# Guntur

August 2021

# CITY PROFILE AND DIAGNOSTIC REPORT

Sustainable Cities Integrated Approach Pilot (SCIAP)

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This report has been prepared under the Sustainable Cities Integrated Approach Pilot (SCIAP) project funded by the Global Environment Facility (GEF-6). It documents the findings from the application of the Urban Sustainability Assessment Framework (USAF), which was developed under SCIAP for five pilot cities – Bhopal, Guntur, Jaipur, Mysuru and Vijayawada. The report is produced using data provided by the state and urban local bodies of the four participating states and additional geospatial data collected from the National Platform for Sustainable Cities, European Space Agency. While UN-Habitat checks data to the fullest extent possible, the responsibility for the accuracy of the data lies with the original providers of the data. Information contained in this Report is provided without warranty of any kind, either express or implied, including, without limitation, warranties of merchantability, fitness for a particular purpose and non-infringement. UN-Habitat specifically does not make any warranties or representations as to the accuracy or completeness of any such data. Under no circumstances shall UN-Habitat be liable for any loss, damage, liability, or expense incurred or suffered that is claimed to have resulted from the use of this Report, including, without limitation, any fault, error, omission with respect thereto. The use of this Report is at the User's sole risk. Under no circumstances, including, but not limited to negligence, shall UN-Habitat or its affiliates be liable for any direct, indirect, incidental, special, or consequential damages, even if UN-Habitat has been advised of the possibility of such damages.

**Cover Page:** Jinnah Tower - A landmark structure in Guntur city (Image source: UN-Habitat)

# Guntur

# CITY PROFILE AND DIAGNOSTIC REPORT

Sustainable Cities Integrated Approach Pilot (SCIAP)

Component 1: Sustainable Urban Planning and Management

# Acknowledgments

# GUNTUR

**City Profile and Diagnostic Report**

Asia's largest dried chilli market is in Guntur

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# List of Acronyms

| | |
|---|---|
| AFOLU | Agriculture, Forestry, and Other Land Use |
| AIIB | Asian Infrastructure Investment Bank |
| AMRDA | Amaravati Metropolitan Region Development Authority |
| AMRUT | Atal Mission for Rejuvenation and Urban Transformation |
| APCPDCL | Andhra Pradesh Central Power Corporation Distribution Limited |
| APG&BC | Andhra Pradesh Greening and Beautification Corporation |
| APIIC | Andhra Pradesh Industrial Infrastructure Corporation |
| APPCB | Andhra Pradesh Pollution Control Board |
| APSAC | Andhra Pradesh Space Application Centre |
| APSDRFS | Andhra Pradesh State Disaster Response and Fire Services (APSDRFS) |
| APSDMA | Andhra Pradesh State Disaster Management Authority |
| APRDC | Andhra Pradesh Road Development Corporation |
| APSRTC | Andhra Pradesh State Road Transport Corporation |
| BRT | Bus Rapid Transit |
| CAA | Constitutional Amendment Act |
| CDMA | Commissioner & Directorate of Municipal Administration |
| COVID | Coronavirus disease |
| CPCB | Central Pollution Control Board |
| DoP | Department of Planning |
| DTCP | Directorate of Town and Country Planning |
| EESL | Energy Efficiency Services Limited |
| ELSR | Elevated Level Service Reservoirs |
| FTL | Flood Tank Level |
| GDP | Gross Domestic Product |
| GoAP | Government of Andhra Pradesh |
| GEF | Global Environment Facility |
| GHG | Greenhouse Gas |
| GIS | Geographical Information System |
| GMC | Guntur Municipal Corporation |
| GPSC | Global Platform for Sustainable Cities |
| GVA | Gross Value Added |
| GVP | Garbage Vulnerable Points |
| HSC | House Service Connections |
| ICT | Information Communication Technology |
| INR | Indian Rupee |
| IPPU | Industrial Processes & Product Use |
| LED | Light-emitting Diode |
| LPCD | Litres Per Capita Per Day |
| MA&UD | Municipal Administration and Urban Development Department |
| MEPMA | Mission for Elimination of Poverty in Municipal Areas |
| MoHUA | Ministry of Housing and Urban Affairs |
| MSWM | Municipal Solid Waste Management |
| MT $CO_2$-eq | Metric Tonnes of Carbon Dioxide Equivalent |
| MTD | Metric Tonnes per Day |
| NGT | National Green Tribunal |
| NH | National Highway |

| | |
|---|---|
| NIUA | National Institute of Urban Affairs |
| NMT | Non-Motorized Transport |
| NPC | National Productivity Council |
| NREDCAP | New & Renewable Energy Development Corporation of Andhra Pradesh Ltd. |
| NRW | Non-Revenue Water |
| NULM | National Urban Livelihood Mission |
| ODF | Open Defecation Free |
| PHMED | Public Health & Municipal Engineering Department |
| PMAY-U | Pradhan Mantri Awas Yojana - Urban |
| PPH | Persons Per Hectare |
| SBM | Swachh Bharat Mission |
| SCIAP | Sustainable Cities Integrated Approach Pilot |
| SCS | Sustainable City Strategies |
| SH | State Highway |
| SLIP | Service Level Improvement Plan |
| SPV | Special Purpose Vehicle |
| STP | Sewage Treatment Plant |
| UDA | Urban Development Authority |
| ULB | Urban Local Body |
| UNDP | United Nations Development Programme |
| UNEP | United Nations Environment Programme |
| UN-HABITAT | United Nations Human Settlements Programme |
| ROAP | United Nations Human Settlements Programme Regional Office for Asia & the Pacific |
| UNICEF | United Nations Children's Fund |
| UNIDO | United Nations Industrial Development Organization |
| UPHC | Urban Primary Health Centres |
| URDPFI | Urban and Regional Development Plans Formulation and Implementation |
| USAF | Urban Sustainability Assessment Framework |
| WHO | World Health Organization |
| WPR | Workforce Participation Rate |
| WTP | Water Treatment Plant |
| ZDP | Zonal Development Plan |

# 01

# Introduction

## 1.1 REPORT OBJECTIVES

The city profile and diagnostic report situates Guntur 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 analyzes 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.

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[1]  The Urban Sustainability Assessment Framework wad 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

## 2.1  LOCATION

Guntur city stands in the state of Andhra Pradesh in southern India (see Map 2.1). It is located 64 km to the West of the Bay of Bengal on the eastern coast of India. It is 35 km South-East of the state's legislative capital, Amaravati, and 400 km South-West of the state's executive capital, Visakhapatnam. Guntur city is the administrative headquarters of Guntur District.



LEGEND
■ Guntur City
■ Guntur District
■ Andhra Pradesh
□ India _State Boundaries

Map 2.1: Location of Guntur city

Source: UN-Habitat

## 2.2  REGIONAL CONNECTIVITY

## Road Connectivity

Guntur is well connected to all the major towns and cities of the state and other parts of the country by the national and state highways.

- NH 16: Chennai to Kolkata via Guntur and Vijayawada
- NH 544D: Guntur to Ananthapur via Narsaraopet
- SH 40: Guntur to Ponnuru via Chebrolu
- SH 255: Guntur to Hanumapalem via Nandivelugu
- SH 249: Guntur to Parchoor via Etukuru and Prathipadu

- SH 21: Guntur to Macherla via Sattenapalle
- SH 288: Guntur to Amaravathi

As the headquarters of one of the 12 regional administration divisions of the Andhra Pradesh State Road Transport Corporation (APSRTC), Guntur Bus Terminus is one of the largest in the state. About 2,190 buses (as of February 2020) ply daily from this transit point to all cities and districts of Andhra Pradesh as well as to the major cities of Telangana and Karnataka.

National Highway 16 at Guntur

3
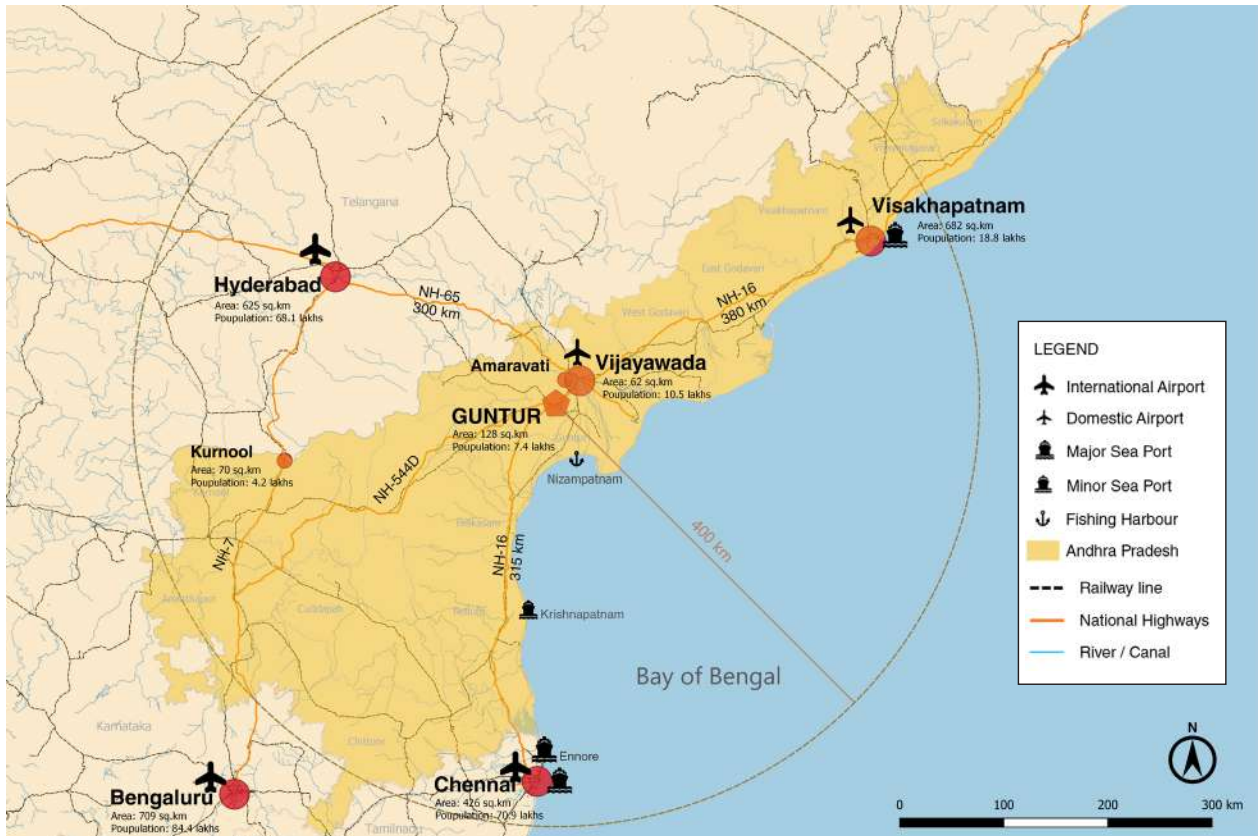
Map 2.2: Guntur – key transport connections

Source: UN-Habitat

**Map 2.2 shows Guntur's regional connectivity with different transit nodes and major cities within a 400-km radius.**

## Rail Connectivity

Guntur Junction is one of the divisional headquarters of the South Coast Railway Zone and a major transit point of the Indian Railways, linking Guntur to various districts of Andhra Pradesh as well as to several state capitals. Besides the main city station, Guntur has two other railway stations, New Guntur and Nallapadu. About 80 express train services passes through Guntur Junction on a daily / weekly basis (as of February 2020).

## Air Connectivity

Vijayawada airport located 55 km away, is the nearest domestic airport to Guntur. Hyderabad airport located 285 km from the city, is the nearest major international airport.

## Sea Port Connectivity

Nizampatnam Harbour, located 60 km from Guntur, is the nearest seaport. Currently, only the fishing harbour is being operated in this port. Krishna Patman port is the nearest major port providing both freight shipping and cargo services.

## 2.3  REGIONAL URBAN FUNCTION

**Guntur is third most populous city in Andhra Pradesh and a major service centre in the region.** The second largest city in the state, Vijayawada, lies 40 km to the North. No other city larger than Guntur (in terms of population) lies within 200 km to its South or South-West, as shown in Map 2.3.

**The city is a major market centre for local agricultural produce. It is also a prominent medical and educational centre in the region.** The city is home to many professional colleges and higher educational

institutions that serve the surrounding region. The Government General Hospital in Guntur is one of the largest multi-speciality hospitals in the state. A sizeable urban and rural population from Guntur District and neighbouring districts visit the city for trading in agricultural produce, for work in government offices, as well as for employment, health, education, transport, shopping, and entertainment. The city attracts a floating population of over 50,000 everyday, which increases to above one lakh during the harvest season.



Map 2.3: Accessibility of Guntur with neighbouring urban areas[2]

Source: UN-Habitat

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[2]  According to the Census of India, a place with a minimum population of 5,000 could be considered as an urban area

## 2.4  SOCIO-ECONOMIC CONTEXT

## 2.4.1  Demographic profile



## Population

As per Census 2011, the population of Guntur city[3] was 6.70 lakh[4]. The city's population constituted 13 per cent of the district's population and 0.76 per cent of the state population. The city's population also constituted 39 per cent of the district's urban population and two per cent of the urban population of Andhra Pradesh. Over the last three decades, Guntur city experienced a higher average population growth rate than that of Guntur District and Andhra Pradesh, as shown in Table 2.1.

As per Census 2011, Guntur is the third most populous city in the reorganized state of Andhra Pradesh[5], after Visakhapatnam (17.28 lakh) and Vijayawada (10.34 lakh).

**Table 2.1:** Population and decadal growth rates of Guntur city, Guntur District and Andhra Pradesh between 1981 and 2011

| Year | Guntur City | | Guntur District | | Andhra Pradesh | |
|---|---|---|---|---|---|---|
| | Population (in Lakh) | Decadal Growth rate (%) | Population (in Lakh) | Decadal Growth rate (%) | Population (in Lakh) | Decadal Growth rate (%) |
| 1981 | 3.67 | - | 34.34 | - | 535.49 | - |
| 1991 | 4.71 | 28.11 | 41.06 | 19.57 | 665.08 | 24.20 |
| 2001 | 5.14 | 9.22 | 44.65 | 8.70 | 762.10 | 14.60 |
| 2011 | 6.70 | 30.35 | 48.87 | 9.47 | 845.80 | 10.98 |

*Source: Census of India*

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[3]  Data for Guntur (M Corp. + OG) – Urban Agglomeration was considered for section 2.4 of the report.
[4]  Census 2011 considered 45.79 sq. km. of Guntur (M Corp. + OG). For the current municipal jurisdiction of 128 sq. km., the population as per Census 2011 was 7.43 lakh.
[5]  In 2014, Andhra Pradesh was bifurcated into the two states of Andhra Pradesh and Telangana.

Image 2.1: Guntur railway station

Source: UN-Habitat

## Sex Ratio

In 2011, The city's female population constituted 51 per cent of its total population. The sex ratio in the city was 1,022 females per 1,000 males, which was higher than that of Guntur District and Andhra Pradesh (see Figure 2.1). It was also higher than the national average of 940.

During 2001-11, the city witnessed an increase in its sex ratio from 996 to 1,022. However, females constituted only 49 per cent of the age group of 0-6 years. About 10 per cent of the city's population was below six years.

## Age Cohort

As per Census 2011, Guntur city's working age population (15-64 years) constituted 72 per cent of its total population, slightly higher than that of Guntur District and Andhra Pradesh (see Figure 2.2). About 28.32 per cent of the city's population made up its dependent population (0-14 years and above 65 years).

The youth (15-34 years)[6] in Guntur city constituted 38.92 per cent of its total population, while they made up 36.34 per cent and 36.52 per cent of the total populations of Guntur District and Andhra Pradesh, respectively. The population bracket of 35-64 years (working population other than youth) in the city constituted 32.75 per cent of its total population (see Figure 2.3).

**Figure 2.1:** Sex ratio of Guntur city in comparison to Guntur District and Andhra Pradesh



1022 Guntur city
1003 Guntur district
993 AP
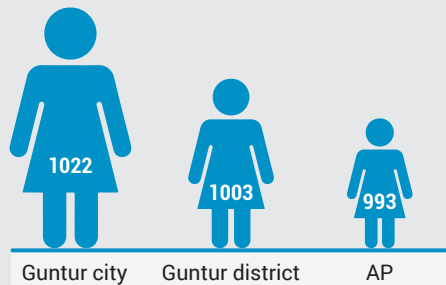
Source: Census of India 2011

**Figure 2.2:** Percentage of working age (15-64 years) and dependant age (0-14 years and above 65 years) populations in Guntur city, Guntur District and Andhra Pradesh



| | 0-14 | 15-64 | 65+ |
|---|---|---|---|
| Guntur city | 23.4% | 71.7% | 4.9% |
| Guntur district | 24.3% | 69.0% | 6.7% |
| Andhra Pradesh | 26% | 67.9% | 6.1% |
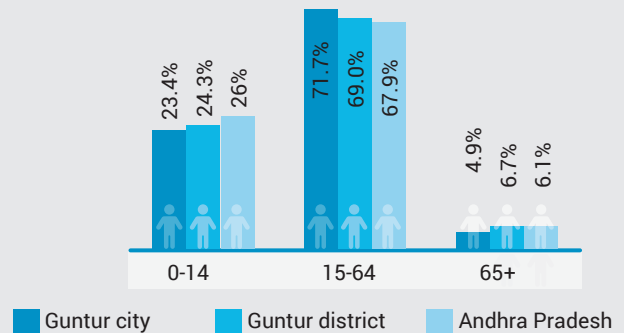
Source: Table C-14 Andhra Pradesh – Population in five-year age group by residence and sex, Census 2011

**Figure 2.3:** Age-sex pyramid of Guntur city



Female    Male

| Age Group | Female | Male |
|---|---|---|
| 65+ | 15,403 | 18,213 |
| 40-64 | 83,649 | 80,829 |
| 15-39 | 1,51,571 | 1,63,760 |
| 0-14 | 80,812 | 75,836 |

Population

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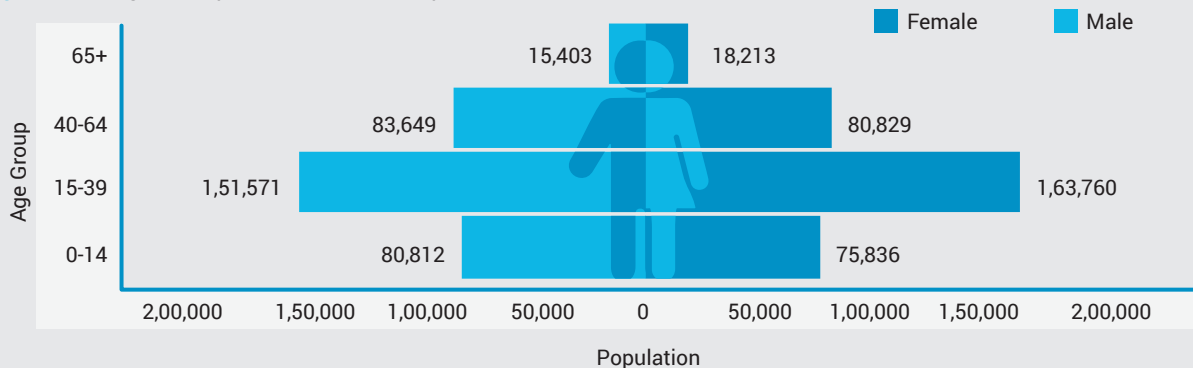
6 The Central Statistics Office (CSO), Ministry of Statistics and Programme Implementation (MoSPI), GoI (2017), considered the youth category as the population group between 15-34 years.

## 2.4.2   Social context

### Literacy Rate

The literacy rate of Guntur in 2011 was 80 per cent. As per Census 2011, this was higher than the district and state levels (see Figure 2.4). Despite a high sex ratio, the literacy rate among the city's female population was only 75 per cent, while its male literacy rate was about 85 per cent.

