubbed together to form popular tourist circuits for travellers.

2.3 SOCIO-ECONOMIC CONTEXT

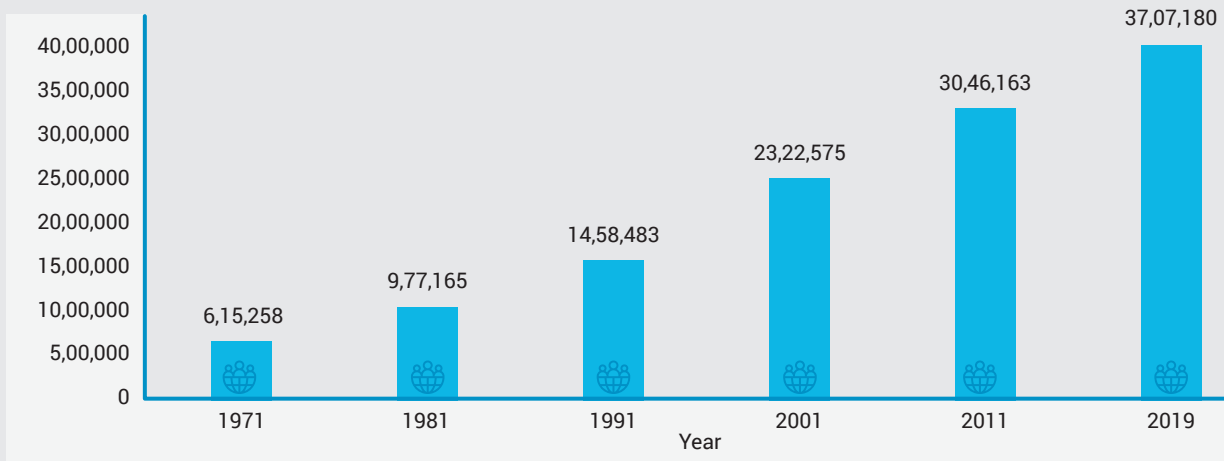
Jaipur is the most populated city of Rajasthan. As per Census 2011, a population of 30.46 lakh resided within the municipal limits of Jaipur. In 2019, this population was reported to be 37.07 lakh.³

Table 2.1: Population of Jaipur city (1971-2019)

Year	Population
1971	6,15,258
1981	9,77,165
1991	14,58,483
2001	23,22,575
2011	30,46,163
2019 ⁴	37,07,180

Source: Census 2011 (data for year 1971 to 2011)

Figure 2.1: Population Trend



Source: Census 2011; Swachh Survekshan Assessment 2020

² <http://mohua.gov.in/cms/number-of-cities--towns-by-city-size-class.php>

³ Swachh Survekshan Assessment 2020 reporting

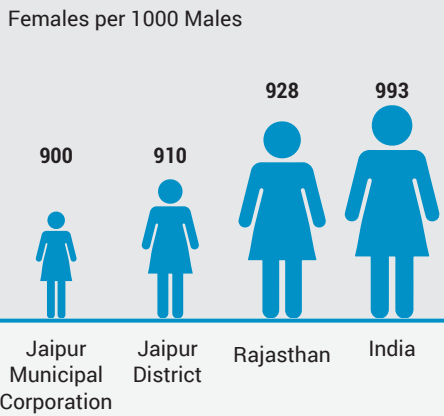
⁴ JMC population in Swachh Survekshan Assessment 2019-20 reporting



Sex Ratio

The Census 2011 reported the city's sex ratio to be 900 women per 1,000 men. Among children aged 0-6 years, the sex ratio is 855. These numbers are significantly lesser than the state average of 928 and the national average of 933.

Figure 2.2: Sex ratio within JMC compared to Jaipur District, Rajasthan and India



Source: Census 2011



Poverty, Income Levels and Literacy Rate

About 5.9 per cent of the total population lies below the poverty line.⁵ The per capita income of the city in 2008-09 was INR 37,984, higher than the average per capita income of INR 23,194 of Rajasthan, but marginally lower than the national average of INR 38,084.⁶

Within the municipal limits, 83.33 per cent of the total population is literate; with 89.38 per cent of all the male population and 76.65 per cent of the female population being literate.



Migration Patterns

Census 2011 data revealed that 3,52,245 people, constituting 11.6 per cent of the total population within Jaipur city's municipal limits, migrated to Jaipur between 2001 and 2011. In fact, almost 49 per cent of the net increase in the city's population in 2011 was owing to migration against 32 per cent in 2001. This data suggests the increasing attractiveness of the city.

Table 2.2: Net population increase (decadal) in Jaipur – 1981 to 2011

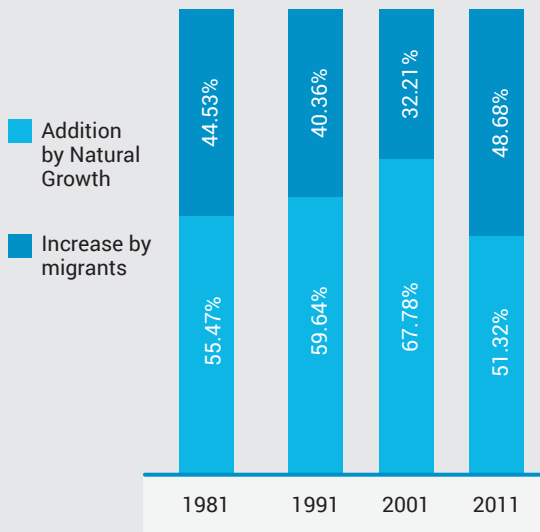
Year	Total Population (in lakhs)	Net population Increase from previous decade (in lakhs) A=[B+C]	Addition by Natural Growth		Increase by Migrants	
			Population increase [B]	%	Population increase [C]	%
1981	9.77	3.75	2.08	55.47	1.67	44.53
1991	14.58	5.03	3	59.64	2.03	40.36
2001	23.23	8.04	5.45	67.78	2.59	32.21
2011	30.46	7.24	3.71	51.32	3.52	48.68

Source: Jaipur MDP 2025 Vol 1; Census 2011

⁵ <https://niu.a.org/khub/wp-content/uploads/2015/08/CII-RAJ.pdf>

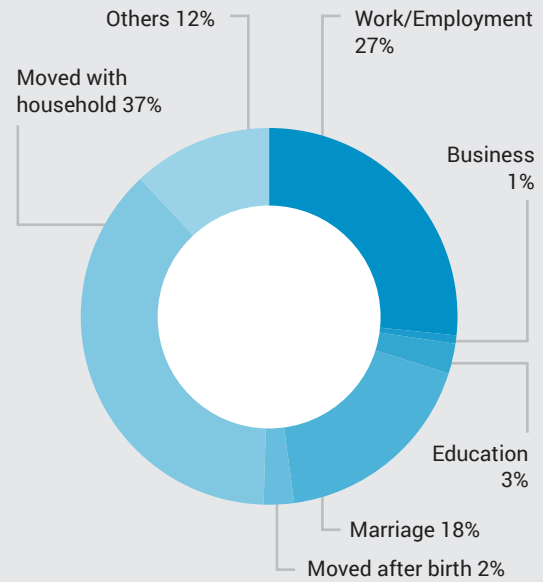
⁶ http://mospi.nic.in/sites/default/files/press_release/pressnote_nad_9feb09.pdf

Figure 2.3: Contribution to net increase in population from previous decade



Source: Jaipur MDP 2025 Vol 1; Census 2011

Figure 2.4: Reasons for migration into urban areas of Jaipur District



Source: Census 2011

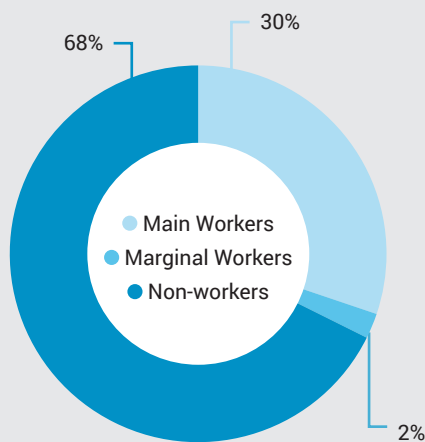
Of this migrant population, about 37 per cent migrated along with their households, followed by 27 per cent who moved for work or employment.



Workforce Participation

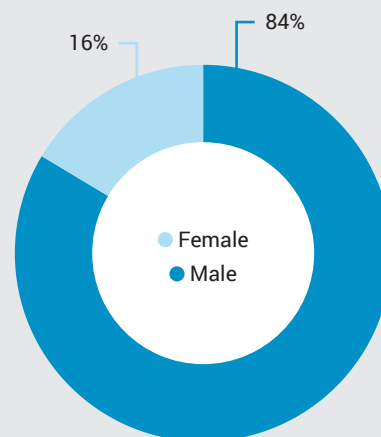
There are a total of 9,85,494 people categorized as main and marginal workers⁷ within the municipal corporation limits, which accounts for approximately 32.4 per cent of the population.

Figure 2.5: Workforce Participation Rate



Source: Census 2011

Figure 2.6: Gender Distribution of Workers



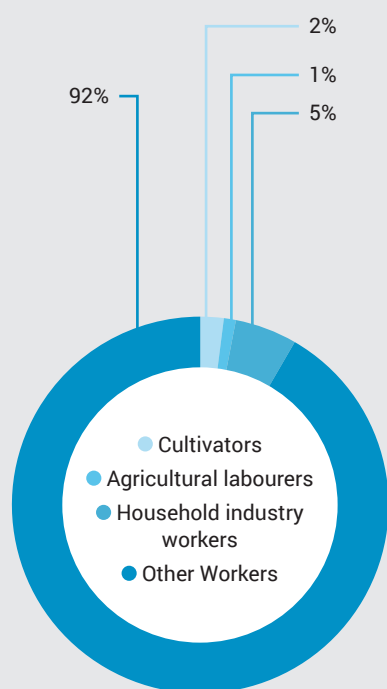
Source: Census 2011

Sixty-eight per cent of the total population, including children and senior citizens, are categorized as non-workers. Eighty-four per cent of main/ marginal workers within the municipal limits are male and the remaining 16 per cent are females.

Merely eight per cent of workers within the municipal limits were engaged in cultivation, agricultural or

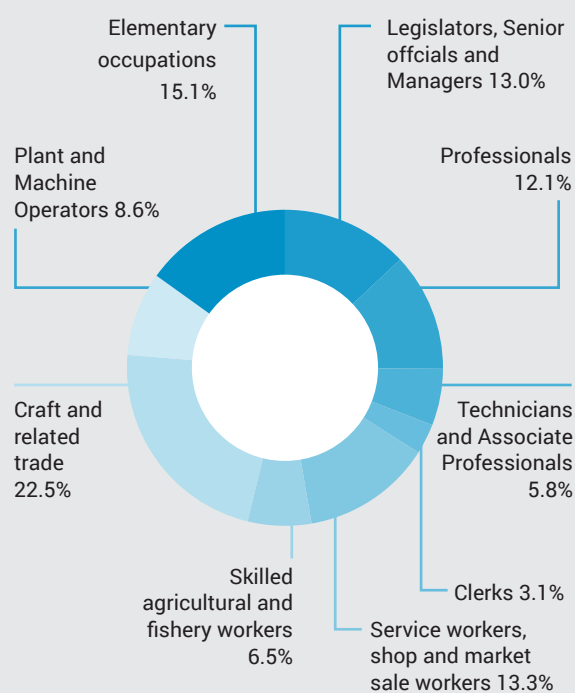
household industry activities. The rest of the 92 per cent of the working population were engaged as government servants, municipal employees, teachers, factory workers, plantation workers, priests, entertainment artists, traders, business persons, and those engaged in transport, banking, mining, construction, political or social work, etc.

Figure 2.7: Worker distribution by category



Source: Census 2011

Figure 2.8: Urban Workers Distribution



Source: National Classification of Occupation

⁷ Employment stats reported in the Census are classified into main, marginal and non-workers. Main workers are those who work for the major part of the year (183 days or more); marginal workers are those who did not work for the major part of the year (less than 183 days); non-workers are those who never worked during the preceding year. Source: http://mospi.nic.in/sites/default/files/reports_and_publication/statistical_manual/Chapter%207.pdf

03



Urban Governance

The institutional structures at the state, parastatal and city levels determine the governance efficiency of cities. Their interconnectedness and symbiotic functions could enhance vertical linkages to implement and operationalize national programmes and policies at local levels. In India, the responsiveness of state and parastatal agencies in land management policies and service delivery inform municipal development and determine the growth trajectory of cities.

3.1 LEGAL CONTEXT

The Jaipur Municipal Corporation (JMC) functions under the Rajasthan Municipalities Act, 1959, and its further amendments. JMC was formed to provide essential services in the city, such as sanitation, solid waste management, maintenance of parks, building and layout approvals, and public grievance. Despite the 74th Constitutional Amendment, JMC still has to seek approval from the Directorate of Local Bodies.

The Jaipur Development Authority Act, 1982, is the legal document in place for planning, co-ordinating and

supervising the proper, orderly and rapid development of the Jaipur Region and of executing plans, projects, and schemes for such development. Under this Act, the Jaipur Development Authority (JDA) is mandated to prepare Master Development Plans (MDPs) as well as the more detailed Zonal Development Plans (ZDPs). The last MDP for Jaipur was prepared for the horizon year 2025 and was approved in 2011. The MDP 2025 area is divided into 17 planning zones. The ZDPs for these zones were last published in 2018. The urban area boundary of MDP 2025 is divided into sectors and their respective plans are prepared with detailed road layouts.

The Rajasthan Urban Development Policy, 2017, envisions developing cities and towns by enhancing productivity, livability, and prosperity for their citizens. It provides an overarching framework to deal with important and critical issues of urban services, such as water, sanitation, drainage, mobility, housing, etc., and other cross-cutting aspects related to urban development, including finance, governance and smart solutions, and environmental sustainability.

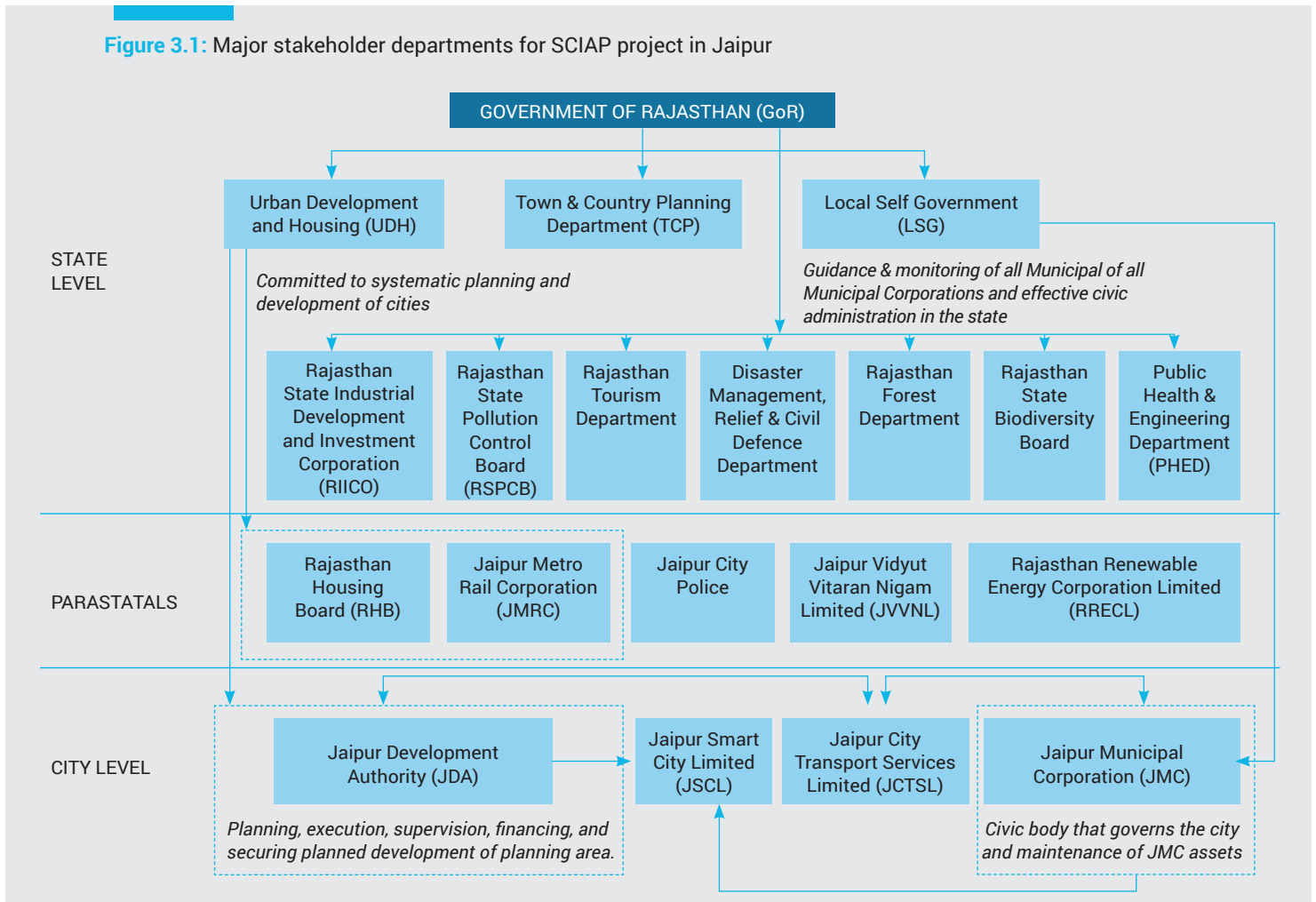
JMC was formed to provide essential services in the city, such as sanitation, solid waste management, maintenance of parks, building and layout approvals, and public grievance addressal.

3.2 INSTITUTIONAL CONTEXT

The department of Local Self Government (LSG) and the department of Urban Development and Housing (UDH) are the apex bodies that administer and monitor town and infrastructure planning and execution in Rajasthan.

LSG is the controlling department of all municipalities for all administrative purposes, monitoring and coordinating all functions at the state level for all the 213 municipal bodies of the state. This department looks after the daily functioning of all these urban local bodies (ULBs), including the JMC or Jaipur Nagar Nigam. The institutional structure and hierarchy are shown in Figure 3.1.

Figure 3.1: Major stakeholder departments for SCIAP project in Jaipur



Source: UN-habitat

The UDH is responsible for planning policies and regulations in Rajasthan. It is the supervising agency for three development authorities (Jaipur, Jodhpur and Ajmer) and all Urban Improvement Trusts in the state. In Jaipur, it is the approving authority for most projects under the purview of JDA. While UDH deals with broader policymaking at the state-level, JDA is responsible for the planning and implementation of city development plans and infrastructure for the notified JDA area. JDA also holds the land bank of the city.

JDA and JMC together have two committees for layout plan approvals and building approvals. JDA is responsible for preparing development plans; while the

authority of land and development plans lies with JMC, who is responsible for providing basic services, tax collection and maintenance of the developed layout. The interaction between JDA and JMC is limited to the transfer of layouts and development rights.

JDA's activities are primarily governed by the city's administrators with less involvement of political leaders, while JMC is governed by a legislative council headed by the city's Mayor.

Table 3.1 provides information about roles and responsibilities of various other agencies in Jaipur.

Table 3.1: Roles and responsibilities of key stakeholder departments in Jaipur

S. No	Organization	Key roles and responsibilities in Jaipur
1	Jaipur District Collectorate	Plays key role in disaster management, public distribution, and civil supplies, monitoring and implementation of various social welfare programmes.
2	Jaipur City Police	Maintains law and order enforcement, and public safety. Besides police stations, the city has special branches for women, traffic control, cyber security, crime records and intelligence gathering. The traffic wing handles road safety, vehicular traffic regulation and management.
3	Public Health & Engineering Department (PHED)	Responsible for provision of safe drinking water supply to city. This includes securing water sources, treatment of water, transmission and distribution of water, providing water connections, billing of water charges, disconnections of water charges, repair of damages, etc.
4	Jaipur Metro Rail Corporation (JMRC)	State-owned company that operates the Jaipur Metro
5	Jaipur City Transport Services Limited (JCTSL)	An SPV created to operate city bus services (known as Jaipur Bus). It is owned by the Rajasthan State Road Transport Corporation (RSRTC).
6	Rajasthan Forest Department	Manages forests in and around 9.6 per cent of the state area; its primary mandate is to protect and conserve forest and wildlife wealth in the state.
7	Rajasthan State Pollution Control Board (RSPCB)	Responsible for quality check and monitoring of air, water and noise pollution, hazardous waste management, and industrial waste. Also responsible for enforcing environmental zones and environmental guidelines, protecting bio-diversity, etc. It gives environmental clearances to various industrial, mining and construction activities. Mining operations are also screened by RSPCB.
8	Disaster Management, Relief & Civil Defence Department	State apex body for disaster management. Oversees relief work through different departments/ organizations like the PWD, forest department, soil conservation department, PHED, Panchayati Raj department, revenue department, and local bodies, etc.
9	Jaipur Vidyut Vitran Nigam Limited (JVNL)	Responsible for distribution and supply of electricity in 12 districts of Rajasthan, including Jaipur.
10	Rajasthan State Industrial Development & Investment Corporation Limited (RIICO)	Responsible for administering the development and management of industrial areas. It also acts as a financial institution by providing loans to large, medium and small scale projects.
11	Rajasthan Renewable Energy Corporation Limited (RRECL)	State nodal agency for promoting and developing non-conventional energy sources in the state. Works as a state designated agency (SDA) for enforcement of the Energy Conservation Act, 2001, in Rajasthan.
12	Directorate of Environment and Climate Change, GoR	Planning, promotion, co-ordination and overseeing the implementation of environmental and forestry projects, policies and programmes in the state.

Source: Un-Habitat



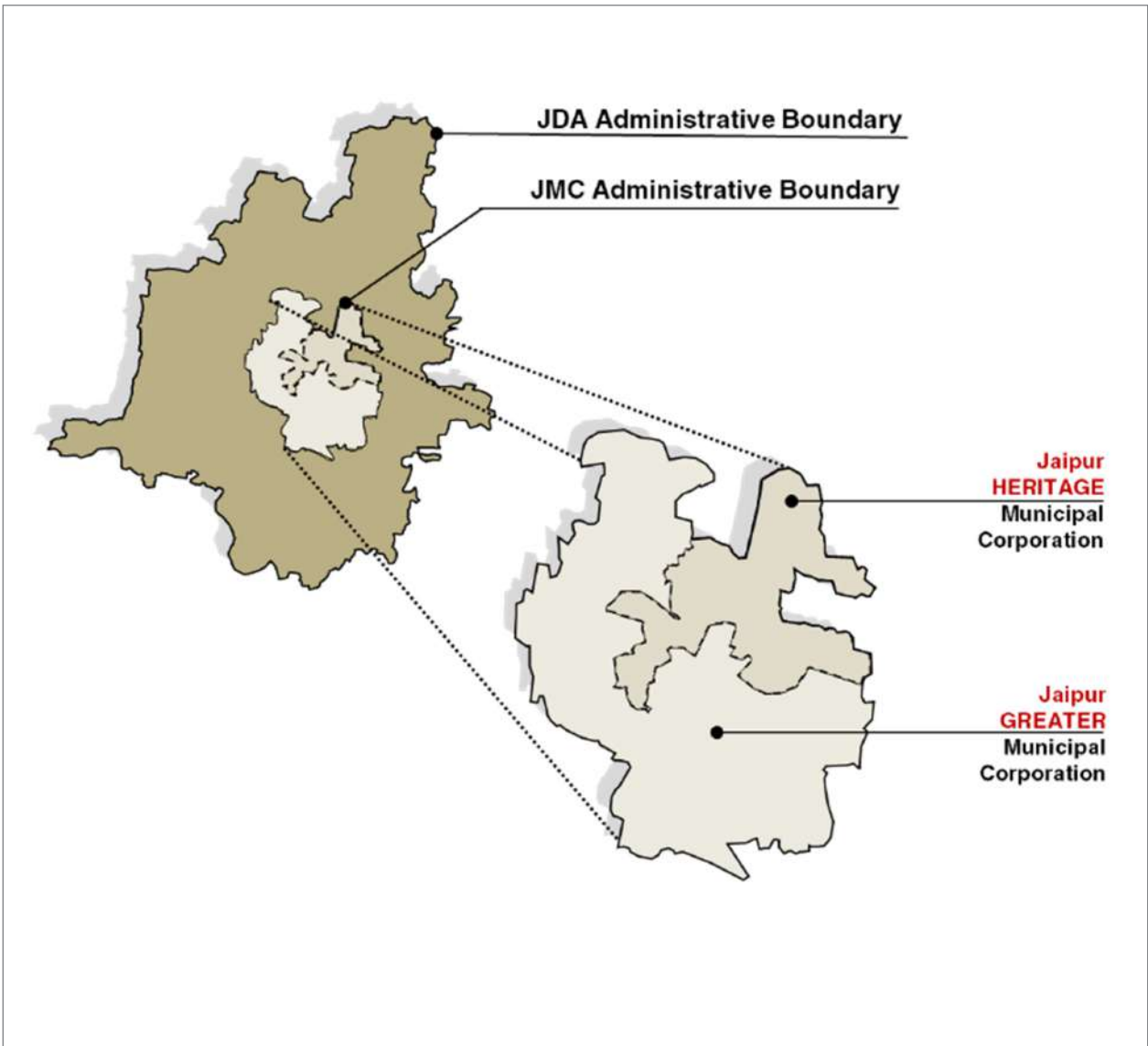
Image 3.1: Jaipur Municipal Corporation (JMC), Greater Office, Tonk Road

Source: <https://urban.rajasthan.gov.in/content/raj/udh/jaipur-nagar-nigam/en/home.html#>

3.2.1 Administrative boundaries

As per census 2011, the jurisdictional area of JMC is 484.64 sq. km. (48,464 Ha). For better service delivery and management of the city, in 2020 JMC was bifurcated into two administrative bodies, JMC Heritage and JMC Greater.

For better service delivery and management of the city, in 2020 JMC was bifurcated into two administrative bodies, JMC Heritage and JMC Greater.

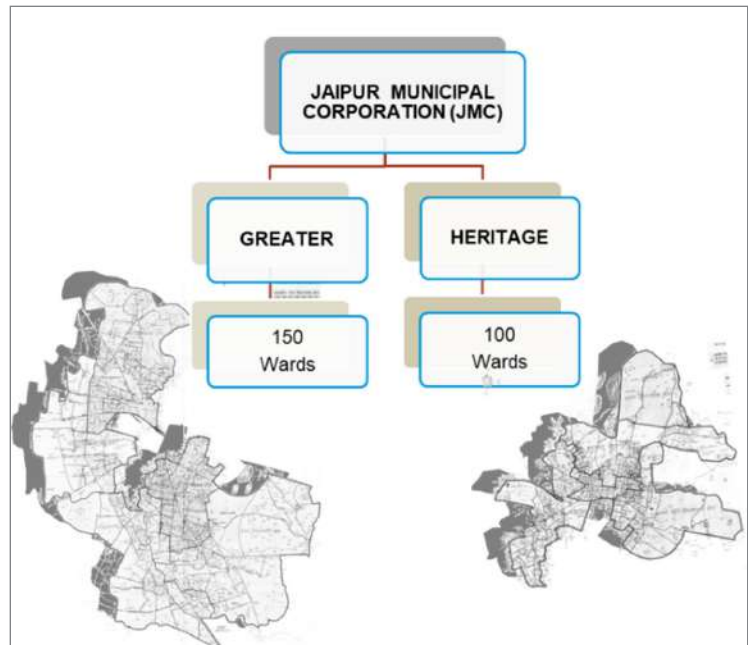


Map 3.1: Jaipur Administrative Boundaries

Data Source: JMC; Map Source: UN-Habitat

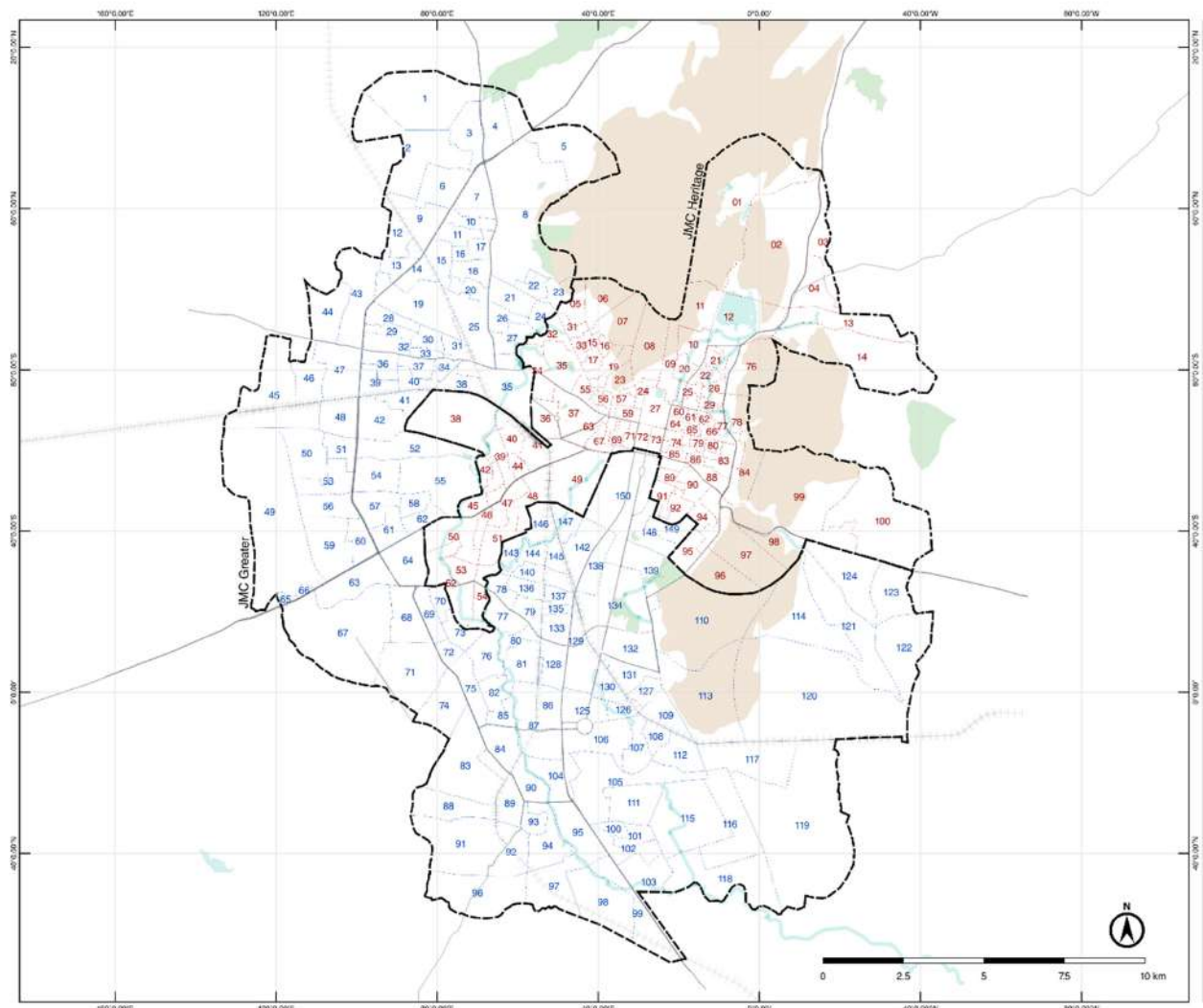
JMC Heritage's jurisdiction is further divided into 100 wards with five zones. It caters to a population of about 13 lakh. It includes the walled city area and the city of Amer. JMC Greater's administration extends to the western and southern parts of the city. It is divided into 150 wards with another five zones and caters to a population of roughly 17 lakh.

The JDA administrative boundary (which is also the planning area boundary) extends beyond the JMC Heritage and JMC Greater limits, capturing an area of 2,940 sq. km. (29,400 Ha) and includes 15 satellite towns and 725 revenue villages.



Map 3.2a: Area under JMC Heritage and JMC greater

Data Source: JMC; Map Source: UN-Habitat



Map 3.2b: JMC Heritage and JMC greater Ward Boundaries

Data Source: JMC; Map Source: UN-Habitat

04



Existing Urban Analysis

4.1 SIGNIFICANT NATURAL AND BUILT ASSETS

4.1.1 Natural features

The city of Jaipur lies on a flat terrain at an elevation of 442 m above sea level, but is also surrounded by dominant natural features. The Nahargarh Hills to the North and Jhalana to the East, which form part of the ancient Aravalli Range, wrap around the northern and eastern peripheries of the city, reaching an elevation of about 587 m. There are other deeply dissected and eroded hills at Jaigarh, Amargarh and Amber, in addition to an isolated hillock in the middle of the city's administrative centre, called "Moti Dungri", topped by an old castle. These rugged hills give the city a unique character and identity.