### Work Participation Rate

In 2001, the Work Participation Rate (WPR) of Guntur city stood at 34.9 per cent, increasing to 37.5 per cent by 2011. As per Census 2011, the city's WPR was well below the district and state levels (see Figure 2.5). The city's low WPR was a result of low female participation (merely 25.1 per cent) in the workforce. The female WPR for Guntur District and Andhra Pradesh stood at 38.4 per cent and 36.1 per cent, respectively, in 2011.

**Figure 2.4:** Total, male, and female literacy rates in Guntur city, Guntur District and AP
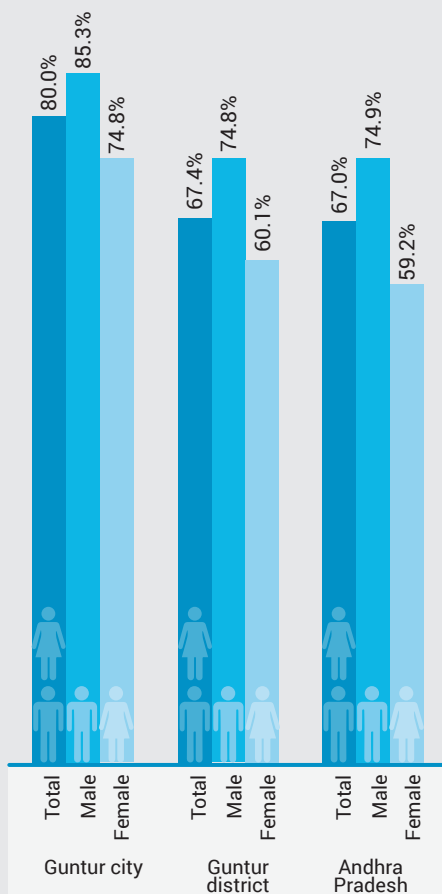


Source: Census of India 2011

**Figure 2.5:** Total, male and female WPR in Guntur city, Guntur District and Andhra Pradesh
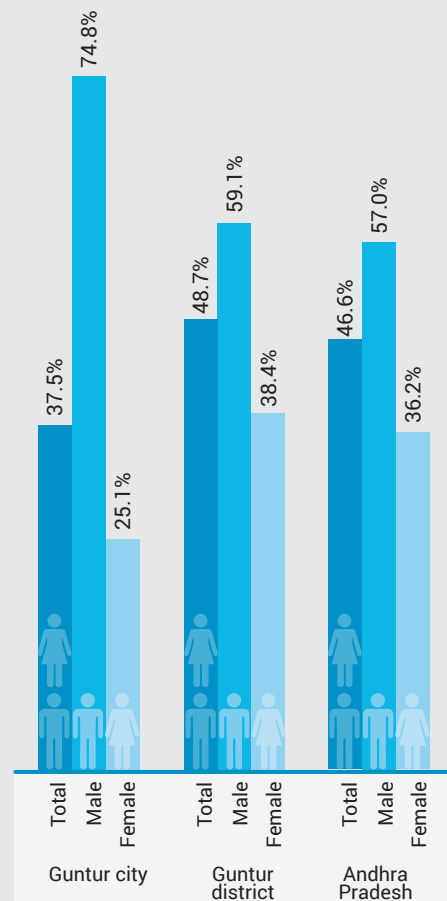


Source: Census of India 2011

The city's main workers constituted 91.7 per cent of its total workforce, while marginal workers comprised the remaining 8.3 per cent. Guntur city's total workforce numbered more than 2.51 lakh in 2011. Of this, nearly 90 per cent was engaged in 'other' work, which included working in the service / tertiary sector. The distribution of the city's workforce is shown in Figure 2.6.

**Figure 2.6:** Distribution of workforce by occupation in Guntur city



- 1.0%
- 6.0%
- 3.1%
- 89.9%

- Cultivation
- Agricultural Labourers
- Household Industry Workers
- Other Workers
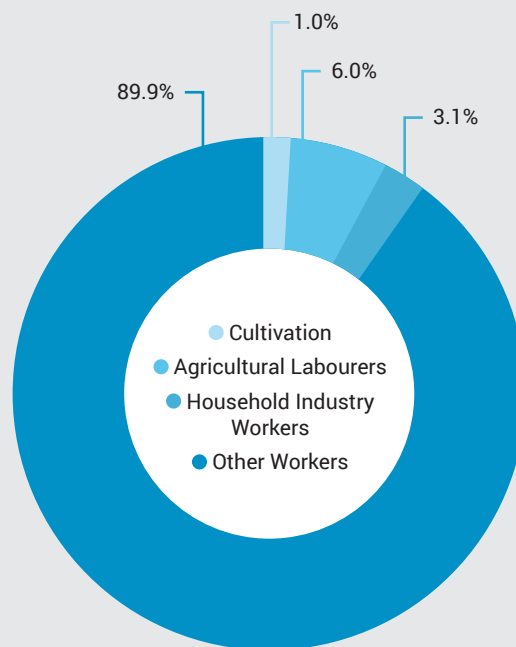
Source: Census of India 2011

## 2.4.3 City economy

City level economic data such as Gross Domestic Product (GDP) and per capita income are not available for Guntur city. The city is a major regional and national trade centre for agricultural produce. **It houses Asia's largest dried chilli market and is the headquarters of India Tobacco Board. Dried chillies and tobacco from Guntur city's market yard are sold across India and exported globally.** Cotton, paddy, turmeric and pesticides are also sold to various states in the country. The city has many cold-storage units along national highways like NH 16 and NH 544D near the market yard. The city also houses numerous agro-based industries and an industrial district called Autonagar.

Guntur city is the headquarters of the Guntur Mandal[7]. According to the Mandal Domestic Product 2017-18 estimates published by the Directorate of Economics and Statistics, Department of Planning (DoP), Government of Andhra Pradesh (GoAP), the combined Gross Value Added (GVA)[8] of the *mandal* is INR 14,53,244 lakh. The Guntur Mandal constitutes 2.6 per cent of the state's GVA. The GVA of Andhra Pradesh was INR 5,48,43,099 lakh in 2017-18. Guntur Mandal occupied the fourth and third places among the state's highest revenue earners in the industry (secondary) and service (tertiary) sectors. The service sector drove 73.3 per cent of the city's total GVA, followed by the industry (24.7 per cent) and the agriculture and allied (two per cent) sectors.

As shown in Figure 2.7, trade (40.7 per cent) and real estate (19 per cent) generated the highest revenue shares for the service sector. Within the industry sector, meanwhile, construction (45.6 per cent) and manufacturing (41.4 per cent) earned the highest revenue shares. The declaration of Amaravati as the capital city of Andhra Pradesh in 2015 was one of the reasons behind the growth of the real estate and construction sectors in the region. In the agriculture and allied (primary) sector, livestock (69.8 per cent) and agriculture (27.4 per cent) contributed the highest share. The annual per capita income of Guntur Mandal stood at INR 1,78,359 in 2017-18.

**Figure 2.7:** Sub-sector wise GVA (INR lakh) of Guntur Mandal at current prices (2017-18)



**Agriculture Sector**
- Fishing: 805
- Forestry & Logging: 11
- Livestock: 20,455
- Agriculture: 8,022

**Industry Sector**
- Construction: 1,64,020
- Electricity, Gas & Water Supply: 36,300
- Manufacturing: 1,48,796
- Mining & Quarrying: 10,352

**Service Sector**
- Other Services: 83,612
- Public Adminiistration: 86,238
- Real Estate, Ownership of Dwellings & Professional Services: 2,02,728
- Financial services: 57,974
- Communications: 14,315
- Transport by Other Means & Storage: 1,69,811
- Railways: 16,844
- Trade, Hotel & Restaurants: 4,32,961

Source: Mandal Domestic Product 2017-18, Directorate of Economics and Statistics, GoAP

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7  A *mandal* is a local administrative area, similar to a *tehsil*, in parts of India. A group of *mandals* make up a district. A *mandal* is headed by a Mandal Revenue Officer.
8  GVA is the measure of the value of goods and services produced in an area, industry or sector of an economy.

Image 2.2: A view of the Guntur Market Yard                                                              Source: UN-Habitat

# 03

# Urban Governance

This chapter covers the legal, institutional, and regulatory context for urban governance in Andhra Pradesh and Guntur city.

## 3.1  LEGAL CONTEXT

In Andhra Pradesh, the Urban Local Bodies (ULBs) are constituted within the legal framework of the Andhra Pradesh Municipalities Act, 1965, and Andhra Pradesh Municipal Corporations Act, 1994. Guntur Municipal Corporation (GMC), the city's administrative body, was constituted under the Andhra Pradesh Municipal Corporations Act, 1994.

The development plans in the state are prepared under the provisions of the Andhra Pradesh Town Planning Act, 1920, and Andhra Pradesh Metropolitan Region and Urban Development Authorities (APMR & UDA) Act, 2016. The Acts provide regulations on development plans such as time span, contents, process of plan preparation, modification, approval, and enforcement.

**Guntur falls within the Amaravati Metropolitan Region Development Authority (AMRDA),** which was constituted under the APMR & UDA Act. **AMRDA is responsible for preparing the Development Plan for the Metropolitan Region,** whose jurisdictional area covers 8,603.32 sq. km. As per Census 2011, the population of the region was 58.65 lakh. Vijayawada and Amaravati, the new legislative capital of the state, also fall within AMRDA's jurisdiction.

The Andhra Pradesh Building Rules, 2017 (including its amendments), provide standards for regulating building requirements. These building rules are applicable for all ULBs and UDAs in Andhra Pradesh.
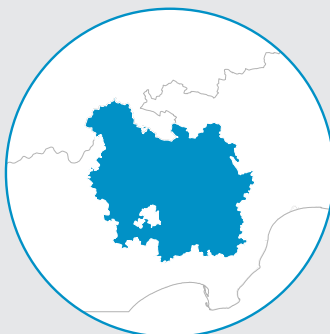


Andhra Pradesh (State)          AMRDA (Urban Development Authority)          GMC (Urban Local Body)

## 3.1.1 Planning instruments and procedures

### Hierarchy of Plans

As per the APMR & UDA Act, the respective UDA is required to prepare a regional level vision document called the Perspective Plan with a long-term development timeframe, preferably not less than 30 years. It is complemented by a conforming, detailed city/ zonal level development plan, with a medium-term timeframe of (preferably) not less than 10 years.

### Draft Perspective Plan for AMRDA

The Draft Perspective Plan for AMRDA was prepared in 2015 for the horizon year 2050. The entire region was categorized under six land use zones – such as agricultural, urban, industrial, development corridor, infrastructure, and protection (water bodies, hills, and forests). The permissible uses for each land use zone were also specified. Further, the entire region was sub-divided into eight administration zones and a regional centre identified for each zone. Guntur city was identified as the regional centre for the southern zone. The key proposals in the Guntur plan included introducing the Bus Rapid Transit (BRT) network for connecting Guntur with Vijayawada, Tenali, and Amaravati, constructing a Regional Outer Ring Road adjacent to the city and widening the main highways radiating from the city. The plan also earmarked an industrial zone focused on the food and beverages (F&B) and textile sectors. Upgrading GMC's water supply network and underground drainage systems was also proposed in the plan. At present, the plan is pending approval and further notification from GoAP.

### Zonal Development Plan – 2021

The Zonal Development Plan (ZDP) for Guntur was notified in 2006 for the horizon year 2021. Guntur ZDP was prepared for the former city limits and peripheral precinct of 53.72 sq. km. The remaining areas of Guntur's existing city limits fall within four different planning zones, i.e., Ankireddyplaem, Namburu, Perecherla and Vejendala. The Chowdavaram area, which lies to the South-West of the city, does not have a ZDP as it was not a part of the Urban Development Region during the plan preparation (see Map 4.8 for the different planning zones, as per ZDP 2021).

The Guntur ZDP adopted a population density norm of 150 persons per hectare (PPH). The entire extent of the then existing vacant land and agricultural land was proposed for future urban development use, with focus on industrial development. An industrial area (Autonagar) covering 111 Ha was also notified within the city limits.

The Guntur ZDP estimated a capex of INR 201 crore for developing sectors as per the following priority:
- Upgradation of open drains, construction of underground drainage and public toilets
- Upgradation of water supply network
- Improvement of roads, intersections, and provision of traffic infrastructure
- Construction of community level healthcare facilities and parks

The Guntur ZDP targeted to achieve the following vision by 2021:

**Vision 1:** To develop "the city as an international trade & commerce and industrial hub and centre of Educational institutions of the world order and providing good living Environment to its surrounding areas", with an emphasis on enhanced physical and social infrastructure in and around the city.

**Vision 2:** To develop Guntur city as a regional service centre for neighbouring towns and villages by providing a planned world class infrastructure for the future and maintaining a clean environment.

The revised Development Plan for the city for the horizon year 2035 is under preparation.

Image 3.1: Guntur Municipal Corporation (GMC) office, Grand Trunk Road                    Source: UN-Habitat

# 3.2 INSTITUTIONAL CONTEXT

## State and Regional Level

The Municipal Administration and Urban Development (MA&UD) Department, GoAP, is the apex body for urban development related activities in the state. The Commissioner and Directorate of Municipal Administration (CDMA) is the nodal agency for ULB administration under the MA&UD Department.

The Directorate of Town and Country Planning (DTCP) looks after the planning and development of urban and rural areas in the state, except for areas that fall within UDA limits. However, DTCP provides technical advisory assistance to UDAs and ULBs in various planning and development matters, including change of land use proposals and alienation of lands. DTCP has four regional offices in the state, including one in Guntur. AMRDA is the planning authority for Guntur, responsible for preparing the city's master plan and playing a key role in any change of land use and development promotion.

At the state level, several departments under the administrative control of the MA&UD Department, including the Public Health & Municipal Engineering Department (PHMED), Mission for Elimination of Poverty in Municipal Areas (MEPMA), and Andhra Pradesh Greening and Beautification Corporation (APG&BC), support the ULBs in areas of urban service delivery. These services include infrastructure development, skill development, and urban greenery. The key roles and responsibilities of PHMED, MEPMA, and APG&BC, including their ongoing support to GMC, as well as those of various other agencies in Guntur city are provided in Table 3.1.

**Figure 3.1:** Major stakeholder departments for SCIAP project in Guntur city



Source: UN-Habitat

16
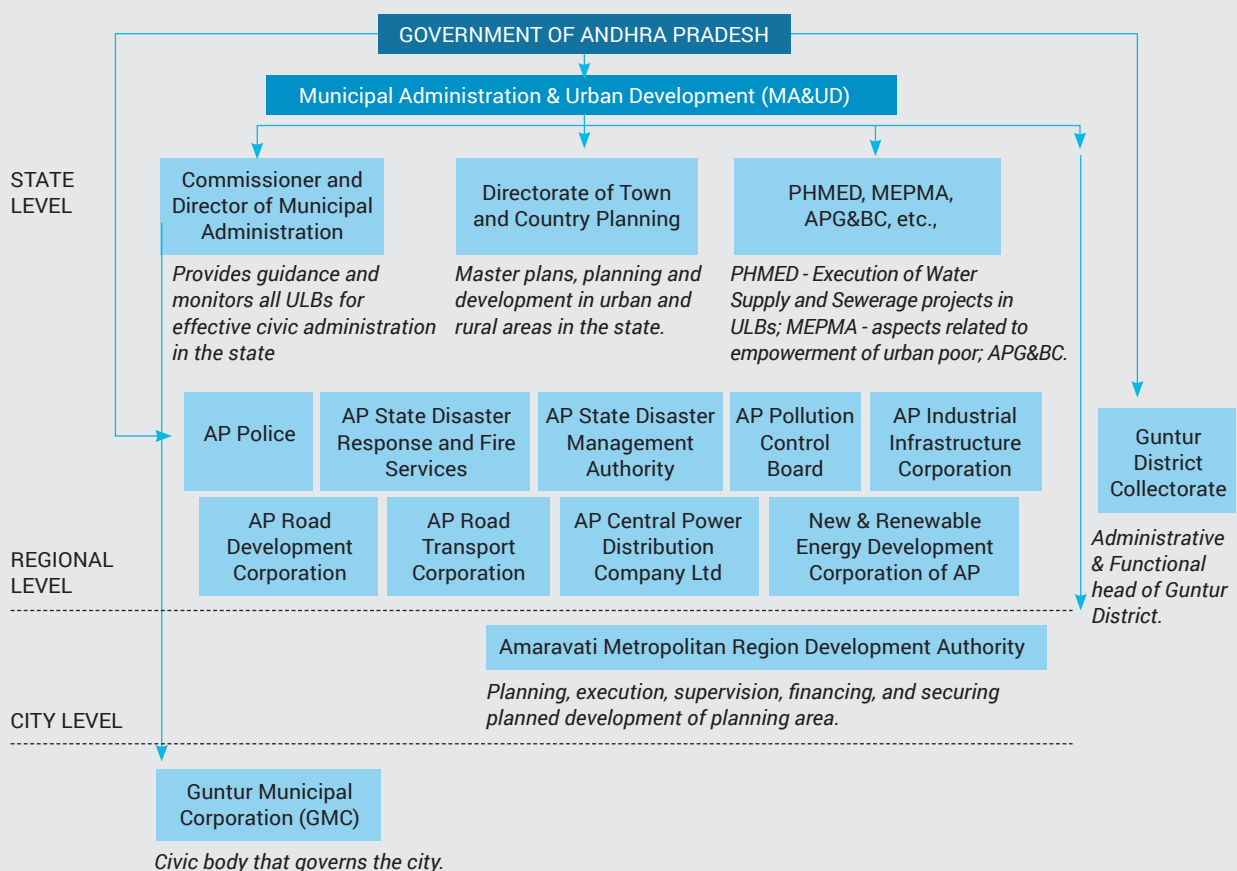
**Table 3.1:** Roles and responsibilities of key stakeholder departments in Guntur city

| S. No | Organization | Key roles and responsibilities in Guntur city |
|---|---|---|
| 1 | Guntur District Collectorate | Plays key role in disaster management, public distribution, civil supplies, monitoring and implementation of various social welfare programmes, etc. The Guntur District Magistrate is also the Special Officer of GMC. |
| 2 | Guntur Urban Police | Maintains law and order, 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 | PHMED | Is responsible for investigations, designs, and execution of water supply and sewerage schemes in ULBs across the state. In Guntur, it is currently executing water supply and underground drainage projects. |
| 4 | MEPMA | Deals with issues related to empowerment of urban poor women, especially those residing in slums. It works with the urban poverty alleviation cell of GMC to enhance access to credit, financial freedom, skill development, employment creation and health. |
| 5 | APG&BC | Is responsible for improving the urban green cover by conserving and preserving existing green areas. Also responsible for scaling up urban landscapes by creating parks and green zones in all ULBs of the state. It plans and designs the development of various parks and rejuvenation of water bodies in Guntur. |
| 6 | Andhra Pradesh State Disaster Response and Fire Services (APSDRFS) Department | APSDRFS' Guntur District Office is responsible for fire prevention, firefighting, community safety, rescue activities and disaster response in the city. Guntur city has two fire stations, one at the premises of the District Collectorate Office and the another near BR Stadium. |
| 7 | Andhra Pradesh Pollution Control Board (APPCB) | Responsible for the prevention, control, and monitoring of various forms of pollution and improvement of the quality of the environment in the state by effective implementation of environmental laws. The regional office in Guntur works in coordination with GMC for waste management and environmental improvement, among other related activities. |
| 8 | Andhra Pradesh State Disaster Management Authority (APSDMA) | Apex body in the state for disaster management. Provides support to districts and ULBs in the state for hazard monitoring, hazard mapping, disaster management planning, scientific data analysis, emergency operations, response communications, capacity building, etc. |
| 9 | Andhra Pradesh State Road Transport Corporation (APSRTC) | Responsible for public bus transport service in the state. Guntur is one of the 12 APSRTC centres in the state, headed by a Regional Manager. Guntur does not have any state operated intra-city bus service. The intercity buses operated by APSRTC from the Guntur Bus Station also serve as the city's bus service. |
| 10 | Andhra Pradesh Road Development Corporation (APRDC) | Responsible for developing, maintaining, and managing state highways, roads, stretches, bridges, and flyovers, as entrusted by GoAP. Some roads and flyovers in Guntur city were constructed by the department. |
| 11 | Andhra Pradesh Industrial Infrastructure Corporation (APIIC) | Nodal agency for all industrial promotion in the state. It has a zonal office in Guntur. Autonagar in Guntur is being developed and promoted by APIIC. |
| 12 | Andhra Pradesh Central Power Corporation Distribution Limited (APCPDCL) | Supplies electricity to Guntur city. The city has a regional circle office headed by a Superintending Engineer. |
| 13 | New & Renewable Energy Development Corporation of Andhra Pradesh Ltd. (NREDCAP) | Responsible for promotion and implementation of non-conventional / renewable / clean energy projects in the state. NREDCAP's district office in Guntur provides technical advisory assistance to GMC, other government, and private institutions in Guntur for implementing renewable energy projects. |

Timeline of Guntur city with regard to institutional context (1886 – 2014)

# TIMELINE OF GUNTUR CITY

Guntur is one of the oldest municipalities in the country. Below are listed a few key milestones of the city between 1886 and 2014.

## 1886

Guntur was given the status of Municipality

## 1904

Guntur was made the Head Quarters of Guntur District

## 1969

General Town Planning Scheme for Guntur was prepared under AP Town Planning Act, 1920

## 1978

Constitution of Vijayawada - Guntur - Tenali - Mangalagiri (VGTM) Urban Deveopment Authority

## 1988

Master Plan for VGTM UDA was prepared

## 1994

Guntur attained status of Municipal Corporation Under AP Municipal Corporations Act, 1994

## 2006

Zonal Development Plan was approved for the horizon year 2021

## 2012

Guntur municipal limits were extended by merging 10 neighbouring villages

## 2014

Guntur city became the part of Amaravati Metropolitan Region Development Authority (former AP Capital Region Development Authority)

Data source: ZDP 2021, GMC, AMRDA; Figure source: UN-Habitat

## Local (ULB) Level

GMC was constituted within the legal framework of Andhra Pradesh Municipal Corporations Act, 1994. The Municipal Commissioner appointed by the state government is the executive head of GMC. The Mayor is the head of the GMC city council, an elected body of 57 ward corporators.

**GMC's jurisdiction covers 128 sq. km. It is divided into 57 municipal wards**.[9]  GMC comprises various departments, including administration, accounts, revenue, engineering, public health, town planning and urban poverty alleviation to monitor and provide respective services to citizens. **In 2019, in line with GoAP's initiative of the ward secretariat system, the city was divided into 207 secretariat units with a secretariat office in each unit.** A single unit has 10 secretaries appointed through the MA&UD Department for administration, amenities, sanitation and environment, education, data processing, planning and regulation, welfare and development, energy, health, revenue, and women's protection (*Mahila Samrakshana Karyadarsi*). **The secretaries are responsible for delivering civic services to the residents of respective units.** Further, within a unit, a ward volunteer is appointed for every 100 households (approximately). This system is meant for effective service delivery at the grassroots level and efficient response to public grievances.

Apart from state government programmes, GMC also implements national missions such as the Swachh Bharat Mission (Urban)[10], Atal Mission for Rejuvenation and Urban Transformation (AMRUT)[11], and Pradhan Mantri Awas Yojana (PMAY)[12].

## 3.2.1   Administrative boundaries

The jurisdictional area of GMC is 128 Sq.kms. (12,800 Ha). In 2012, the city limits increased to 159.46 sq. km.[13] from 45.71 sq. km. The 10 villages added to the municipal area included Nallapadu, Pedapalakaluru, Ankireddipalem, Adavitakkellapadu, Gorantla, Pothuru, Chowdavaram, Etukuru, Budampadu and Reddypalem. In 2017, following the ruling from the Hon'ble High Court of Andhra Pradesh, the city limits were revised to 128 sq. km.[14] Nallapadu, Pedapalakaluru, Ankireddypalem and Pothuru villages were partly excluded from GMC limits. In this report, the older GMC area of 45.71 sq. km. is referred to as the 'former city limits and areas under the 10 villages added to the GMC in 2012 / 2017 is referred to as 'newly added areas to the city'. GMC's jurisdiction is divided into 57 municipal wards (see Map 3.1).

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[9]  In April 2021, the municipal wards in the city were reorganized into 57 wards from the earlier 62.

[10]  Swachh Bharat Mission (Urban) 2014 – to achieve open defecation free (ODF) status and scientific waste management in all urban areas

[11]  Atal Mission for Rejuvenation and Urban Transformation (AMRUT) 2015 – to improve service levels for water supply, sanitation, public transportation, and green and open spaces

[12]  Pradhan Mantri Awas Yojana 2015 (PMAY) – to provide housing for all by 2022 by meeting the housing shortage in urban India

[13]  Government Order (G. O). Ms. No. 279, MA&UD Dept., Dated 12.07.2012

[14]  Government Order (G. O). Ms. No.310, MA&UD Dept., Dated 10.08.2017
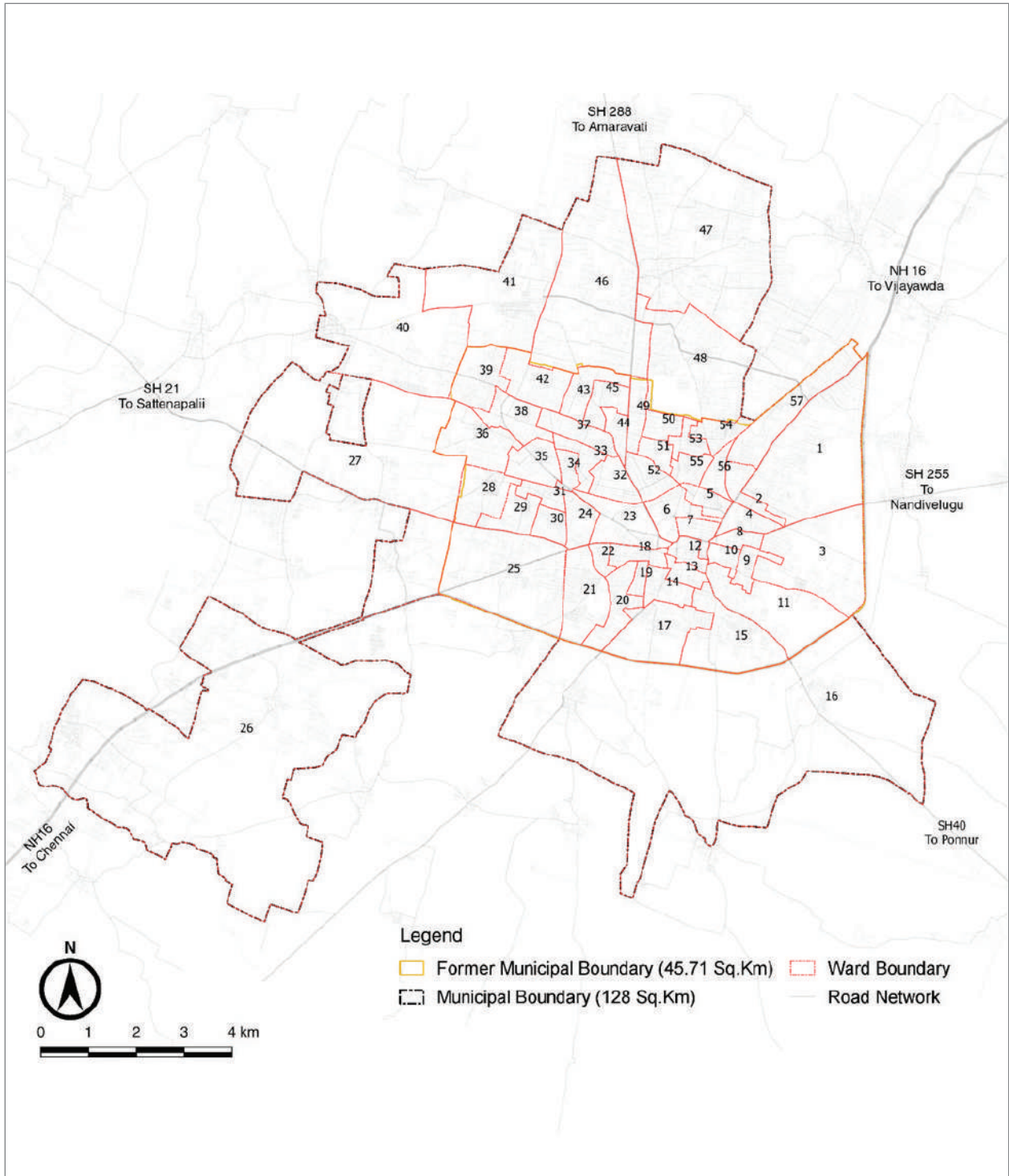
Map 3.1: GMC administrative boundaries

Data source: GMC; Map source: UN-Habitat

Image 3.2: A traffic island at the entrance of Guntur city from NH 16 bye-pass at Autonagar                    Source: UN-Habitat

# 04

# Existing Urban Analysis

## 4.1  NATURAL TOPOGRAPHY

Guntur city is located on gently sloping grounds with the land sloping from the West to the South and South-East, and from the North-West to the South and South-East. Topographically, Nallapadu to the West is at a higher elevation of around 65 m and areas towards the South, such as Etukuru and Budampadu, are at a lower elevation of 15 m and 17 m, respectively (see Map 4.1). A small rocky hill at Nallapadu is the city's highest point at 86.5 m. The Kondaveedu Hills stand outside the city limits, to the South-West.



Map 4.1: Contour map of Guntur city                    Data source: GMC; Map source: UN-Habitat

Image 4.1: View of the Kondaveedu Hills located beyond city limits (South-West)                    Source: Guntur Coffee Table Book, GMC

# 4.1.1 Significant natural features

Guntur's landscape is characterized by water bodies and cultivable open lands. Over the years, these two features had influenced the city's growth and urbanization pattern.

for rejuvenating/ developing seven water bodies in the city, including the development of green areas and recreational spaces along the waterfronts, is in progress.

## Water Bodies

**The word 'Guntur' in Telugu translates into 'the village of tanks', referring to the region's natural ponds.** There are about 50 water bodies within the city (see Map 4.2), which are an inherent part of its natural as well as cultural ecosystem. According to GMC (2020), about 418.65 Ha (3.27 per cent) of the city is covered by water bodies, many of which are under encroachment, such as Nallacheruvu, Koritepadu Cheruvu, and Gujjanagundla Cheruvu. GMC has been conserving some of the city's water bodies through the construction of embankments (bunds). A project

## Agricultural Land

Guntur city is located within the delta of the Krishna River. Tributaries of the Krishna, such as Guntur Channel, Chandravanka, Naagileru and the Guntur Branch Canal (see Map 4.2) flow through the city and provide irrigation facilities.

Based on the existing land use draft (2017)[15] of Guntur, nearly 55 per cent of the land is under agricultural use. Since the last decade, Guntur has experienced rapid conversion of agricultural land to vacant, residential, and other developable uses.

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15    Existing land use is prepared for the ZDP area of 174.07 sq. km. The numbers and percentage mentioned are of ZDP area.
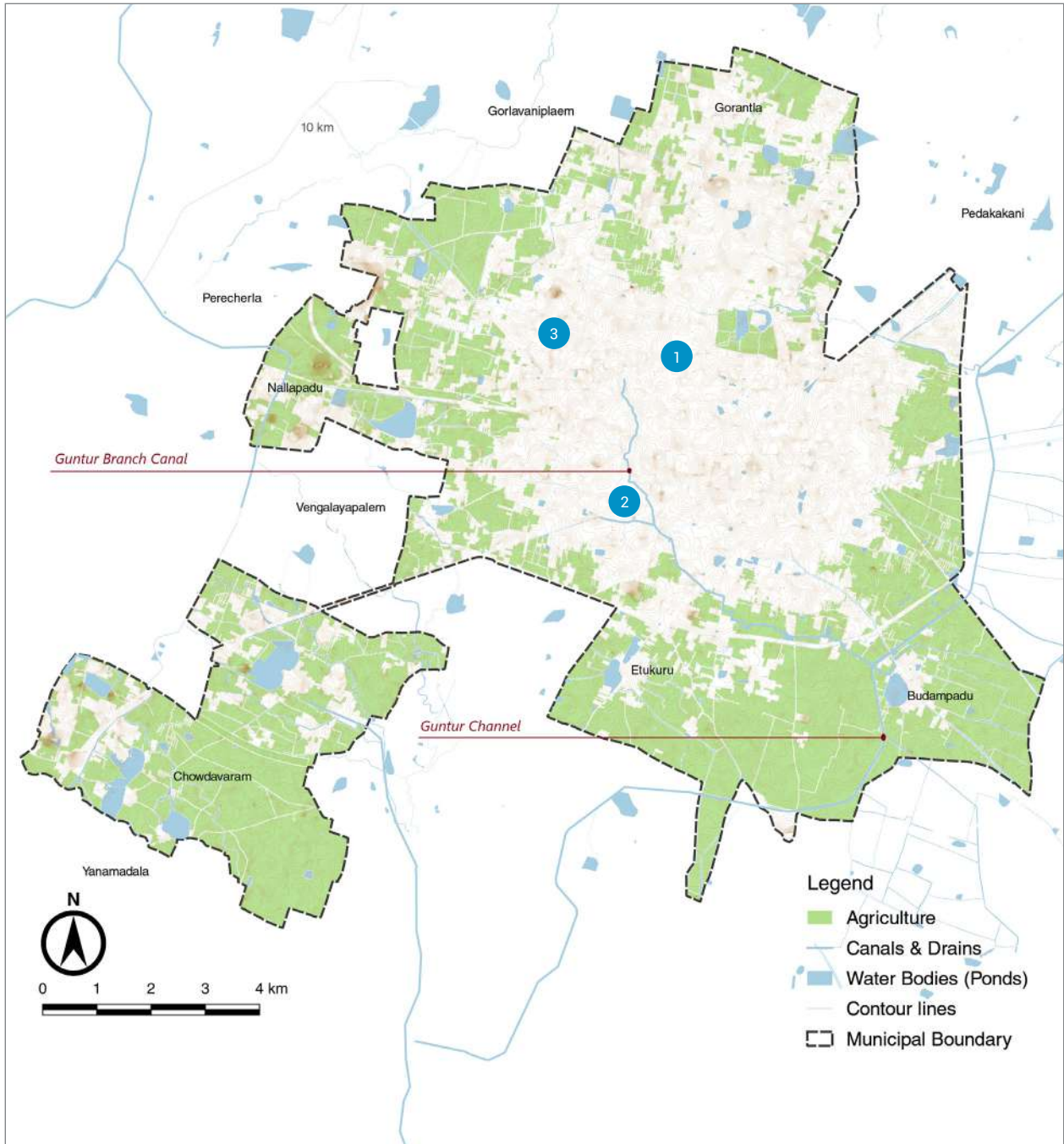
Map 4.2: Water bodies and agricultural land

Data source: GMC; Map source: UN-Habitat

1. Koretepadu Cheruvu

2. Chuttugunta Cheruvu

3. Gujjanagundla Cheruvu

# City Development Timeline

**1866** — Municipal Board status given

**1904** — Made district headquarters

**1913** — District Collector's office established

**1920** — Madras Town Planning Act enforced

**1922** — Regional Agriculture Research Station established

**1922** — Government General Hospital established

**1928** — Livestock Research Centre established

**1935** — Hindu College established

**1939** — Guntur Market Committee constituted

**1946** — Guntur Medical College established

**1975** — Autonagar established

**1976** — Made the India Tobacco Board headquarters

Major activities in Guntur over the last century that accelerated the city's growth

# 4.2  URBANIZATION AND LAND USE PATTERNS

## 4.2.1  City's development pattern

Guntur is one of the oldest municipalities in the country. It was given the status of a municipal board in 1866. Key national and state-level institutions were set up in Guntur over six decades from 1920 to 1980, which accelerated the city's population growth (see Map 4.3).
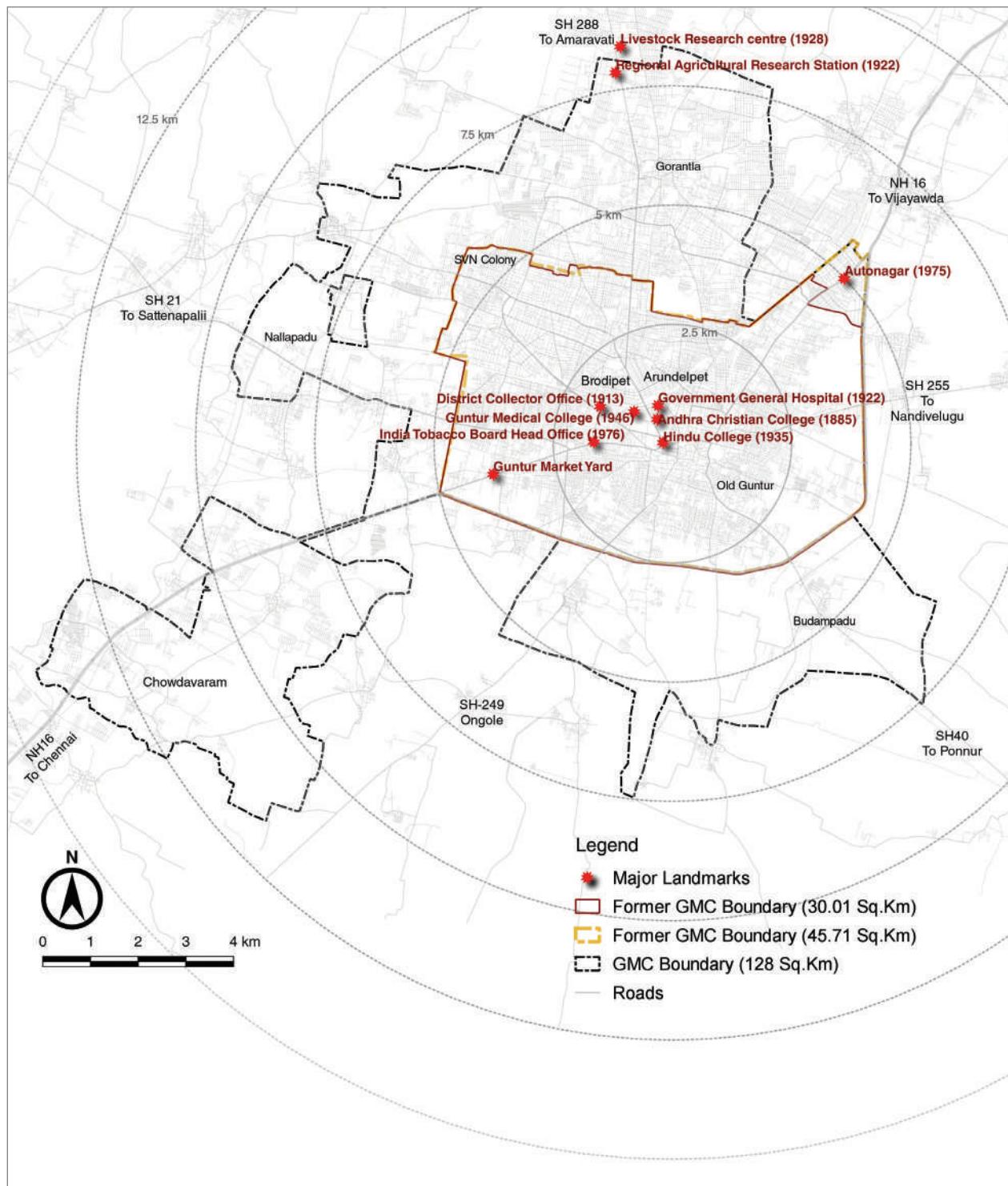


Map 4.3: Major city landmarks and GMC jurisdiction boundaries over last four decades                    Source: UN-Habitat