Image 4.1: Terrain view of Aravalli Hills in Jaipur

Source: Google Earth



Image 4.2: View inside Jhalana Forest

Source: UN-Habitat

With an area of approximately 20 sq. km., the hills of Jhalana, to the South-East of Jaipur, contain lush forests with a very rich biodiversity. They host various species of local wildlife, most popularly leopards, along with striped hyenas, blue bulls (*nilgai*), spotted deer (*chital*), some sambar deer, desert foxes, jackals, Indian civets, desert cats and jungle cats. The forests here are also home to porcupines, jungle rats, monitor lizards, mongoose, and a variety of snakes.

forming a natural drainage pattern for the city. The most prominent contiguous drain of the city is the Amanishah Nala, now known as the Dravyavati River, which runs for about 47.55 km within Jaipur before extending further South to join the Dhund River. Two major tributaries joining the Amanishah Nala (drain) are Kharatapura Nala (Ganda Nala) and Jhalana Nala, which originate from the Jhalana Hills and merge with the main stream at Mansarovar and the Sitapura industrial areas, respectively.

The general slope of the land in and around Jaipur tilts from North to South, and then to the South-East,



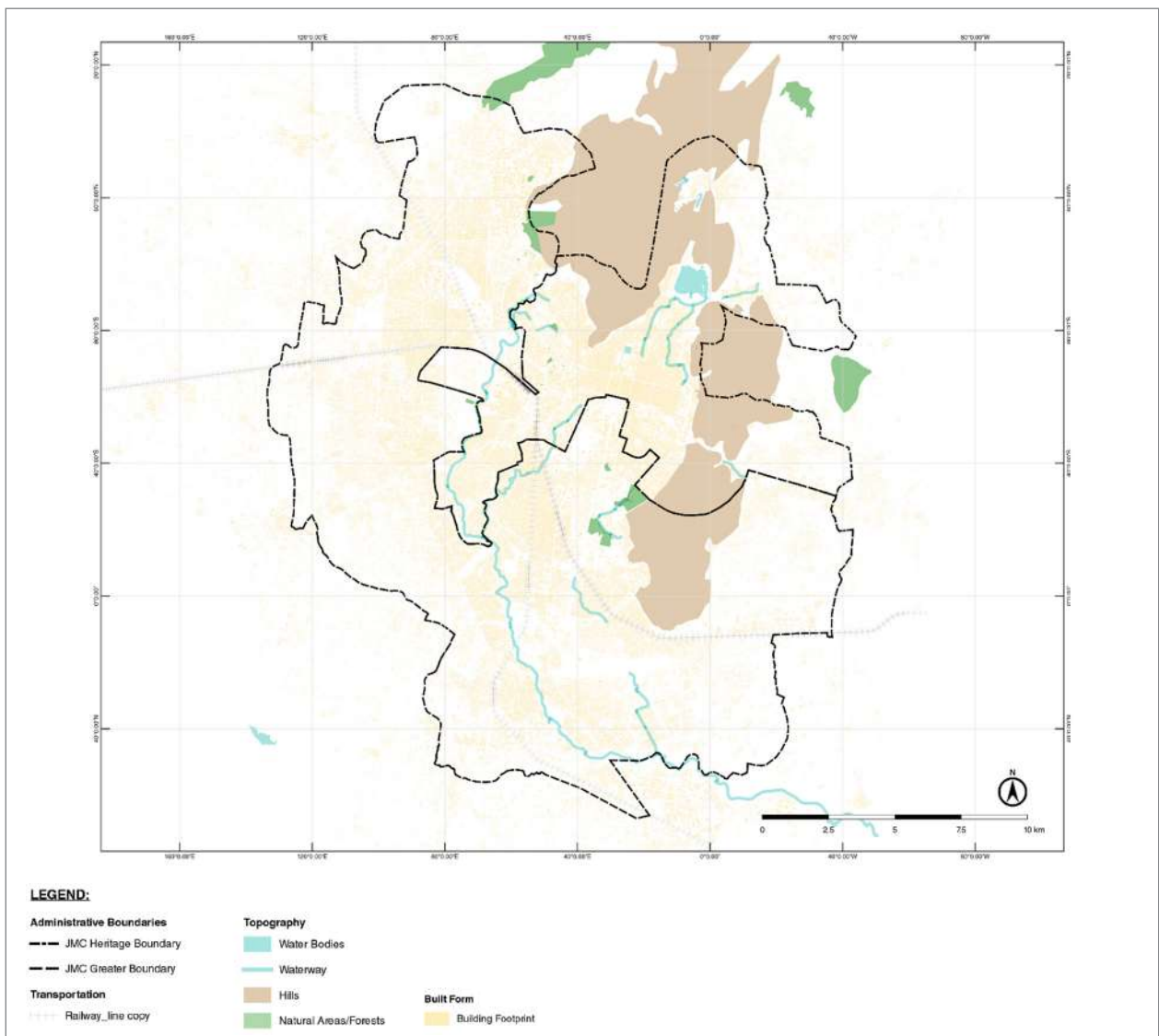
Image 4.3: View of landscape park along the Dravyavati riverfront development project

Source: <https://www.thehindu.com/news/cities/mumbai/quiet-flows-the-dravyavati-in-jaipur-could-mithi-be-next/article28665080.ece>



Image 4.4: View from Nahargarh Fort overlooking Jaipur and the Aravalli Hills

Source: <https://ourglobaltrek.com/travel-blog/jaipur-hello-rajasthan>



Map 4.1: Natural features

Data Source: JDA; Map Source: UN-Habitat

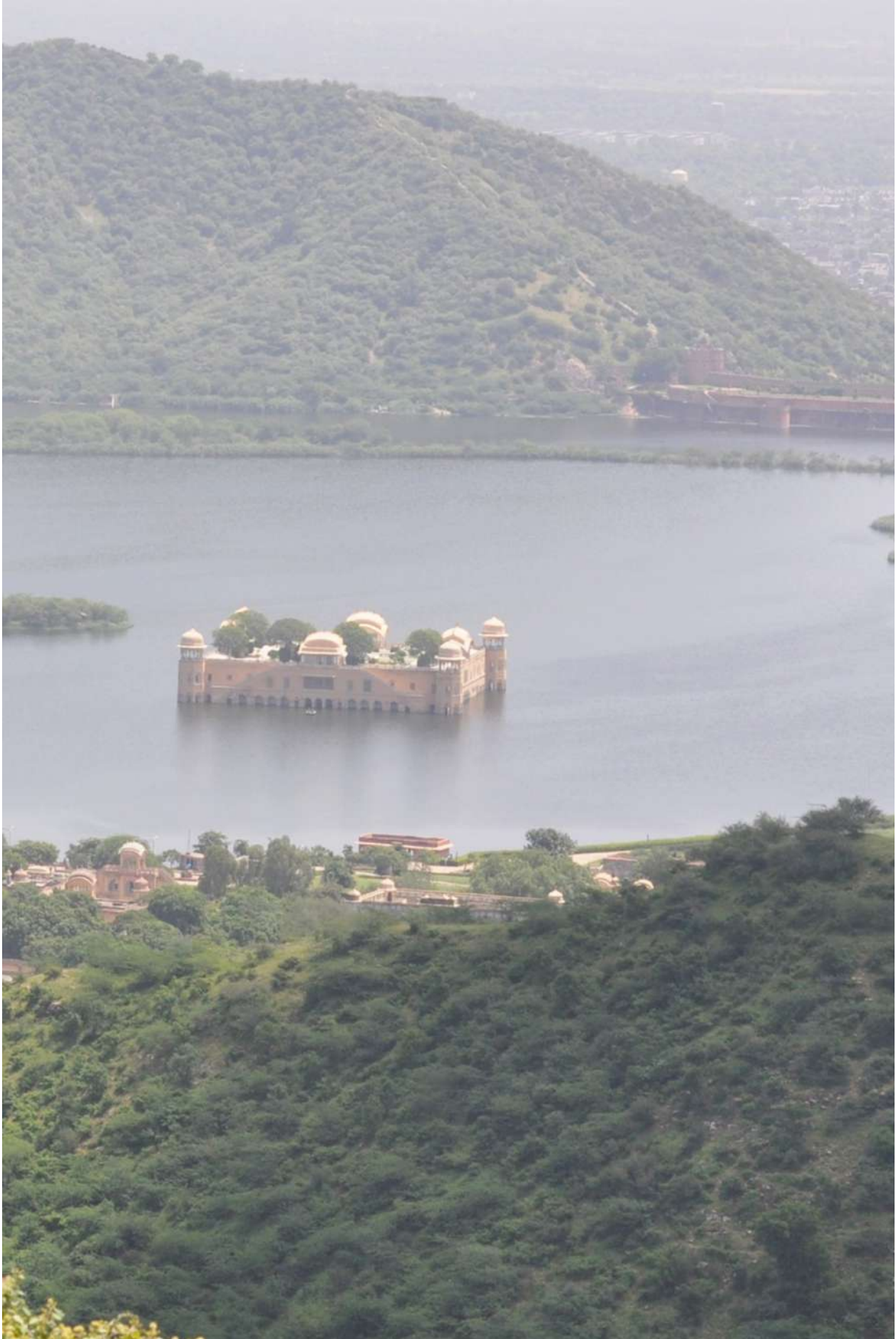


Image 4.5: View of Jal Mahal on Mansagar Lake

Source: Indian Birding Fair Group

4.1.2 Built assets

Jaipur's walled city is renowned worldwide as an embodiment of traditional cultures as well as modern city planning. The walled city has a pragmatic grid layout, designed as per the traditional Indian Vastu and Shilpa Shatra norms of planning and architecture. The area hosts a number of built marvels that are a blend of architectural styles from early Indian, medieaval Islamic as well as colonial influences.

Some of Jaipur's iconic monuments include the Amer Fort, Hawa Mahal, Birla Mandir, Jal Mahal, Jantar Mantar and the Jaipur City Palace, which display exemplary architecture. In 2010, Jantar Mantar was exclusively declared as a UNESCO World Heritage Site.



Image 4.6: Hawa Mahal

Source: <https://www.orientrailjourneys.com/info/jaipur-unesco-world-heritage-site.html>



Image 4.7: Jal Mahal

Source: <https://www.orientrailjourneys.com/info/jaipur-unesco-world-heritage-site.html>



Image 4.8: Amer Fort

Source: <https://www.orientaljourneys.com/info/jaipur-unesco-world-heritage-site.html>

Jaipur Walled City was added to the 'UNESCO World Heritage City' list in 2019

Given its rich and vibrant cultural history, Jaipur is studded with beautiful architecture and is renowned across the globe for its heritage. There are 1,096 structures listed within the walled city and 82 structures listed outside it. Additionally, the city has 45 protected monuments listed under the Archaeological Survey of India and State, and 350 structures listed under INTACH. The city received additional validation by making it to the UNESCO World Heritage City list in 2019. It is the one of the most visited places in India, attracting an average of

3,000 national and international tourists every day. The city's greatest strength is its heritage and culture, which functions in tandem with its economy.

The architecture outside Jaipur's walled city is quite disconnected from what lies within. This is primarily due to the lack of design and planning guidelines back when the city was expanding outside the walled area. However, there are examples of some beautiful public buildings in the new city, such as the Jawahar Kala Kendra.



Image 4.9: Jawahar Kala Kendra



Source: Twitter; <http://hiddenarchitecture.net/jawahar-kala-kendra/>

4.2 URBANIZATION AND LAND USE PATTERNS



City Development Pattern

The city was founded by the state ruler of the Kingdom of Amber, Maharaja Jai Singh II, in 1727. He created Jaipur by moving his state capital from Amer town to a location about 11 km away, due to limitation of space and state security reasons.

Jaipur is one of India's first planned cities, with avenues neatly dividing the city into nine blocks. The city centre, where the old city flourished, is now known as the walled city and holds great cultural and economic significance.

The physical terrain of Jaipur acted as a major guideline for its planning and design. With an area of 6.7 sq. km., the walled city was originally located on a rocky terrain to provide for an easy drainage system on either side of the city. Future expansions of the city, however, took place towards the South and the West. The development beyond the old city was considered to be suburban that the time.

With the development of railway infrastructure and introduction of motor cars in the early 1900s, Jaipur soon became the administrative, commercial and trade centring, spilling beyond the walled city. In 1929,

a new act of Jaipur Municipal Council was enforced. The consequential growth of industries and social infrastructure triggered a high rate of urbanization.

In 1935, five major land development schemes were prepared for housing the growing population towards the North-West of the walled city, viz., Fate Tibba, the Medical College and Gangwal Park area, Ashok Nagar, New Colony, and the Jalupura and Bani Park area. Other developments, such as Sanganer, the Sitapura Industrial Area and Malviya Industrial Area soon followed towards the South-East.

After the independence of India in 1947, Jaipur experienced a sudden growth in population with the influx of refugees from the Partition. It was around this time that Jaipur was declared the official capital of the newly formed state of Rajasthan, becoming its administrative centre.

4.2.1 Urban density

During the decades between 1970 and 2001, Jaipur city experienced extremely high decadal growth rates ranging from 49 per cent to 59 per cent. The city displayed a decadal population growth rate of 31.15 per cent between 2001 and 2011, which was higher than Jaipur District's decadal growth of 26.19 per cent during the same period. However, it was much lower than that in earlier decades.

Table 4.1: Population, population growth rate, area and population density of Jaipur over decades

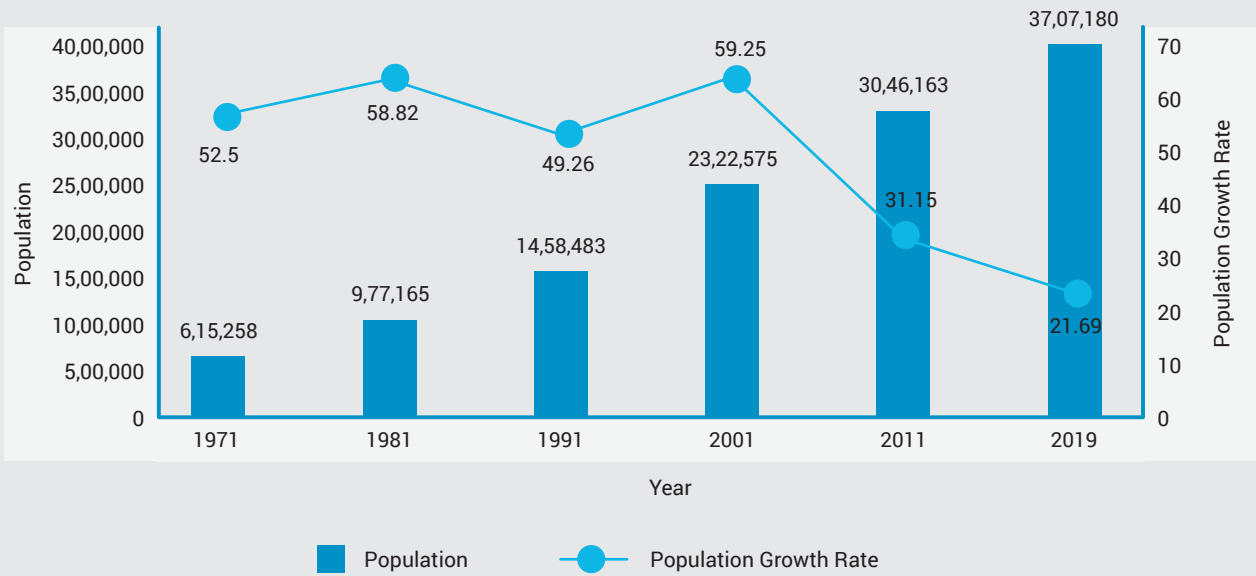
Year	Population	Decadal growth rate (%)	JMC Area (in SqKm)	Population Density/ Ha (PPH)
1971	6,15,258	52.50		
1981	9,77,165	58.82	200.00 ⁸	48.85
1991	14,58,483	49.26	218.30	66.81
2001	23,22,575	59.25	484.64	47.92
2011	30,46,163	31.15	484.64	62.85
2019 ⁹	37,07,180	21.69	484.64	76.49

Source: Census 2011

⁸ CDP, 2006

⁹ JMC population as per the Swachh Survekshan Assessment 2019-20 report

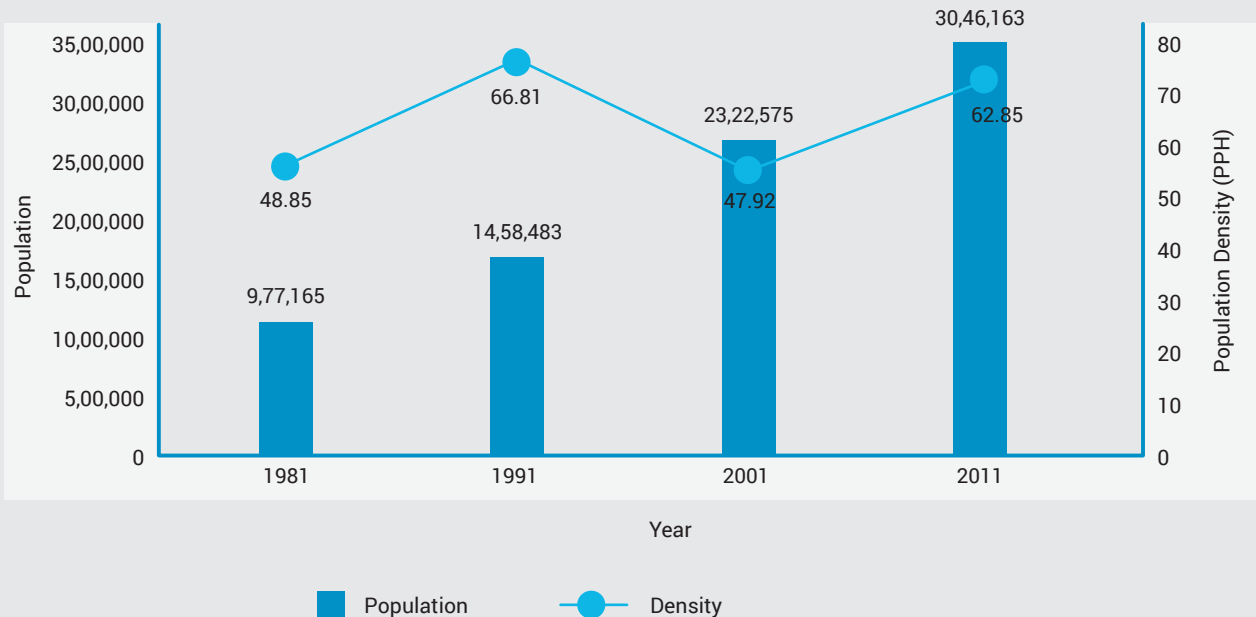
Figure 4.1: Population Growth Trend



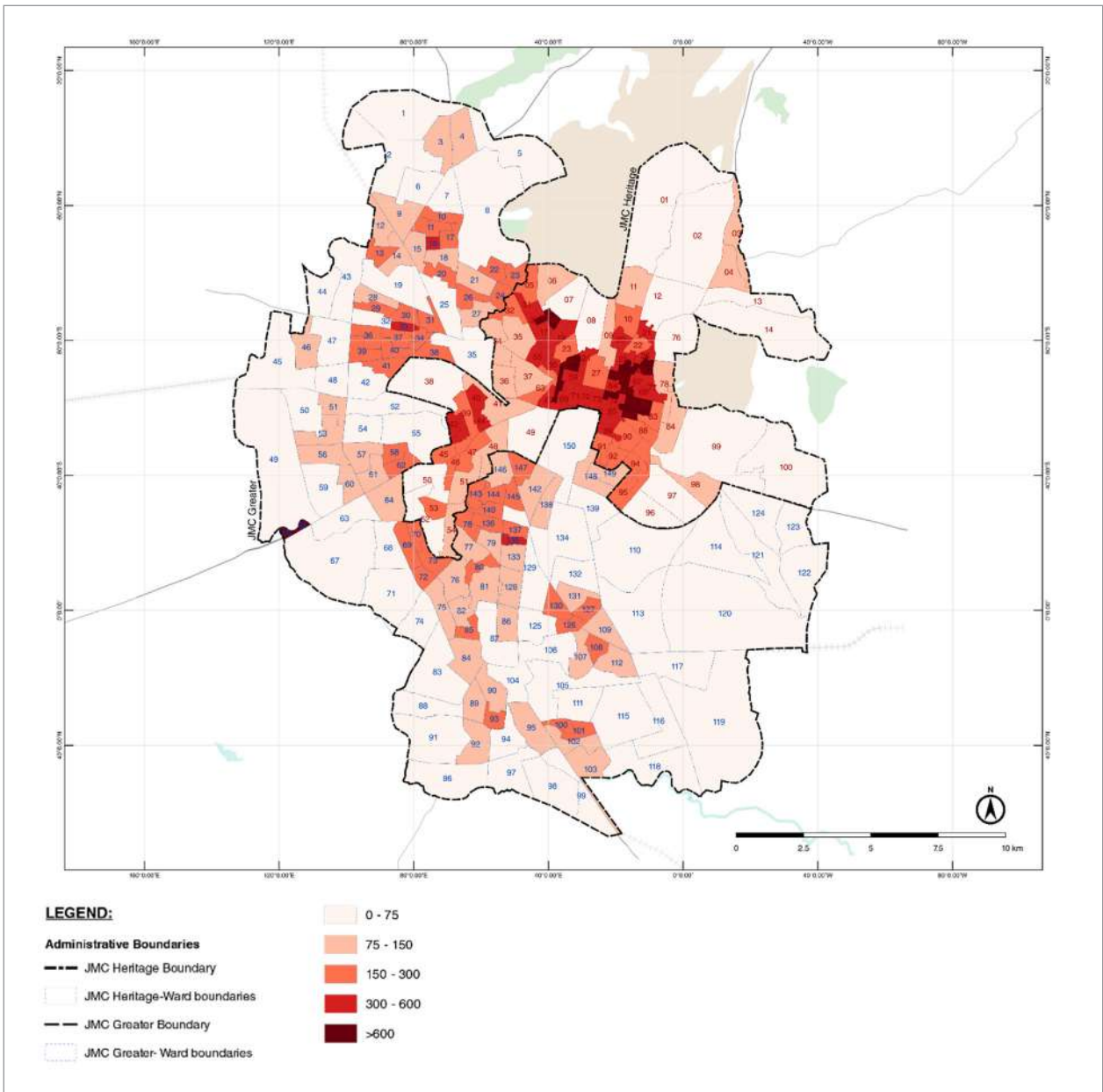
Source: Census 2011

Between 1981 and 2011, Jaipur's municipal limit expanded about 2.5 times from 200 sq. km. to 484.84 sq. km.

Figure 4.2: Population Density Trend



Source: Census 2011



Map 4.2: Ward-wise population density distribution

Source: JMC

4.2.2 Existing and proposed land use patterns

The city centre of Jaipur constitutes of mostly residential, commercial and mixed-use development. The industrial agglomerations can be spotted towards the periphery and outskirts of the city’s municipal limits. As the city fans outwards, more agricultural land use patterns are observed with some linear development along national highways, state highways

and major district roads. About 75.5 sq. km. is demarcated as forest cover within the U1 area, accounting for roughly eight per cent of the land cover. Most of this forest area is part of the Aravalli Range.

Informal settlements of the city can typically be spotted on vacant lands, in clusters or in linear fashion, along the foothills of the Aravallis or near waterfronts. They are also found near popular commercial areas of the city.



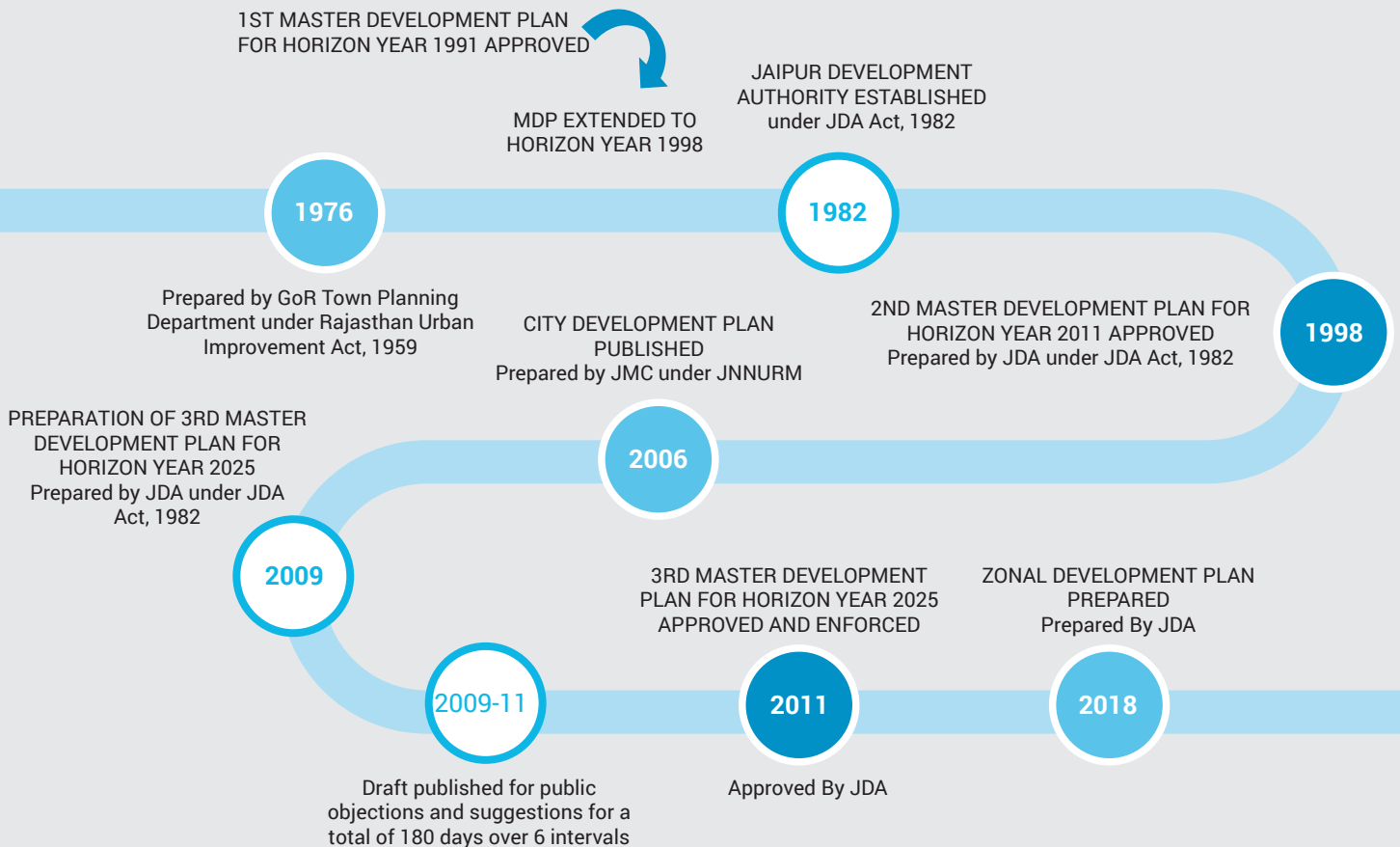
Master Development Plan of Jaipur

Over the years, JDA has responded to the rising pressure of urbanization and development through the preparation of Master Development Plans (MDPs).

With the city's expanding growth the planning area expanded from 390 sq. km. in MDP 1976 to 1,959 sq. km. in MDP 2011 and to 2,940 sq. km. in the last MDP for 2025.

The first master plan of Jaipur was prepared in 1976, under the Urban Improvement Act of 1959, for the horizon year 1991. After the enforcement of the JDA Act in 1982, the second MDP of Jaipur was prepared by JDA in 1998 for the horizon year 2011.

Figure 4.3: Timeline of Jaipur Master Development Plans



Source: UN-Habitat

The last Jaipur MDP 2025 was published by JDA in 2011, as discussed earlier, and guides the development of an area of 2,940 sq. km, including the area under JMC's jurisdiction. Within the planning boundary, an area of 945 sq. km. was demarcated as urbanizable area, or U1 area.

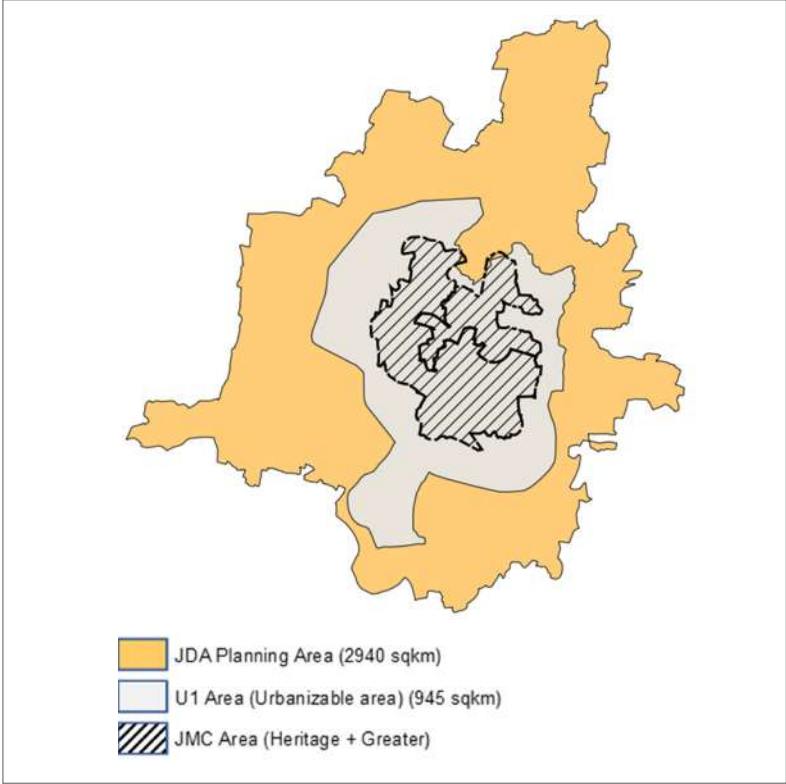
The Vision for MDP 2025 is to position the Jaipur region as a global metropolis and a world-class city that provides a better quality of life for its citizens through sustainable development.

The goals and objectives are intended to be met by methods of increased engagement of private sector, aggregation of land through land pooling schemes, use of land bank available with JDA, setting of Action Plans (5 years, 10 years, 20 years), etc. The actual implementation of MDP 2025 was designed to be executed through focused plans such as zonal development plan, local area plan, infrastructure plan, city sanitation plan, etc. Different committees would be formed for the planning, monitoring, coordination, approvals and reviews.



Proposed Land Use Plan

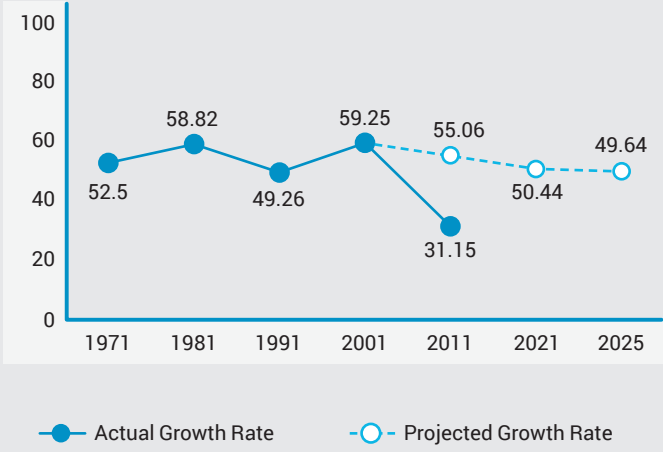
When the MDP 2025 was being prepared in 2009, through the least square projection method, JDA estimated a steady decadal population growth of 50-55 per cent in Jaipur. With such a high growth estimation, MDP 2025 demarcated about half of the U1 area as residential land use to accommodate the growing population. For Jaipur’s resident’s, however, only 6.6 per cent of the U1 area was allocated to public parks and recreational space. This is disproportionate to the city’s population and much below the recommended URDPFI standards of 14-16 per cent.