**1975**
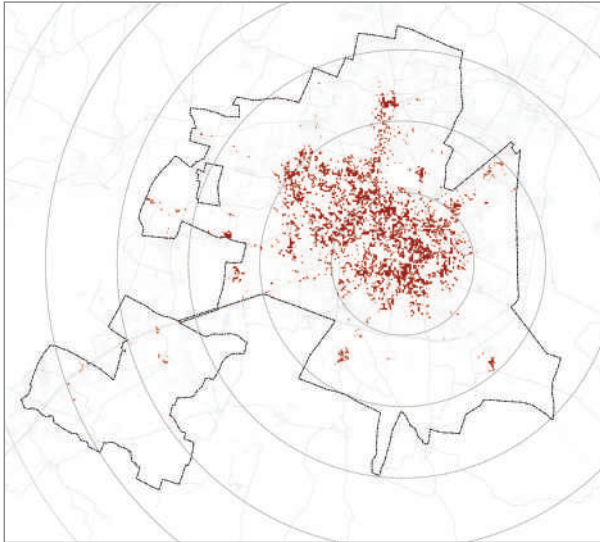


Area: 7.64 sq. km.
Population: 2.99 lakh

**1990**
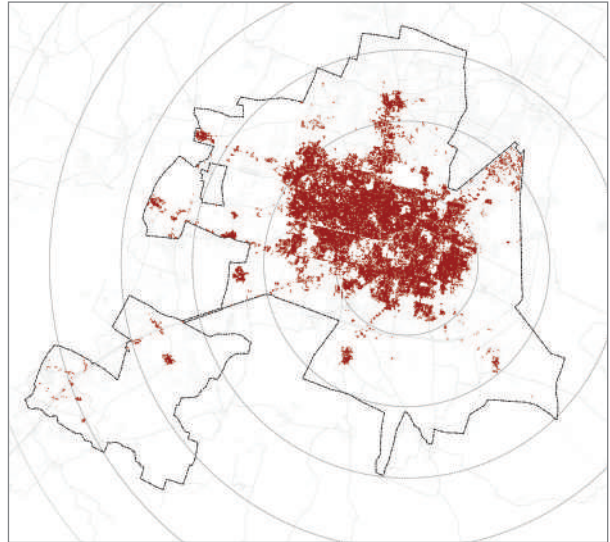


Area: 22.70 sq. km.
Population: 4.60 lakh

**2000**
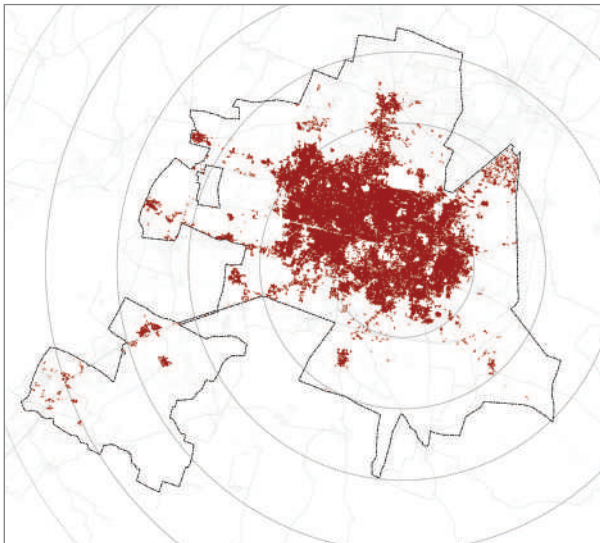


Area: 29.30 sq. km.
Population: 5.10 lakh

**2018**
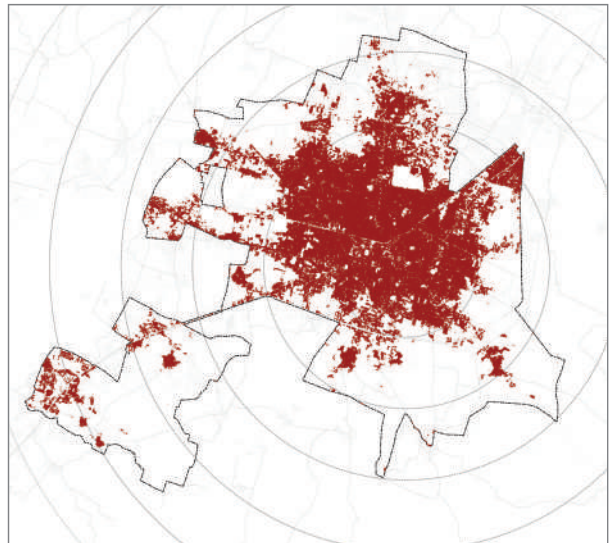


Area: 46.48 sq. km.
Population: 8.15 lakh

Map 4.4: Change in built-up area over the years in Guntur city

Source: Multitemporal information layer on built-up presence as derived from Landsat image collections (GLS1975, GLS1990, GLS2000, GHSL (10m) Sentinel-2 imagery (2018)

**Table 4.1:** Population growth pattern in Guntur down the decades

| Year | Population (in lakh) | Decadal growth (%) | GMC Area (in Ha) | Population Density / Ha |
|------|---------------------|--------------------|--------------------|--------------------------|
| 1971 | 2.70 | - | 3001 | 90 |
| 1981 | 3.67 | 36.2 | 3001 | 123 |
| 1991 | 4.71 | 28.1 | 4571 | 103 |
| 2001 | 5.14 | 09.2 | 4571 | 113 |
| 2011 | 6.47 | 25.8 | 4571 | 142 |
| 2011[16] | 7.43 | 44.0 | 12800 | 58 |
| 2019[17] | 8.25 | 11.0 | 12800 | 64 |

Source: Census of India, GMC

The population of Guntur, as per the Census of India in 1951, was 1.25 lakh. For two decades between 1961–1981, the city recorded a decadal population growth rate of 44.3 per cent and 36.2 per cent, respectively. During 1981–1991, the city's municipal boundary was also expanded to incorporate peripheral areas. Between 1991–2001, population growth in the city slowed down to only 9.2 per cent, three times less than the growth rate of the previous decade. Between 2001–2011, however, the city witnessed a significant growth of 25.8 per cent, nearly three times higher than the last decade. In 2012, the city's area increased by nearly three times when 10 neighbouring villages were merged into it. This development is discussed in the subsequent section (see Map 4.3 for change in GMC's jurisdiction boundaries over the decades). In 2015, Amaravati (about 35 km from the city) was declared as the new capital of the state, which also drove Guntur city's population growth during 2011–2019.

**Between 1975 and 2018, the built-up area in Guntur increased by almost seven times, while its population grew by three times** (see Map 4.4) **during the period.**

## 4.2.2 Spatial development pattern



## Core City Area

**The city's central business district (CBD), which served as an administrative, educational, medical, and commercial centre since the early twentieth century, continues its functions with extended spatial growth.** About 80 per cent of the city's households and population live within a 5-km radius of the city centre, or the 'Market Centre' near the GMC office on Grand Trunk Road. Most government offices, educational institutions, hospitals, public transport hubs (bus terminus and railway station), public parks, playgrounds, wholesale markets, cinema halls and theatres are located within a 1.5-km radius of the city centre (see Image 4.2).

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[16] Includes the total population of 10 villages added to GMC limits in 2012. According to Census 2011, the total population of the 10 villages was 98,585.

[17] For Service Level Benchmarking (SLB) 2018-19, GMC estimated the city's population to be 8.25 lakh in 2019. Government Order (G. O). Ms. No.310, MA&UD Dept., Dated 10.08.2017
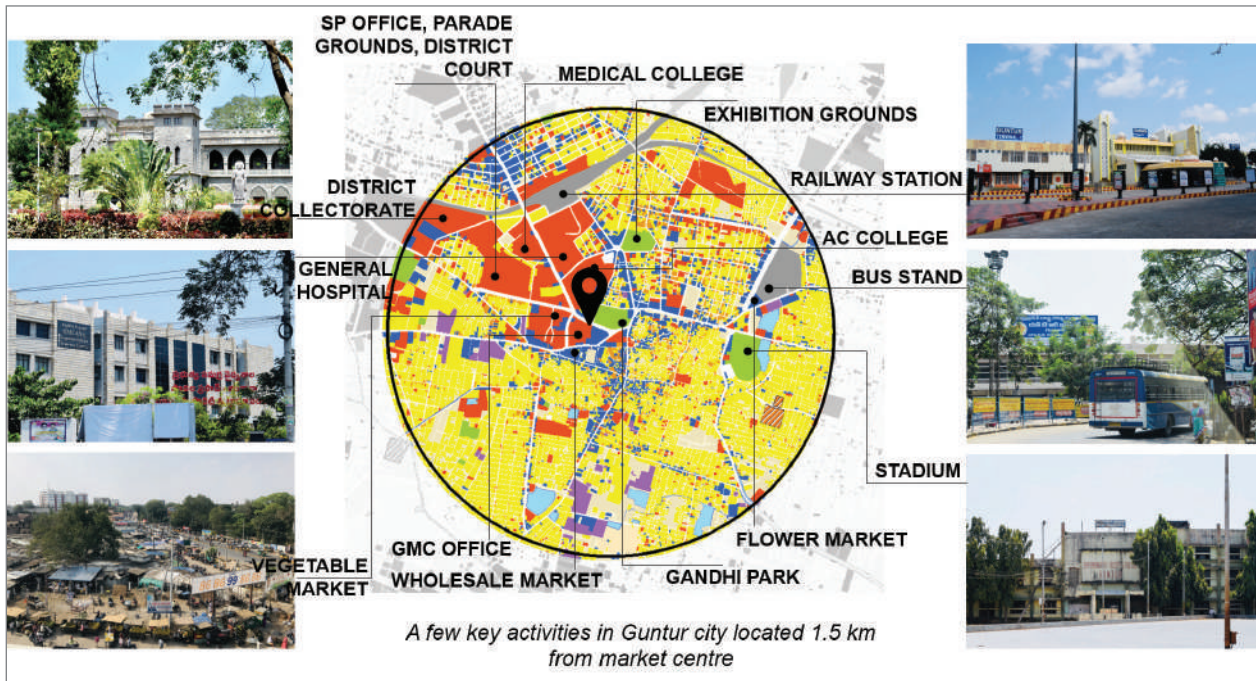
Image 4.2: Landmarks and activity hubs within 1.5 km of Guntur city centre (Market Centre junction)    Source: UN-Habitat

## City Suburbs

In 2012, 10 neighbouring villages were added to GMC's jurisdiction, increasing the city limits to 128 sq. km. (12,800 Ha) from 45.71 sq. km. (4,571 Ha). The total population of these villages stood at 98,595 (Census 2011) with areas predominantly under agricultural land use. These rural settlements today are scattered around Guntur's former municipal limits (see Map 4.5). These areas were underserved with respect to basic infrastructure and civic services, such as water supply, sewerage network, stormwater drainage, roads, and parks. The addition of these villages to Guntur's city limits significantly increased the service area under GMC.

## Impact of Amaravati, the New Capital

With the bifurcation of Andhra Pradesh into two states (Andhra Pradesh and Telangana) and Guntur's proximity to Amaravati, the new capital city after 2015, construction activity in Guntur increased significantly. The city's urban growth was primarily noted in the northern, North-East and western zones along the corridors leading to NH 16 (towards Vijayawada), SH 288 (towards Amaravathi) and SH 21 (towards Sattenapalli). Large portions of agriculture land in newly added areas, such as Gorantla, Reddypalem and Adavitakkellapadu (see Map 4.5), were converted to high-rise buildings. This trend led to the creation of new housing stock away from the urban core, leading to a sprawling development.

In 2020, the GoAP announced Amaravati as the legislative capital of the state, Visakhapatnam as the executive capital and Kurnool as the judiciary capital. This decision may impact the city's growth once the executive and judicial activities are shifted from Amaravati.

Image 4.3: New housing stock at Gorantla in northern Guntur city

Source: UN-Habitat
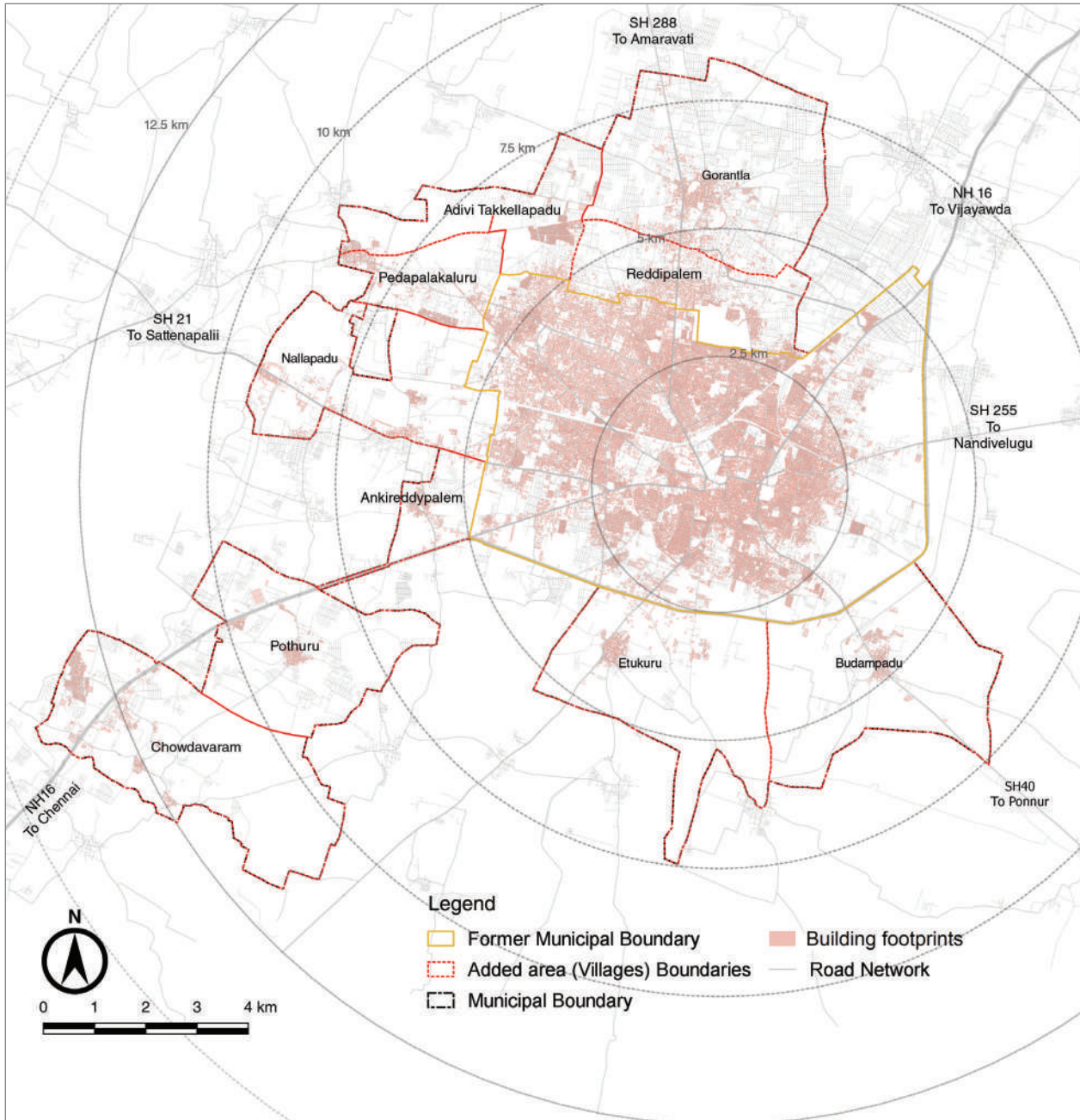
Map 4.5: Building footprints within former city limits and in the newly added areas

Data source: GMC; Map source: UN-Habitat

## 4.2.3  Urban density

As shown in Table 4.1, based on the population in 2011, the average population density in the city was 58 PPH. In the same year, the population density in the former city limits was 142 PPH and that in the newly added areas stood at 12 PPH.

The city's average population density increased to 64 PPH by 2018. This wide-ranging population density varies between 9–344 PPH, with inner city precincts exhibiting a high density of 300–344 PPH, as shown in Map 4.6. Areas with densities above 150 PPH occupy about 15 per cent (18.52 sq. km.) of the city's total area.
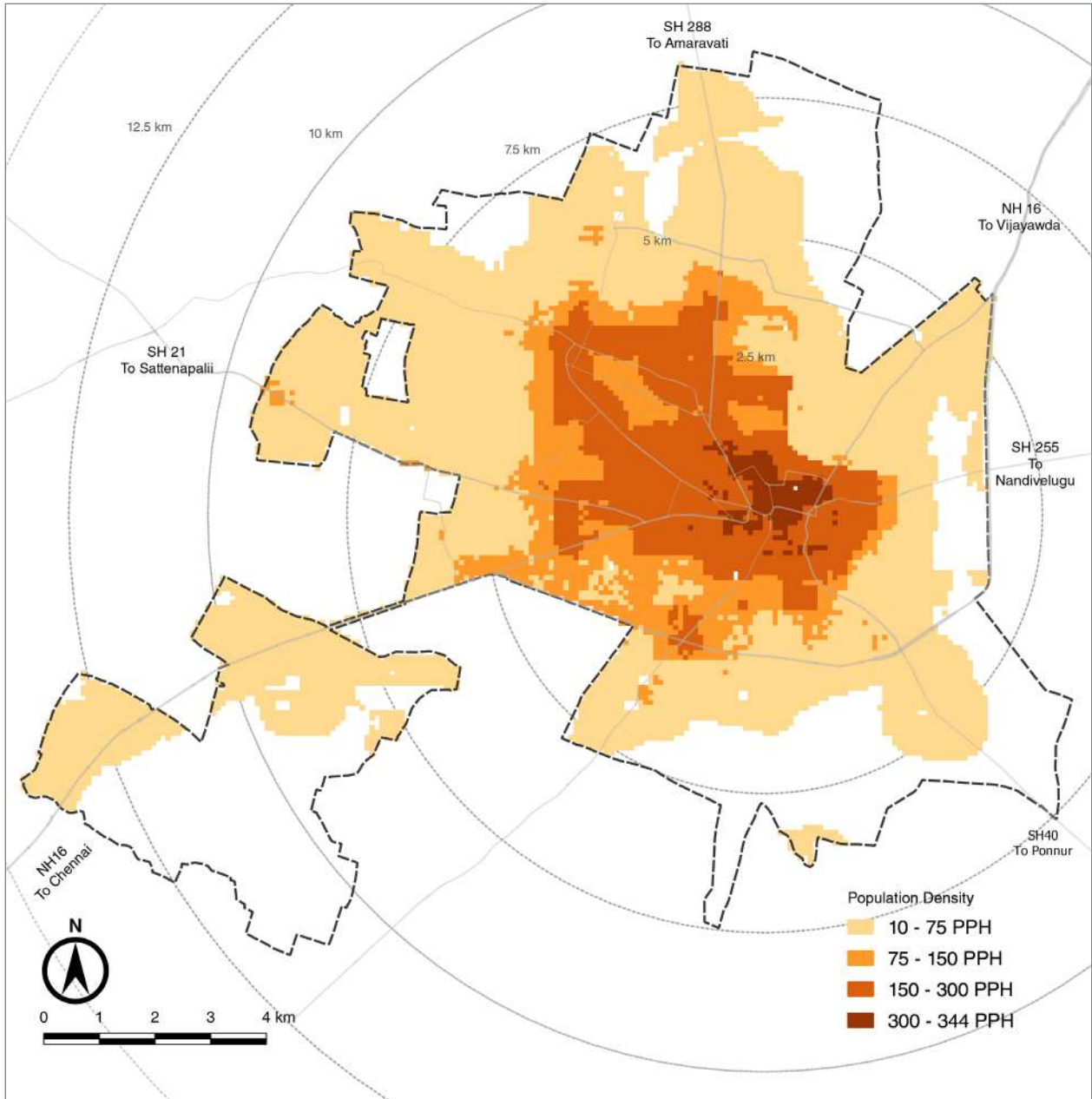
Map 4.6: Population density distribution in Guntur (2018)                    Data source: World Pop 2020; Map source: UN-Habitat