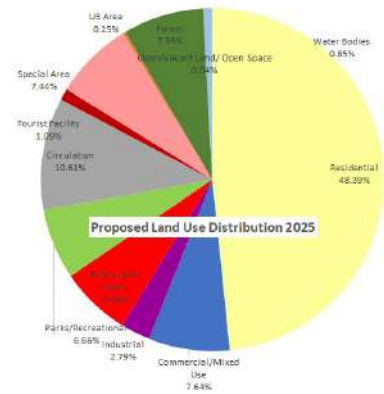
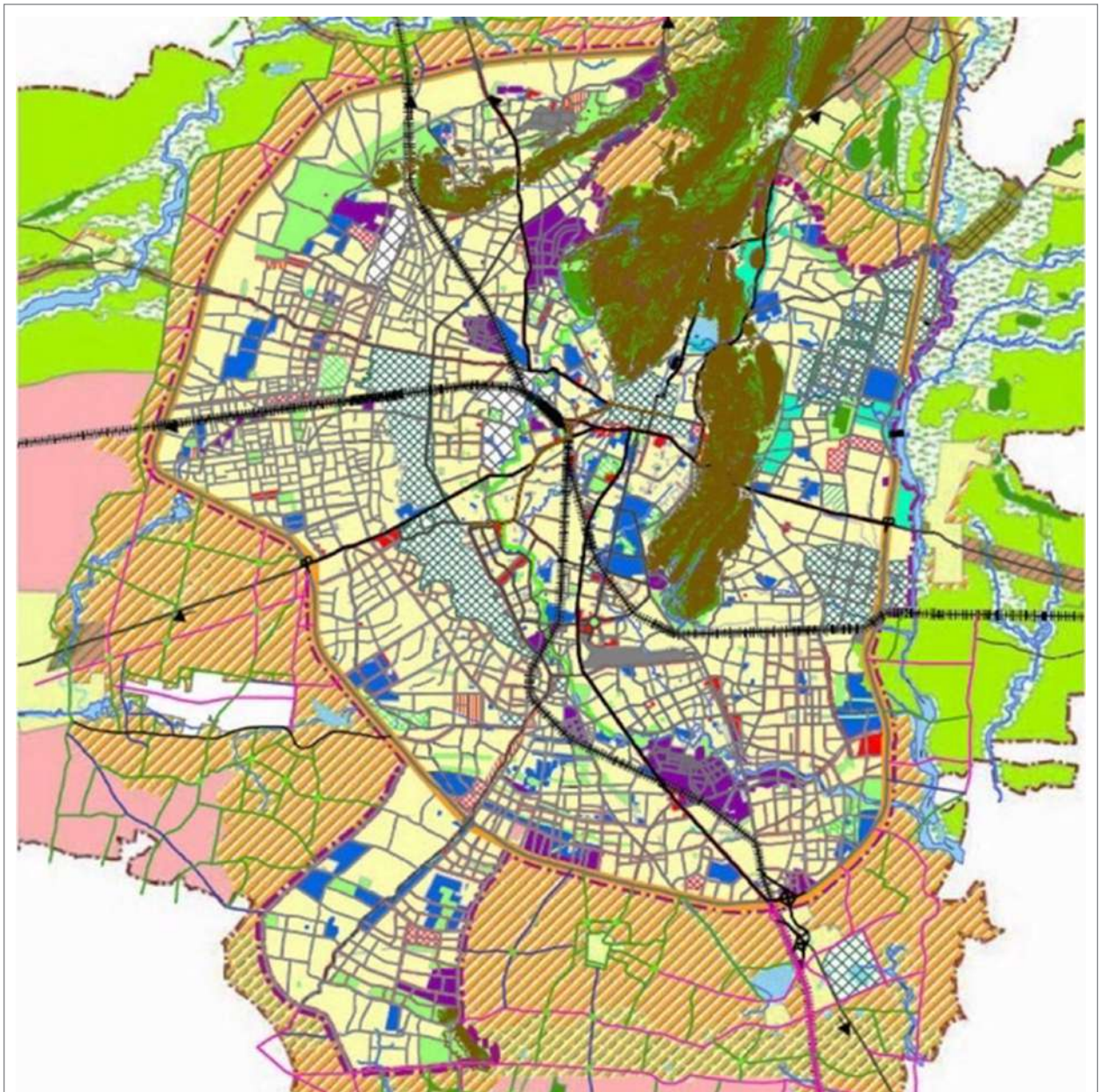
Map 4.3: Jaipur Master Development Plan 2025 Boundaries

Source: UN-Habitat

Figure 4.4: Projected population Growth Rate (%) as per MDP 2025



Source: Actual Growth Rate – Census 2011, Projected Growth Rate – Jaipur MDP 2025



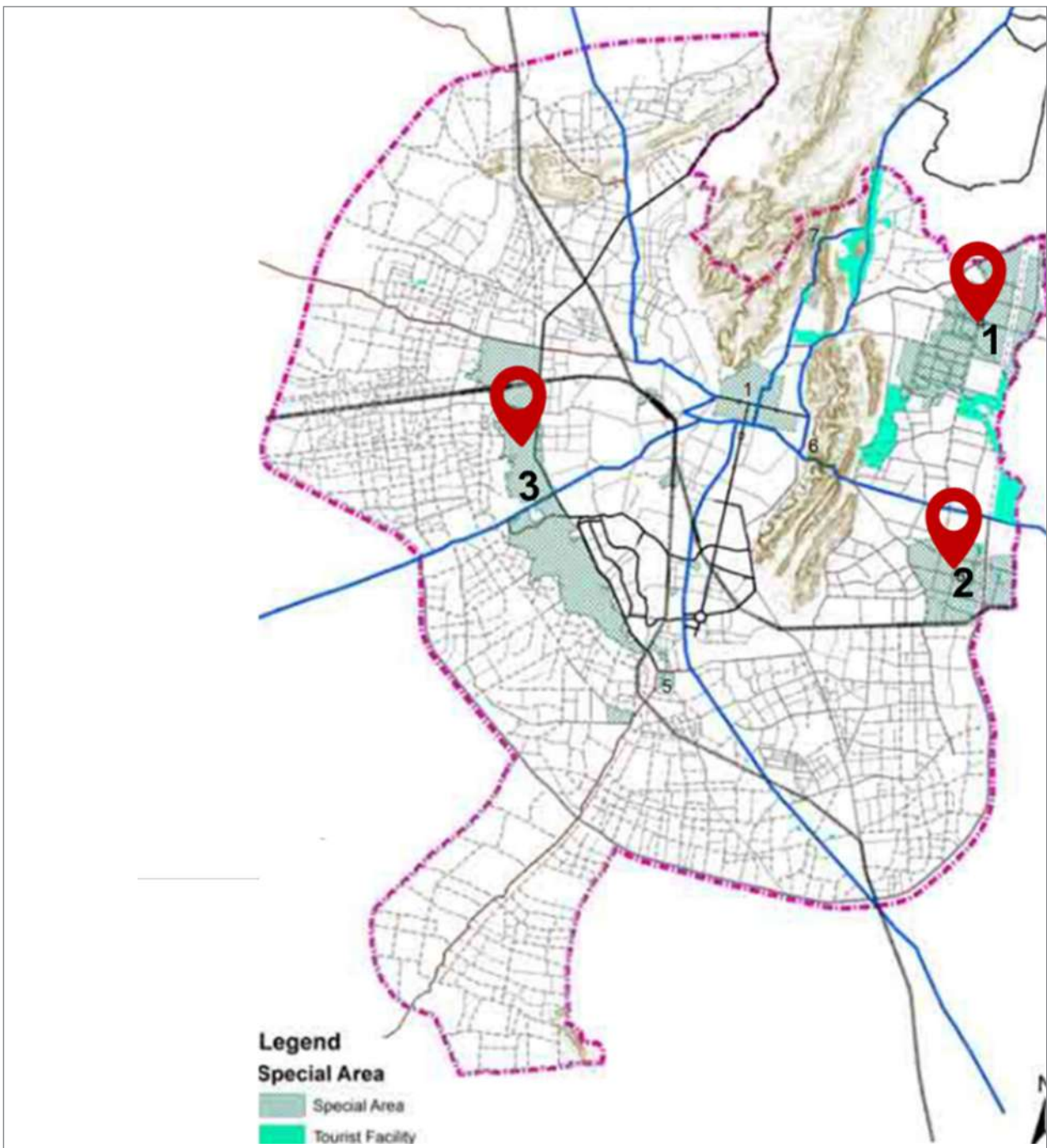
Map 4.4: Proposed Land Use Plan

Source: Jaipur MDP 2025

Following some sporadic development on the city's eastern edge, beyond the Aravalli Range and along the western edge of the Delhi–Ajmer expressway, Jaipur MDP 2025 proposed the formalization of this unplanned development into two special development schemes. One of these schemes was the 37-sq. km. New Jaipur area, which consisted of the Green city and the Heritage city. The other was the Prithvi Raj Nagar scheme, spread across nearly 175 sq. km. along the western peripheral ring road. Although

these neighbourhoods were planned for the near future, there are no supporting infrastructure or connectivity plans to make these developments sustainable. Map 4.5 shows the locations of these upcoming development schemes in the city.

The phenomenon of development proposals following the growth of the city indicates that, thus far, Jaipur's planning has been reactive.



Map 4.5: Development schemes proposed under masterplan 2025: 1) Green city; 2) Heritage city; 3) Prithvi Raj Nagar

Source: Jaipur MDP 2025



Existing Land Use (ELU) 2017

The existing land use plan was prepared for the U1 area of 945.34 sq. km. and was updated in 2017.¹⁰ Contrary to the expectation of high growth, with a 33 per cent share of the U1 area, agriculture remains the predominant land use, followed by vacant land (19 per cent).

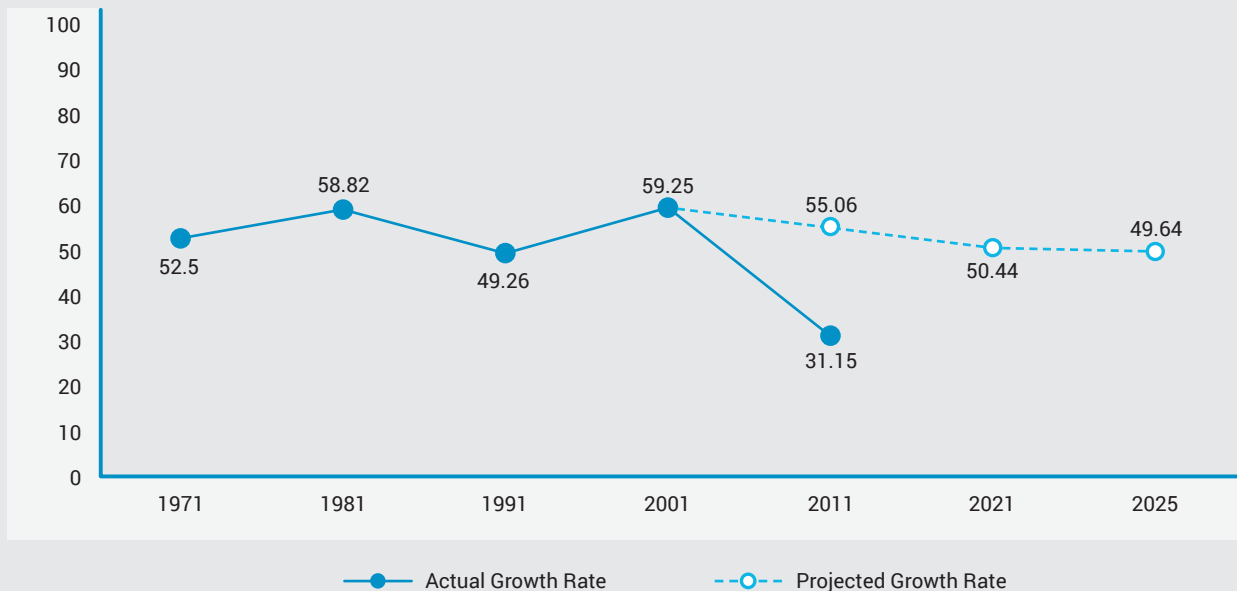
A comparison between the existing and proposed land use plans shows that there are signs of overestimation of the development of Jaipur. This is especially stark

in the residential sector where the ELU 2017 shows merely 17 per cent of the land occupied for residential use against the allocated 48 per cent in the proposed land use plan.

One of the major limitations of this master plan is that it primarily relied on data from Census 2001, which was two decades old. This was when Jaipur experienced its peak urbanization with an urban decadal growth rate of 59.3 per cent. Considering this growth trend, population estimates were derived from different statistical methods where the growth rate was projected to be 55 per cent in 2011 and 49.6 per cent in 2025. Consequently, all infrastructure planning demand estimates followed these population projections; while the actual decadal growth rate, as per Census 2011, was only 31.2 per cent.

One of the major limitations of this master plan is that it has primarily relied on data from Census 2001, which is two decades old.

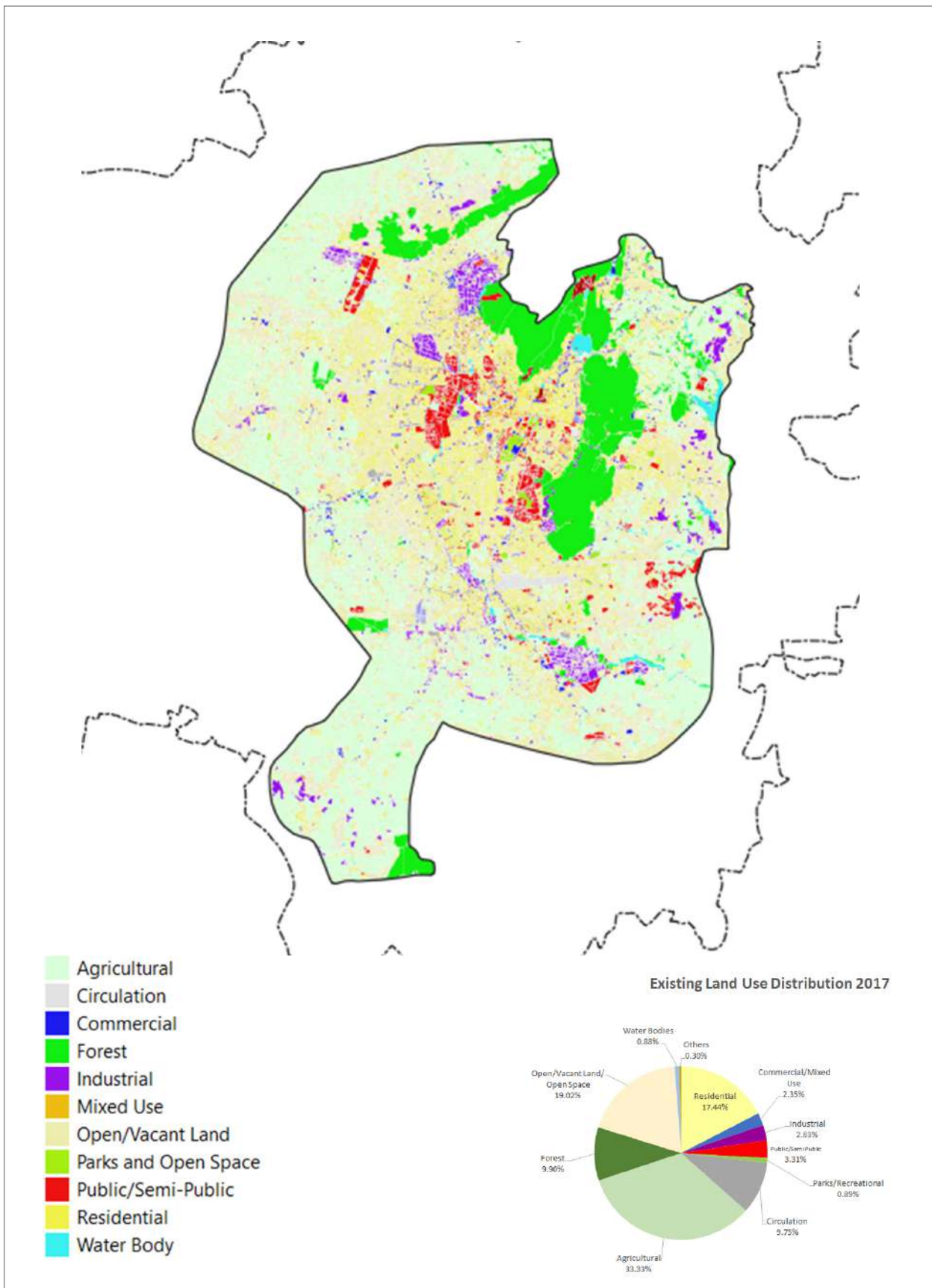
Figure 4.5: Population Growth Rate (%) – Projected vs Actual



Source: Actual Growth Rate – Census 2011, Projected Growth Rate – Jaipur MDP 2025

¹⁰ GIS data shared acquired from Town Planning Department, GoR

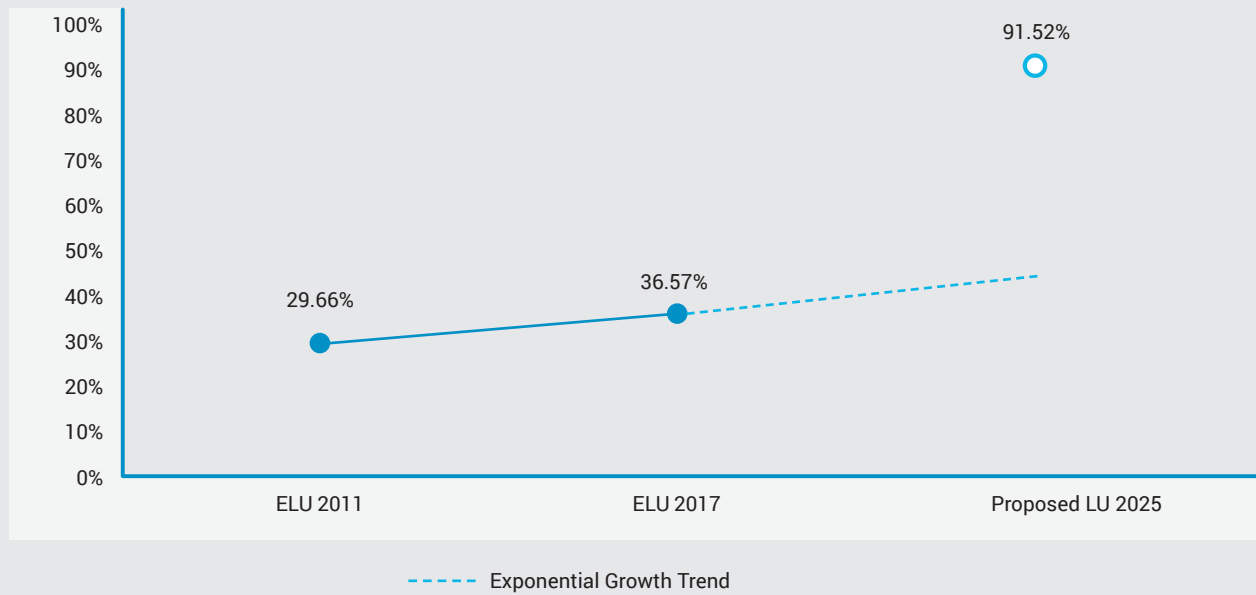
The ELU 2017 also shows the share of parks and open spaces within the U1 area to be less than one per cent, which is extremely low as per standard norms. In addition, the share of commercial/ mixed land use is only 2.35 per cent, which is about a third of that in the proposed land use.



Map 4.6: Existing Land Use – U1 Area (2017)

Source: Jaipur MDP 2025

Figure 4.6: Share of developed land use in U1 area – ELU vs Proposed Land Use



Source: JDA

Of the 945.34-sq. km. U1 area, MDP 2025 demarcates approximately 865 sq. km. (91.5 per cent) as developable land. Meanwhile, the ELU 2017 indicates that about 346 sq. km. has been developed, which is 36.6 per cent of the U1 area. A rudimentary trendline analysis suggests that even in an exponential growth rate scenario, the share of developed land may only be able to reach about 45 per cent, re-emphasizing that estimations for 2025 are too ambitious.

4.3 GREENHOUSE GAS EMISSIONS PROFILE



Measuring GHG Emissions

Currently, the city has no GHG emissions measurement and monitoring system. However, a study by UNIDO in 2017 reported that during 2015-16, Jaipur city

emitted 51,36,817 Mt CO₂-eq from stationary energy, transportation, waste, industrial processes and product use (IPPU), agriculture, forestry, and other land use (AFOLU) sectors.

As shown in Figure 4.7, with estimated emissions of 33,82,336 Mt CO₂-eq, the stationary energy sector/ energy use was the highest contributor, accounting for 66 per cent of the total GHG emissions during 2015-16. The transportation sector emitted 12,41,812 Mt CO₂-eq., which was 24 per cent of the total GHG emissions. The waste sector emitted 4,71,271 Mt CO₂-eq. (nine per cent) and the AFOLU sector emitted only 41,397 Mt CO₂ eq. (one per cent). The annual GHG (CO₂-eq) emissions per capita in 2015-16 was 1.39 Mt CO₂-eq/capita.¹¹

The total CO₂, CH₄, and N₂O emitted were 46,24,149 Mt, 16,511.29 Mt, and 190.01 Mt, respectively, equalling an emission of 51,36,817 Mt CO₂-eq.

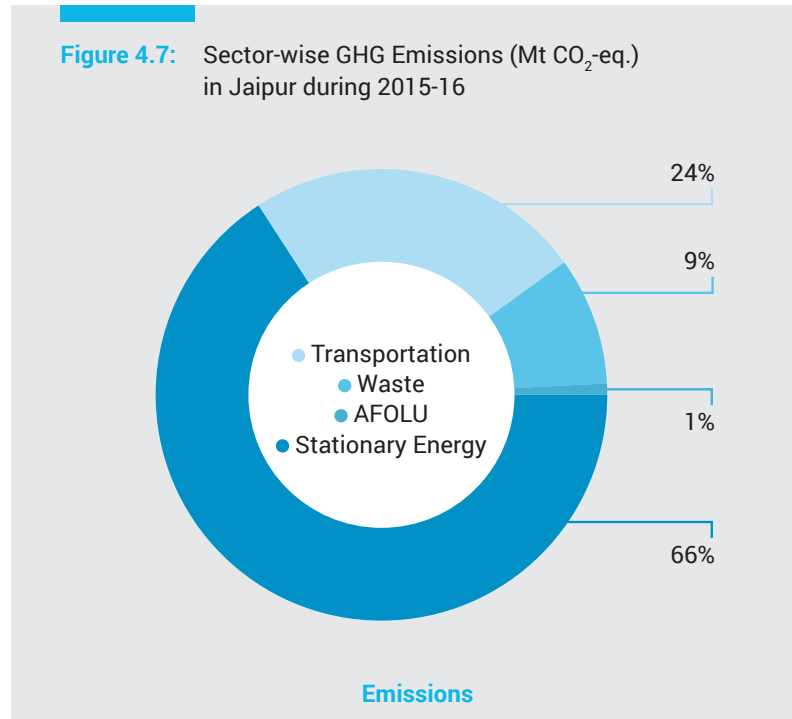
The stationary energy sector/ energy use drove 66 per cent of the total GHG emissions during 2015-16.

¹¹ GHG Accounting and Capacity Building for the Cities of Jaipur, Bhopal, Mysore, Vijayawada and Guntur as a first step under the GEF-UNIDO-MoUD Project (2017)

4.4 SECTORAL CONTEXT

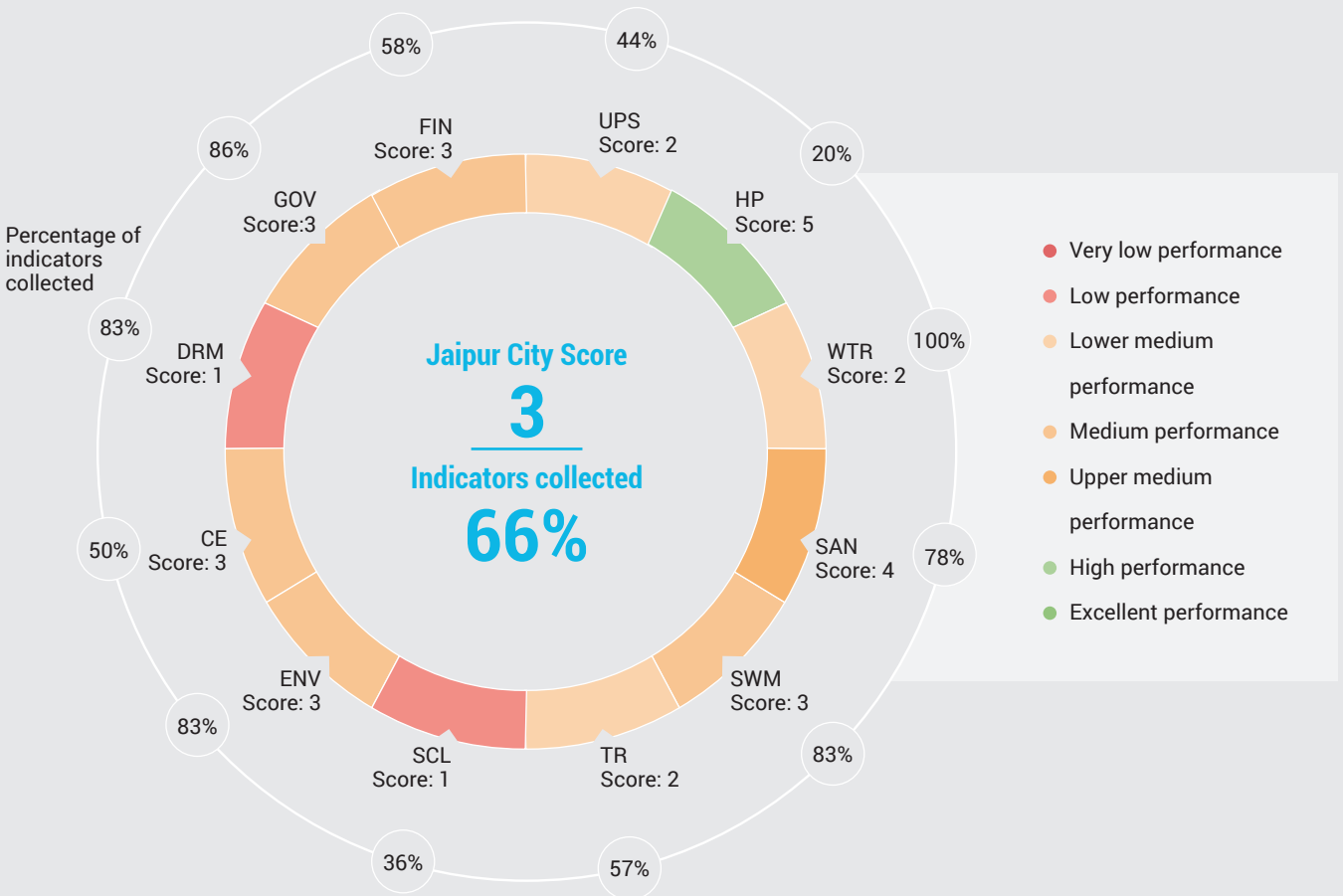
The following sections highlight Jaipur’s performance on the USAF indicators and develop a cross-sectoral analysis to understand the underlying causes, patterns, and development trends of the city.

For analysing Jaipur city, 66 per cent of all indicators (87 of the total 131 indicators) were collected. Based on Figure 4.2, the overall city score was three. For the detailed performances of these sectors, refer to the Jaipur Urban Sustainability Indicators Report.



Source: GEF-UNIDO-MoUD Project completion report (2017)

Figure 4.8: USAF sectoral performance across sectors



Source: UN-Habitat

4.4.1 Urban form, public space and safety

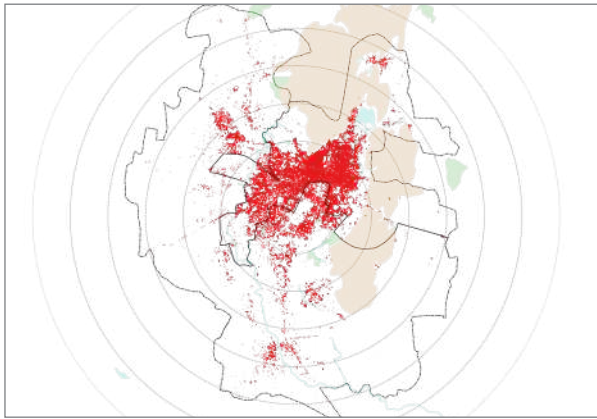
There are nine indicators for analysing this sector; four are related to public spaces; two focus on urban form and the remaining three relate to safety. For Jaipur, data was collected for five indicators. The overall performance of this sector was found to be 'low'.



Urban Footprint Growth and Patterns

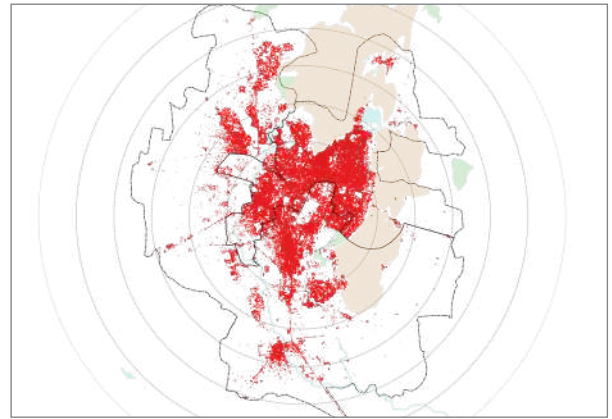
Although, Jaipur experienced an eight per cent decrease in built-up area per person between 2000 and 2014, the city is sprawling outwards sporadically. This leapfrog and sparse development pattern suggests that land was made available for development with no effective phasing strategy in place.

1975



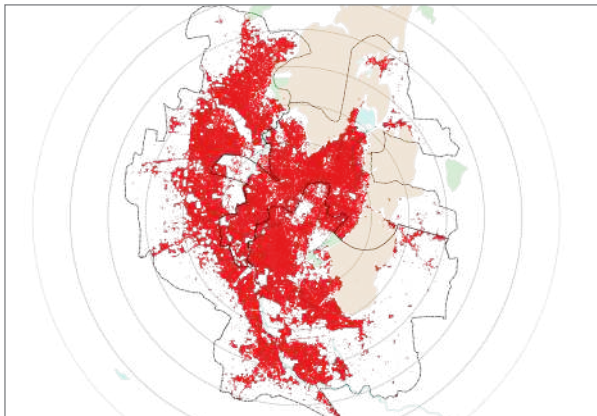
Area: 36.49 sqkm
Population: 3,55,685

1990



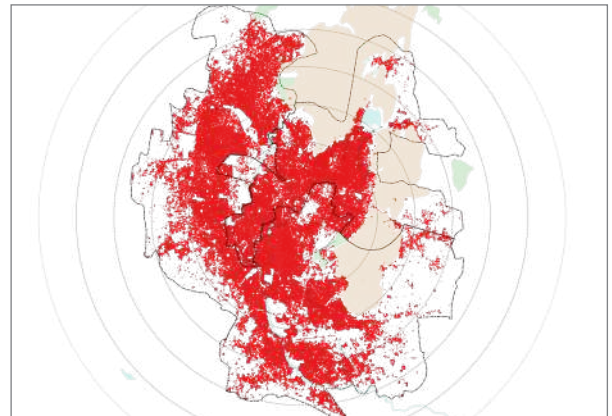
Area: 65.59 sqkm
Population: 5,87,648

2000



Area: 139.5 sqkm
Population: 23,22,575

2014



Area: 169.12 sqkm
Population: 30,46,163

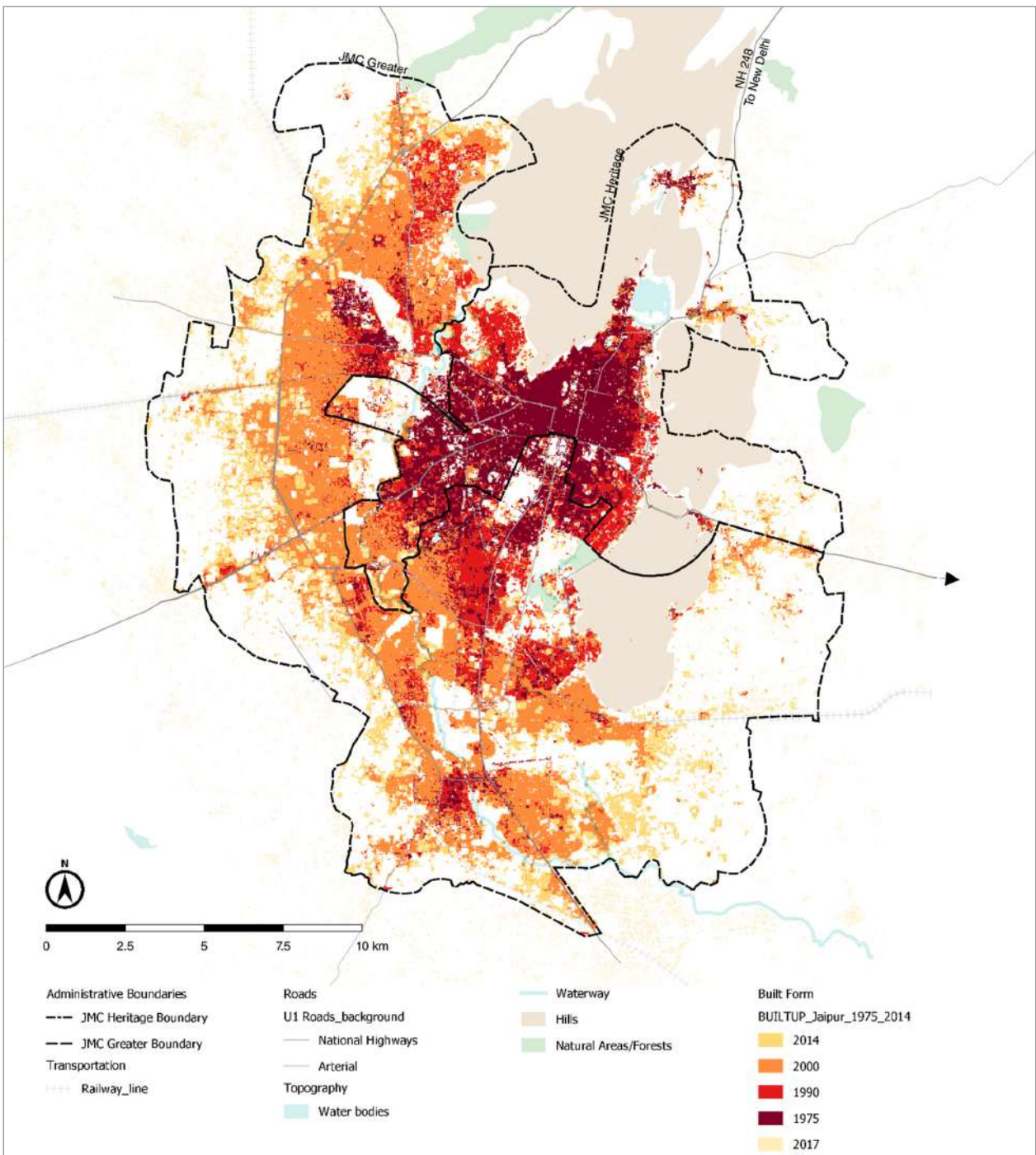
Map 4.7: Urban footprint growth over years

Data Source: Multitemporal information layer on built-up presence as derived from Landsat image collections (GLS1975, GLS1990, GLS2000, and ad-hoc Landsat 8 collection 2013/2014, GHSL (10m) Sentinel-2 imagery(2018); Map Source: UN-Habitat

The current change of land use policy makes conversion of land from other uses to residential use much simpler and encourages uncontrolled and piecemeal growth along the urban fringes. In several cases, it has not just led to loss of agricultural land but also ecological degradation.