Image 4.4: Newly developing area in North-West Guntur

Source: UN-Habitat

## 4.2.4    Existing and proposed land use patterns



## Zonal Development Plan

The proposed land use plan for Guntur was prepared for the horizon year 2021, as part of the Guntur ZDP. The ZDP was prepared for the former city limits and peripheral precinct comprising 53.72 sq. km. The villages added to GMC's limits in 2012 fall within four different planning zones, i.e., Ankireddyplaem, Namburu, Perecherla and Vejendala (see Map 4.7). All ZDPs were approved in 2006 for the horizon year 2021. Chowdavaram area, which lies to the South-West of the city, does not have a ZDP as it was not a part of the Urban Development Region during the plan preparation.
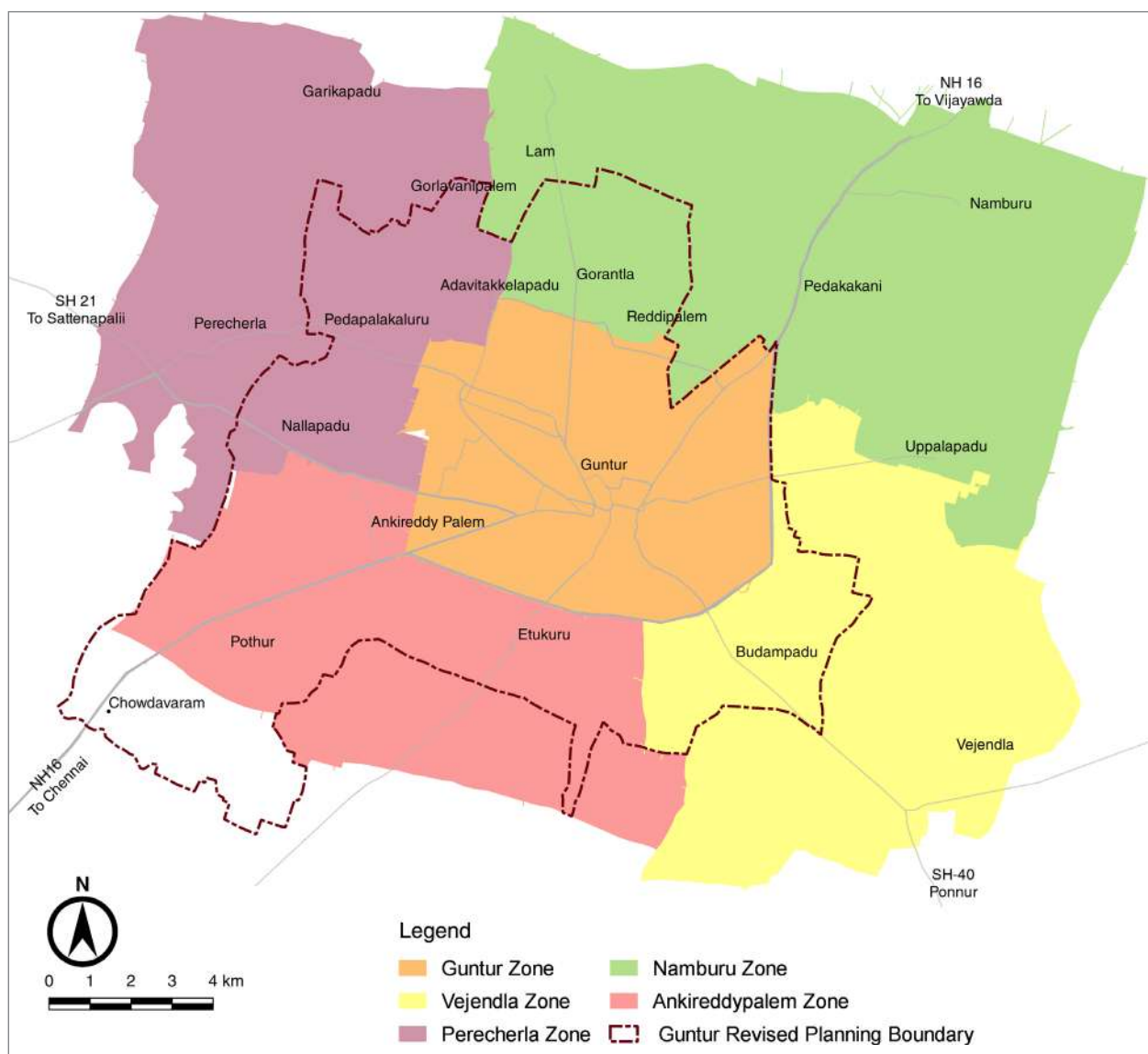


Map 4.7: Different planning zones (as per ZDP 2021) within the revised Guntur Planning Boundary

Data source: ZDP 2021; Map source: UN-Habitat

# Proposed Land Use

The Guntur ZDP considered a population density of 150 PPH as the base for estimating developable land. The other four ZDPs considered a density of 75–125 PPH for arriving at proposed land use estimates for 2021. All the ZDPs considered the existing land use for 2004 as the base for estimating proposed land use. In the proposed land use plan (combining all five zones for Guntur's revised planning boundary), about 53 per cent of the agricultural land available in 2004 was distributed into developable land uses to cater to the demands of the population by 2021. The Guntur ZDP proposed all the agricultural land as of 2004 for developable uses. The proposed land use for the revised Guntur planning boundary for 2021 is shown in Map 4.8.
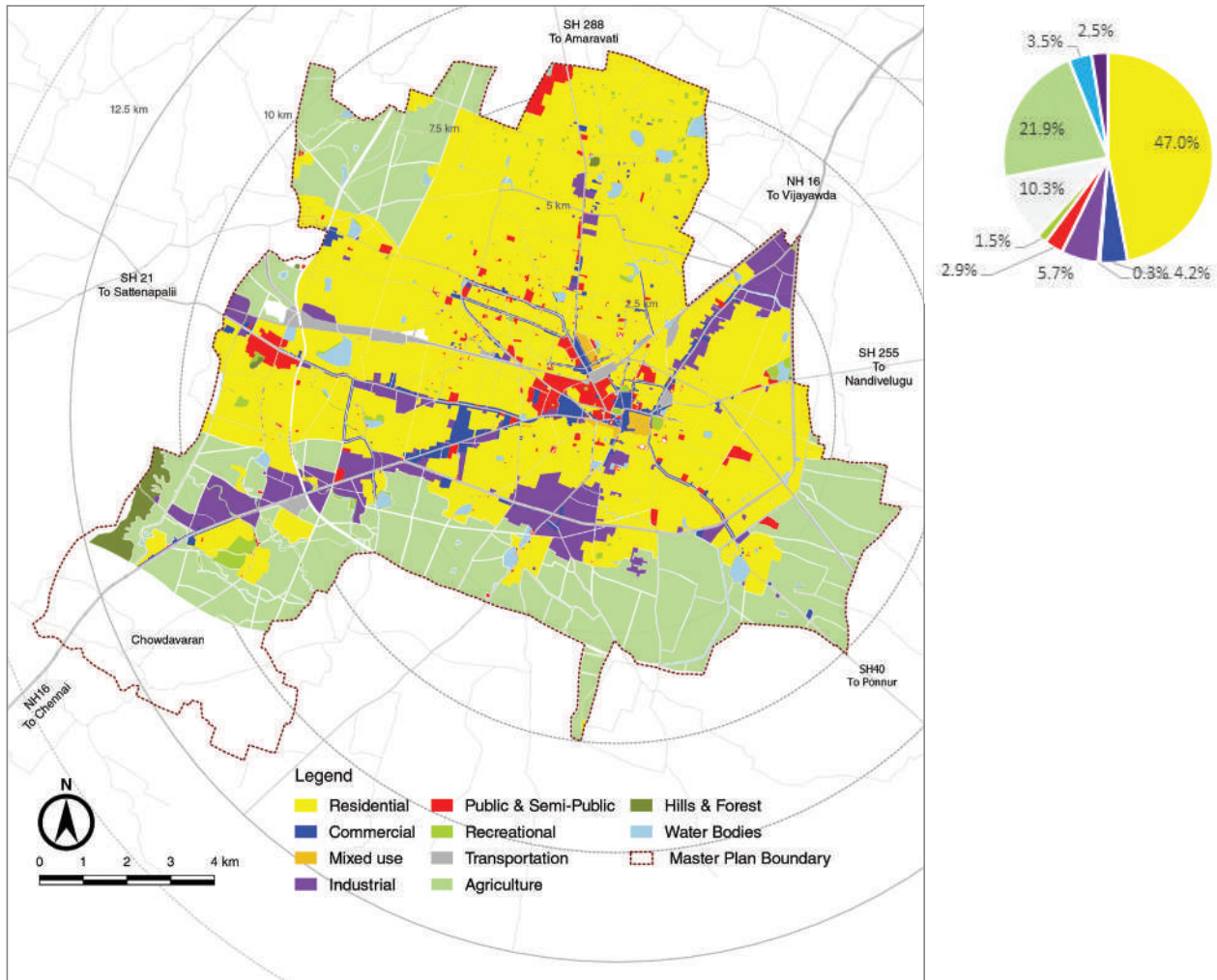


Map 4.8: Proposed land use of Guntur for 2021                Source: ZDP 2021

# Existing Land Use

The latest land use map of Guntur was prepared in 2017 (see Map 4.9).[18] Agriculture was the predominant land use in the city, covering 55 per cent of its total area, despite significant loss of agricultural land over the years. Agricultural land predominantly covers the South and South-West parts of the city. With vacant land accounting for nearly 15 per cent of the total land use area, large vacant land parcels lie between agricultural and built-up areas in many parts of the city. The commercial areas are located along all the city's major roads with key locations within a 5-km radius of the city centre. A major part of the city's industrial activity is anchored along the two national highways. Only 0.48 per cent of the total city area falls under recreational use, against the recommended norm of 12-14 per cent for large cities[19], as per the Urban

and Regional Development Plans Formulation and Implementation (URDPFI) guidelines. The area allotted for transportation and communication constitutes only eight per cent of the total land use. This is also below the recommended norm of 12–14 per cent for transportation and communication uses in large cities, as per URDPFI guidelines.

**Urban growth in Guntur has fallen short of the rate estimated by the ZDP. The proposed land use (2021), in comparison to the latest land use (2017), shows large sections of the city that were proposed for residential use to be still under agricultural use, especially to the East and West of the city.** Urban growth, for the most part, is noted to the city's North and North-East, around the main transit corridors. Large scale construction of high-rise buildings by private developers, and conversion of agricultural land to vacant land for real estate development have come up significantly in the city's newly added areas, which lack adequate infrastructure and civic services. This rising trend has also led to loss of agricultural land, while industrial growth has not taken off as anticipated.
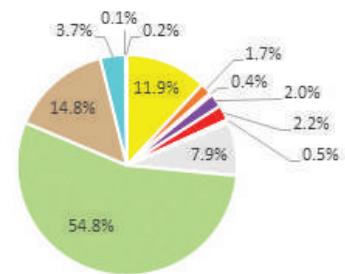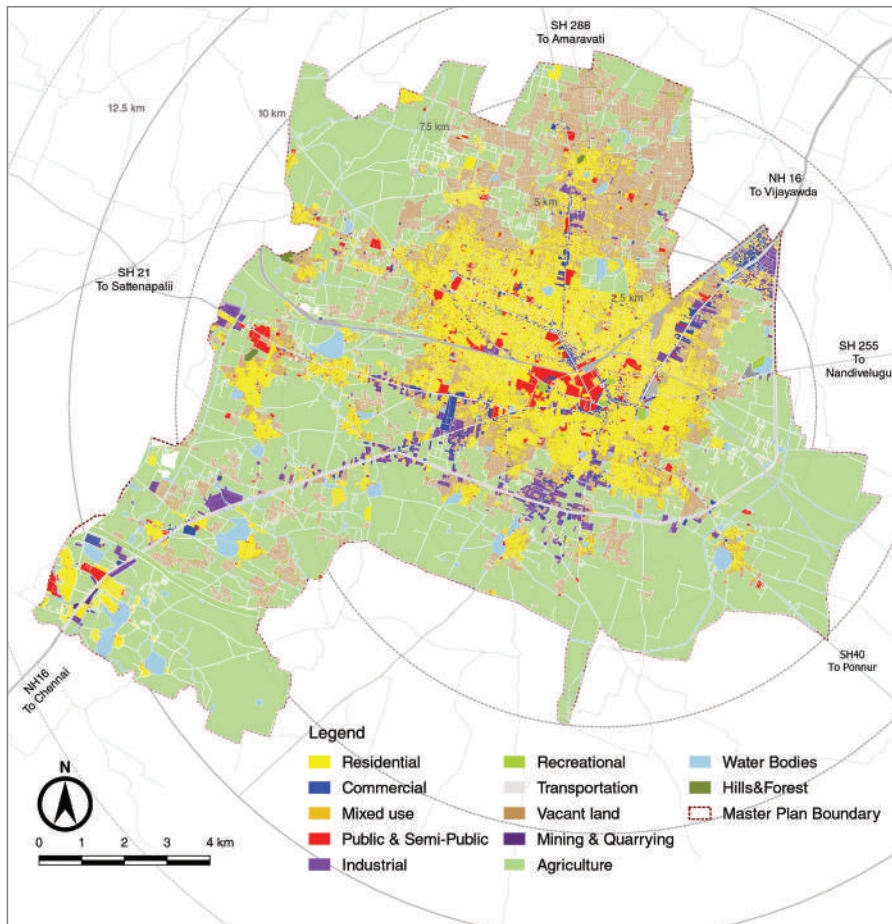


Map 4.9:  Existing land use of Guntur (draft), 2017

Source: AMRDA

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[18]  The draft land use plan was prepared for a 174-sq. km. extent

[19]  URDPFI classifies a 'Large City' as an urban settlement with a population range of 5–10 lakh, governed by a municipal corporation (UDPFRI Vol I, Pg. 4).

## 4.3 GREENHOUSE GAS EMISSIONS PROFILE

According to a GEF-UNIDO-MoUD study (2017)[20], **the GHG emission in Guntur during 2015-16 was 1,122,848 Mt $CO_2$-eq, with total $CO_2$, $CH_4$ and $N_2O$ of 977,232 Mt, 4,844 Mt, and 38 Mt, respectively, in the air.**

As shown in Figure 4.1, the stationary energy sector/energy use emitted 698,649 Mt of $CO_2$-eq, accounting for 62 per cent of the total GHG emissions during 2015-16. The transportation sector emitted 278,489 Mt of $CO_2$-eq, which was 25 per cent of the total GHG emissions of the city, followed by the waste sector, which emitted 137,207 Mt of $CO_2$-eq (12 per cent). The agriculture, forestry, and other land use (AFOLU) sector emitted 8,503 Mt of $CO_2$-eq, which was one per cent of the total GHG emissions in the city. In Guntur, no

industry is classified under the industrial processes and product use (IPPU) sector. Hence, the emission of gases from the industrial sector was considered as zero. A few industrial activities in the city, such as road metal quarrying and stone crushing, only cause dust emissions. **The annual GHG emissions per capita in 2015-16 was 1.44 Mt of $CO_2$-eq.**

## 4.4 SECTORAL CONTEXT

This section discusses Guntur's assessment over 12 USAF sectors – namely, public space, urban form and safety, housing and property, water, sanitation, solid waste management, clean energy, disaster management, environment, transport, social facilities and services, governance and data management, finance, and economy.



**Figure 4.1:** Sector-wise GHG emissions (Mt of CO2-eq) in Guntur during 2015-16

- Transportation
- Waste
- AFOLU
- Stationary energy sector
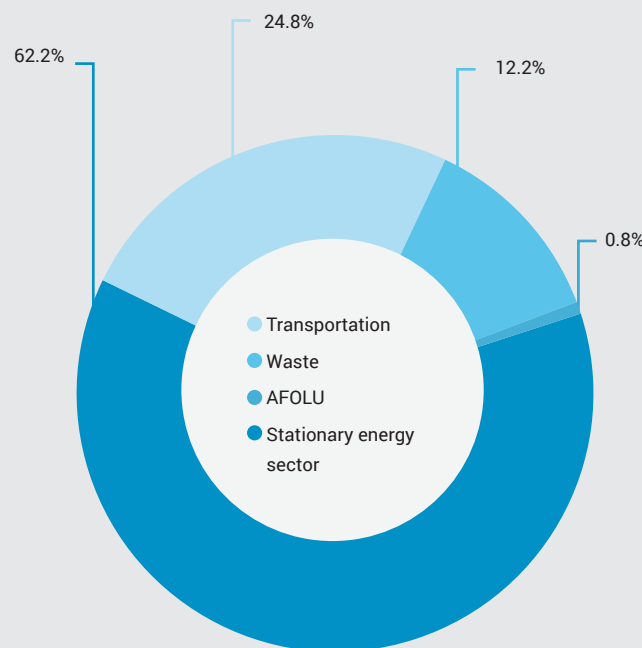
Source: GEF-UNIDO-MoUD project completion report (2017)

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[20] 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)

For Guntur, 75 per cent of all indicators (98 out of the 131 indicators) were collected, including 85 per cent of all primary indicators. As shown in Figure 4.2, the overall city score was three (medium performance). Environment and ecology, Governance and data management, Finance and economy, and Solid waste management were the top performing sectors in the city. Whereas, Transportation, Urban form, public space and safety, Housing and property were the least performing sectors.

For the detailed performances of these sectors, refer to the Guntur Urban Sustainability Indicators Report.

The following sections present an in-depth evaluation of each of the sectors based on the USAF sustainability indicators.

**Figure 4.2:** Average performance and percentage of indicators collected for the 12 USAF sectors
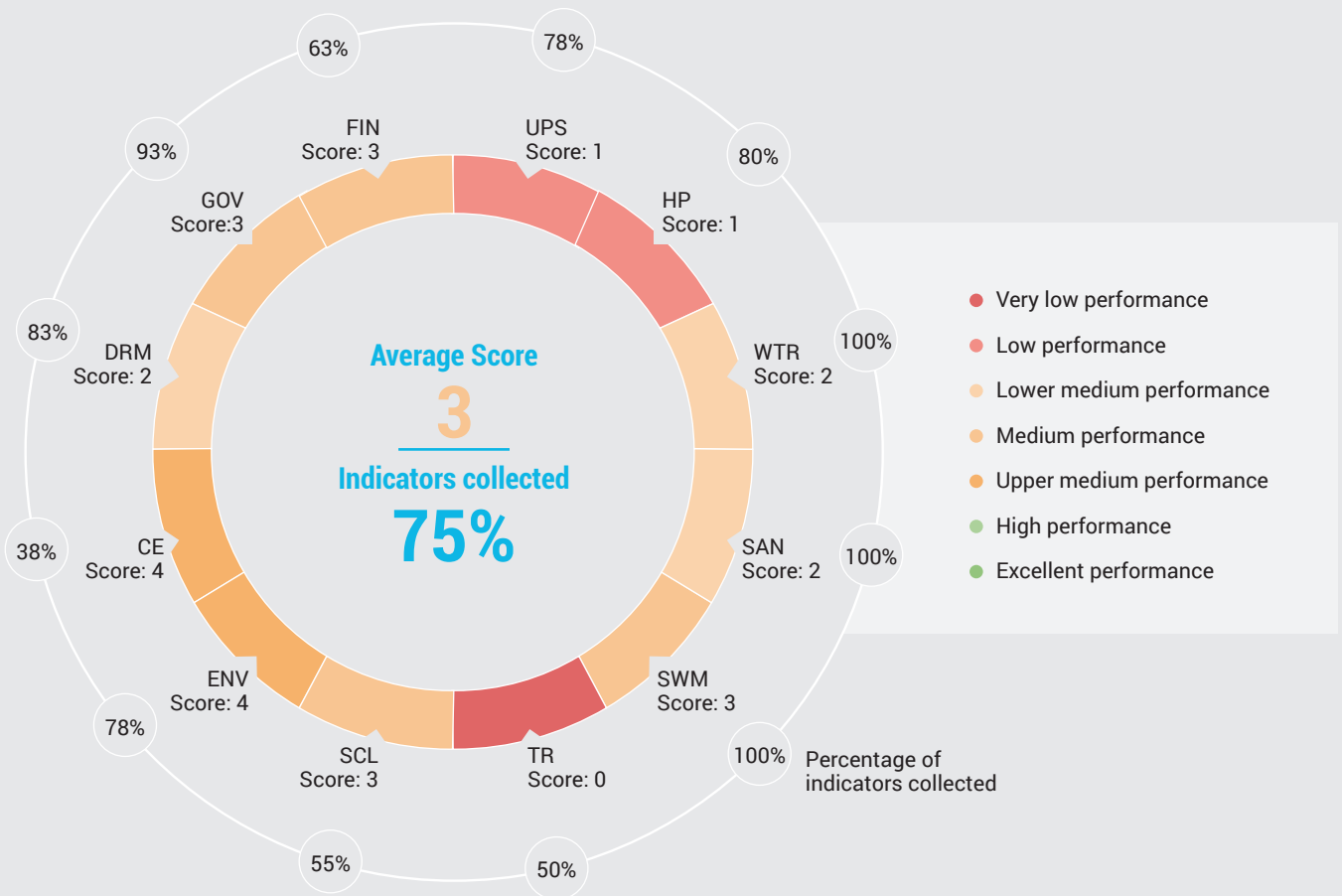


Source: UN-Habitat

Refer to Annexure 4.1 for indicator-wise scoring across the 12 USAF sectors.

Image 4.5: Neighbourhood Park at Arundalpet, Guntur city                                         Source: UN-Habitat

## 4.4.1   Public space, urban form and safety

There are nine indicators in this sector, four related to public spaces, two to urban form, and the remaining three related to safety. For Guntur, data was collected for seven indicators. The overall performance of this sector was found to be 'low'.



## Public Spaces

Open public space per capita in Guntur stands at 0.92 sq. m. per person, which is less than the benchmark recommended by the URDPFI guidelines (12 sq. m. per person). The city scored 'very low' with regard to open spaces available to its residents.

Image 4.6: Walking track along Koritepadu pond

Source: UN-Habitat

The city has 25 municipal parks comprising 29.26 Ha. Of these, two parks, Gandhi Park and Manasasarovaram Park (see Map 4.10), constitute 84 per cent of the total area under parks in the city. In addition, the city has two
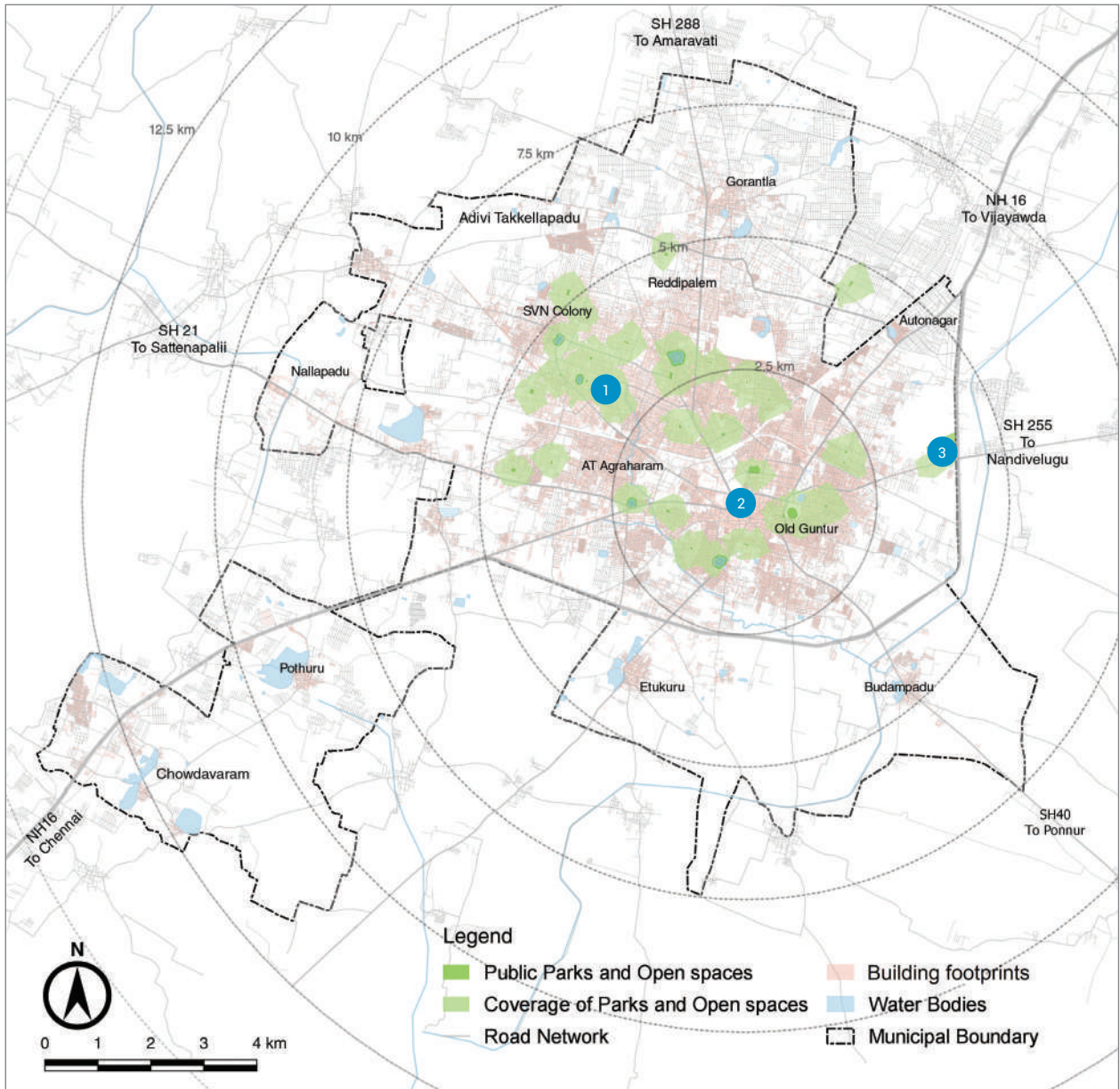


Map 4.10: Population catchment with access to public parks and open spaces within 500 m.                    Source: UN-Habitat



1. NTR Stadium

2. Gandhi Park

3. Manasasarovaram Park

stadiums and a playground. GMC has also landscaped the waterfronts along the embankments (bunds) of five water bodies in the city, namely Koritepadu Cheruvu, Gujjanagundla Cheruvu, the Brindavan Gardens Pond, Chuttugunta Cheruvu and Nallacheruvu. These public spaces are used by local communities for recreation and exercise. Only 45 per cent of the city's population has access to such parks and open spaces within 500 m. of their residences (see Map 4.10). The city scored 'very low' on access to parks and open spaces for its citizens. Green areas and open public spaces, therefore, constitute less than one per cent of the city's total developable area, earning it a 'very low' score for this indicator. In 2018-19, GMC had spent an average of INR 23 per sq. m. towards the operations and maintenance of parks in the city.

## Proposed Agricultural Land Use Conversion

The ZDP 2021 proposes the conversion of about 53 per cent of the city's agricultural land (as of 2004) for various developable uses. As per Guntur's existing land use, in 2004, the area identified for undeveloped uses stood at 52.95 per cent, which was reduced to 27.98 per cent in the proposed land use (ZDP) for 2021. However, the city's growth fell short of the development rate anticipated by the ZDP. Large land parcels in the city proposed for conversion to developable uses in 2004 still remain marked as agricultural land in 2021.

## Change in Built-up Area over the Years

The total built-up area of the city in 2014 increased to 30.06 sq. km. from 29.30 sq. km. in 2000, as shown in Figure 4.3. Guntur's per capita built-up area decreased (32 per cent) from 57 sq. m. per person in 2000 to 39 sq. m. per person in 2014.

**Figure 4.3:** Built-up area in the city in 2000 and 2014

2000
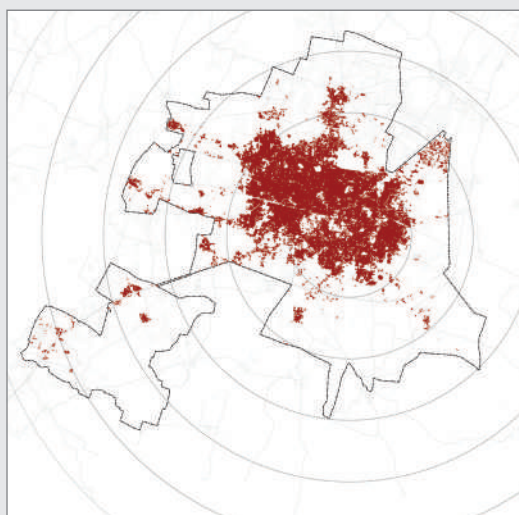


Area: 29.30 sq. km
Population: 5.10 lakh (approx.)

2014
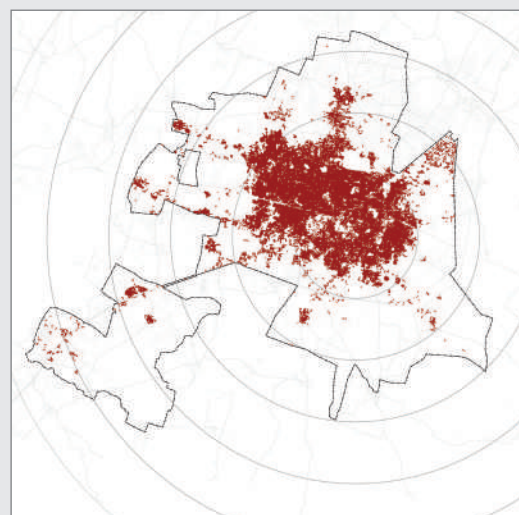


Area: 30.06 sq. km
Population: 7.74 lakh (approx.)

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)

## Safety
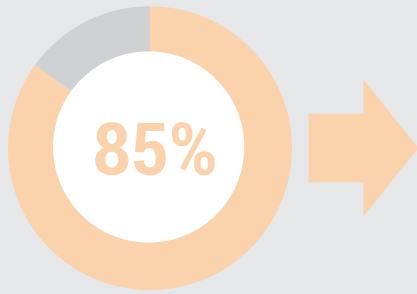
**85%** → About 85 per cent of city roads are covered with streetlights. The city scored 'lower medium' for its street lighting coverage.

Data for the 'rating of safety standards of the city' is unavailable for Guntur. The Guntur Urban Police monitor all on-street activities through CC TV surveillance and command control centre. The city has traffic signals and surveillance systems installed at all its major cross-sections, but it lacks adequate facilities for pedestrians. Zebra crossings are not evident in many locations, and most footpaths are occupied by shops, street vendors, and vehicular parking.



Image 4.7: View of Grand Trunk Road

Source: UN-Habitat

## 4.4.2   Housing and property

There are five indicators for measuring the status of informal settlements / slums and housing demand in the city, of which data for four indicators were collected for Guntur. The overall performance of this sector in the city is 'low'.

## Housing

As per Census 2011, the total number of households in the city numbered 1.72 lakh, increasing to 1.89 lakh in 2019. The average household size remained 4.3 in both 2011 and 2019.

The housing typology in Guntur is predominantly plotted row housing. Residential buildings in the old city are mostly low-rise structures. Multi-storeyed apartments are primarily seen in areas along the Inner Ring Road, North, North-East, and North-West zones of the city.



Image 4.8: A view of City view of North-West Guntur seen from the Kankaragunta flyover

Source: Guntur Coffee Table Book, GMC

# Informal Settlements

The city has 173 slum settlements comprising 133 notified and 40 non-notified slums. All of them are in the inner-city precinct, within the former city limits. Many slums are located along drains, canals, major roads, and railway tracks (see Map 4.11).

**The city scored 'very low' on the parameter for households living in slums, as the percentage was much higher than the national average of 17.4 per cent. The slums in the city are densely populated with an average density of 333 PPH. The government has regularized houses in many notified slums. In 2020-21, GMC provided housing sites at various locations within and outside the city limits for approximately 66,300 urban poor households under the state government programme, Pedaladariki illu. The construction of houses in the allocated housing sites is planned to be undertaken under Central and state schemes like the Pradhan Mantri Awas Yojana - Urban (PMAY-U), Pedaladariki illu and YSR Housing Scheme.**

**28%** About 0.52 lakh households live in slum settlements

**5%** Slum settlements cover about 6.19 sq. km., constituting 4.8% of the total city area
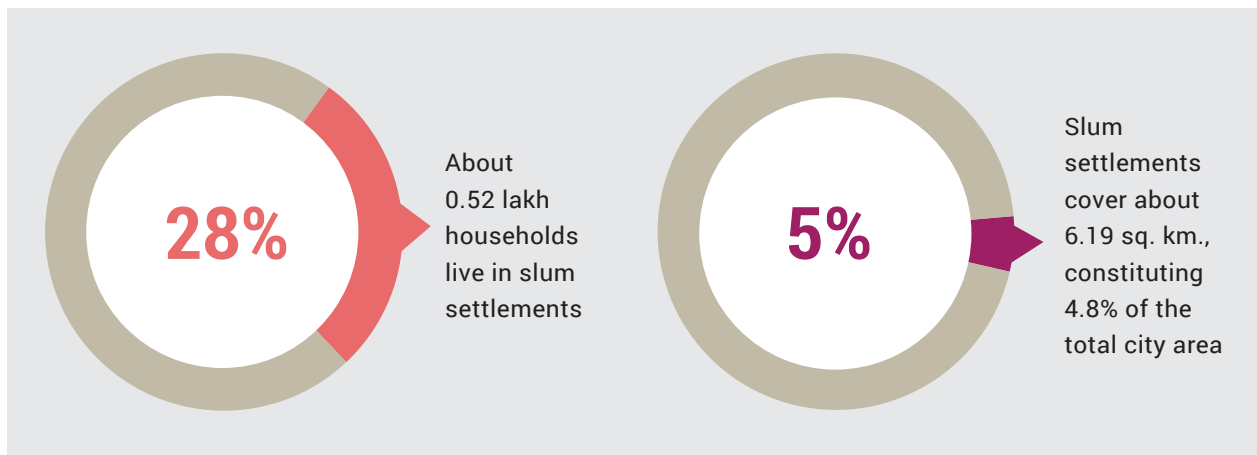
# Ownership of Housing and Overcrowding

According to Census 2011, most households in the city live in rented accommodation (see Figure 4.4). The city scored 'medium' for the percentage of its households living in a one dwelling room (37.6 per cent). Data for households in Guntur city spending more than 30 per cent of their income on accommodation is not available.

**Figure 4.4:** Ownership status of households in Guntur (2011)

| | |
|---|---|
| Owned | 47.3% |
| Rented | 50.5% |
| Any others | 2.2% |
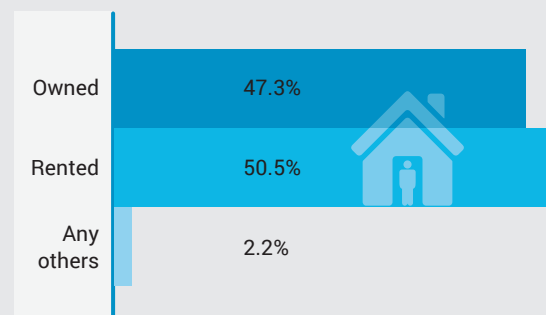
Source: Census of India 2011
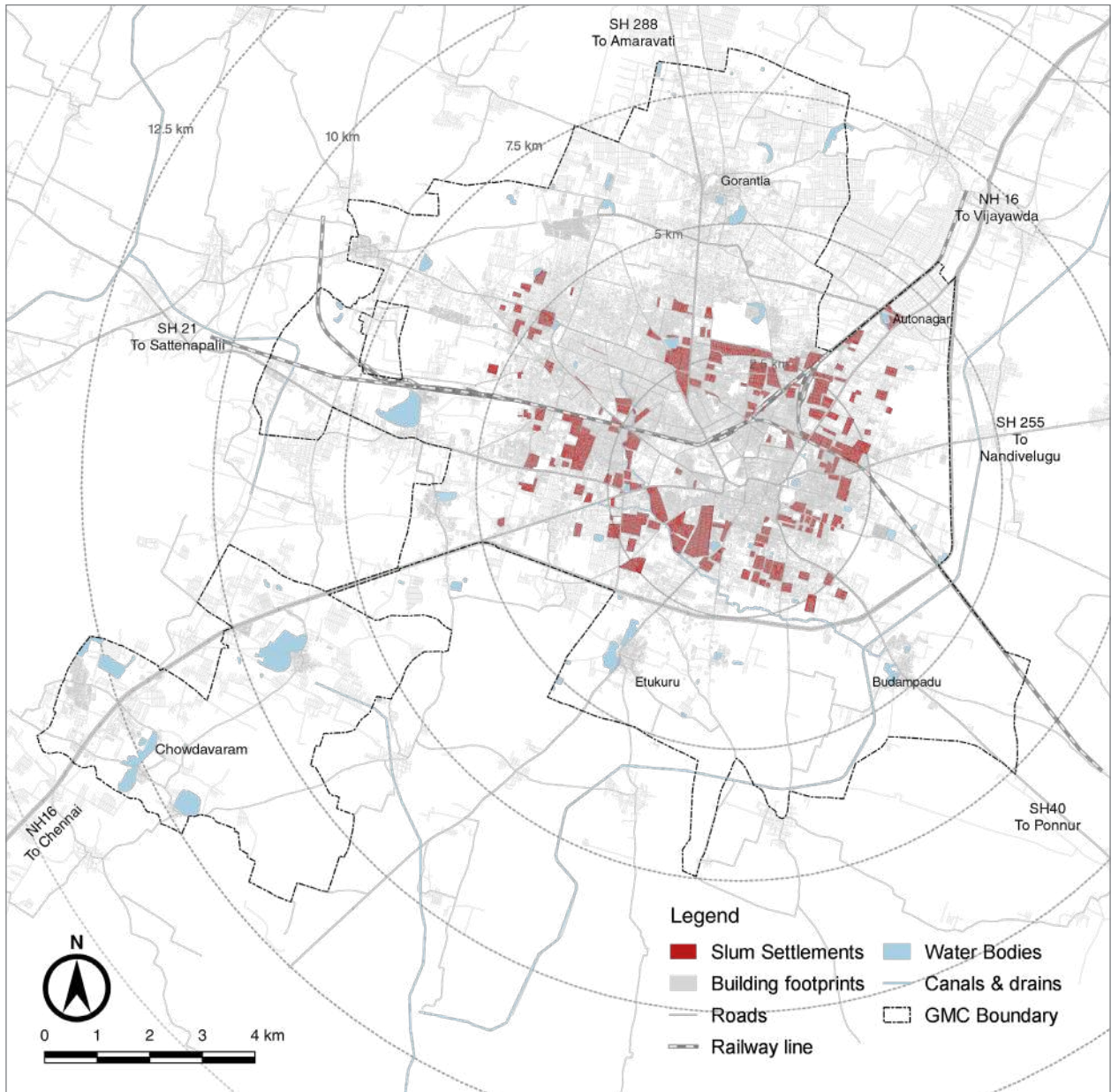
Map 4.11: Location of slum settlements in Guntur city

Source: GMC; Map source: UN-Habitat

Image 4.9: Housing in the AT Agraharam locality of Guntur city                                    Source: UN-Habitat

## 4.4.3   Water supply

There are six indicators for assessing the management of water supply in the city, including service coverage, quality of water supply and extent of non-revenue water. Data for all these six indicators were collected for Guntur city. The city's overall performance against this parameter was 'lower medium'.