Additionally, PHED states that the cost associated with delivering infrastructure to farther distances and lower densities is extremely high.¹² It also

hampers the natural drainage patterns of the city and could become a cause for overflowing drains and consequent flooding of streets. As reported by PHED, 138 MLD of water is extracted through 2,524 tubewells typically located in areas where households are not connected to the city water supply network. Excessive ground water extraction in the more remote areas would lead to depletion in water table. Therefore, such kind of development is very unsustainable, financially as well as environmentally.



Map 4.8: Multi-temporal classification of built-up presence

Data Source: Global Human Settlement Layer (GHSL) European Commission; Map Source: UN-Habitat

¹² As per consultation with PHED Executive Engineer in February 2020



Proposed Agricultural Land Use Conversion

The MDP 2025 states that protection of agricultural land from indiscriminate urbanization is one of the founding principles of the document. However, the proposed land use plan under does not have any land exclusively delineated for agricultural use.



Public Space

Jaipur has large lung spaces, such as the Central Park, mostly concentrated in the city centre and used by residents living nearby. However, with an area of

approximately 5.43 sq. km., public parks and open spaces only make up for one per cent of the total city area. Open public space per capita in Jaipur stands at 1.46 sq. m. per person, which is less than the benchmark recommended by the URDPFI guidelines (12 sq. m. per person). Consequently, the city scored 'very low' for open spaces available to its residents. Additionally, accessibility analysis suggests that only 30 per cent of the population has access to these open green spaces within 500 m. of their homes.

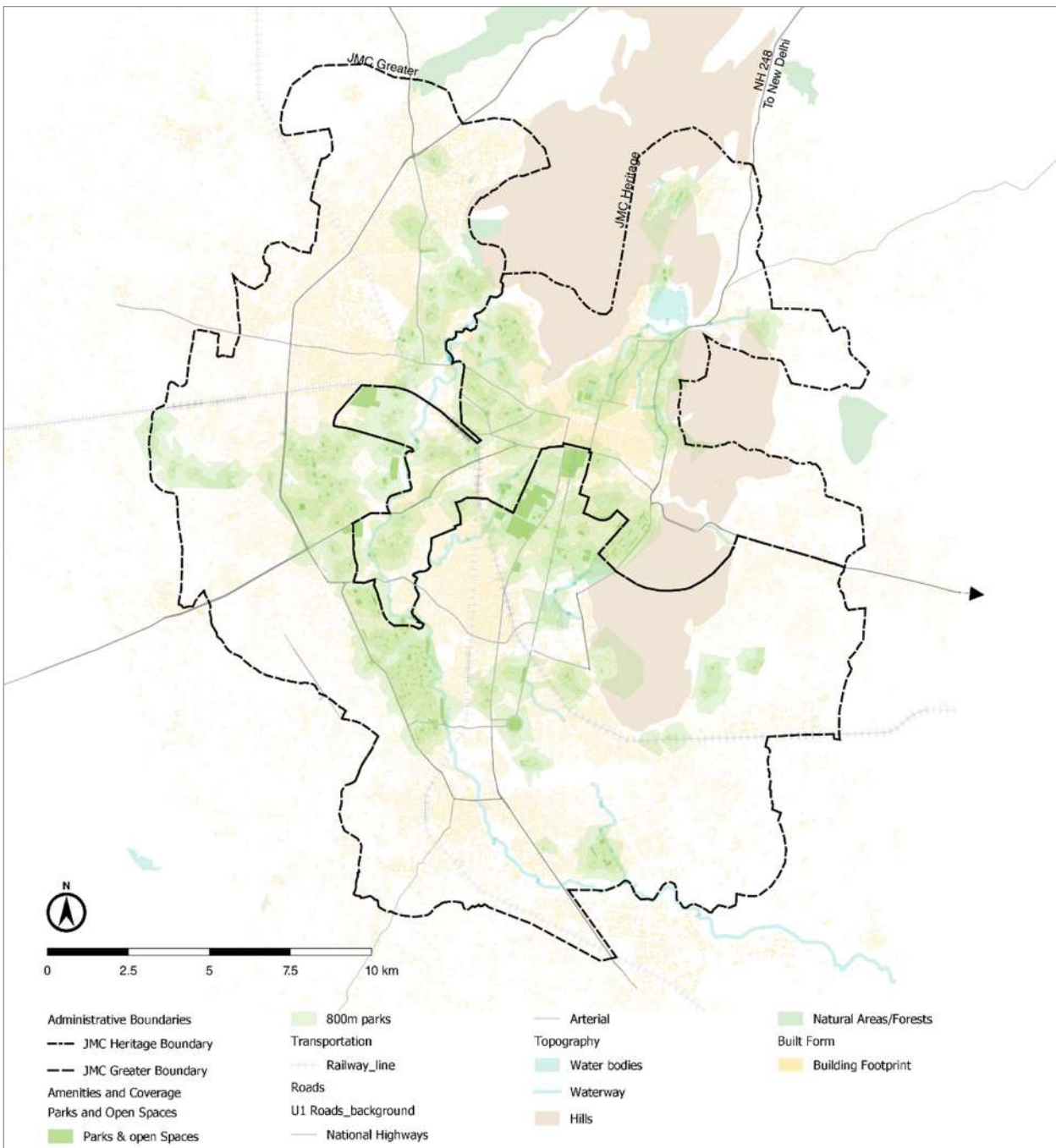
While some planned neighbourhoods, such as Mansarovar, house several parks, areas such as the walled city have a severe dearth of such open green spaces. There are also other large contiguous areas along the periphery of the city's municipal boundary that have almost no access to green pockets for its residents. The lack of such accessible green and open spaces in cities has a direct impact on the health and quality of life of its citizens.

A city-level park project in Mansarovar, the largest in Jaipur, has been initiated by the Rajasthan Housing Board to develop the southern part of the city.



Image 4.10: Landscape Park on Dravyavati River

Source: UN-Habitat



Map 4.9: Coverage of public parks and open spaces within 800 m

Source: Open Street Maps

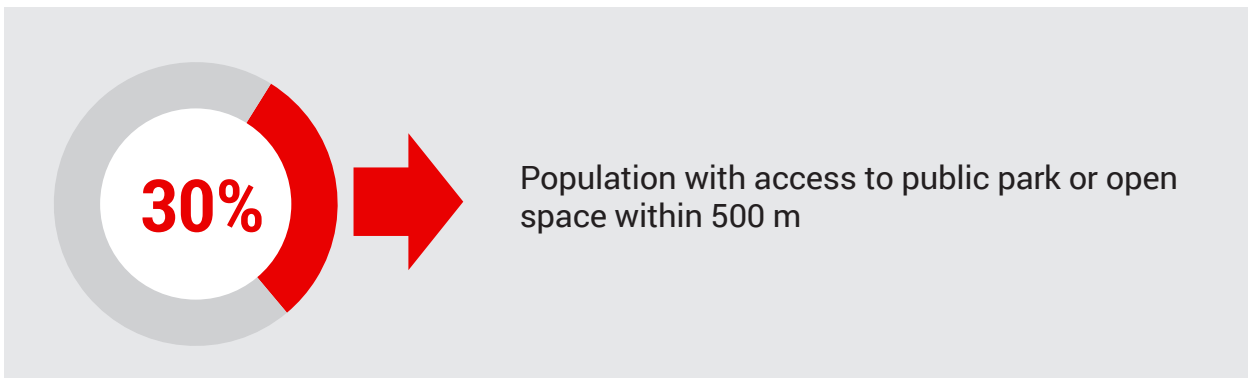




Image 4.11: Central Park, Jaipur

Source: <https://www.dnaindia.com/jaipur/report-jaipur-central-park-to-have-more-fun-activities-2710281>



Safety

About 95 per cent of city roads have streetlights. Jaipur City Police monitors on-street activities through CCTV surveillance, whose feed is checked through command control centres. The city has traffic signals and surveillance systems installed at all major road cross-sections.

Road safety, however, is a major concern in the city as reflected in surveys conducted for the draft Comprehensive Traffic and Transportation Study (CTTS) report¹³, which identified several black spots in the city that primarily include large junctions on arterial and sub-arterial roads where fast moving traffic is more prevalent. Also, most of the pedestrian infrastructure in the city is discontinuous and in such poor condition that it forces pedestrians to walk on the carriageway, making them more vulnerable to road incidents.

4.4.2 Housing and property

There are five indicators in this sector for measuring the status of informal settlements/ slums and housing demand in the city. Data was collected for only one indicator for Jaipur. With the limited data available for this sector, the overall performance appears to be 'high'.



Housing

As per Census 2011, there were 5,99,507 households within the municipal limits. Recent

data from 2019 suggests that this has increased to 7,37,179.¹⁴ The urban residential fabric of Jaipur predominantly consists of row housing, bungalows, low-rise buildings and some high-rise buildings (upto 30 m.) in the relatively new neighbourhoods of the city, or as part of a redevelopment project.



Informal Settlements

According to Census 2011, about 10.3 per cent of the city's households resided in slums, and Jaipur appears to be a high performer in this aspect. However, a recent household survey conducted in 2018, estimates this share to have increased to 22.5 per cent.¹⁵ Development of slums is administered jointly by JMC in 192 slums and by JDA in 46 slums.¹⁶

Data from another recent survey¹⁷ suggests that out of all the notified slums in the city, only 68 settlements fit the description of slum as defined by the Census. These settlements contain a population of 1,34,835 from 25,043 households.

Slums in Jaipur are also called 'Kachhi Basti' locally. The Jawahar Nagar slum area is the largest in the city, containing eight settlements that house a population of 11,751. With a population of 16,100, Bhatta Basti in the JMC Heritage area is home to the largest slum population in the city.

Since some of the slums lie close to the Aravalli foothills and along low lying areas, their inhabitants are highly vulnerable to environmental threats, such as floods and landslides.

¹³ As The draft CTTS report was prepared in 2019 by L&T and is currently under review by JDA

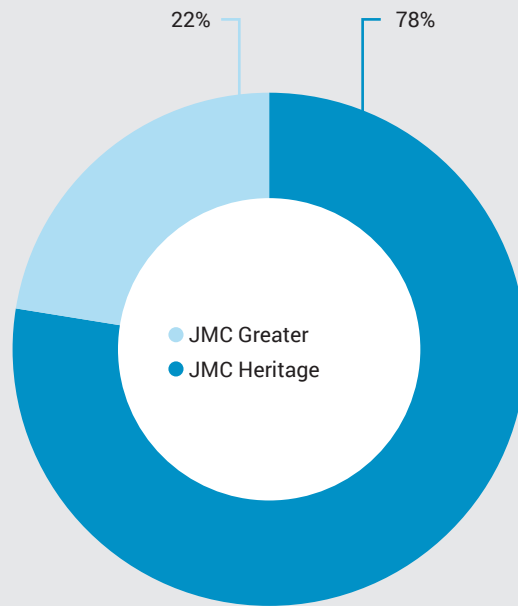
¹⁴ <https://smartcities.data.gov.in/>

¹⁵ Comprehensive Mobility Plan 2018

¹⁶ <https://www.pria.org/engaged-citizens-responsive-city/?p=249>

¹⁷ Slum survey by Centre for Advocacy and Research in 2020; 78 per cent of the population of these 68 settlements resides within JMC Heritage limits and the remaining 22 per cent within JMC Greater limits.

Figure 4.9: Slum Population Distribution



Source: Centre for Advocacy and Research, 2020



Image 4.12: Kachhi Basti on the eastern edge of Jaipur

Source: <http://www.willylogan.com/?tag=jaipur&paged=4>

4.4.3 Water

There are six indicators in this sector to assess water supply management in a city, including service coverage, quality of water and measuring the extent of non-revenue water. Data was collected for all six indicators for Jaipur. The city's overall performance in this sector was 'lower medium'.

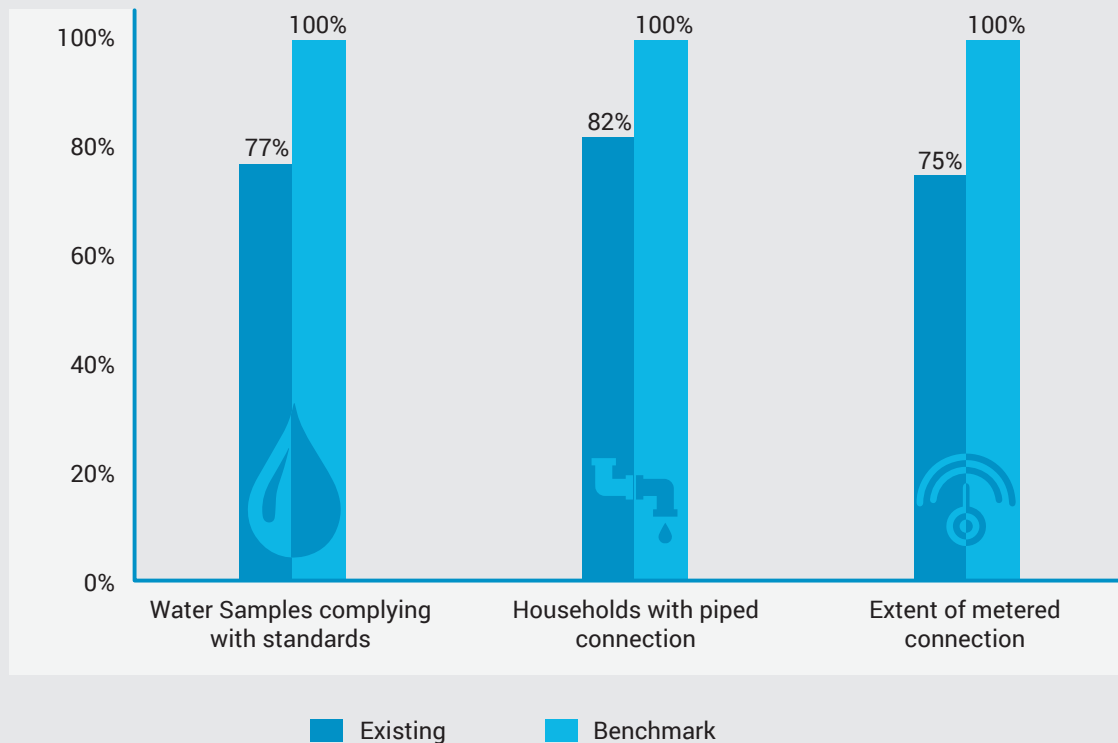
Water supply in Jaipur is handled by PHED. The main source of water is the Bisalpur Dam, which is located about 110 km from the city.

Approximatey, 430 MLD of water is supplied throughout the city.¹⁸ As per the SLB 2020 reporting, 80 per cent of households have piped water

connection in Jaipur. On an average, 133 lpcd of water is provided in the city, which is less than the national benchmark of 135 lpcd for urban water supply.¹⁹ In addition, the extent of non-revenue water in Jaipur is 33 per cent.

Certain neighbourhoods of the city, such as Prithviraj Nagar and Jagatpura, are currently not serviced by piped connections and are highly dependent on water tankers and ground water extraction through handpumps and tubewells. This is a concern, as the ground water level in some areas of Jaipur have fallen as low as 120 m.²⁰ The Bisalpur Dam had almost dried up in 2018, but it was filled up again by heavy rains in 2019, and will now continue to be the main source of water for the city.

Figure 4.10: Water supply service coverage and quality in the city compared to national benchmarks



Source: SLB Reporting 2020

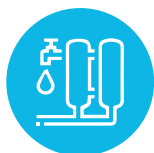
¹⁸ Average of daily report on Jaipur water supply in 2020-21, as shared on the PHED website

¹⁹ SLB 2020 Jaipur reporting

²⁰ https://phedwater.rajasthan.gov.in/content/dam/doitassets/water/Ground%20Water/Groundwaterdata/website_wl_11_20-compressed.pdf

4.4.4 Sanitation

There are nine indicators in this sector for assessing the performance of a city's sewerage network coverage, toilet facilities, compliance with wastewater treatment norms and guidelines. For Jaipur, 78 per cent of the required data was collected for these indicators. The city's overall performance in this sector was 'upper medium'.



Wastewater Management

According to SLB 2020 reporting, about 86 per cent of households in Jaipur are connected to the city's sewerage network, displaying a 'low medium' performance. Of the treated sewage, merely two per cent is recycled or reused by the city.

Jaipur is an ODF++ city. Approximately 93 per cent of its households have access to toilet facilities,



Image 4.13: 8 MLD STP at Brahmpuri

Source: UN-Habitat

scoring it a 'low medium' on this aspect as well. All the public toilets of the city have been mapped on Google Maps setting an 'excellent' performance score in this aspect.

Of the 332 MLD of wastewater generated in Jaipur, 295 MLD is treated, amounting to approximately 89 per cent adequacy of treatment capacity.²¹ About 183 MLD of this wastewater is treated through STPs. JMC is currently responsible for the operation of four STPs in Jaipur, located at Brahmpuri, Delawas, Jaisinghpura and Vidyadhar Nagar. The STP at Brahmpuri is a newly implemented, state-of-the-art plant with an eight MLD capacity.

In view of the increased inflow and strict standards of effluent treatment, as well as to meet new standards of treating waste water, JMC Greater is upgrading two of its existing STP units with a 62.5-MLD capacity each. Construction is also on for an additional STP capacity of 90 MLD at Delawas, to treat a total 215 MLD of wastewater as per the latest NGT norms.



Image 4.14: Lab testing unit to check quality of treated water
Source: UN-Habitat



Image 4.15: 62.5 x 2 MLD STP at Delawas

Source: <https://ijesc.org>



Image 4.16: Gas collection chambers at Delawas STP
Source: <https://civildigital.com>

²¹ Jaipur SLB 2020 reporting

According to the Jaipur City Sanitation Study, the capacity of all the STPs put together (442 MLD, including the 14 STPs operated by JDA) is high enough to cater to the needs of the city for the next decade. However, the functioning of these STPs is not optimal due to lack of maintenance. The untreated wastewater from these plants often mix directly with the city drains, leading to clogging of the network. In such cases, the city resorts to manual scavenging, which is a banned practice. The remaining wastewater from the drain eventually flows into Dravyavati River, leading to its pollution.

Some of the wastewater is also treated through decentralized systems, especially in areas without a proper slope for water drainage. The city can further build a unified strategy for implementing decentralized systems, as they can ease the operational and financial burden of the ULB. Additionally, such systems can be very cost effective and environmentally friendly.

In 2018, RUIDP had published the draft policy for Faecal Sludge and Septage Management (FSSM) in Rajasthan, while an FSSM action plan was published by the ULB and notified in 2019. This has earned the city an 'excellent' score for this part of the assessment.



Storm Water Drainage

In the SLB 2020, JMC reported that merely 15 per cent of the city was covered by storm water drains.

As a result of this poor network coverage, the city frequently experiences severe urban flooding. In fact, in 2019-20, the city officially reported three such instances.

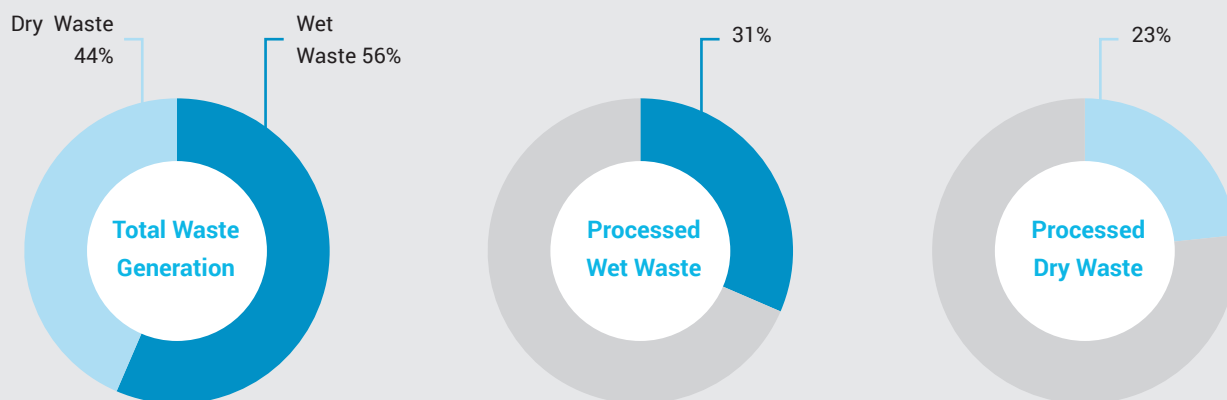
4.4.5 Solid waste management

There are 12 indicators in the sector to assess solid waste management in a city, which includes the efficiency of waste collection, extent of waste processing and remediation of legacy waste in the city. Data was collected for 11 indicators in the case of Jaipur. The city's overall performance in this sector was 'medium'.

As per the SLB 2020 reporting, 95 per cent of households are covered by solid waste management services in the city. With a total solid waste generation of 0.45 kg per capita per day, the city displayed an 'upper medium' performance.

Jaipur generates about 1,477 TPD of waste, of which only 22.5 per cent is processed. Of this, around 834.1 TPD is wet waste, of which only 31 per cent is processed; while merely 23 per cent of the city's 642.9 TPD of dry waste is processed.²² The city scores 'very low' in these two areas.

Figure 4.11: Waste Generation versus Processing in Jaipur



Source: SLB 2020 Jaipur reporting

²² Swachh Survekshan 2019 reporting

As per Swachh Survekshan 2020 reporting, 80 per cent of the wards in Jaipur city practice source segregation of waste, which is maintained till the processing/ disposal site. At the same time, 80 per cent of the city's municipal solid waste, disposed off in open dumps/ controlled dumps and water bodies, is burnt. About 400 TPD ends up in the three landfills of the city. The landfill at Mathuradaspora is located approximately 17 km from the main city and caters to the waste generated by the city's Heritage area. Another landfill at Langariyawas is located 3-4 km further East from Mathuradaspora. The landfill at Sewapura is 20 km from the main city, along the Delhi–Jaipur National Highway (NH 8) and mostly caters to the waste generated by the Greater city area.

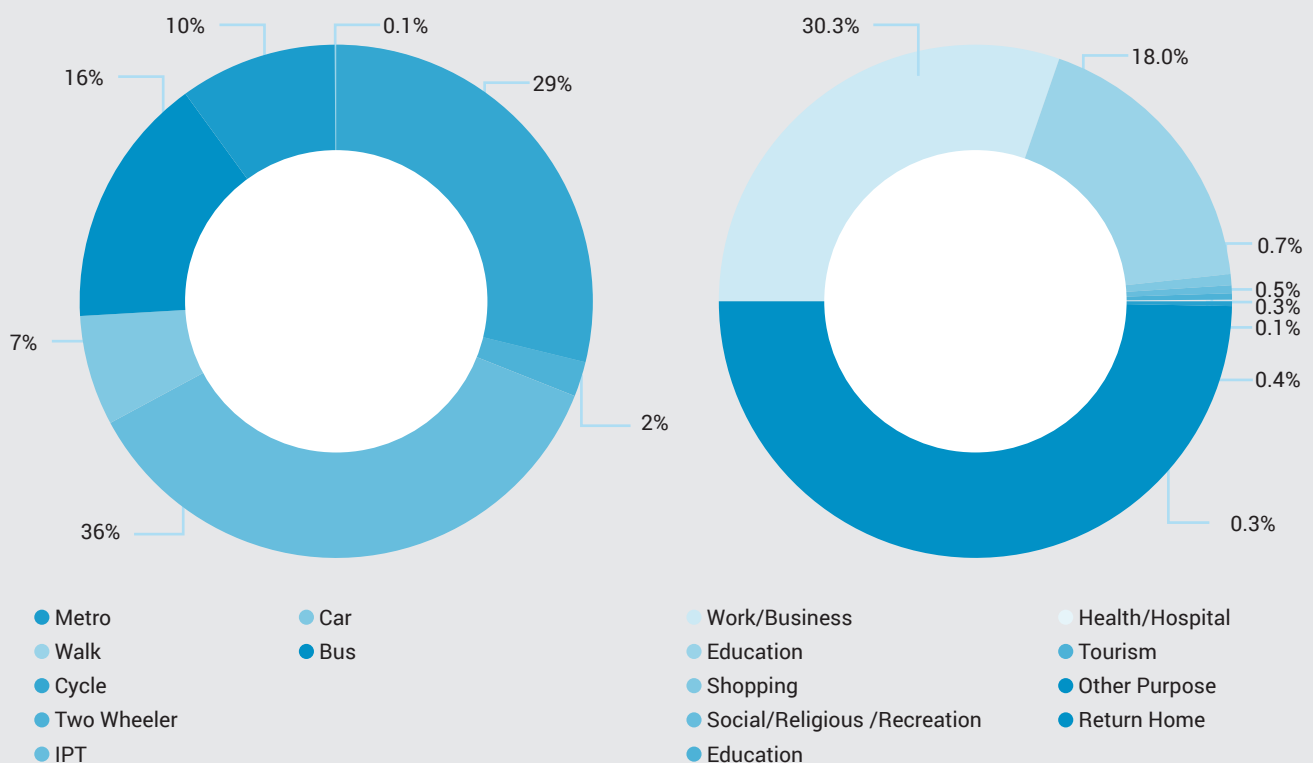
During 2015-16, the waste sector emitted 4,71,271 Mt CO2-eq, which was nine per cent of the total GHG emissions of the city. The city has communicated the need for MRF centres to tackle its waste. This would also help in increasing employment and in creating monetary value out of materials that are collected and sold back into the market. JMC is also considering a 'Solid Waste to Fuel/ Energy' project for Jaipur.

4.4.6 Transportation

There are 14 indicators in the transportation sector to assess the status of public transport coverage, quality, safety, and investments made towards environmentally friendly infrastructure. For Jaipur, data was collected for eight of these indicators. The city's overall performance in this sector was 'lower medium'.

For a tourism and commerce hub, urban mobility in Jaipur is a major challenge as well as opportunity. During 2015-16, emissions from the transportation sector was equal to 12,41,812 Mt CO2-eq, which was 24 per cent of the city's total GHG emissions. Till 2017, of the total number of vehicles registered in the city, 70 per cent were two-wheelers and 18 per cent were four-wheelers. With 52 per cent of trips covered by privately-owned motorized vehicles, the city faces a threat of increasing vehicular traffic as well as increasing emissions. Most of these trips were made for work/ business purposes (30 per cent) or for commuting (50 per cent).²³

Figure 4.12: Jaipur's Transportation Modal Share -Trips (left) and Trip Purpose (right)



Source: Draft CTTS report 2019

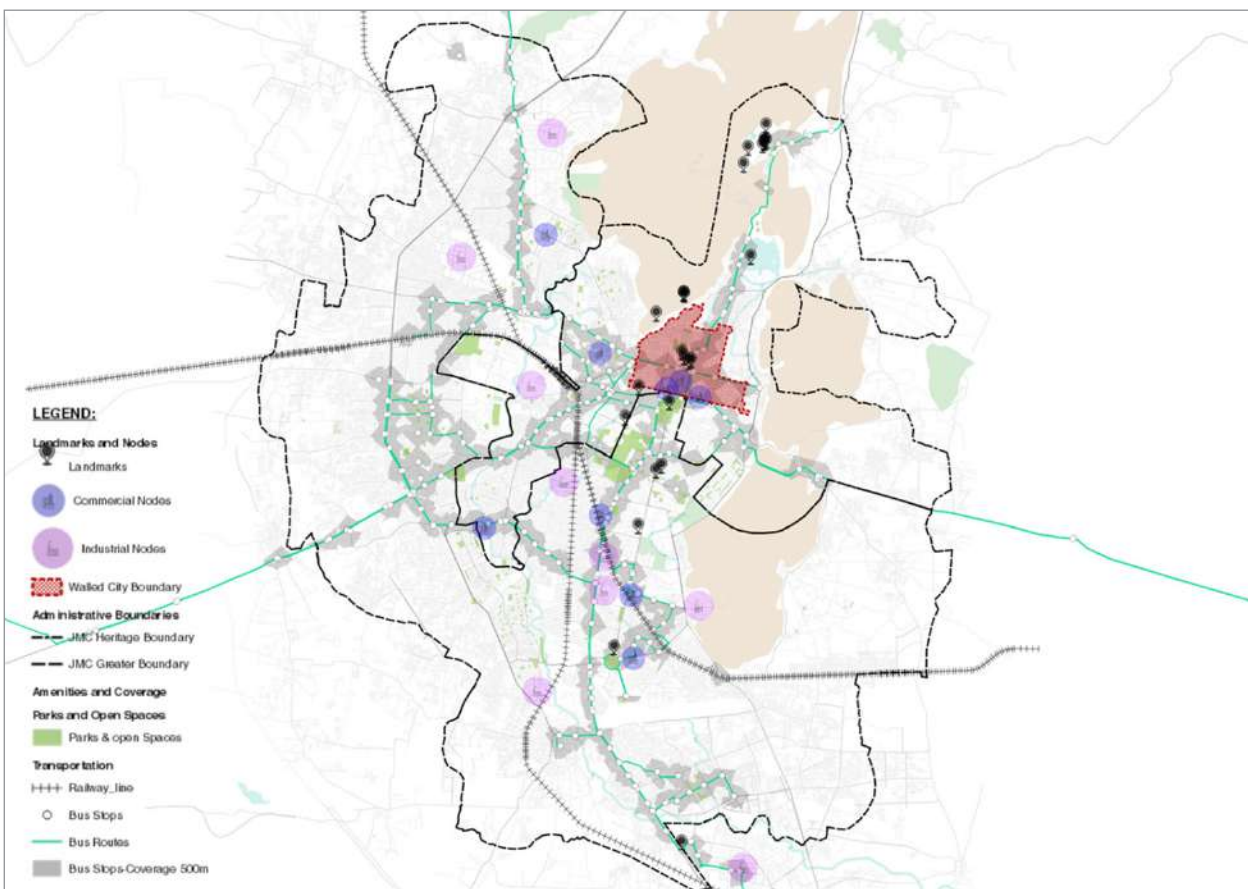
²³ Draft Comprehensive Traffic and Transportation Study 2019



Public Transportation

There are currently two public-operated public transit systems in the city. The local bus transit system, known as Jaipur Bus, is operated by the Jaipur City Transport

Services Limited (JCTSL). Apart from the JCTSL buses there is a fleet of about 2,300 privately-operated mini buses that cater to the city's population. There are two functional inter-city and intracity bus depots—the Sindhi Camp terminal located between the walled city and the Jaipur Junction railway station, and the Vidhyadhar Nagar depot on the northern end of the city. The daily average ridership of buses in the city is 1.6 lakh. As per our network analysis, only about 32.5 per cent of the population has access to a bus stop within 500 m. of their homes.