## Service Coverage

Krishna River is the main source of water supply in Guntur. The city houses four Water Treatment Plants (WTPs) with a total processing capacity of 159.47 MLD. Currently, 145.20 MLD is being utilized. There are 43 Elevated Level Service Reservoirs (ELSR) in the former city area with a total storage capacity of 52.06 ML. On an average, 150 litres per capita per day (LPCD) is supplied across much of the former city area, and 100 LPCD to some areas of former city area. The city's new neighbourhoods do not have any water storage capacity (see Map 4.12). Consequently, water is only supplied to Reddypalem, Gorantla, Adavitakkelapadu and parts of PedaPalakaluru. In other newly added areas, GMC supplies water through tankers of 4-KL and 12-KL capacity, at less than 50 LPCD. **On an average, 117 LPCD of water is supplied across the city, which is less than the national benchmark of 135 LPCD for urban water supply. The city scored 'very low' on the parameter for water supply per capita** (see Figure 4.5).



**Figure 4.5:** Water supply per capita in the city compared to national benchmark for urban water supply
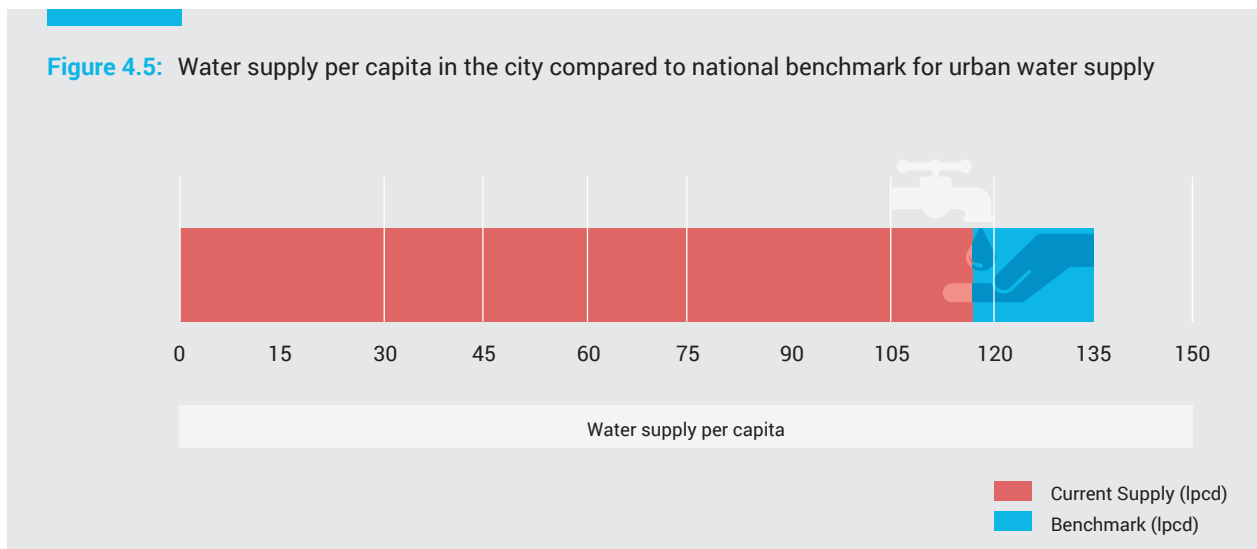
Source: GMC (2018-19)

According to SLB 2018-19, about 72 per cent of households in the city have a water supply connection. The city scored 'upper medium' for its performance against the parameter for households with piped water connections. However, only 24 per cent of households with piped connections have water meters, thereby earning the city a 'low' score here (see Figure 4.6). Guntur city has 1,00,931 domestic House Service Connections (HSCs) and 3,269 commercial and non-domestic (metered) HSCs

## Water Quality

In 2018-19, about 96 per cent of the water samples collected from the city complied with the national potable water quality standards prescribed by the Central Pollution Control Board (against a 100 per cent benchmark). Hence, the city scored 'upper medium' for its water quality (see Figure 4.6).

**Figure 4.6:** Service coverage and water quality in the city compared to national benchmarks
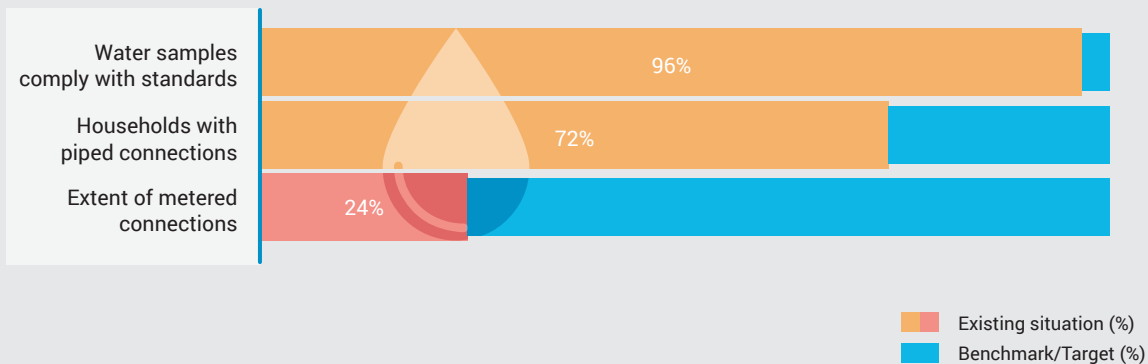


Source: GMC (2018-19)
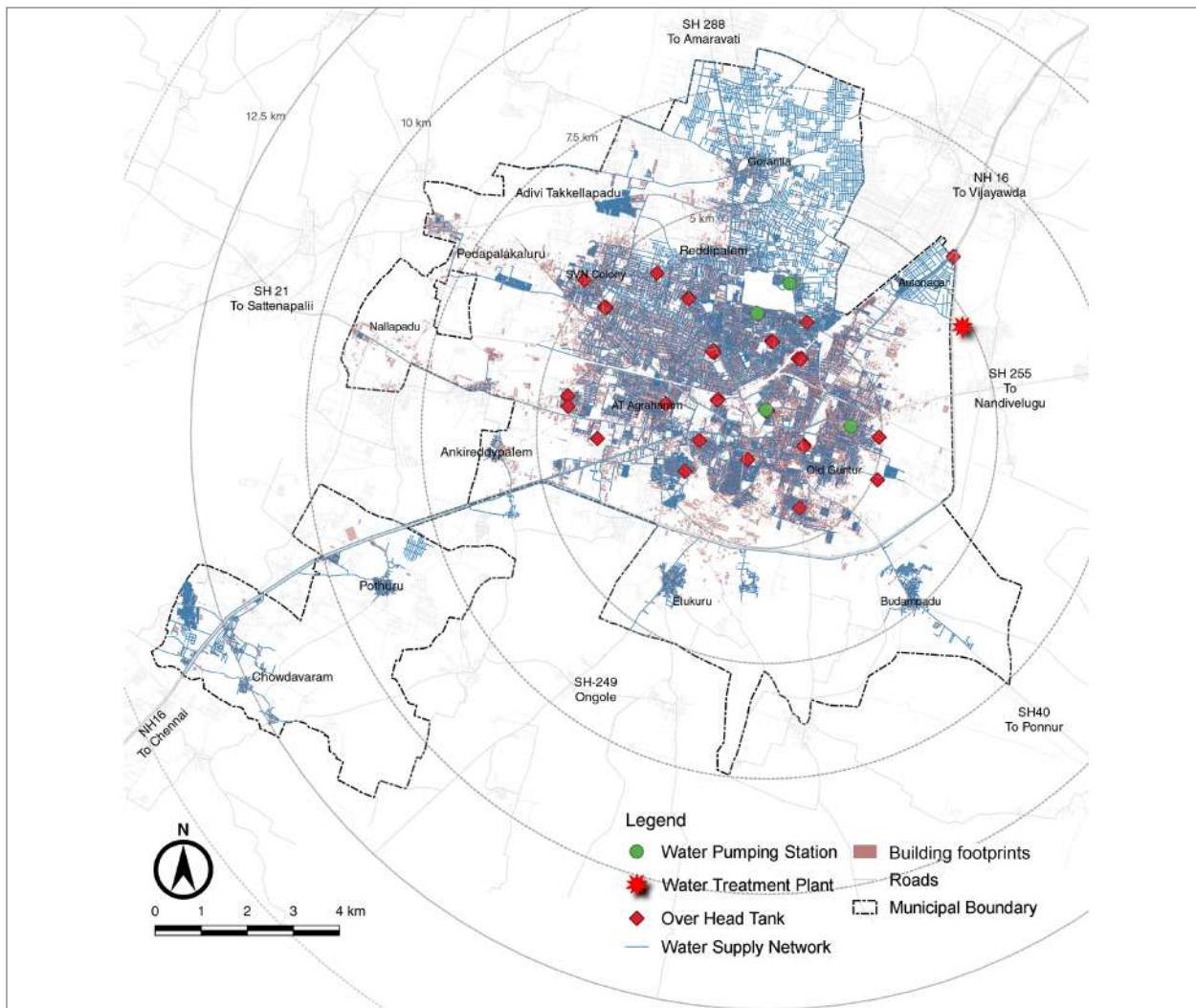


Map 4.12: Water supply network in the city

Source: GMC; Map source: UN-Habitat

Image 4.10: View of water being treated in Takkellapadu Water Filtration Plant          Source: Guntur Coffee Table Book, GMC

## Non-Revenue Water

The extent of Non-Revenue Water (NRW) in Guntur is 31 per cent, earning it a 'medium' performance score in this sector. The city's NRW is higher than the national benchmark of 20 per cent. In addition, it does not have a water resources assessment plan.

To address the existing gaps in the city's water supply system, especially in the newly merged areas, GMC has been undertaking various activities. Under the national AMRUT mission, provisioning of water supply HSCs and strengthening of the existing water supply system are being undertaken.

GMC is also in the process of metering all water supply service connections in the city, including domestic ones. The GoAP sanctioned a scheme for supplying 50 MLD of water to the newly merged areas of GMC through financial assistance from the Asian Infrastructure Investment Bank (AIIB). The Public Health and Municipal Engineering Department, GoAP, is executing the project. After completion, the project will be handed over to GMC for operations and maintenance. The project is expected to meet the water demand of the newly added areas till 2050.

## 4.4.4   Sanitation

There are nine indicators for assessing the performance of the city's sewerage network coverage, toilet facilities, and compliance with wastewater treatment norms and guidelines. Data for all nine indicators were collected for Guntur. The city's overall performance in this sector is 'lower medium'.

### Coverage of Sewage Network Services

Guntur city generates about 112 MLD of sewage. Only 10 per cent of the former city area is covered with an underground sewerage network. According to SLB 2018-19, only 21 per cent of properties in the city are connected to the sewerage network against the benchmark of 100 per cent coverage. Consequently, the city exhibits a 'low' performance in this segment.
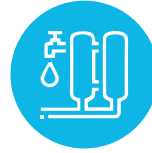
### Wastewater Treatment

A Sewage Treatment Plant (STP) of 9 MLD capacity in the Suddapalli Donka area is non-operational. The sewage generated by the city is discharged into the Peekalavaagu and Suddapallidonka drains without any treatment (see Map 4.13). As the city does not have STPs, it scores 'low' against the three indicators for sewage treatment before discharge into surface water bodies, the specified secondary treatment standards of wastewater, and recycling or reuse of wastewater.

To address the poor condition of the sewerage system in the city, the Government of India has sanctioned an underground drainage (UGD) project at an estimated cost of INR 903 crore, co-funded by the GoAP. The key components of the project include construction of five decentralized STPs with a 123 MLD capacity, provisioning of sewerage connections to about 1,40,000 properties, construction of a 1,083-km sewer line distribution network and construction of 43,574 manholes and 87,148 inspection chambers. The Public Health and Municipal Engineering Department, GoAP, is the project execution agency.

### Storm Water Drainage

The total length of the storm water drainage network in the city is 2,612 km (see Map 4.13). There are five major outfall drains in the city that take most of the flood discharge, namely, Peekalavagu, Nandivelugu drain, Suddapallidonka drain, Budampadu drain, and Kankaragunta drain. All of them cross the NH 16 bypass at different points.
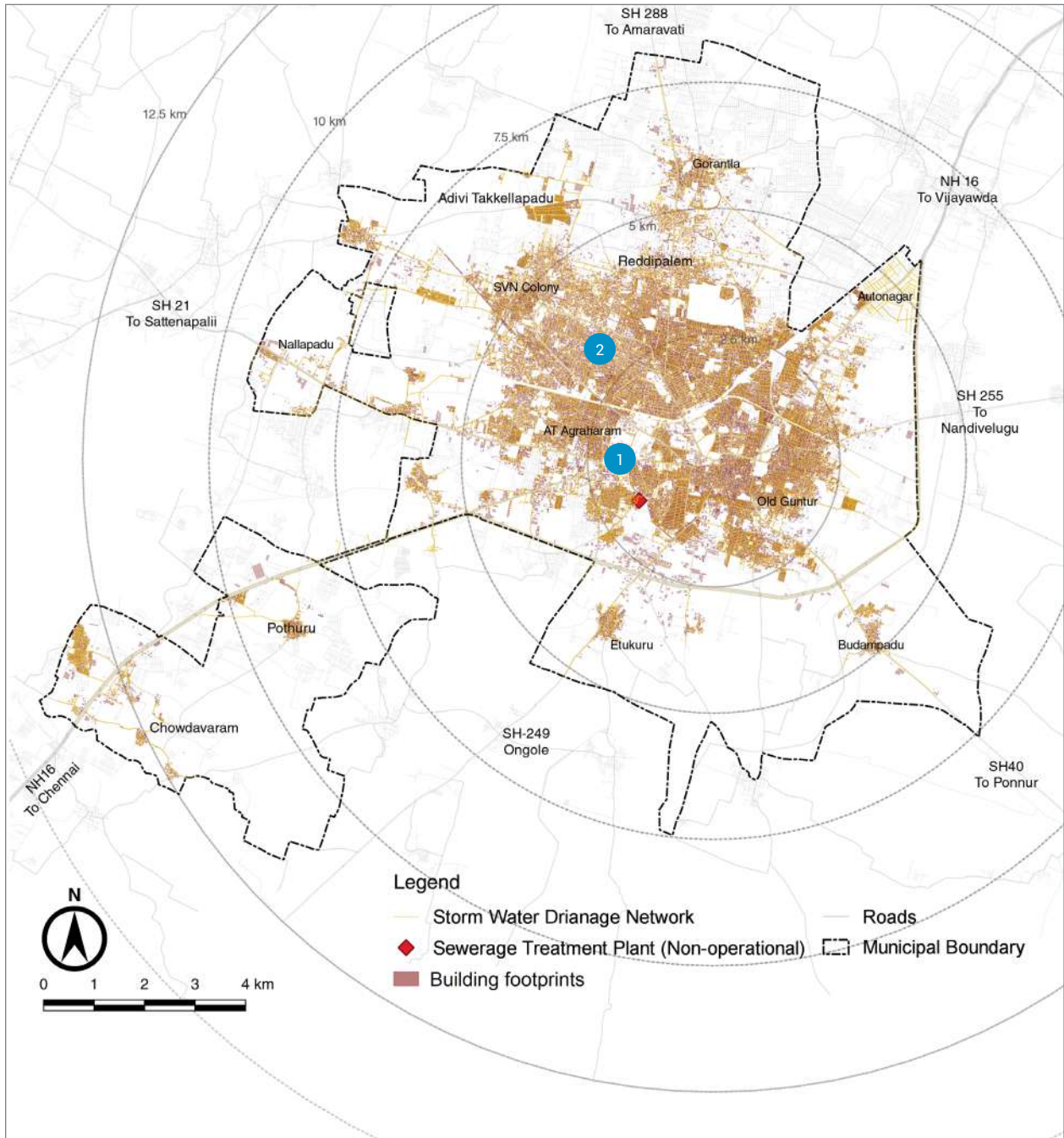
Map 4.13: Storm water drainage network

Data source: GMC; Map source: UN-Habitat



1. Drain near Medical Club, GT Road



2. Peekalavagu near Lakshmipuram Main Road

## Access to Toilets

**Guntur has been declared Open Defecation Free (ODF) as 100 per cent of its households have access to toilets.** The city has seven community toilets and 24 public toilets. It scored 'excellent' on the parameter of household access to toilet facilities and the percentage of public toilets, as per Google Maps (see Figure 4.7).

GMC has set itself a target to achieve ODF+ and ODF++ status by 2021. It is working towards

improving the city's existing toilets as per the norms of the Swachh Bharat Mission (SBM), and constructing new public toilets proportionate to the city's floating population.

Guntur does not have any established system for septage treatment and disposal. At present, the city does not have a Faecal Sludge and Septage Management (FSSM) action plan or notified SAN benchmarks, byelaws/ guidelines, thus earning it a 'low' score with regard to the existence of FSSM plans / guidelines. For undertaking an FSSM plan in the city, GMC has empanelled and licensed a few private desludging operators. GMC is also planning to construct faecal sludge treatment plants in select locations across the city.



**Figure 4.7:** Households with access to private and public toilets compared to benchmarks

Public toilets mapped on Google Maps — 100%

Households with access to toilet facility — 100%

Benchmark / Target (%)
Existing Situation (%)
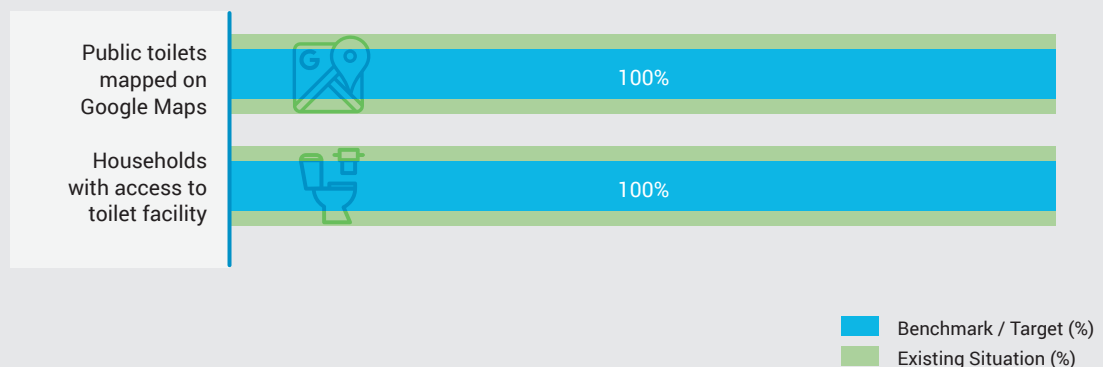
Source: GMC (2018-19)

## 4.4.5   Solid waste management

There are 12 indicators for assessing the status of solid waste management in a city, which includes efficiency of waste collection, extent of waste processing, and remediation of legacy waste management in the city. Data for all the indicators were collected for Guntur city. The overall performance of the city in this sector is 'medium'.

## Waste Collection Efficiency

GMC has been undertaking 100 per cent door-to-door waste collection in a segregated manner across all the 57 wards of the city. The segregated waste collected at source is maintained till the processing/ disposal site. Hence, the city scored 'excellent' on both indicators, door-to-door waste collection and segregation of waste at source.

## Waste Processing

Municipal Solid Waste Management (MSWM) is currently GMC's highest priority sector. On a daily average, Guntur collects 420 MT of municipal solid waste.

About 6 MT of waste is used for generating electricity from a biogas plant (5MT capacity) and producing synthetic fuel from plastic waste at a fuel conversion plant (0.5-tonne capacity). COVID-19 medical waste is being treated through an incinerator of 0.5-MT capacity. The city does not have a construction and demolition waste processing facility ('very low' performance).

**54%**
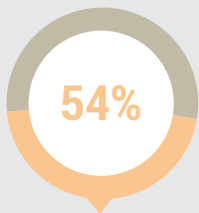
GMC on average collects 252 MT of wet waste per day. Of this, 51 MT is processed for composting

**6%**
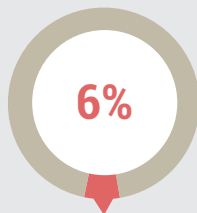
Out of 168 MT of dry waste collected daily, only about 5 MT is separated for recycling and material recovery

## Waste Treatment

Other than the wet and dry waste utilized for processing, the rest, approximately 267 MTD (accounting for 64 per cent of the total waste collected), is dumped at the city's Naidupet dumping yard without any treatment. Thus, the city scored 'very low' with regard to the percentage of MSW disposed in open dumps without treatment.