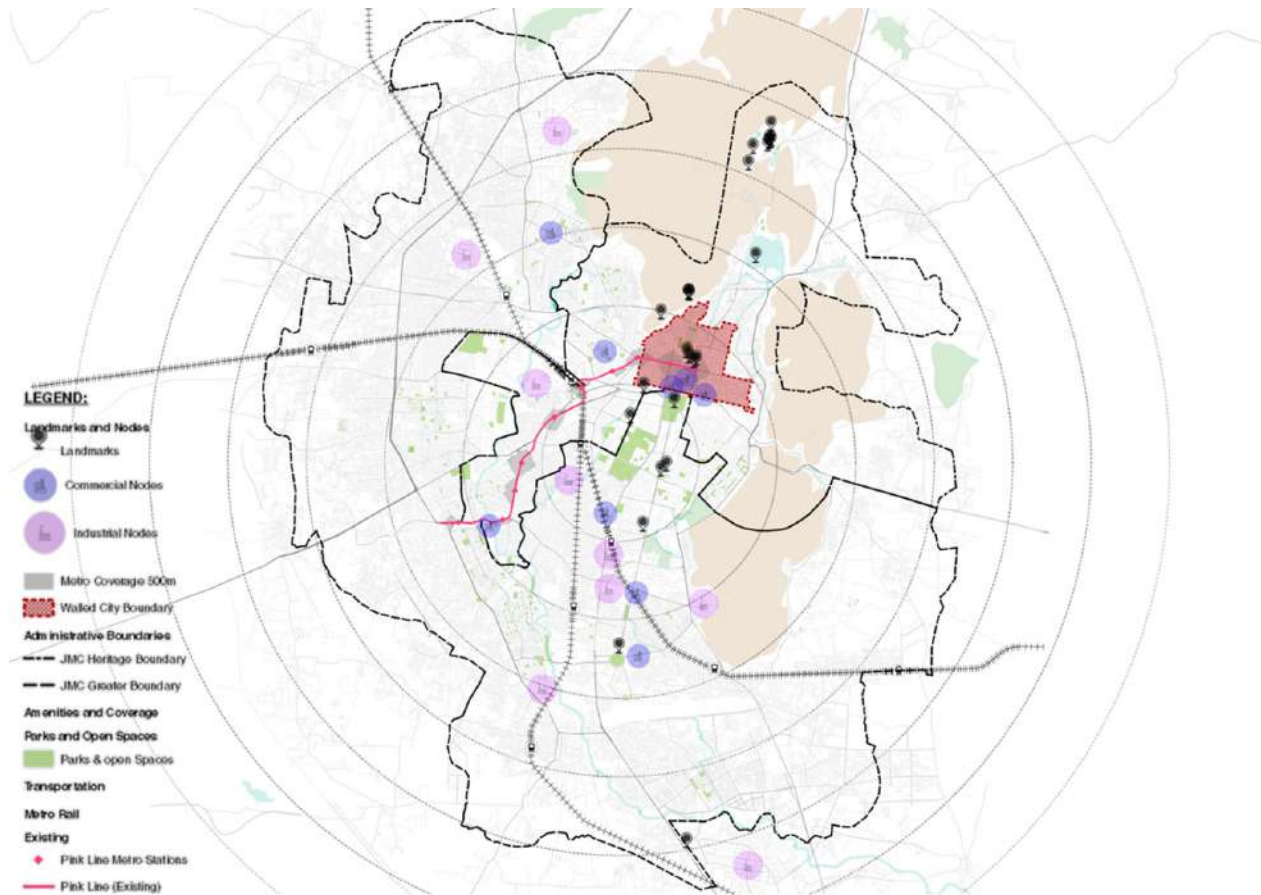
Map 4.10: Access to bus stops within 500 m

Data Source: Open Street Mapping (OSM); Map Source: UN-Habitat



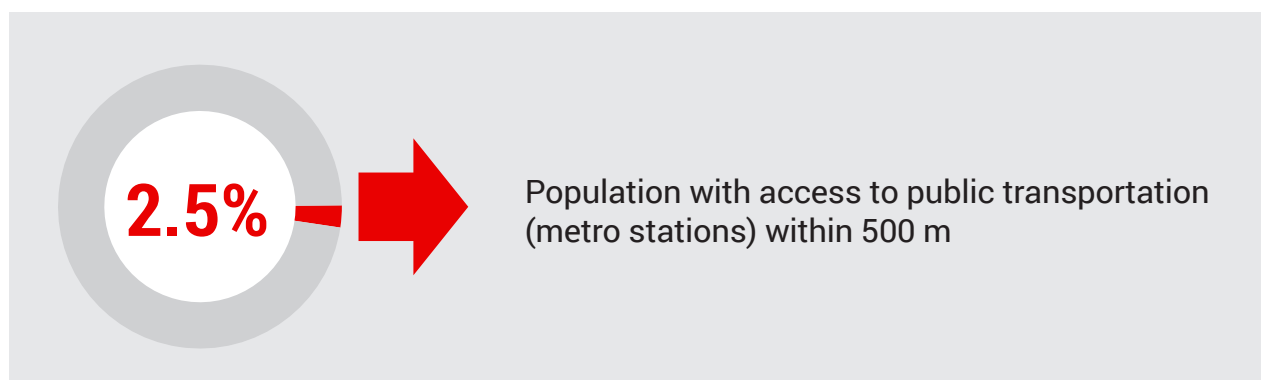
In 2015, the city was introduced to a metro rail system, the Jaipur Metro, which is operated by the Jaipur Metro Rail Corporation (JMRC). The network currently has only one operational line (Pink Line) that connects the East to the West, from Mansarovar to Badi Chaupar.

Only 0.1 per cent of all trips in the city are by the Jaipur Metro. Network analysis suggests that only 2.5 per cent of the total population has access to any metro station within a 500 m distance.



Map 4.11: Access to metro stations within 500 m

Data Source: Open Street Mapping (OSM); Map Source: UN-Habitat



A detailed project report (DPR) has been prepared for Jaipur Metro Phase-2 (Sitapura to Ambabari) and Phase-1C (Badi Chaupar to Transport Nagar). With the expansion of the Jaipur Metro network, JMRC plans to intergrate an extensive feeder bus service. However, the proposed metro and feeder bus network is being planned separately from the city bus network, as they are administered by different agencies.

With about seven per cent of trips covered through Intermediate Public Transportation (IPT), Jaipur's population depends on auto-rickshaws, e-rickshaws, and app-based ride share, etc., for short distances and first-mile/last-mile connectivity.



Non-Motorized Transport

About 29 per cent of all trips in the city are on foot, but only 14.4 per cent of the total road length of the city has sidewalks on either one side of the road, or on both

sides. These existing sidewalks along major roads are often encroached by street vendors, on-street parking activities, large trees, electric poles, and structures such as public toilets. The poor infrastructure along with the hot-arid weather creates a discouraging environment for pedestrians. Dedicated cycle lanes along carriageways are few and far between, with no provision for safety measures, such as curbs for safe crossings at intersections

Only 14.4% of the total road length of the city has sidewalks on either one side of the road or on both sides



Image 4.17: Pedestrian-vehicular conflict at Choti Chaupar junction in walled city area

Source: Pinterest

JDA is in the process of reviewing a draft report on Comprehensive Traffic and Transportation Study for Jaipur Region, prepared by L&T. The report covers traffic and transportation challenges of the city, including findings from primary surveys conducted for the study. It shares a vision for providing the Jaipur region access to sustainable urban transportation that is safe, reliable and environmentally friendly for the movement of people as well as goods.

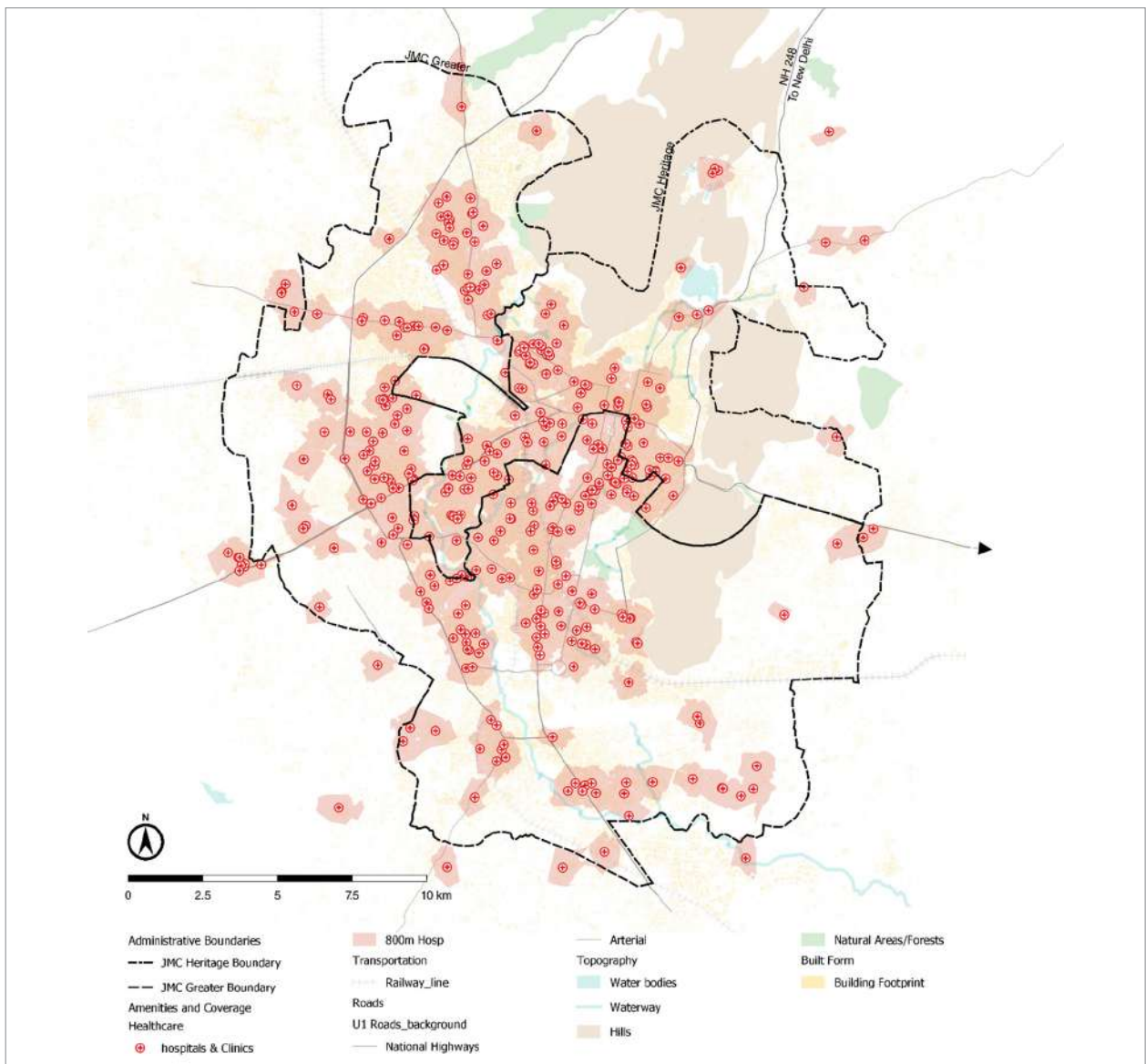
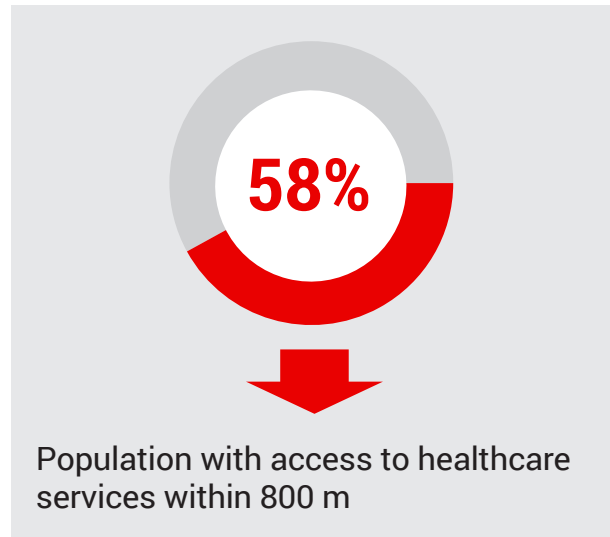
4.4.7 Social facilities and services

There are 11 indicators for assessing this sector, two on demography, five related to health, one about ICT and three about the status of education in the city. In the case of Jaipur, data was available for only five indicators. The city's overall performance in this sector is 'low'.



Healthcare

Jaipur has some of the leading hospitals in the state, such as SMS Hospital and SDM Hospital. However, as per our accessibility analysis, only 58 per cent of the city's population has access to the city's 490 public health facilities²⁴ within 800 m. of their homes.



Map 4.12: Access to health services within 800 m

Data Source: Open Street Mapping (OSM); Map Source: UN-Habitat

²⁴ As reported in EoL index 2019



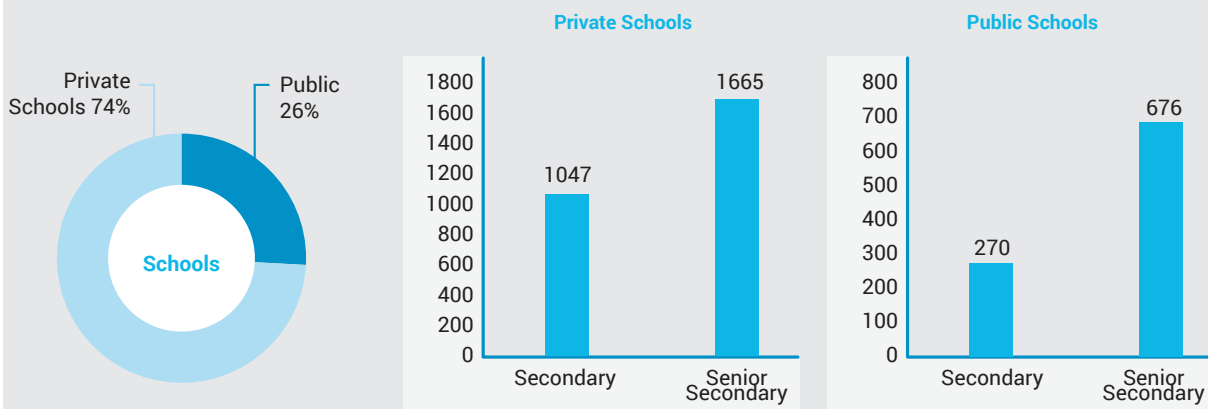
Education

As per Census 2011, the literacy rate of Jaipur city was 83.33 per cent, with a female literacy rate of only 76.65 per cent. Jaipur has a total of 3,628 schools, of which 946 are public schools and 2,712 are private schools. Only 26 per cent of schools are operated by the government.

4.4.8 Environment and ecology

There are 18 indicators in the sector to understand whether a city has a clean air action plan, whether they are equipped to measure major pollutants and monitor emissions data for specific sectors. Data was available for 14 indicators in Jaipur. The city's overall performance in this sector was 'medium'.

Figure 4.13: Number of public schools versus private schools



Source: Office of District Education Officer, Jaipur



Air Quality

Jaipur is one of the five non-attainment cities of Rajasthan and as a mandate of the National Clean Air Programme, it is in the process of implementing a clean air action plan. The city is posed with the concern of PM_{2.5} and PM₁₀ measurement levels. In 2019, at the RSPCB Chandpole monitoring station, the

PM₁₀ levels exceeded the acceptable standard (100 ug/m³) for 11 out of 12 months. The situation was worst in the winter, when the reading was 200 ug/m³. For more than 65 per cent of the year, the Air Quality Index is recorded at higher than acceptable standards.



Tree Cover

The forest clad Aravalli Range on the outskirts of Jaipur help in naturally capturing carbon and regulating air pollution in the city. The Jhalana Forest is separated from the Amargarh Hills to the North through a busy national highway and is surrounded by densely populated settlements on its eastern and southern borders. Rapid urbanization has had a harsh impact on the habitat of the region's endemic flora and fauna, leading to several instances of human-wildlife conflict in the city over the past few years. Such trends not only pose a severe threat to the existing biodiversity, but also to the safety of Jaipur's citizens. Hence, it is crucial to protect the region's natural resources.

4.4.9 Clean energy

There are eight indicators in this sector to assess the current energy demand of cities, including access to renewable energy, energy efficiency, accessibility of households to natural gas for cooking. Data was collected for four of these indicators for Jaipur. The city's overall performance in this sector was 'medium'.



Energy Consumption

Jaipur Vidyut Vitran Nigam Ltd. (JVVNL) is responsible for the power distribution in Jaipur. In 2018-19, Jaipur city consumed about 5,170 MWh of

electricity, about 4.7 times more than the estimated demand of 1,104 MVA. About 80 per cent of all metered connections serve domestic demand. Only 0.17 per cent of the total consumption was met through renewable energy sources.²⁵

During 2015-16, the stationary energy sector/ energy use emitted 33,82,336 Mt CO₂-eq of GHGs, accounting for 66 per cent of total GHG emissions.²⁶ Although the regulatory measures in the Rajasthan Unified Building Bye Laws, 2017, for environmental conservation contain some provisions for solar energy in buildings, they only apply to large scale projects.

About 87 per cent of urban households of Jaipur district use clean fuel for cooking.²⁷



Energy Efficient Street Lighting

In 2015, under an initiative of the GoR and JMC, a project was proposed to replace all conventional street lights under JMC's jurisdiction with high efficacy LEDs. GoR signed an MoU with Energy Efficiency Services Limited New Delhi (EESL) to implement this energy saving project. Through this project, JMC is expected to save 77 per cent of the expenditure and operations of street lights in the city. In a period of 10 years, GoR and JMC will gain about INR 100 crore in revenues through savings in energy and maintenance costs.²⁸ As of 2019, about 44 per cent of the existing street light poles were installed with LED lights.²⁹

²⁵ JVVNL 2020

²⁶ UNIDO 2017

²⁷ National Family Health Survey 2015-16 (NFHS-4), Jaipur Fact Sheet 2015-16

²⁸ https://www.c40.org/case_studies/implementation-of-a-large-scale-led-street-lighting-project-in-the-city-of-jaipur-and-across-the-state-of-rajasthan

²⁹ JMC 2019



Image 4.14: View of Jaipur from Jhalana Forest

Source: <https://ijw.org/jhalana-abode-of-urban-leopards/>

4.4.10 Disaster risk management

There are six indicators in the sector to assess the preparedness of a city for natural disasters (floods, earthquakes and cyclones, etc.) and manmade disasters (incidence of fires). Data was collected for five indicators in case of Jaipur. The city's overall performance in this sector was 'low'.



Disaster Preparedness

Jaipur lies in one of the hottest regions of the country and is highly vulnerable to heat waves,

Jaipur is highly vulnerable to heat waves, urban flooding and droughts

urban flooding and droughts. Between the years 2011 and 2018, the state declared drought thrice in Jaipur District during 2013-14, 2015-16 and 2017-18.³⁰ During the monsoon of 2020, the city experienced severe urban floods that left several houses and urban services damaged.

The Jaipur District Disaster Management Plan was prepared in 2014. The city lies in Seismic Zone 2. The Jaipur District Collectorate has a command control centre linked with hazard early warning systems. The collectorate office communicates information to JMC in case of an early warning.

³⁰ National Crisis Management Plan for Drought, 2018



Image 4.15: Urban flooding in the walled city area

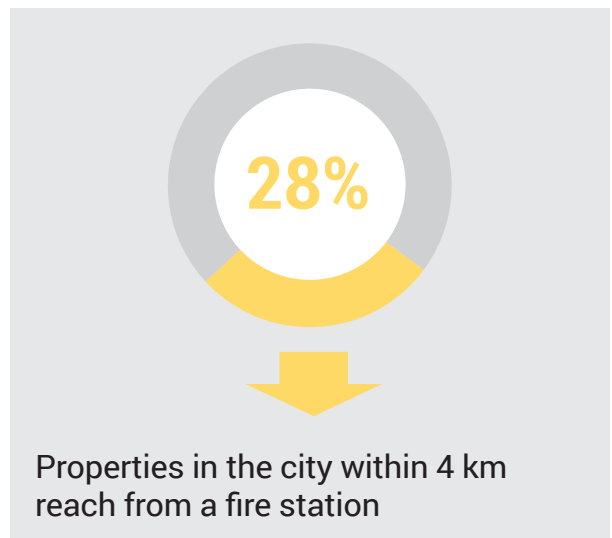
Source: <https://pibindia.wordpress.com/2016/10/28/interview-dr-kapil-gupta-on-urban-floods/#jp-carousel-5545>

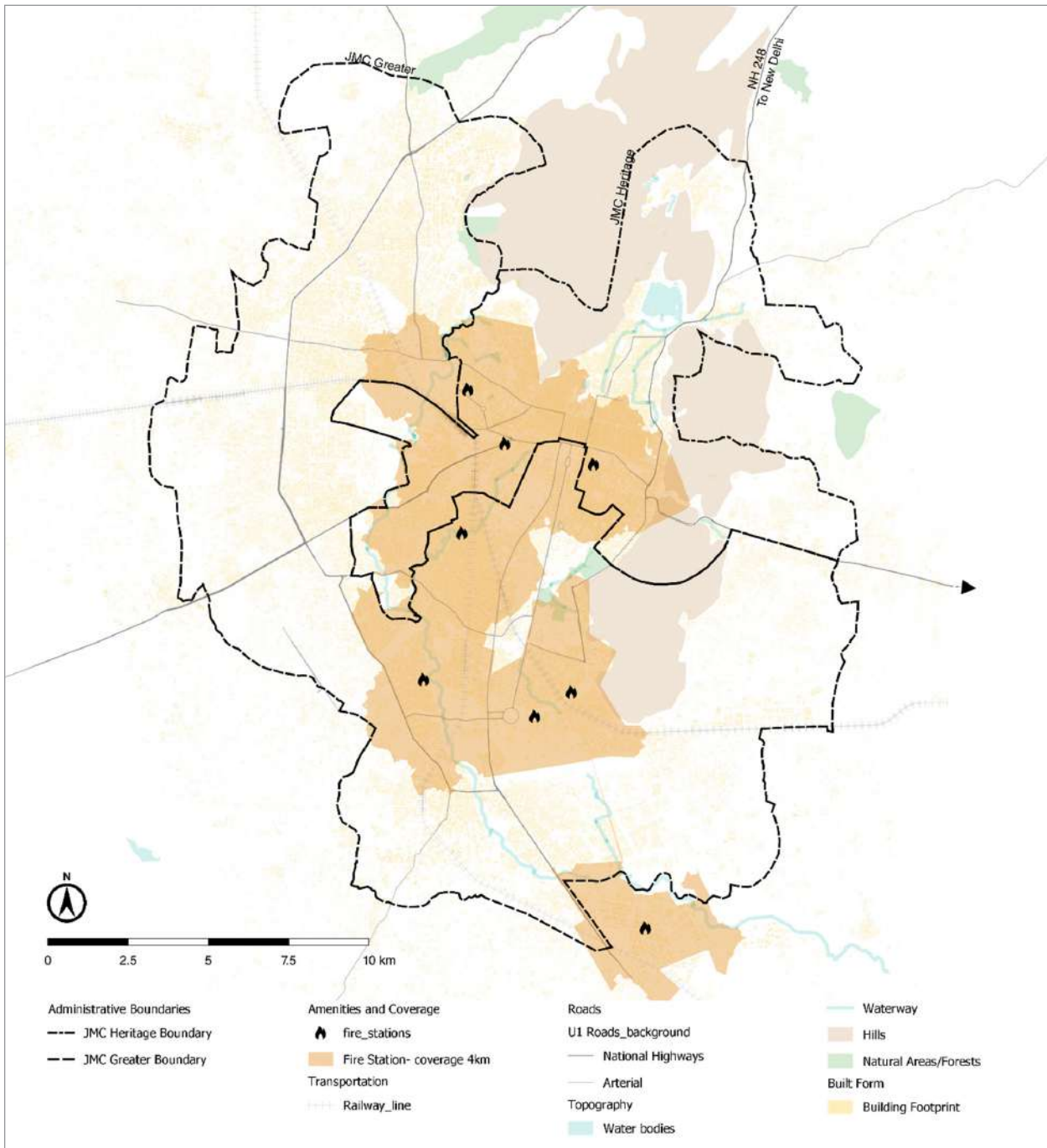


Fire Stations Coverage

There are seven fire stations in Jaipur, but only less than one-third of all properties in the city are within a 4 km radius of these fire stations.

There is an urgent need for a city level disaster management plan with updated hazard and vulnerability mapping.





Map 4.13: Fire service coverage within 4 km

Data Source: Google Maps; Map Source: UN-Habitat

4.4.11 Governance and data management

There are 14 indicators to analyse how a ULB is effectively directing the planning and management of a city. Data was collected for 10 indicators in case of Jaipur. The city's overall performance in this sector was 'medium'.

JMC's civic activities in the city are in line with the 74th Constitutional Amendment Act (CAA). In practice, it handles only seven out of the 18 functions stipulated in the Twelfth schedule (Article 243W) of the Indian constitution.³¹ The major functions of JMC include city cleanliness, solid waste management, maintenance of gardens/dividers/ circles, street lights, bio-medical waste, slaughter houses, firefighting, flood control, encroachment removal, stray cattle management, community toilets, community halls, sewer maintenance, parking lots, development works, advertisements, sale of land, house tax, and licensing.³²

Under the e-governance programme, an integrated computerized system has been implemented for efficient service delivery of 26 modules for each of municipal function. Implemented by the district administration, E-Mitra offers services like depositing electricity, telephone and water bills, issuing birth and death certificates, paying house tax, etc., through its 70 kiosks installed across Jaipur city. JMC also has an established help-line phone number for resolution of public grievances regarding sanitation, sewer, street lights, etc. Other essential services, such water supply, fall under the purview of PHED.

Although the approval of buildings and layouts are shared by JMC and JDA, the preparation of Jaipur's Master Development Plan is the responsibility of JDA. The last MDP was prepared in 2011 for the horizon year 2025, and has not been reviewed since.

Until 2020, no property mapping was undertaken by JMC. However, currently the same is being carried out under the supervision of the LSG department. In parallel, various civic departments of the city,

such as JDA, PHED and DoIT&C, have independently prepared GIS maps for the city of Jaipur. There is a strong need for a city-level data cell that would ensure effective inter-departmental collaboration and data sharing, saving the city from unnecessary duplication of information and efficient use of resources.

4.4.12 Finance and economy

Out of the total 19 indicators in this sector, 13 help to assess the status of municipal finance in a city, while the remaining six highlight the performance of the city across various economic factors. Data was collected for 10 of these indicators in case of Jaipur. The city's overall performance in this sector was 'medium'.



Financial Performance

JMC receives maximum revenue from the collection of urban development tax and hoardings. In FY 2018-19, the revenue share of these two collections amounted to approximately 58 per cent. In FY 2019-20, cost recovery in water supply was healthy at 73 per cent; however, cost recovery in sewage management was 23 per cent, while the same in solid waste management services was merely two per cent.



Property Tax Collection Efficiency

Only 34 per cent of total properties in the ULB were covered under the tax net in FY 2018-19.³³ The city is in the process of mapping all its properties on to a GIS platform and linking them to property tax collection.

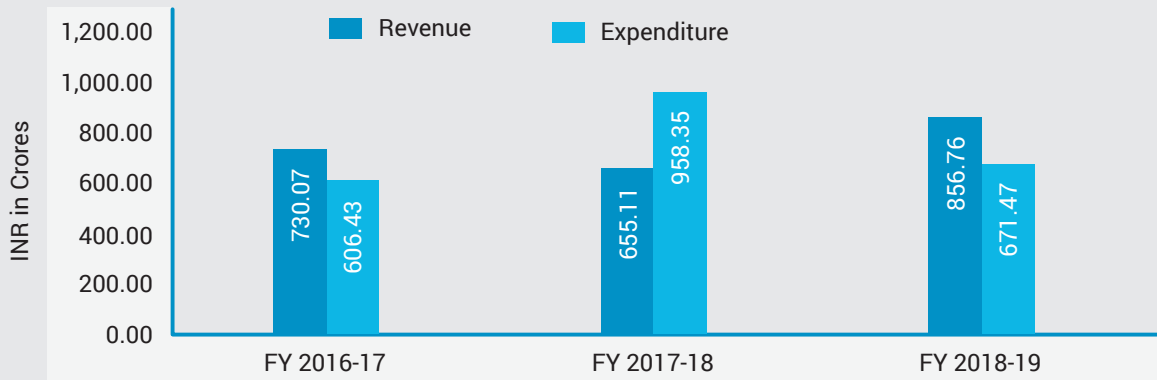
³¹ Annual Survey of India's City-Systems (ASICS) 2017

³² City Development Plan, 2006; JnNURM

³³ Municipal Performance Index 2019

Only 34% of total properties in the ULB were covered under tax net in FY 2018-19

Figure 4.14: Revenue and expenditure of JMC during three financial years (2016-17 to 2018-19)



Data Source: Municipal Performance Index 2019



Cost Recovery of Services

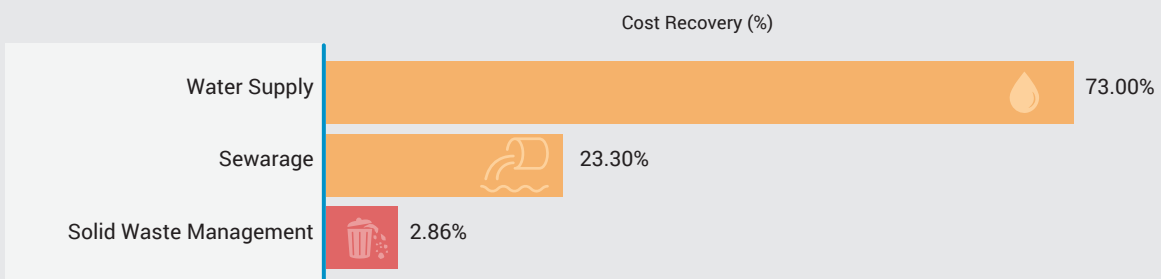
In 2019-20, the total operating revenues of JMC towards water supply services, sewerage and solid waste management services with respect to their total operating expenses was 73 per cent, 23 per cent and three per cent, respectively, as shown in Figure 4.15. The city performed 'excellent' for cost recovery in water supply, and 'very low' in sewerage services and solid waste management.



Credit Rating

In 2016, as part of the Atal Mission for Rsejuvenation and Urban Transformation (AMRUT), a credit rating report was prepared by CRISIL for JMC, which awarded the ULB a rating of A-.

Figure 4.15: Cost Recovery in Water Supply, Sewerage (wastewater) and Solid Waste Management Services during FY 2019-20 in JMC



Data Source: SLB 2019-20 reporting, JMC



Economy

Like many cities in India, Jaipur does not have a system for measuring its Gross Domestic Product (GDP) at the city level. However, some targeted studies³⁴ suggest that with a contribution of USD 24 billion, Jaipur ranks 11th among India's top 15 cities with the highest GDP. It is also has the highest share in Rajasthan, generating 12.8 per cent of the state's GDP.³⁵



³⁴ https://in.finance.yahoo.com/photos/the-top-15-indian-cities-by-gdp-1348807591-slideshow/the-top-15-indian-cities-by-gdp-photo-1348807055.html?guccounter=1&guce_referrer=aHR0cHM6Ly93d3cuZ29vZ2xlLmNvbS8&guce_referrer_sig=AQAAADOERBuIS_q1umgyAq96j9M174Qr_wA4gVMeolppb_amLZeGUtJSHfhOj0ha5DdZL6LZ_QA8mVSNRHyzpcixny6kTzA2KE2PGXHpleHV6vImYHZMByyu-JJxfbMFfynN7mn-mo2MW4cJ18Klyo6eCymLysp1WJdbrQ2nf6C-TI

³⁵ <https://timesofindia.indiatimes.com/city/jaipur/barmer-vaults-to-no-1-in-per-capita-income/articleshow/68543841.cms>



05

Strategic Diagnosis

5.1 IDENTIFICATION OF KEY STRATEGIC ISSUES

Through the application of the USAF, subsequent exhaustive analysis of the results, secondary information gathered and stakeholder consultation, a few patterns, development trajectories and trends were identified. As illustrated in Section 4.2 earlier, strengths were observed in city governance and management, which effectively maintains a clean and noise-free environment bracing Jaipur to achieve its higher goals of becoming a sustainable and resilient city. There are also areas where Jaipur is lagging behind and significant improvement is warranted. These include improvements in transportation and mobility, which has a direct impact on pollution and, consequently, on the health of its citizens. Further, the city needs focussed attention on its disaster risk management tools and their application.

There were other multi-sectoral issues as well that were deduced after careful analysis of the data. These are listed below and discussed in detail in the next section.

1. Urban sprawl
2. Weak urban mobility
3. Multi-hazard vulnerability
4. Lack of blue-green infrastructure

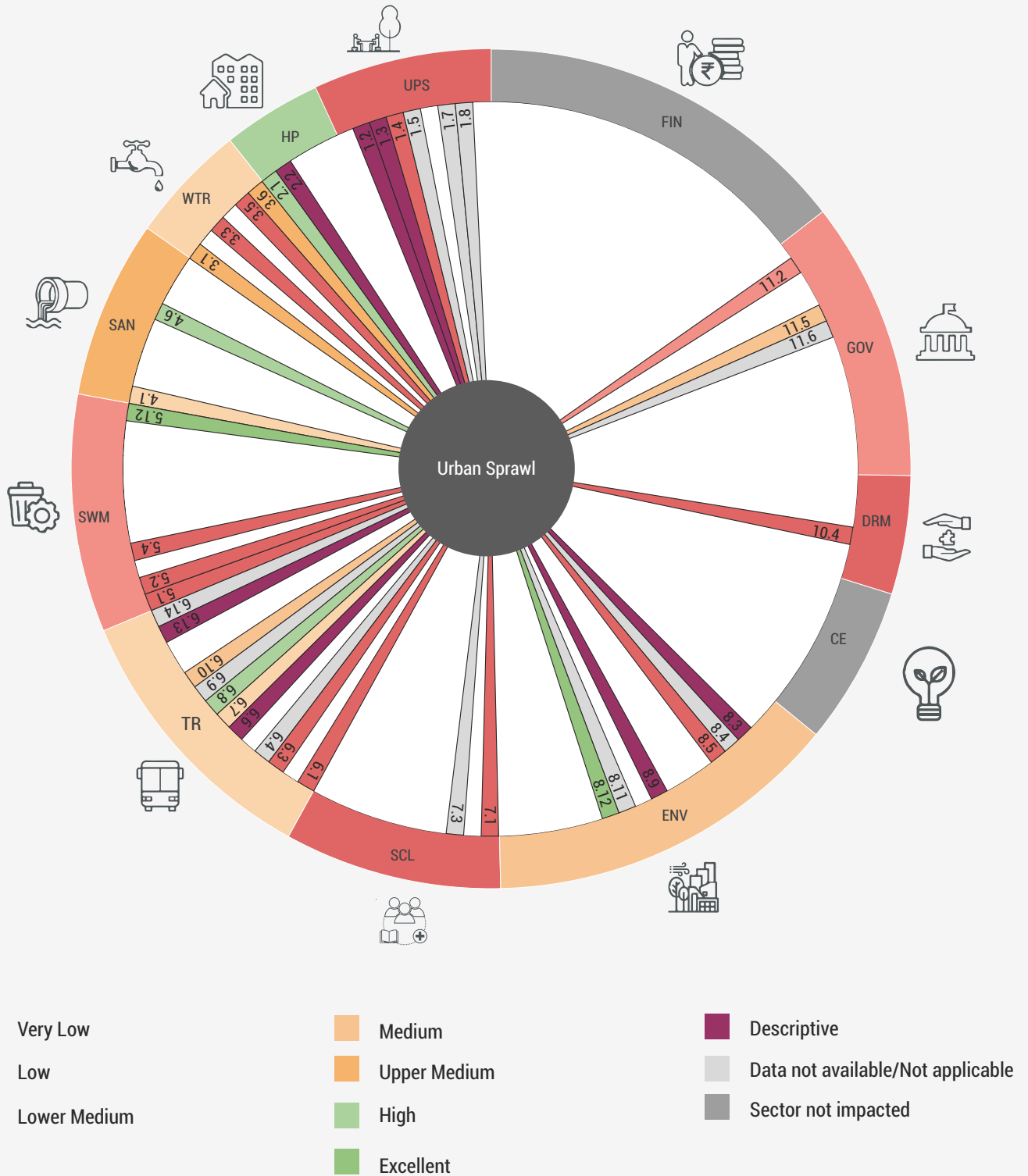
5.2 IN-DEPTH ANALYSIS OF KEY DIAGNOSTIC ISSUES

5.2.1 Diagnostic issue 1: Urban sprawl

Jaipur is experiencing an undesirable urban development pattern resulting in low density habitation, increased travel times, high automobile dependency, loss of agricultural land and, consequently, higher GHG emissions. These concerns have been arrived at by examining growth patterns in Jaipur during the last two decades through spatial analysis, review of documents such as the MDP 2025, Clean Air Action Plan (2019) Census 2011, Comprehensive Traffic and Transportation Study 2019, and consultations with JMC and JDA. With increasing aspiration for economic growth, areas of Jaipur outside of the UNESCO protected pockets are constantly posed with the pressure of development and, consequently, with the threat of the city losing its rich identity.

The application of urban sectoral assessment has highlighted various interlinked factors/ development sectors as shown in Annexure 6.1. In case of Jaipur's urban sprawl issue, among the sectors that have the highest number of related urban sustainability indicators, the average performance of the urban form, public space and safety sector is 'very low', transportation scores a 'lower medium', and environment and ecology scores a 'medium'.

Figure 5.1: Sectoral linkage of the issue of urban sprawl across USAF indicators



Source: UN-Habitat



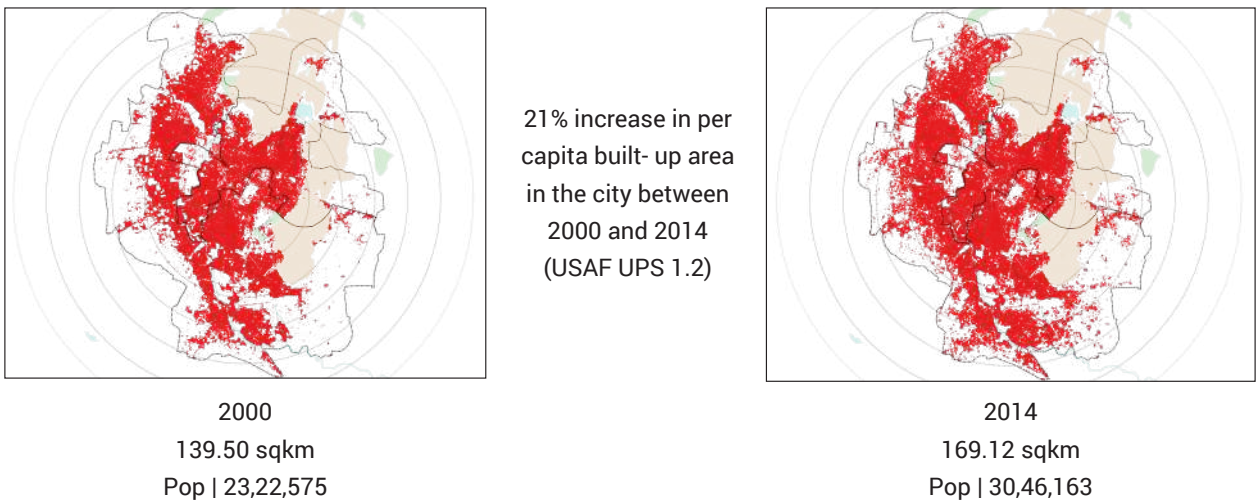
Sprawl Development

As discussed in Section 4.2.1 in greater detail, between 2000 and 2014, the built-up area in the city increased by 21 per cent from 139.50 sq. km. to 169.12 sq. km. (see Map 5.1) and the population increased from 23.22 lakh to 30.46 lakh.

Even though JDA prepared the detailed MDP 2025 for Jaipur in 2011, the growth pattern of the city appears to be sporadic and unmonitored due to lack of implementation plans. The spatial mapping of the city's

growth over time also indicates that instead of the city following the historically established efficient and compact development pattern, it is sprawling outward.

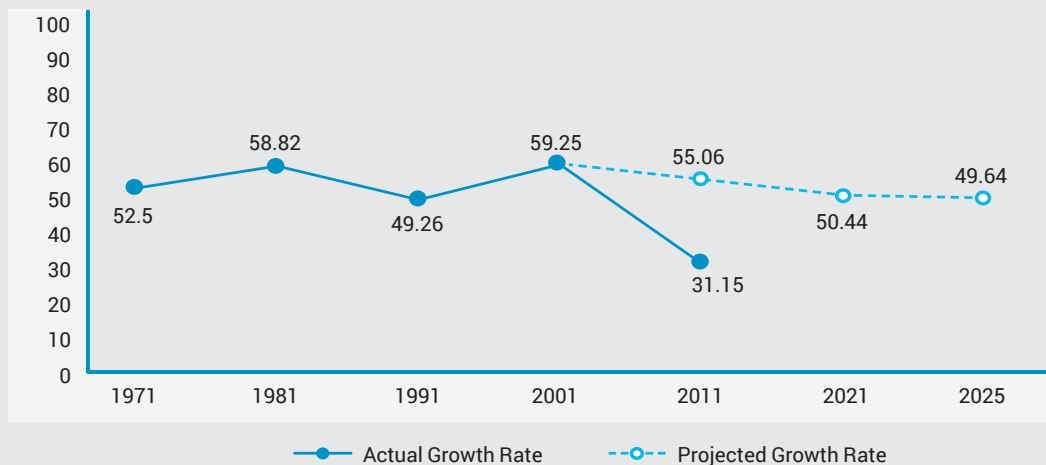
One of the major limitations of this master plan is that it has primarily relied on data from Census 2001, which is two decades old. This was when Jaipur experienced its peak urbanization with an urban decadal growth rate of 59.3 per cent. Considering this growth trend, population estimates were derived by different statistical methods where the growth rate was projected to be 55 per cent in 2011 and 49.6 per cent in 2025. Consequently, all infrastructure planning demand estimates followed these population projections. However, the actual decadal growth rate as per Census 2011 was only 31.2 per cent.



Map 5.1: Built-up area of the city in 2000 and 2014

Source: UN-Habitat

Figure 5.2: Population Growth Rate (%) – Projected vs Actual



Source: Projected – Jaipur MDP 2025; Actual – Census 2011



Ease of Change in Land Use Process

The MDP 2025 has not secured any land within the U1 area for agricultural use. The current change of land use policy makes conversion of land from other uses to residential use much simpler and encourages uncontrolled and piecemeal growth along the urban fringes. In several cases, it has not just led to loss of agricultural land but also to ecological degradation.

If a parcel of land located on a proposed residential land use is to be developed as a residential township, only three basic criteria have to be met. These do not include the parameter of location of land or distance from developed clusters, or other transportation connectivity as a criteria.

As of 2020, most of this converted land use area remained empty but for some scattered

development. This portrays the necessity of densifying the existing areas of the city as expanding outwards would only build more spatial and financial pressure to provide basic infrastructure in remote developments. Developments along major roads, such as the Agra Road, have not lived up to the projected growth.³⁶ Moreover, residential land use allocation extends beyond the current built-up area and exceeds the housing demand in the city.

CHANGE IN LAND USE CHECKLIST



Connectivity

Land should abut at least a 12-m road



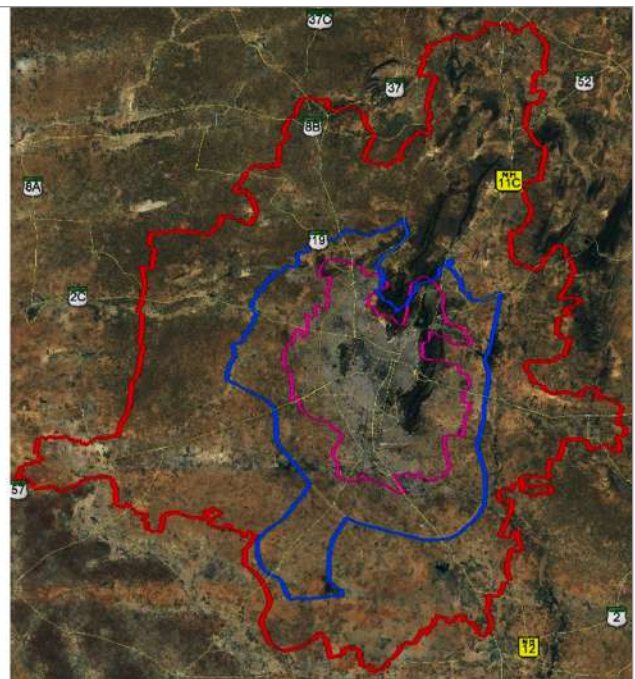
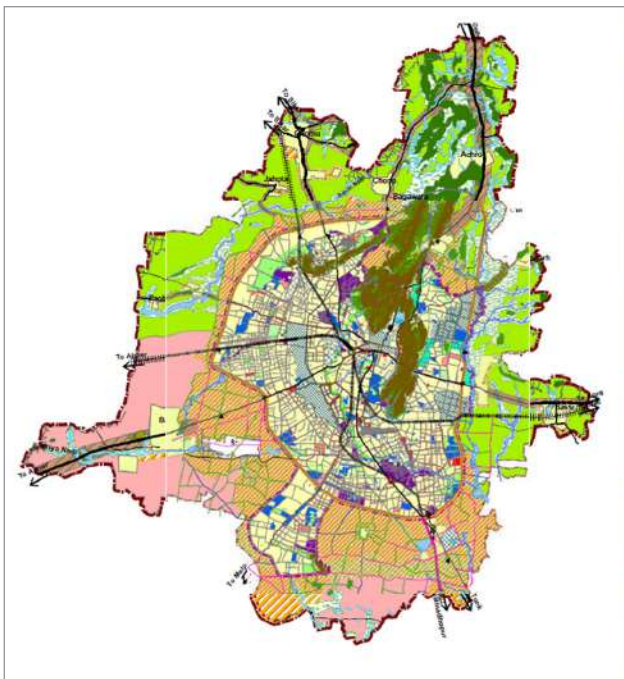
Water Supply

Provided by city or localized



Sewerage Connection

Provided by city or localized



Map 5.2: (Left) Planned Urbanization versus (Right) Actual Urbanization

Source: Jaipur MDP 2025; UN-Habitat

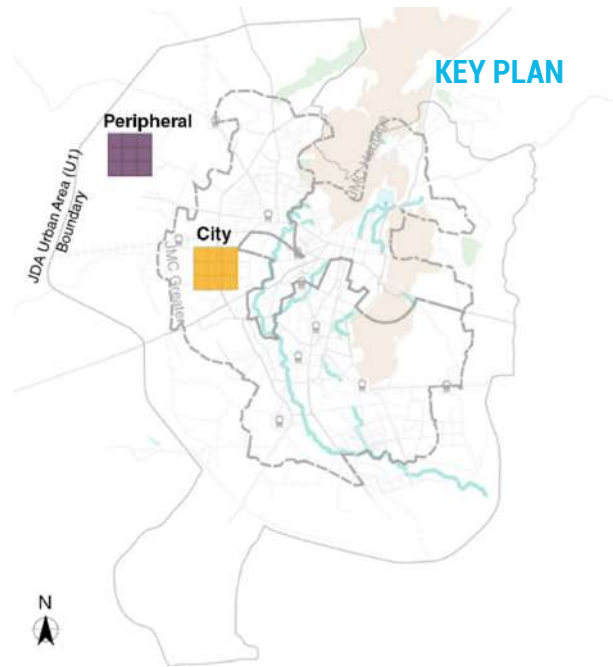
Note: The area encircled in the proposed land use plan (left) can technically be developed if the plot in consideration meets all the change in land use criteria. However, when observed closely on satellite imagery, the proposed land use plan allows for development in pockets that are distant from the city's urbanized cluster (right).

³⁶ As per consultation with JDA officials



Urban Morphology Analysis

To provide evidence of urban sprawl in Jaipur, an analysis was conducted on two different land swatches of nine sq. km. each—one within the municipal limits (city swatch) and one from the peripheral area on the outskirts of Jaipur’s municipal limits (peripheral swatch). Both these patches of land were measured in terms of road density and built footprint ratio.



City Swatch



Peripheral Swatch

	City Swatch	Peripheral Swatch
Patch Area	9.00	9.00
Road Length (km)	284.3	116.1
Road Density (km/sqkm)	31.6	12.9
Built Footprint (sqkm)	2.51	0.17
Built Footprint Ratio	27.8%	1.9%

**City Swatch displays
2.5x road density
15x built footprint**

Map 5.3: Urban Morphology Analysis – City vs Peripheral Swatch Comparison

Source: UN-Habitat

A comparison of results shows that for the same swatch area, the road density of the city swatch is about 2.5 times that of the peripheral swatch, while the built footprint ratio of the city swatch is almost 15 times that of the peripheral swatch.



Land Carrying Capacity Analysis

UN-Habitat's 'Five Principles for Sustainable Urban Development' states that compact cities should aim at developing the recommended density of 150 PPH. If UN-Habitat's recommended density is applied to the present conditions of available vacant land, the current amount of vacant land within JMC limits could inhabit about 8.4 lakh people, which is about 20 per cent of the city's existing population. Considering Jaipur's present population of 37.07 lakh (as per Swachh Survekshan 2019 reporting) and the population that could be accommodated in the vacant land, the area's total population capacity would add up to 45.4 lakh. The population projection of Jaipur city for 2025 is about 44 lakh³⁷. Thus, the existing urbanized land,

including vacant land, can possibly accommodate expected population growth till 2025, if citizens are provided with adequate infrastructure and services, including improved access to public transport.

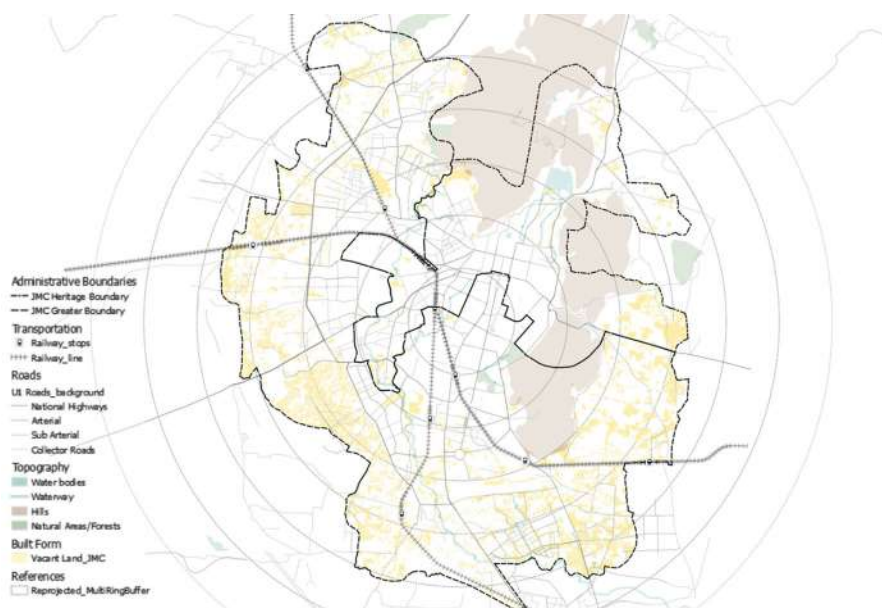
Sprawling development patterns create the need to travel large distances for work as well as to access various services/ facilities. In 2019, more than half of the vehicular composition in the city were two-wheelers and four-wheelers.³⁸ Due to sprawling development, the use of personalized motor vehicles tends to increase further, causing more GHG emissions.

The city needs to re-evaluate its growth pattern and revise its current masterplan to prepare new development strategies and policies to resolve loopholes. The revised MDP must ensure the promotion of sensitive development in the city's existing areas rather than expanding towards the hinterland, as this would have a major social, cultural, economic and environmental impact on the Jaipur region.

Table 5.1: Vacant land carrying capacity (approximation)

Vacant land within JMC (Ha)	5,575.27
Recommended population density (PPH)	150
Population that can be accommodated	8,36,290

Source: Vacant Land- JDA



Map 5.4: Vacant land within JMC limits

Source: JDA

³⁷ <https://worldpopulationreview.com/world-cities/jaipur-population>

³⁸ Draft CTTS Report 2019

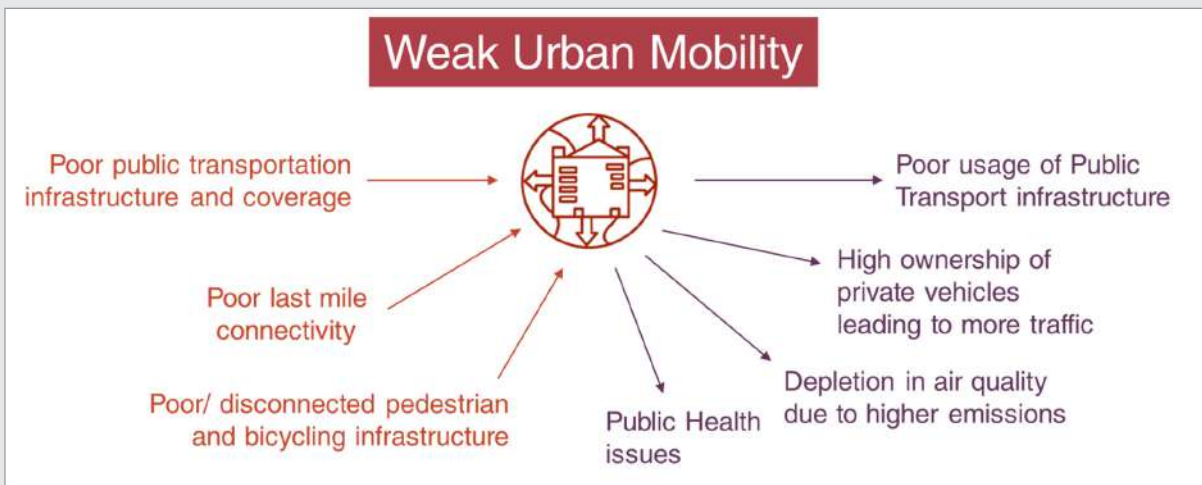
5.2.2 Diagnostic issue 2 : Weak urban mobility

The study of Jaipur's growth patterns through spatial analysis, documents such as the MDP 2025, Census 2011, Comprehensive Traffic and Transportation Study 2019 and stakeholder consultations with several agencies, especially JDA, highlighted some concerns that the city is currently facing with its growth and expansion. Urban mobility is weak in the city owing to poor public transportation infrastructure and coverage.

The application of urban sectoral assessment has highlighted various interlinked factors/ development sectors as shown in Annexure 6.2. In case of Jaipur's weak urban mobility issue, among the sectors that have the highest number of related urban sustainability indicators, the average performance of the transportation sector scores a 'lower medium', and the environment and ecology sector scores a 'medium'.

The performance of the specific indicators in these sectors allude to problem areas in Jaipur and correlations with certain observations in the city's development plan.

Figure 5.3: Co-relation analysis of weak urban mobility issue



Source: UN-Habitat



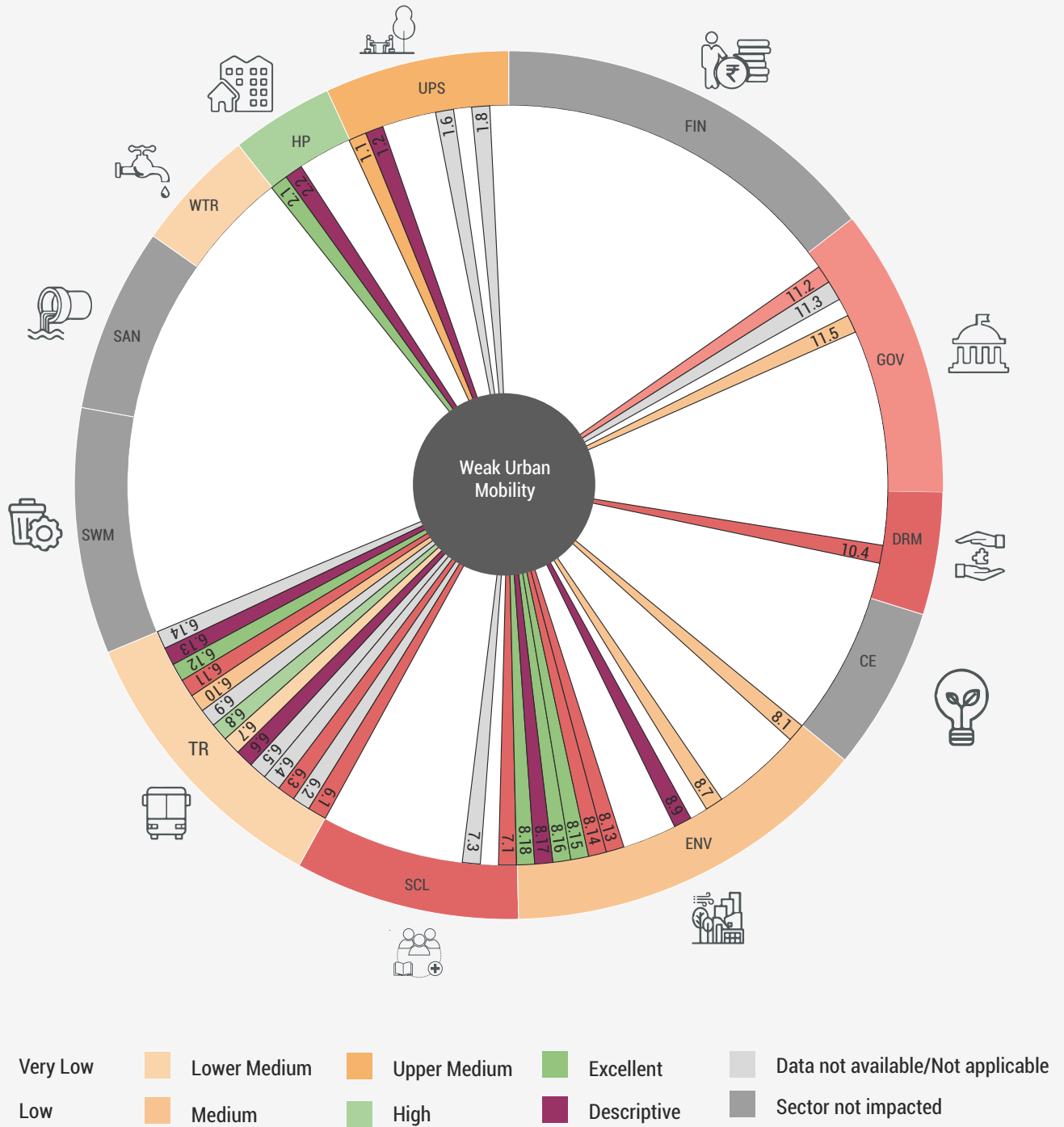
Public Transportation Infrastructure

As discussed in Section 4.6, there are 31 bus routes that run across the city and one operational metro line connecting the western to the eastern end of the city. With a 13.63-km road length with public transit per 1,00,000 population, the performance of the city is 'medium' with respect to public transit infrastructure network coverage.

Although Jaipur has an established bus and metro infrastructure, network analysis suggests that several parts of the city are under-served. In fact, within a radius of 500 m., only about 32.5 per cent of the city's population has access to a bus stop, and merely 2.5 per cent has access to a metro station, earning the city a 'very low' score in this sector.

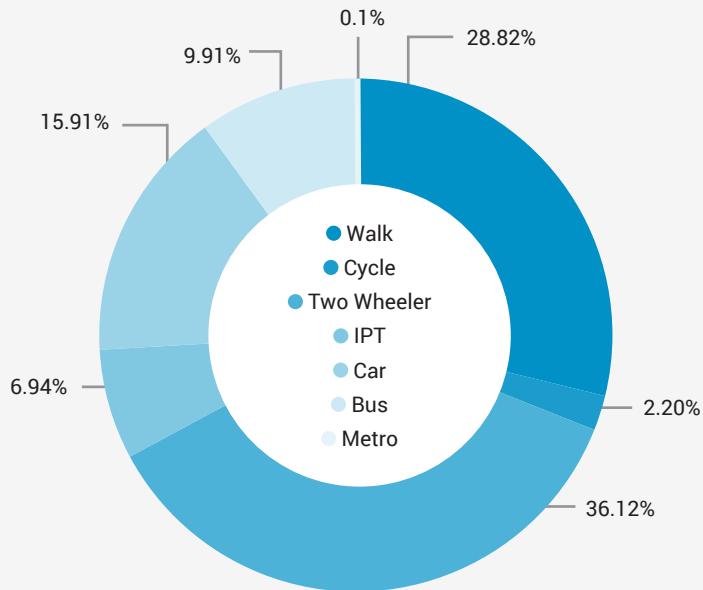
Jaipur's existing public transport services are centrally concentrated and weaken as the city fans out. The buses are often run overcrowded and their condition is quite poor. Citizens in such cases are compelled to use their privately-owned vehicles for a more convenient commute.

Figure 5.4: Interlinkage of the issue of weak urban mobility with indicators across USAF sectors

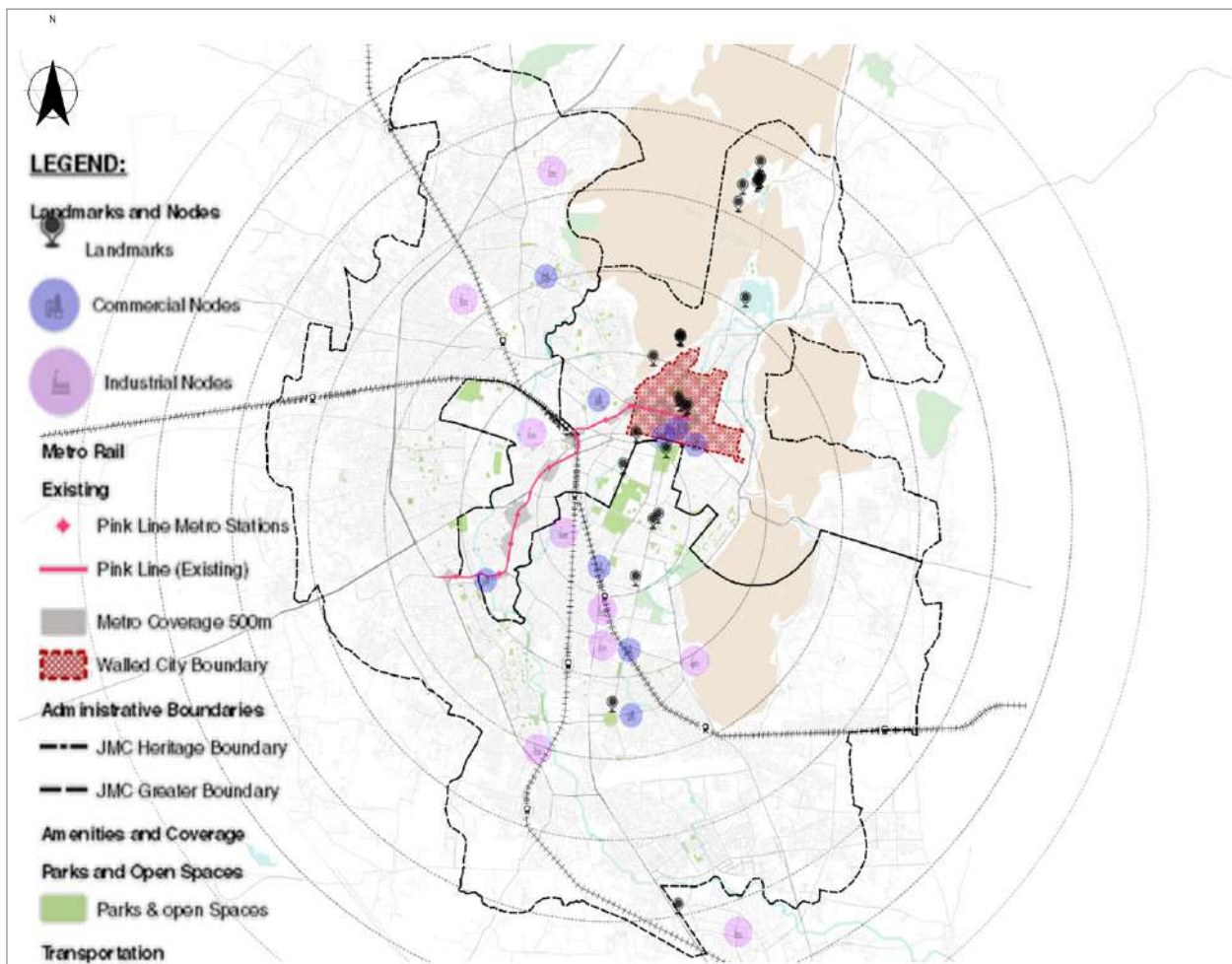


Source: UN-Habitat

Figure 5.5: Transport Modal Share (Trips)



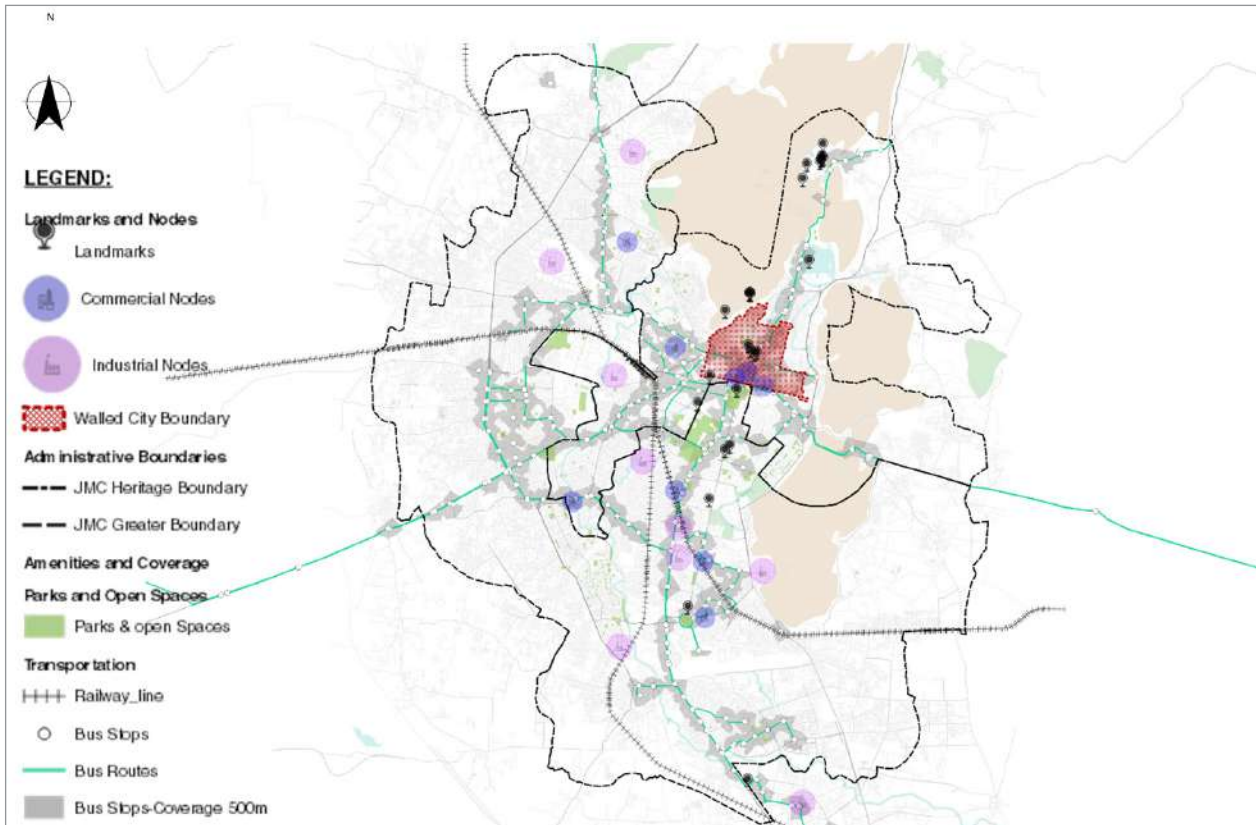
Source: Draft CTTS Report 2019



Map 5.5: 500m service area coverage of metro stations

Source: UN-Habitat

Only 35% of population has access to public bus stops within 500 m of their homes



Map 5.6: 500m service area coverage of bus stops

Source: UN-Habitat



Last Mile Connectivity

As per the Draft CTTS 2019 report, 28.8 per cent of trips in Jaipur are treaded on foot. However, only 14.4 per cent of the road length has a sidewalk on both or either side of the road. These sidewalks are observed to have encroachments and physical hurdles forcing pedestrians to walk on carriageways.

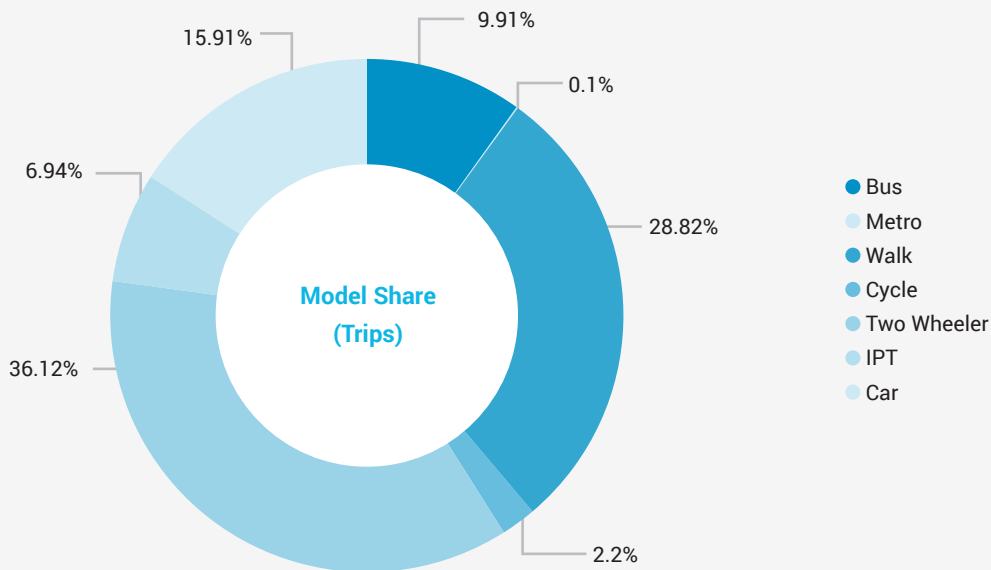
The existing bicycle lanes have been laid in a piecemeal fashion and are few and far between. Since they have no curb separation, these bicycle lanes can easily be accessed by high-speed vehicles. In addition to the

Only 14.4% of city covered by footpaths

non-conducive weather condition, this could also be one of the reasons why the share of trips on bicycles is only 2.2 per cent in the city.

The lack of proper pedestrian and bicycling infrastructure can lead to NMT–motorized vehicular conflicts, causing safety concerns. The Draft CTTS 2019 report reveals that there are about 57 fatal and serious injuries from road accidents per lakh population in Jaipur, leading to a score of ‘zero’ in this area of assessment.

Figure 5.6: NMT Share in Jaipur



Source: Draft CTTS report 2019



Image 5.1: High-speed vehicles observed on dedicated bicycle tracks despite empty motorized vehicle lane

Source: Google Maps Street View



Image 5.2: (Right) Unsafe environment for pedestrians and cyclists; (Left) Encroachments on pavements

Source: mapio.net/pic/p-6326529/; UN-Habitat



Image 5.3: E-rickshaws lined up in unorganized manner on the streets of Jaipur waiting for passengers

Source: www.patrika.com/jaipur-news/e-riksha-charging-station-in-jaipur-5894562/

The presence of Intermediate Public Transportation (IPT) is prominent in the city, but the sector is still unorganized. The shared auto-rickshaws and tempos are operated independently of government organizations by unions that have optimized routes based on passenger demand. There are about 400 battery operated e-rickshaws that help fulfill the short distance travel. The movement of these vehicles on roads can be chaotic as there are no designated lanes or stops. They often interrupt flowing traffic by stopping to pick up or drop passengers at unexpected and unpredictable spots. This also causes high safety concerns.

and 2017, the CAGR of privately-owned cars was the second highest (14 per cent CAGR) among all motorized vehicle registrations in Jaipur, indicating the rising popularity of this transportation mode. Even two-wheelers were reported to be growing at a CAGR of 12 per cent.

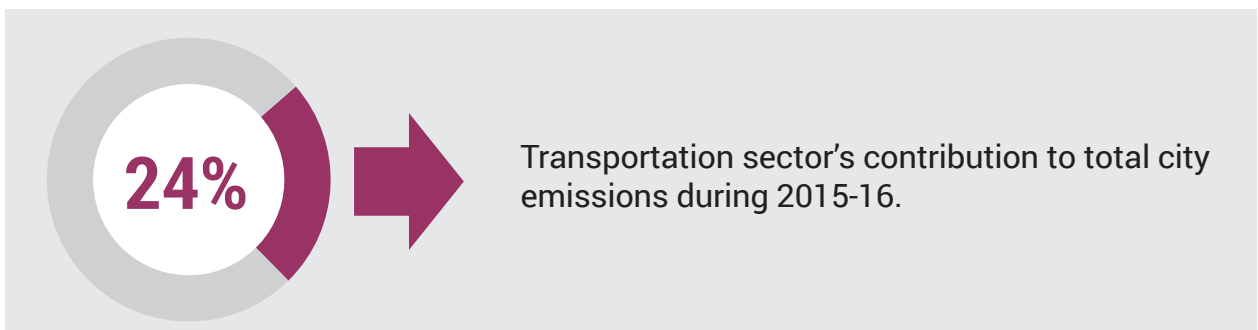
Increased private vehicle ownership creates a greater number of vehicles on the road leading to growth in traffic. This is a two-fold problem, concentration of vehicles and the pollution from them, especially during peak traffic hours, can lead to increased carbon emissions that damage the local environment and deplete the air quality, causing physical and mental health issues. These factors, overall, negatively contribute to the quality of life of Jaipur's citizens.



Health and Quality of Life

Study of motorized vehicular registration data shows that two-wheelers, with a share of 70 per cent, dominate the city roads, followed by cars (18 per cent). Analysis also suggests that between 2012

In 2019, the annual mean concentration of PM10 and PM2.5 in Jaipur was 150 and 132, respectively, which is much higher than the CPCB air quality standards. Jaipur scores 'zero' on both aspects. Additionally, in 2015-16, the transportation sector alone drove 24 per cent of the city's total GHG emissions.

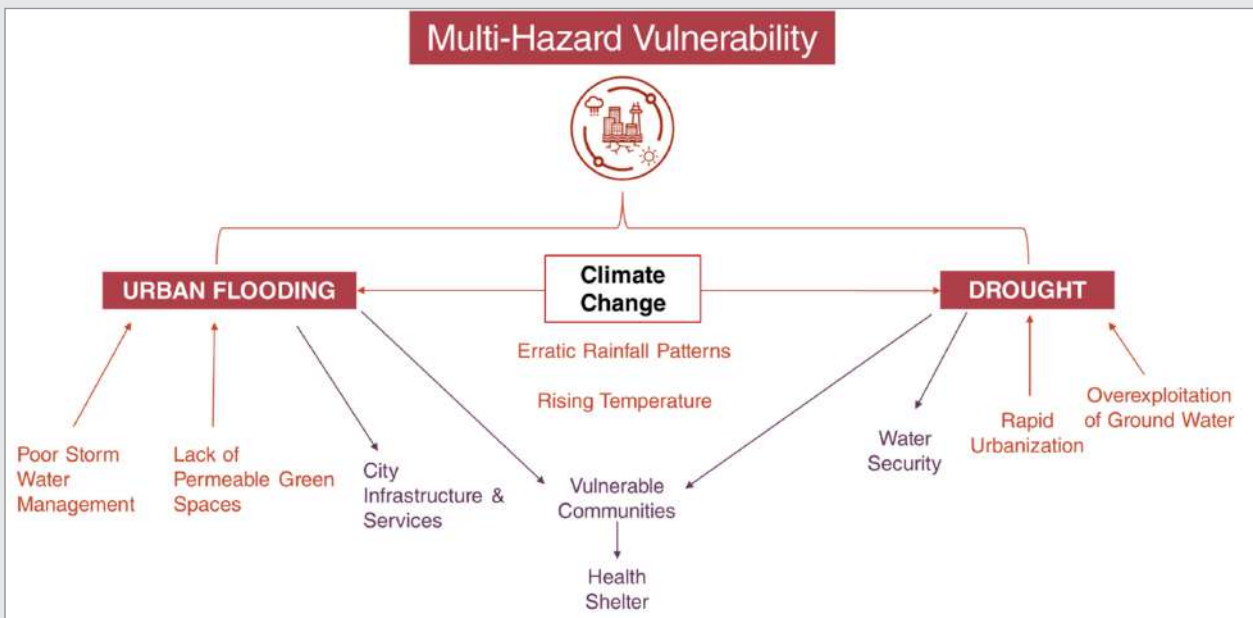


5.2.3 Diagnostic issue 3: Multi-hazard vulnerability

The issue of multi-hazard vulnerability was brought to the forefront when the disaster risk management and water sectors were observed to be the weakest performing ones in the urban sustainability indicator assessment report. As discussed in Section 4.10, Jaipur is prone to droughts, urban flooding and heat waves. Although the higher rate of precipitation and the contradictory, longer

dry spells can be linked to climate change, at a more granular level, these vulnerabilities and the experiences of citizens are directly impacted by urban planning decisions and execution. The application of urban sectoral assessment has highlighted various interlinked factors/development sectors as presented in Annexure 6.3. Key concerns can be attributed to the average and/or low performance of the environment and ecology, social facilities and services, and the disaster risk management sectors.

Figure 5.7: Co-relation analysis of multi-hazard vulnerability issue



Source: UN-Habitat



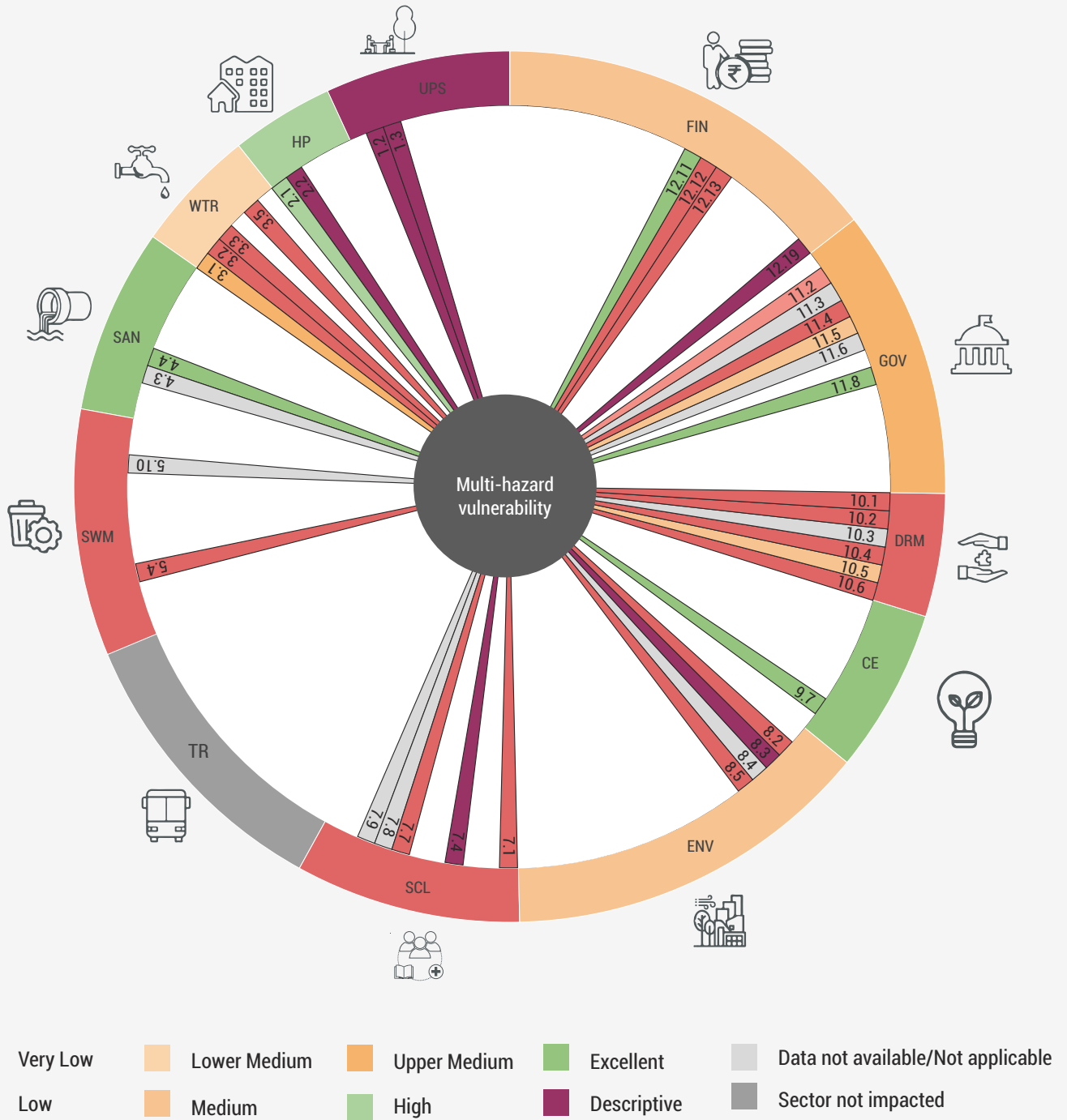
Urban Flooding

There were three instances of urban flooding reported in 2019-20 in Jaipur.³⁹ With merely a

15 per cent storm water network coverage, Jaipur is ill-prepared to face urban flooding from heavy rainfall. Also, the city has only one per cent of green cover implying that there is lack of permeable green spaces. Both these factors play a critical role in urban flooding as rainwater is unable to seep through the ground and tends to settle on road surfaces.

³⁹ SLB 2020 reporting Jaipur

Figure 5.8: Interlinkage of the issue of multi-hazard vulnerability with indicators across USAF sectors



Source: UN-Habitat

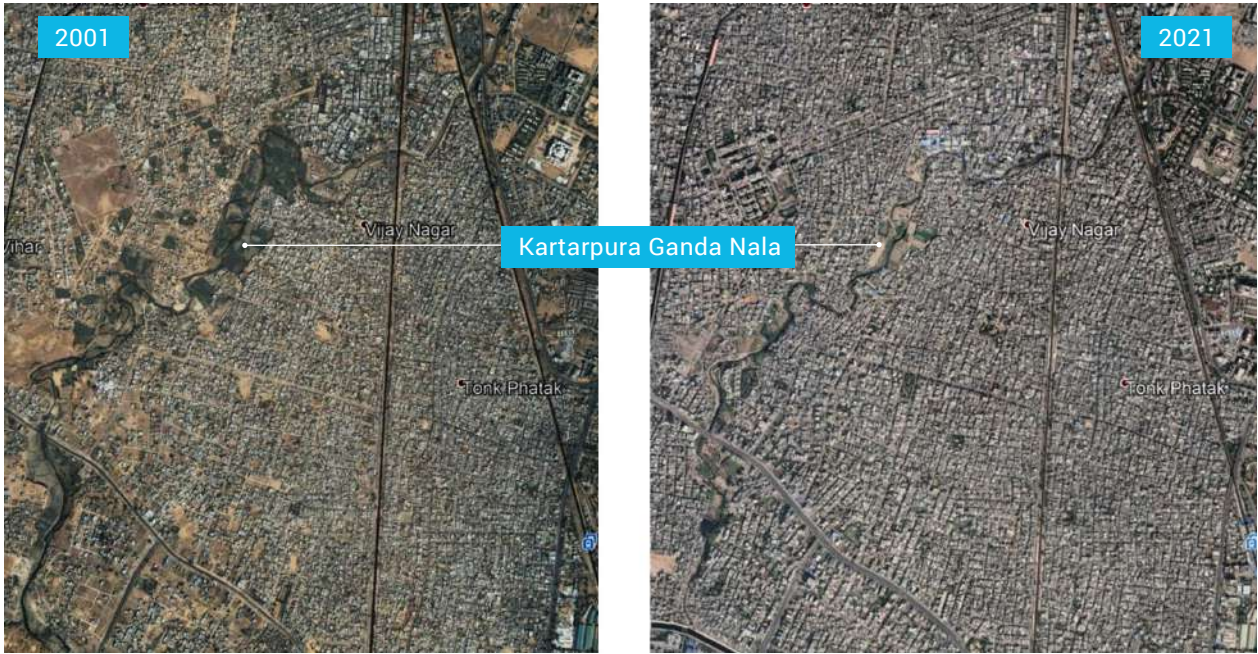


Image 5.4: Depletion of permeable areas around Kartarpura Ganda Nala between 2001 and 2021

Source: Google Earth Satellite Imagery

Jaipur does not have a flood risk management plan. Urban flooding puts high pressure on the city’s infrastructure, services and governance. In instances of calamity, the city is not just left in a chaotic condition, but also faces heavy monetary repercussions due higher number human resources

involved in handling the situation, and the cost of damage repairs and replacements. As per MPI 2019, the cost recovery in sanitation and solid waste management was 23 per cent and three per cent, respectively, both areas of concern.



Image 5.5: Urban flooding in Jaipur in 2019



Source: <https://www.bloomberg.com/news/articles/2020-08-15/three-die-as-rains-lash-india-s-jaipur-city-flooding-some-areas>



Drought

Being a desert state, Rajasthan suffers from acute water shortage. Ramgarh Lake, located about 20 km from Jaipur and previously its primary water source

owing to its proximity to the city, saw its last drop of water dry up in 2000. Jaipur has experienced several instances of drought even in recent years. In fact, between 2016 and 2018, Jaipur’s current main source of water supply, the Bisalpur Dam, located about 120 km away from the city, was on the verge of drying up completely. But in 2019, the water in the dam was restored by torrential rains in the Bisalpur Lake area.

Water security of citizens is greatly threatened by uncertainty of downpours and instances of drought. It is crucial to have a more sustainable and reliable water source in Jaipur and there is an urgent requirement for a water resources assessment and management plan that the city lacks at this moment.

Rapid urbanization has made this issue even more pertinent. Between 2001 and 2011, Jaipur city experienced a growth rate of 31 per cent. Rising

population has, consequently, led to increased water demands in the city.

As per PHED reporting, Jaipur receives only 133LPD of water per capita and scores poorly on the USAF. Also, only 84 per cent of households are connected to a water supply network⁴⁰, while the remaining households rely on water tankers provided by PHED and ground water extraction. Moreover, excessive ground water extraction has led to depletion of the city's water table.

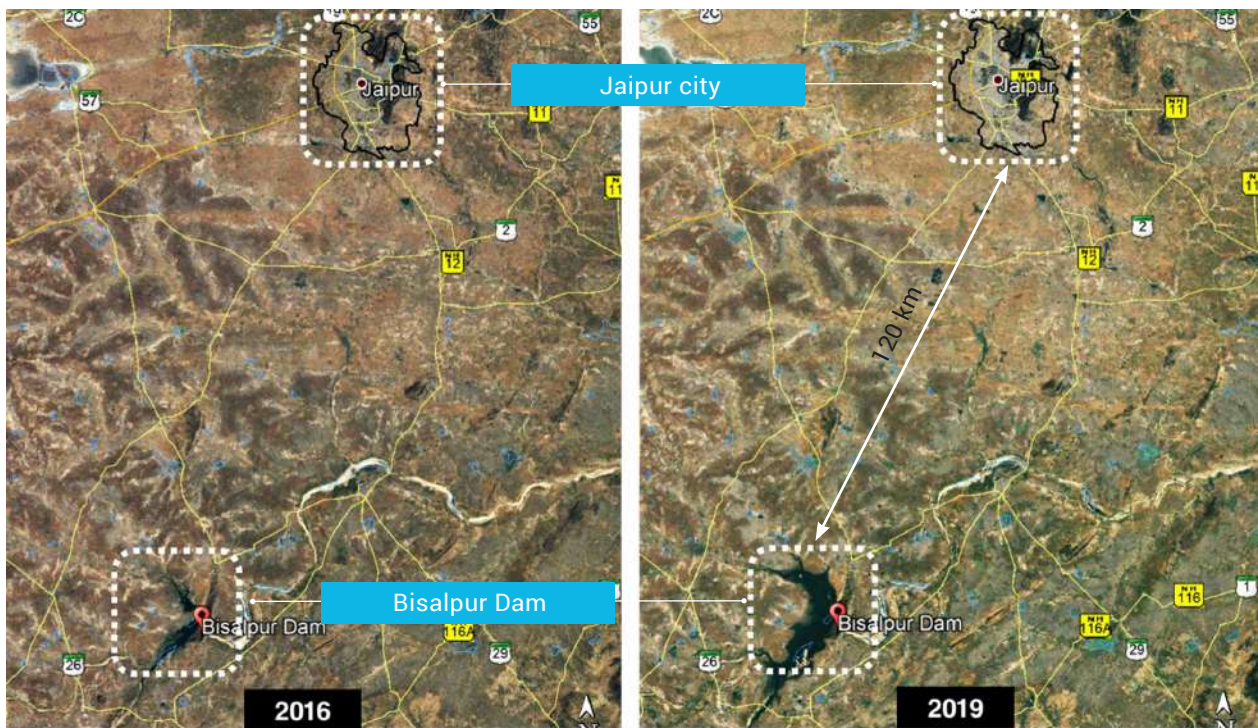
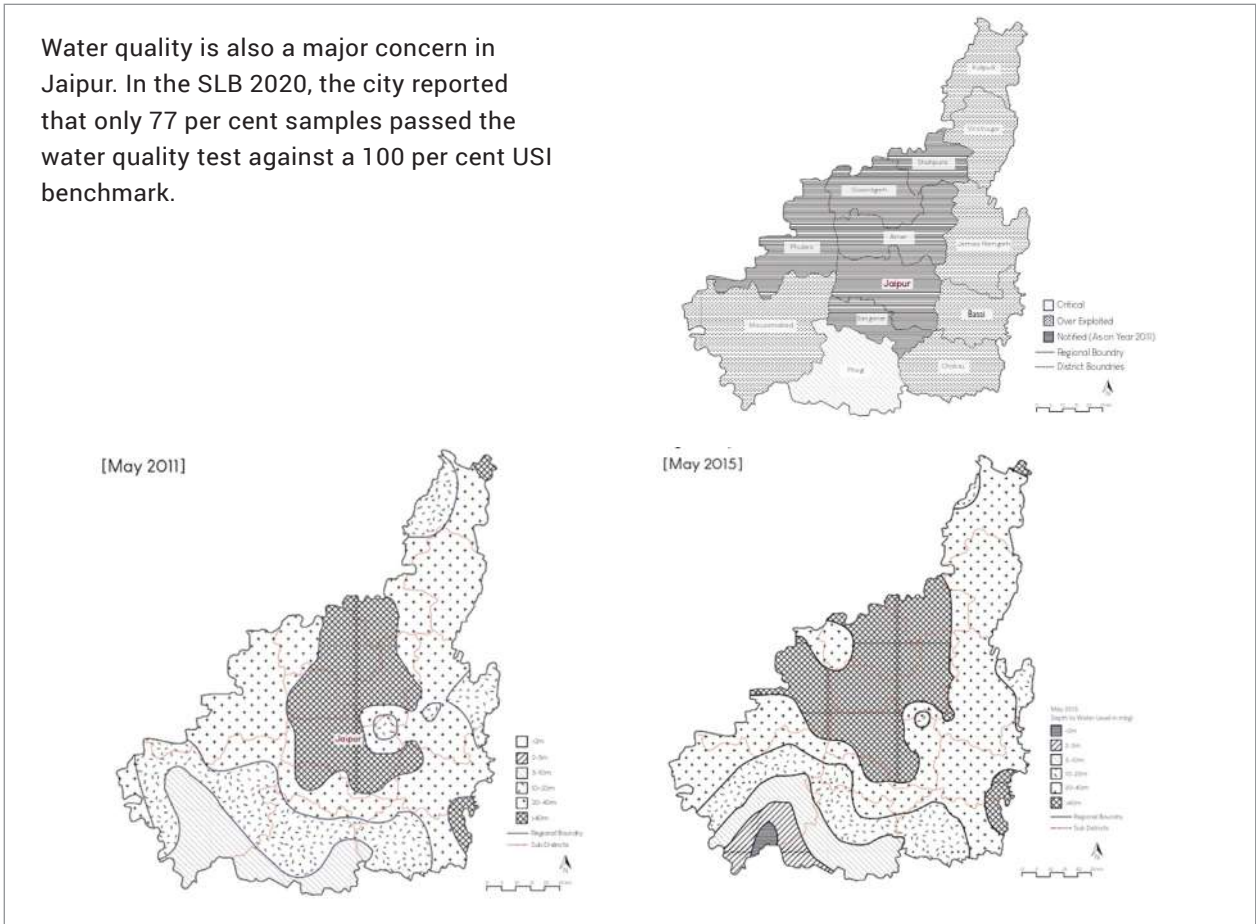


Image 5.6: Bisalpur Dam—the primary water source for Jaipur city—on the verge of completely drying up in 2016. Heavy rainfall in 2019 finally helped in recovering the lost water.

Source: Google Earth Satellite Imagery

⁴⁰ SLB 2020 reporting Jaipur

Water quality is also a major concern in Jaipur. In the SLB 2020, the city reported that only 77 per cent samples passed the water quality test against a 100 per cent USI benchmark.



Map 5.7: (Top) Jaipur city was categorized under 'Notified' area by the Central Ground Water Board in 2011; (Bottom) Comparison of water table levels between years 2011 and 2015

Data Source: Ground Water Information: Jaipur District, 2013, Central Ground Water Board; Map Source: Re-hydrating Jaipur by Anubhuti Chandna



Heat Waves

A 2018 study on the urban heat island phenomenon in Jaipur city⁴¹ states that over a period from 2000 to 2011, there was an average rise of 2.99 degree Celsius in overall summer temperatures. Also, new suburbs of the city recorded two to four degree Celsius increase in land surface temperature. Greater usage of air conditioners has led to more energy consumption and, consequently, carbon emissions that are trapped in urban areas causing a heat island effect. Trees are known to be a very effective way of carbon sequestration and greening

of more areas in the city could help in the mitigation of this vulnerability. Jaipur currently does not have any GHG emission monitoring systems in place.

Overall, with no city level disaster risk management plan, hazard vulnerability mapping or urban flood/ water stagnation risk assessment and management plan, Jaipur scores 'low' in these assessment areas and is currently under-prepared to face such calamities. Disaster preparedness and building the city's resilience can save protect citizens and save the city from financial losses by avoiding damages.

No GHG emissions monitoring system

⁴¹ SLB Jalan, S. and Sharma, K., 2014. Spatio-Temporal Assessment Of Land Use/ Land Cover Dynamics And Urban Heat Island Of Jaipur City Using Satellite Data; The International Archives of the Photogrammetry, Remote Sensing and Spatial Information Sciences, Volume XL-8, 2014, pp. 767



Image 5.7: Streets of Jaipur during heat wave in 2020

Source: <https://www.financialexpress.com/>

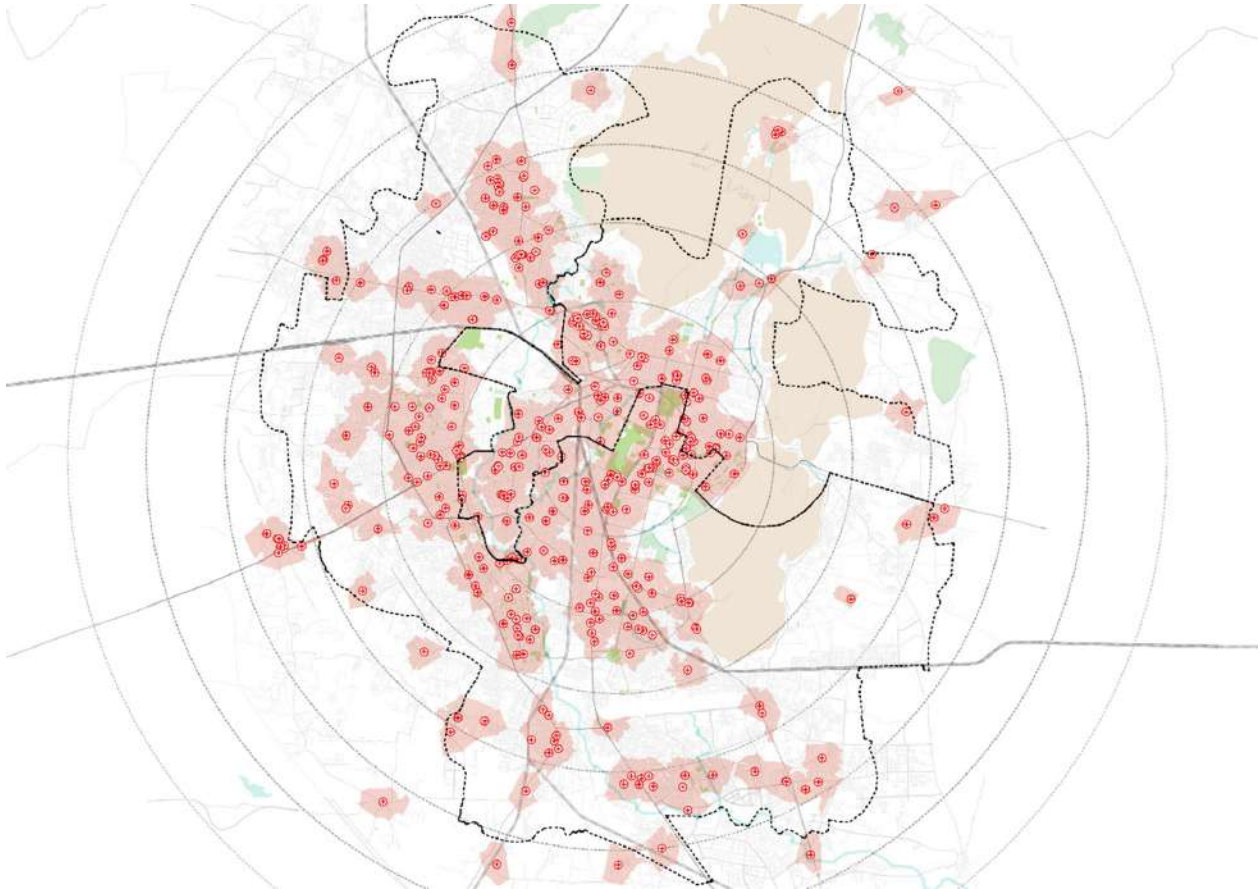
10 years since enforced MDP was last reviewed and updated

Disaster risk management should be an integral part of a city's master plan. In the span of the last 10 years, Jaipur city's master plan has not been updated to accommodate mitigation and adaption strategies to combat existing and future disaster risks and Jaipur's performance in this aspect is 'low'.

Although government agencies, such as JDA, DoIT&C and PHED, have independently executed spatial mapping of Jaipur in GIS, they are yet to use the tool to map vulnerable areas of the city to develop disaster preparedness. Such mapping is essential to social and environmental inclusivity and effective distribution of healthcare facilities.

USAF Indicator	City value	Benchmark	USAF Score
DRM 10.1: Presence of City Disaster Management Plan prepared / updated in last five years (Y /N)	No	Yes	0
DRM 10.2: Existence of hazard vulnerability maps/risk maps (at city level) prepared / updated in the last five years for the main hazards threatening the city (Y /N)	No	Yes	0
DRM 10.6: Existence of urban flood / water stagnation risk assessment and management plan	No	Yes	0

In a situation of calamity, only 58% of the population of Jaipur has access to a hospital within a radius of 800 m.



Map 5.8: Access to healthcare services within 800 m

Data Source: OSM; Map Source: UN-Habitat

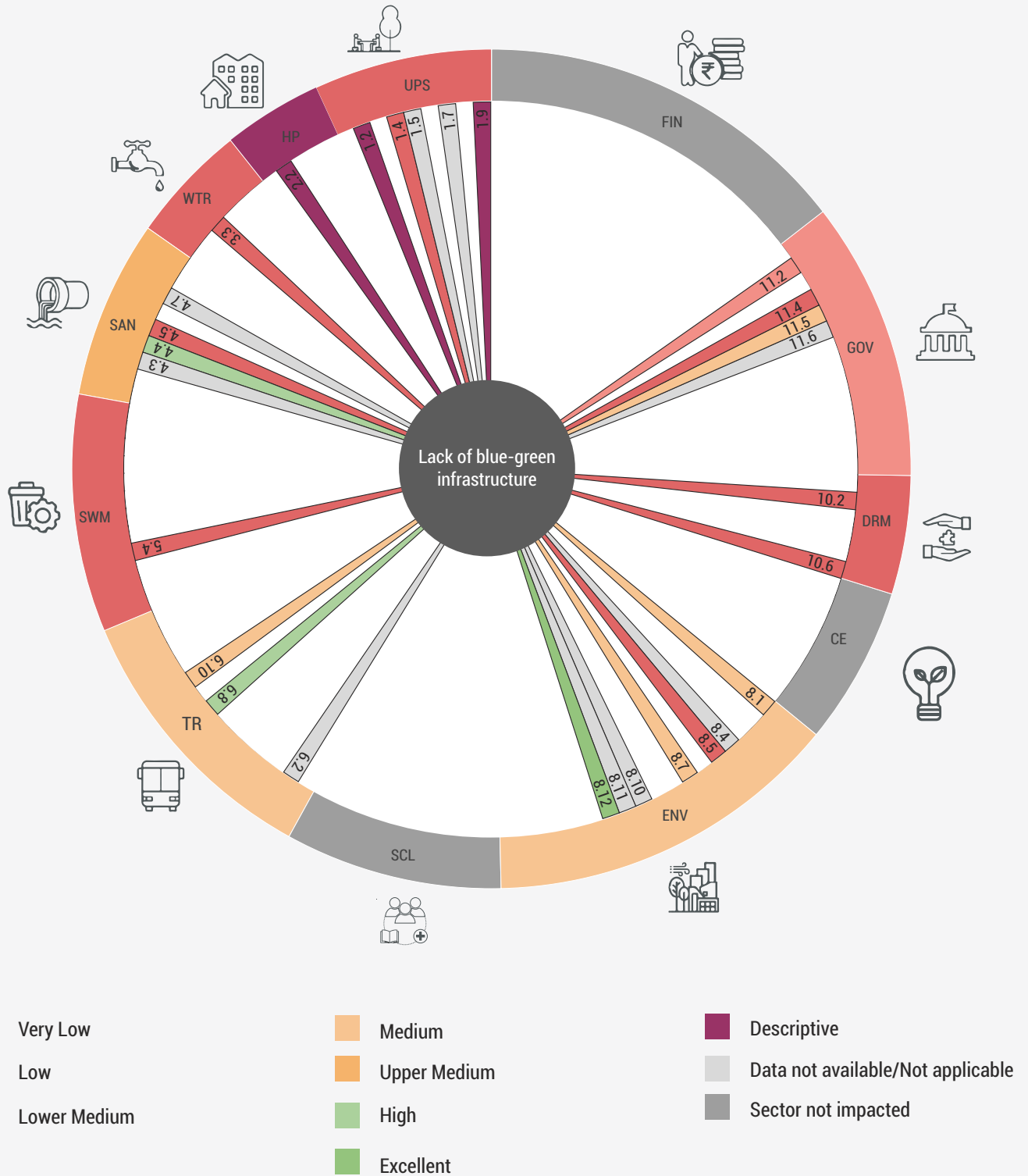
5.2.4 Diagnostic issue 4 : Lack of blue-green infrastructure

As discussed in Section 4.1, Jaipur is endowed with beautiful natural features such as forests, rivers and lakes. Historically, a few large green areas were designed near the walled city area. However, as the city grew in a piecemeal manner over time, the blue-green infrastructure was not proportionately planned with respect to the city's rising population and densities.

The application of urban sectoral assessment has highlighted various interlinked factors/development sectors as shown in Annexure 6.3. In case of the blue-green disconnect issue, among the sectors that have the highest number of related urban sustainability indicators, the average performance of the environment and ecology sector scores 'medium' and the urban form, public space and safety sector scores 'very low'.

Public open spaces play a significant role in the reduction of GHGs, mitigation of the urban heat island effect, water conservation and overall public

Figure 5.9: Interlinkage of the issue of lack of blue-green infrastructure with indicators across USAF sectors



Source: UN-Habitat

well-being and quality of life. As with most urban development challenges, inadequate public open spaces and conservation of water bodies is linked to many other development and environment factors.



Inadequate Open/ Green Spaces

As discussed in Section 4.2.1 in greater detail, Jaipur has reported only 1.46 sq. m. of green space per capita in the city, against a benchmark of 10-12 sq. m. per capita. Moreover, only 30 per cent of the population has access to public parks/ open spaces within a radius of 500 m. The city level and community level parks constitute 40 per cent of the total green spaces. Most of the existing green spaces are concentrated in the city centre

and are not well-connected with the city's public transportation routes.

The dearth of green space is primarily due to lack of prioritization and inadequate spatial planning. The percentage of area allocated for recreational use in the proposed land use in Jaipur MDP 2025 is only 6.66 per cent, against the standard of 12-14 per cent (for large cities) of developable area as per URDPFI guidelines. A lot of the planned parks lie on privately-owned land, which is difficult to acquire. As a result, as per the ELU 2017, only 0.89 per cent of the U1 area under the MDP 2025 is currently under recreational use.

Jaipur has taken no action for the protection, conservation and management of its urban biodiversity.

The city scored 'very low' for three indicators in the urban form public space and safety sector, which measures the accessibility and service level of public open spaces⁴² in the city.



Only 30% of the population has access to public park/ open space within a 500 m. radius

30%

City population with access to organized public open space within 500 m. radius

(USAF UPS 1.4)

1.46 sq.m.

Open space (recreational space, organized green, other common open spaces) per capita

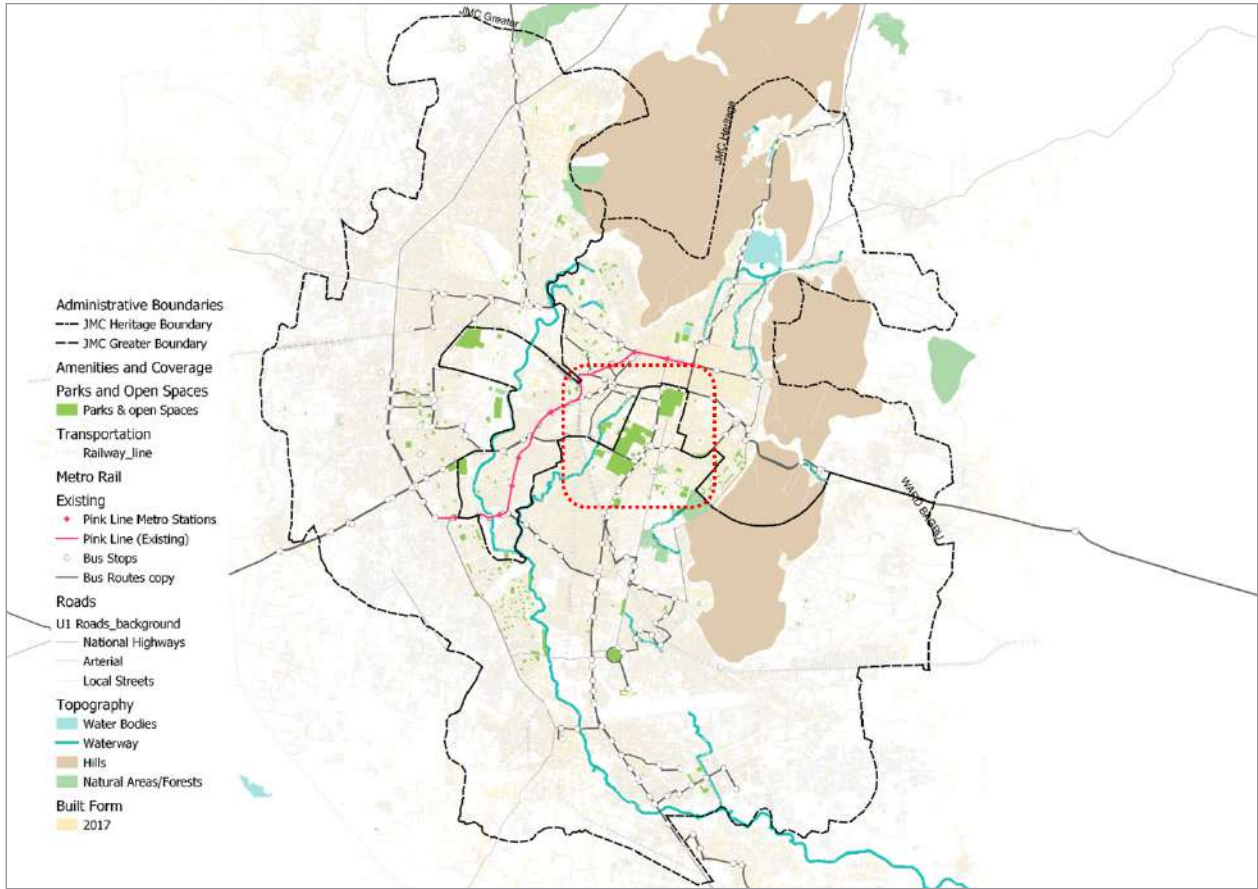
(USAF UPS 1.5)

5.43 sq.m.

Recreational and open space area out of total developable area in the city

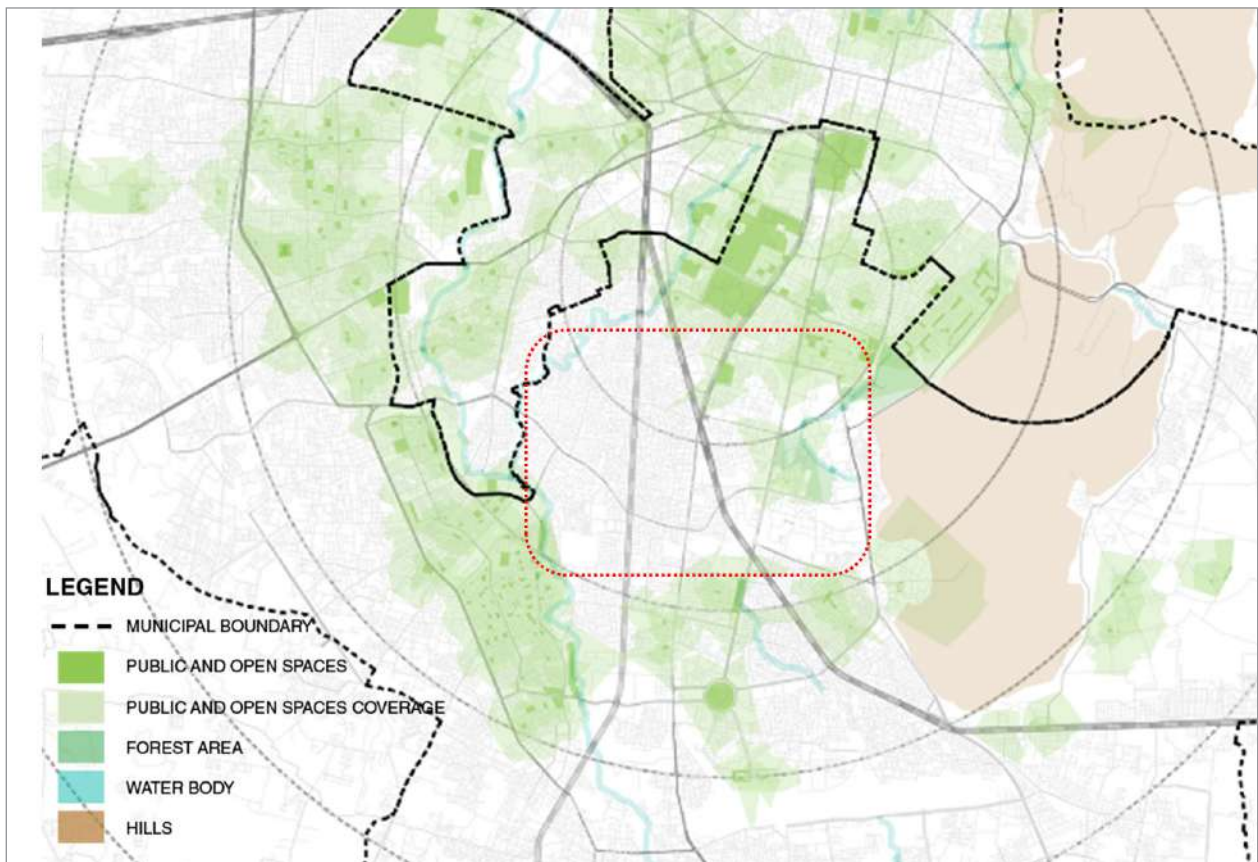
(USAF UPS 1.7)

⁴² Open spaces generally serve the function of recreation (e.g., gardens and parks, community gardens, corridor links, amenity spaces, community use facilities, civic commons, or squares, which are for playing, socializing, exercising or celebrating) or sports (e.g., public playgrounds, which are for formal structured sporting activities such as team competitions, physical skill development and trainings); City-Wide Public Space Strategies: A Guidebook for City Leaders (2020), UN-Habitat.



Map 5.9: Large amount of green space concentrated in central Jaipur

Source: UN-Habitat



Map 5.10: Closer look into the parks coverage displays some underserved pockets in Jaipur

Source: UN-Habitat



Water Management

Despite its extreme vulnerability to both water related extremities, drought and urban flooding, Jaipur has not prepared a water resources assessment and management plan. Only two per cent of wastewater received at the treatment plant is recycled or reused after appropriate treatment for various purposes. A wastewater conservation and recycling system can help the city mitigate the risk of flooding as well as in increasing the ground water table.

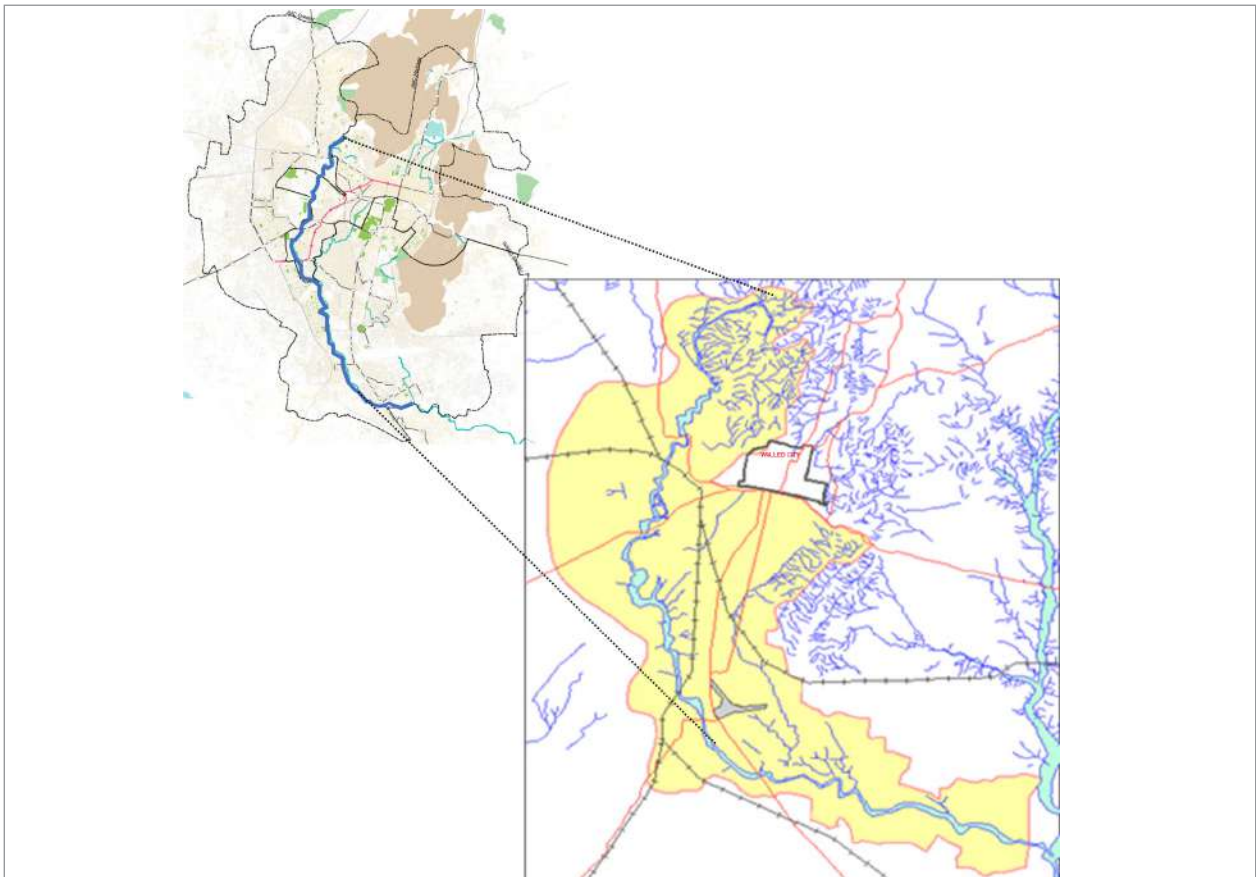
Only 2% of wastewater received at the treatment plant is recycled or reused



Opportunities to Build on Existing City Infrastructure Investments

The Dravyavati River rejuvenation project, completed in 2018 at a cost of about INR 1,700 crore, is a 47.5-km river restoration project with a waterfront. Walking and cycle tracks, and some green spaces at the embankment were developed along the river as part of this development. However, these parks lack connection to nearby neighbourhoods.

Analysis shows an average population density of approximately 120 PPH in a 500-m. buffer zone along the Dravyavati River. In its five principles for sustainable urban development, UN-Habitat recommends a population density of 150 PPH. This indicates that there is scope for redensification of the area to provide a waterfront and open space access to a larger population.



Map 5.11: Dravyavati Riverfront Project

Source: <https://www.ecofirst.in/dravyavati-river.html>



Image 5.8: View of landscape park along the Dravyavati riverfront development project

Source: <https://www.prnewswire.com/>

ANNEXURE

UPS	HP	WTR	SAN	SMM	TR	SCL	ENV	CE	DRM	GOV	FIN
1.1	Street lighting coverage	% HH pipe connection	% Sewage network connection	% Wet waste processed	% Pop. 500m PT	% Pop. 800m healthcare	Clean Air Action Plan	% HH using LPG	Disaster Management Plan	Planners/capita	Credit rating
1.2	Change in Built-up area	% quality of water	% HH toilet access	% Dry waste separated/recycling	Km bicycle path/100,000	% Female literate	GHG measurement system	% Energy from renewable sources	Hazard/ risk maps	Years since MP updated	% Property tax collected
1.3	Agri to developable in MP	resource assessment plan	% Sewage treated before discharge	% Solid waste for energy/processing	% Roads with footpath	% Pop. 800m schools	Annual GHG emissions	% Pop. Access renewable energy	% HHs in risk area	No. Services Command Centre	% Grants received
1.4	500m to parks/open space	% non revenue	% Wastewater passed treatment standard	% Solid waste in dumps, water bodies, burnt	% Increase PT ridership	change decadal pop growth	% Tree cover	% Energy efficient street lighting	% Buildings in 4km fire service	No. of functions by ULB	GDP per capita
1.5	Per capita open space	supply per capita	% Wastewater recycled	% Waste remediated	% clean energy vehicles	City dependency ratio	Biodiversity conservation	Energy use/capita	Hazard warning system	GIS based MP	Change own source revenue
1.6	Pedestrian fatalities %	metering connections	% Sewage treated in plant	% Wards segregating waste	Road density	Under 5 mortality	No. of green building incentives	% HH authorized energy connection	Flood risk plan	Environment all status report	Operating margin
1.7	Recreational open space %		% Industries complying CPCB	ICT monitoring C&T, GVP, staff	Avg travel speed	Hospital bed density/10,000	Annual ACl	Building codes consider eco-technologies		% staff trained	% Annual debt service
1.8	Safety/rating		FSSM Action Plan/ bye laws	% waste pickers integrated	% Share NMT	% Reduction vector disease	Annual GHG/capital	System Average Interruption		No. of E-gov initiatives	% Debt in overall budget
1.9	ULB parks expenditure		% PT google maps	% Hazardous waste processed	Street intrusion density	% Reduction waterborne disease	Emissions from transport			MP accessible online	% Properties covered tax net
				solid waste (kg/capita/day)	% Road PT/100,000	% Schools digital access	Biochemical Oxygen Demand			No. of ULB committees	Capital expenditure efficiency
				% Wards D2D collection	road accidents/100,000	% Mobile network subscription	Trees per inhabitant			citizen charter	Water supply cost recovery
					differently-abled bus accessibility		Land use zoning environment protection			City data officer	Sanitation cost recovery
					workplace accessibility 30min		Annual PM10			% Women councillors	Solid waste cost recovery
					% ULB area streets		Annual PM2.5			Open data portal	Unemployment rate
							Annual NO2				Inequality index Gini
							Avg daily SO2				Workforce employed
							Annual methane emissions				% Capital expenditure
							Noise pollution regulations				GDP density of built up
											% Informal employment

Annexure 6.1: Interlinkage of issue of urban sprawl with indicators across the urban assessment sectors

UPS	HP	WTR	SAN	SWM	TR	SCL	ENV	CE	DRM	GOV	FIN
1.1	Street lighting coverage	% HH pipe connection	% HH toilet connection	% Sewage network connection	% Met waste processed	% Pop. 500m FT	Clean Air Action Plan	% HH using LPG	Disaster Management Plan	11.1	12.1
1.2	Change in Built-up area	% quality of water	% HH toilet access	% HH toilet access	% Dry waste separated recycling	% Pop. 300m healthcare	GHG measurement system	% Energy from renewable sources	Hazard/ risk maps	11.2	12.2
1.3	Agri to developable in MP	resource assessment plan	% Sewage treated before discharge	% Solid waste for energy/ processing	% Roads with footpath	% Pop. 800m schools	Annual GHG emissions	% Pop. Access renewable energy	% HHs in risk area	11.3	12.3
1.4	500m to parks/open space	% non revenue	Wastewater treatment standard	% Solid waste in dumps, water bodies, burnt	% Increase PT ridership	change decadal pop. growth	% Tree cover	% Energy efficient street lighting	% Buildings in 4km fire service	11.4	12.4
1.5	Per capita open space	supply per capita	Wastewater recycled	% Waste remediated	% clean energy vehicles	City dependency ratio	Biodiversity conservation	Energy use/capita	Hazard warning system	11.5	12.5
1.6	Pedestrian fatalities %	metering connections	% Sewage treated in plant	% Wards segregating waste	Road density	Under-5 mortality	No. of green building incentives	% HH authorized energy connection	Flood risk plan	11.6	12.6
1.7	Recreational /open space %		% Industries complying CPCB	ICT monitoring C&T, GVP, staff	Avg travel speed	Hospital bed density/ 10,000	Annual AQI	Building codes consider eco-technologies		11.7	12.7
1.8	Safety rating		FSSM Action Plan/ bye laws	% waste pickers integrated	% Share NMT	% Reduction vector disease	Annual GHG hospital	System Average Interruption		11.8	12.8
1.9	ULB parks expenditure		% PT google maps	% C&D collected	Street intersection density	% Reduction warborne disease	Emissions from transport			11.9	12.9
				% Hazardous waste processed	% Road FT/ 100,000	% Schools digital access	Biochemical Oxygen Demand			11.10	12.10
				solid waste (kg/capita/day)	road accidents/ 100,000	% Mobile network subscription	Trees per inhabitant			11.11	12.11
				% Wards DZD collection	differentiated bus accessibility		Land use zoning environment protection			11.12	12.12
					workplace accessibility 30min		Annual PM10			11.13	12.13
					% ULB area streets		Annual PM2.5			11.14	12.14
							Annual NO2				12.15
							Avg. daily SO2				12.16
							Annual methane emissions				12.17
							Noise pollution regulations				12.18
											12.19
0	5	2	4	1	2	0	3	-	0	2	-

Annexure 6.2: Interlinkage of issue of weak urban mobility with indicators across the urban assessment sectors

UPS	HP	WTR	SAN	SWM	TR	SCL	ENV	CE	DRM	GOV	FIN
1.1	Street lighting coverage	3.1	4.1	5.1	6.1	7.1	8.1	9.1	10.1	11.1	12.1
1.2	Change in Built-up area	3.2	4.2	5.2	6.2	7.2	8.2	9.2	10.2	11.2	12.2
1.3	Agri to developable in IIP	3.3	4.3	5.3	6.3	7.3	8.3	9.3	10.3	11.3	12.3
1.4	500m to parks/open space	3.4	4.4	5.4	6.4	7.4	8.4	9.4	10.4	11.4	12.4
1.5	Per capita open space	3.5	4.5	5.5	6.5	7.5	8.5	9.5	10.5	11.5	12.5
1.6	Pedestrian fatalities %	3.6	4.6	5.6	6.6	7.6	8.6	9.6	10.6	11.6	12.6
1.7	Recreational open space %		4.7	5.7	6.7	7.7	8.7	9.7		11.7	12.7
1.8	Safety rating		4.8	5.8	6.8	7.8	8.8	9.8		11.8	12.8
1.9	ULD parks expenditure		4.9	5.9	6.9	7.9	8.9			11.9	12.9
				5.10	6.10	7.10	8.10			11.10	12.10
				5.11	6.11	7.11	8.11			11.11	12.11
				5.12	6.12		8.12			11.12	12.12
					6.13		8.13			11.13	12.13
					6.14		8.14			11.14	12.14
							8.15				12.15
							8.16				12.16
							8.17				12.17
							8.18				12.18
											12.19
4					2	0	3	-	0	2	-

Annexure 6.4: Interlinkage of issue of lack of blue-green infrastructure with indicators across the urban assessment sectors

UPS	HP	WTR	SAN	SMM	TR	SCL	ENV	CE	DRM	GOV	FIN
1.1	Street lighting coverage	% HH pipe connection	% HH pipe connection	% Sewage network connection	% Wet waste processed	% Pop. 500m FT	Clean Air Action Plan	% HH using LFO	Disaster Management Plan	Planners/capita	Credit rating
1.2	Change in Bulk-up area	% quality of water	% HH toilet access	% HH toilet access	% Dry waste segregated/recycling	Km bicycle path/100,000	GHG measurement system	% Energy from renewable sources	Hazard risk maps	Years since MP updated	% Property tax collected
1.3	Agri to developable in MP	resource assessment plan	4.3	% Sewage treated before discharge	% Solid waste for energy/processing	% Roads with footpath	Annual GHG emissions	% Pop. Access renewable energy	% HHs in risk area	No. Services Command Centre	% Grants received
1.4	500m to parks/open space	% non revenue	4.4	% Wastewater passed before treatment standard	% Solid waste in dumps, water, bottles, burnt	% Increase FT ridership	% Tree cover	% Energy efficient street lighting	% Buildings in 4m fire service	No. of functions by ULB	GDP per capita
1.5	Per capita open space	supply per capita	4.5	% Wastewater recycled	% Waste remanufactured	% clean energy vehicles	Biodiversity conservation	Energy use/capita	Hazard warning system	GIS based MP	Change own source revenue
1.6	Pedestrian fatalities %	metering connections	4.6	% Industries complying CPCB	% Wards segregating waste	Road density	No. of green building incentives	% HH authorized energy connection	Flood risk plan	Environment all status report	Operating margin
1.7	Recreational/open space %		4.7	% Industries complying CPCB	ICT monitoring C&T, GVP, staff	Avg travel speed	Annual ACl	Building codes authorized technologies		% staff trained	% Annual debt service
1.8	Safety rating		4.8	FSSM Action Plan/ byelaws	% waste pickers integrated	% Share NMT	Annual GHG/capital	System Average Interruption		No. of E-gov initiatives	% Debt in overall budget
1.9	ULB parks expenditure		4.9	% PT google maps	% C&D collected	Street intersection density	Emissions from transport			MP accessible online	% Properties covered tax net
				5.10	% Hazardous waste processed	% Road FT/100,000	Biochemical Oxygen Demand			No. of ULB committees	Capital expenditure efficiency
				5.11	% Solid waste (kg/capita/day)	road accidents/100,000	Trees per inhabitant			citizen charter	Water supply cost/recovery
				5.12	% Wards D2D collection	differently-abled bus access facility	Land use zoning environment protection			City data officer	Sanitation cost/recovery
						workplace access facility 30min	Annual PM10			% Women councilors	Solid waste cost/recovery
						% ULB area's treats	Annual PM2.5			Open data portal	Unemployment rate
							Annual NO2				inequality index Gini
							Avg daily SO2				Nonforce employed
							Annual methane emissions				% Capital expenditure
							Noise pollution regulations				GDP density of built up
											% Informal employment
0	-	0	3	0	5	-	3	-	0	1	-