**About 4 lakh MT of legacy waste from more than a decade has accumulated in the city's dumping yard. This untreated mass is a major environmental concern significantly contributing to Greenhouse Gas (GHG) emissions, degrading land as well as the groundwater quality.** During 2015-16, the waste sector emitted 1,37,207 Mt of $CO_2$-eq, which was 12 per cent of the total GHG emissions by the city. GMC is also planning to undertake remediation of this legacy waste (50,000 MT on a pilot basis) accumulated at the Naidupet dumping yard through bio-mining. The approval/ permit for this project is awaited from the GoAP. Due to the large quantity of legacy waste and no progress on the waste remediation process, the city scored 'very low' with regard to treatment of legacy waste.

A regional waste-to-energy plant is currently under construction near the Naidupet dumping yard in Guntur. The 1,200-MT waste generated daily from Guntur and eight other ULBs will be used to generate 15 MW of electricity. GMC is scheduled to send more than 320 MT of waste every day to the plant for the project period of 25 years. The plant is scheduled to commence operation from 2021.

## ICT-based Monitoring System

GMC has established an ICT-based system in the city to monitor waste collection and transportation (C&T), garbage vulnerable points (GVPs) and

Image 4.11: Regional waste-to-energy plant (under construction) at the Naidupet area                Source: UN-Habitat

attendance of sanitation staff. The city scored 'excellent' with regard to its ICT-based systems. GMC has identified and recognized 230 informal waste pickers in the city. Identified through the National Urban Livelihood Mission (NULM), these waste pickers were then formally integrated and mainstreamed into the ULB's waste collection and processing activities. The city scored 'excellent' for integrating all identified, informal waste pickers into formal employment.

## 4.4.6   Transportation

There are 14 indicators to assess the status and health of public transport coverage, transport quality, safety, and investments made towards environmentally friendly transit infrastructure. Data for seven of these indicators were collected for Guntur. The city's overall performance in this sector was 'very low'.

## Public Transport Coverage

Guntur does not have a formal intra-city public transport system. Intercity passenger bus services operated by the APSRTC also serve as the intra-city bus service. Besides, buses run by private operators ply in the city. Most of the major roads are served by regional and private buses. However, **the city has a limited number of bus stops as only 42 per cent of the city's population live within 500 m. of a bus stop (see Map 4.14). The city scored 'very low' with regard to the proportion of its population with access to public transport.** As the city does not have formal public transportation system data is not available for indicators such as rate of increase in public transportation ridership, kilometres of road with public transit, percentage of public buses with accessibility for differently abled groups, workplace accessibility within 30 minutes of transit, etc.

Image 4.12: Lodge centre – one of the major traffic intersections in the city                    Source: UN-Habitat

## Major Transportation Modes in Guntur City

Private transport is the primary means of mobility in the city, followed by paratransit modes such as shared auto-rickshaws[21] (along major corridors) and auto-rickshaws. Motorcycles and auto-rickshaws constitute major portion of the vehicular population and number of trips in the city. These vehicles run on fossil fuels, significantly contributing to air pollution. **During 2015-16, 2,78,489 Mt of CO2-eq was emitted by the transportation sector, constituting 25 per cent of the city's total GHG emissions.[22]**

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[21] Shared auto-rickshaws are operated along a fixed route, and are shared by commuters.

[22] 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)
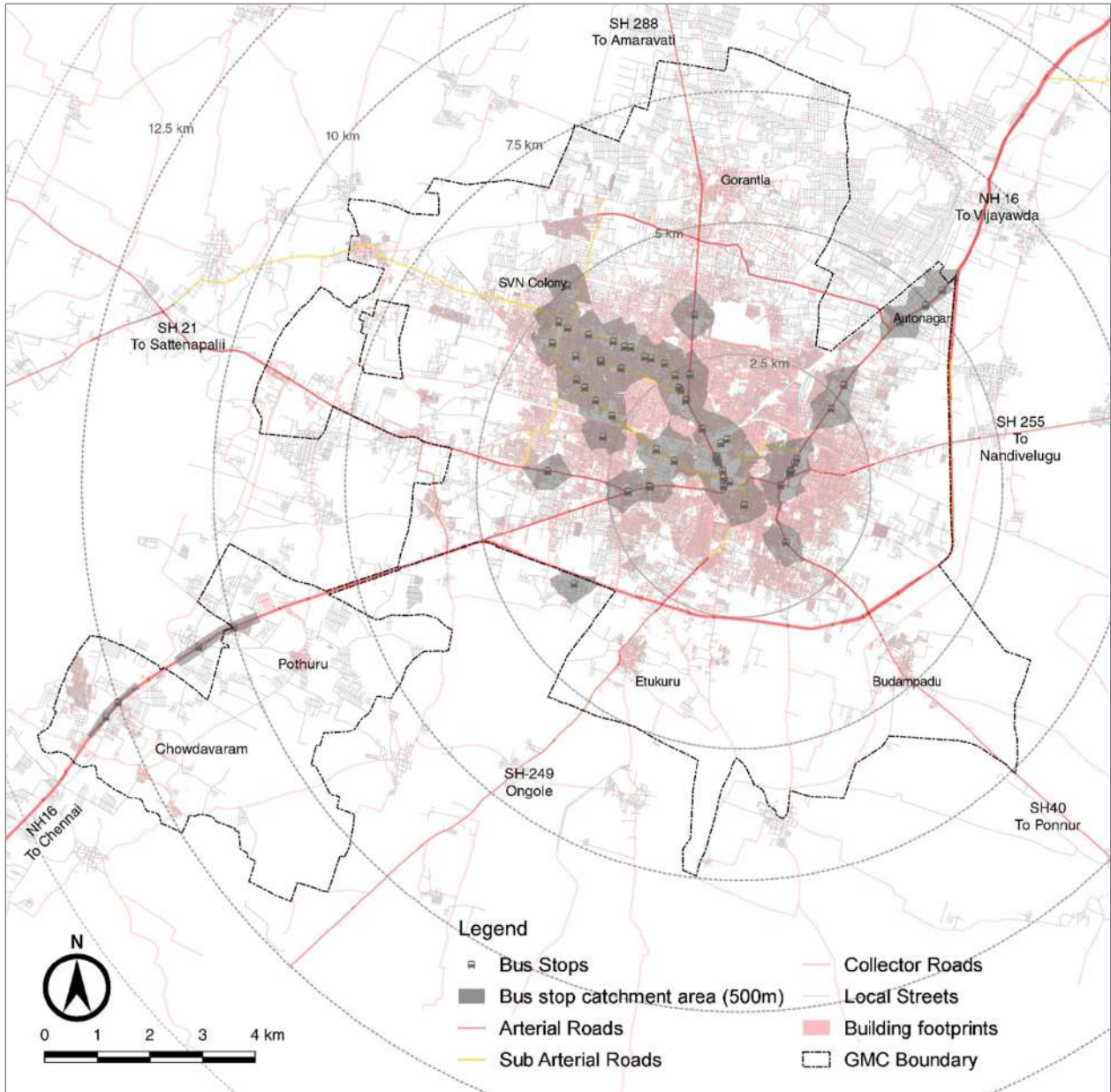
Map 4.14: Population catchment with access to bus stops within 500 m.          Source: GMC, Open Street Mapping (OSM); Map source: UN-Habitat

## Roads

Guntur has a total road length of 1,064 km. Of this, about 100 km comprises arterial and sub-arterial roads (major roads). These major stretches have a lane configuration ranging from undivided two-lane carriageways to divided six-lane ones. The city has a four-lane divided Inner Ring Road of 9 km. The percentage of the city's total area allocated to transportation is eight per cent, which is well below the norm (30 per cent) prescribed by the URDPFI guidelines. Thus, the city ranks 'very low' on this score. Guntur's road density is 8.34 km/ sq. km.

The 11-km railway track running through the city divides it into two sections, creating disruptions in traffic movement (see Map 4.15).



Image 4.13: Naaz Centre – one of the major traffic intersections in the city

Source: Guntur Coffee Table Book, GMC

## NMT Facilities

Only 13 per cent of major roads (9 km) in the city have 1.2 m. wide footpaths on either side, because of which the city scores 'very low' on this indicator. However, the city has footpaths on one side of the road along most of the Inner Ring Road, which are unutilized and lack maintenance. The carriageway and footpaths along major roads are encroached by street vendors and on-street parking activities. The city does not have any dedicated bicycle lanes.
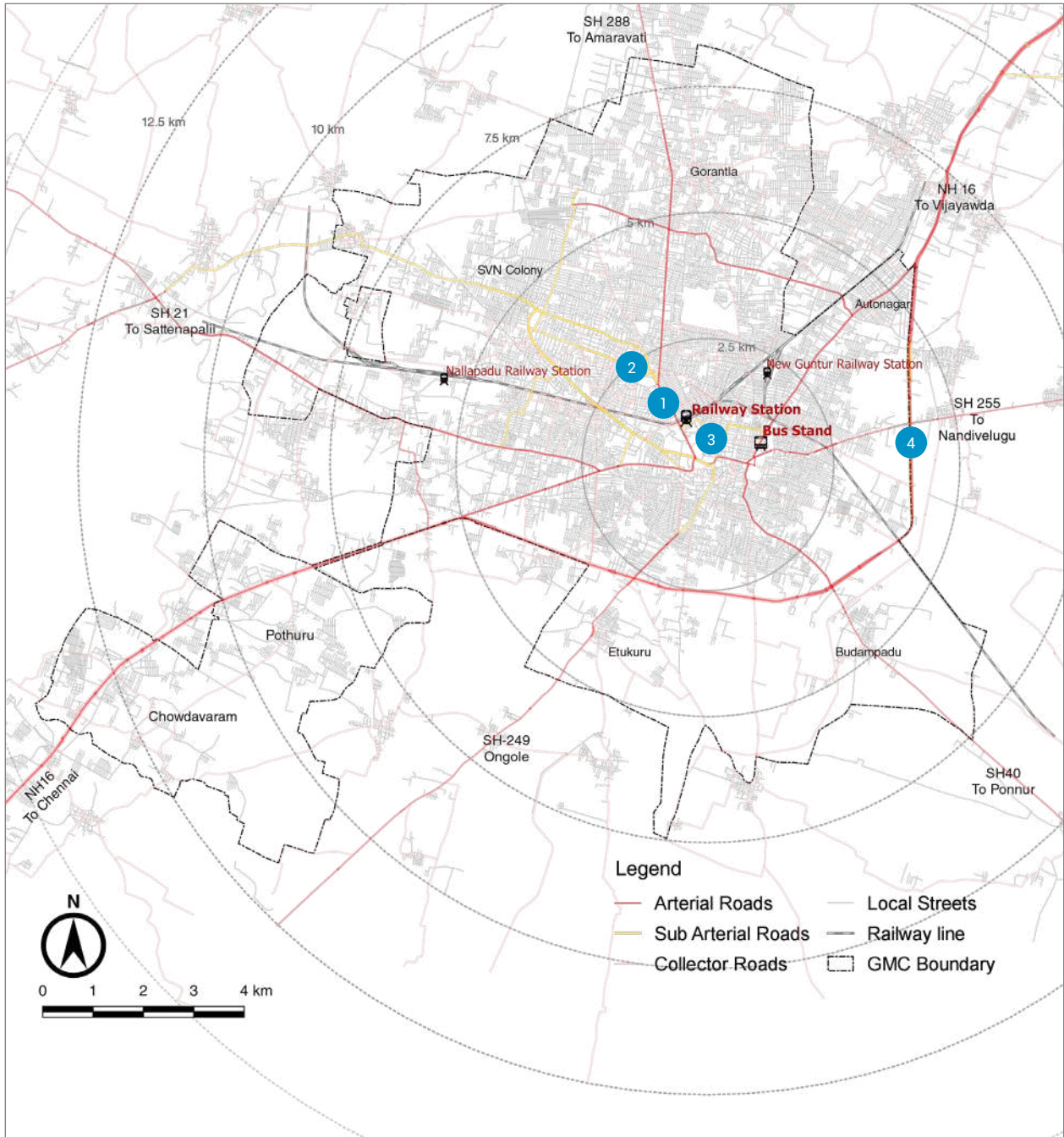
Map 4.15: Transportation network in the city

Source: GMC, Open Street Mapping (OSM); Map source: UN-Habitat



1. Rail Over Bridge near Shankarvilas Centre

2. Lakshmipuram Main Road

3. Road Intersection at Naaz Theatre

Image 4.14: View of NH 16 from Nandivelugu Road flyover[23]

Source: UN-Habitat

## 4.4.7 Social facilities and services

There are 11 indicators for assessing the status and health of a city's social infrastructure. Of these, two indicators are related to demography, five to health, one for ICT, and three for the status of education in the city. For Guntur city, data was collected for six indicators. The overall performance of the city in this sector was 'medium'.



## Demography

As per Census 2011, the percentage of the city's dependent population was 40 per cent. The change in decadal population growth rate in the city between 1991-2001 and 2001-2011 was 21 per cent.

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[23] Numbered '4' in Map 4.15.

# Healthcare

Guntur is a prominent medical hub in the state. Government General Hospital in Guntur is one of the largest and busiest multi-speciality government hospitals in the state. The city has other specialized government hospitals, such as maternal, fever and infectious diseases hospitals, as well as 13 Urban Primary Health Centres (UPHCs) for serving its population. In addition, the city has several private hospitals. **About 91 per cent of the city's population** **has access to a healthcare facility within 800 m. of their residence** (see Map 4.16). The city scores 'upper medium' with regard access to healthcare facilities. In 2020-21, the GoAP sanctioned 12 new UPHCs in the city, and called for tenders for their construction. Guntur also houses renowned medical institutions, such as Guntur Medical College and Government College of Nursing.

With regard to the prevalence of diseases, the number of reported cases of malaria and dengue in the city increased to 702 in 2019 from 374 in 2018, at a rate of 88 per cent. The city scored 'very low' on this indicator.

Data for indicators, such as under-five mortality rate per 1,000 births, bed density in public and private hospitals, and prevalence of waterborne diseases were not collected / available.
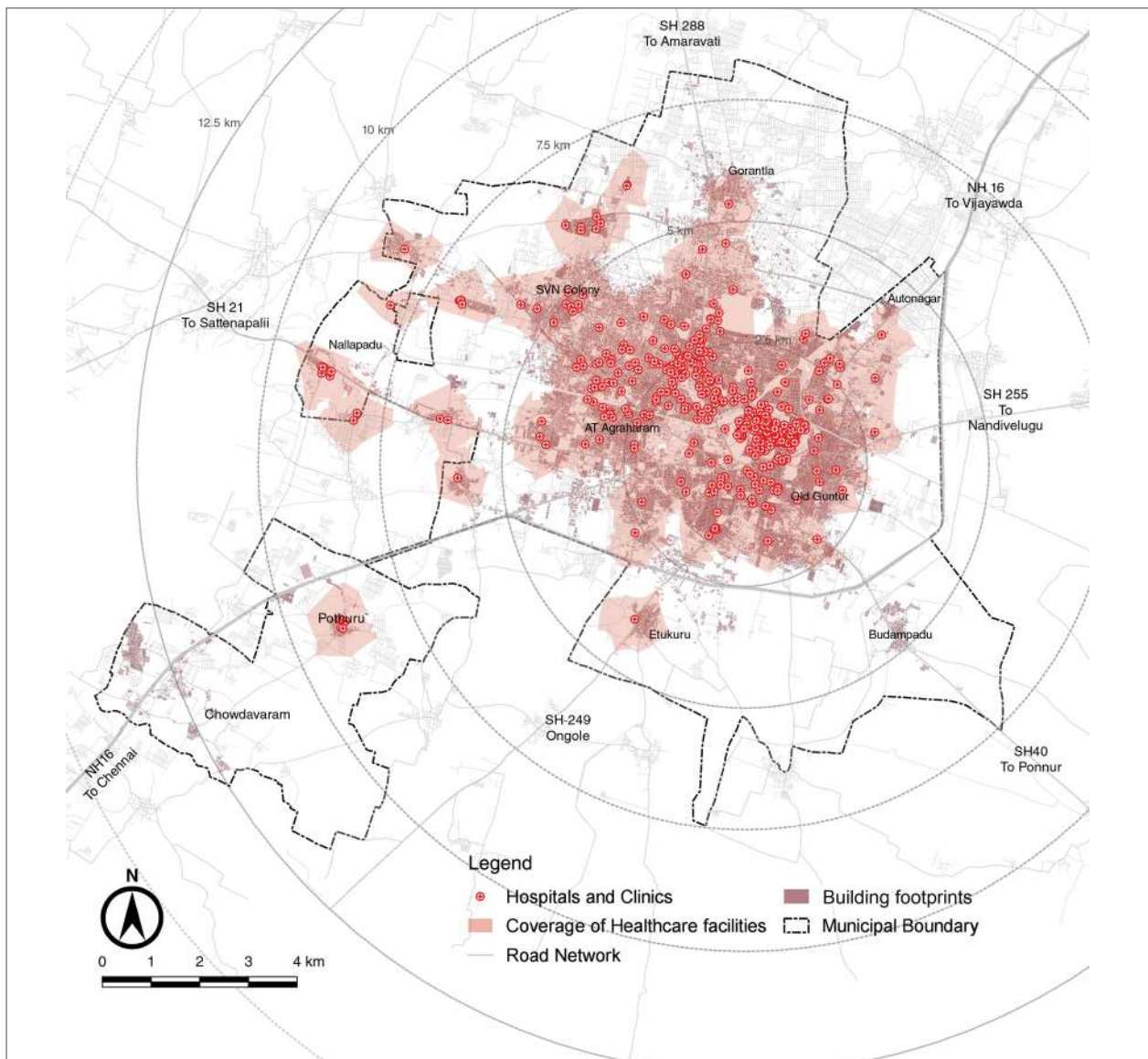


Map 4.16: Population catchment with access to healthcare facilities within 800 m.

Data source: GMC, OSM; Map source: UN-Habitat

Image 4.15: Guntur Government General Hospital – One of the multi-speciality public hospitals in Andhra Pradesh          Source: UN-Habitat

## Education

Guntur is one of the earliest education centres in the state. Andhra Christian College, established in 1885, was one of the first colleges in India to offer graduate programmes. The city has many private and government schools. As of 2020–2021, the city has 97 government schools, which include 77 primary schools, nine upper-primary, and 11 high schools. **About 91 per cent of the city's population has access to either a primary or a secondary school within 800 m. of their residences** (see Map 4.17). The city scores 'upper medium' on its access to educational facilities.

As per Census 2011, the female literacy rate in the city was 75 per cent compared to the male literacy rate of 85 per cent. Female literacy in the city was less than the average national female literacy rate for urban areas (79 per cent) for the same period. The city, hence, scores a 'medium' on this count.

Map 4.17: Population catchment with access to schools within 800 m.                    Data source: GMC, OSM; Map source: UN-Habitat

Image 4.16: Andhra Christian College – Guntur

Data for the indicator percentage of government and private schools with access to digital education was not available for Guntur city, and neither was data for the ICT indicator for percentage of mobile networks with 3G and 4G technology subscriptions.

## 4.4.8 Environment and ecology

There are 18 indicators to assess a city's clean air action plan, and whether it is equipped to measure major pollutants and monitor emission data for this specific sector. Data was collected for 14 indicators in this case. The overall performance of the city was 'upper medium'.

### Clean Air Action Plan

In 2019, Guntur was identified as one of the non-attainment cities[24] in India, with respect to the respirable suspended particulate matter (PM10) in its air. Guntur exceeded the annual average

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[24] The Central Pollution Control Board (CPCB) has identified 122 towns and cities in India as non-attainment cities for not meeting the National Ambient Air Quality Standards (NAAQ) between 2014-2018.

PM10 standard of 60 ug/m³ by four times between 2014 and 2017, with the maximum annual average value reaching 100 ug/m³ in 2015. The other parameters of ambient air quality, i.e., Particulate Matter 2.5 (PM2.5), Sulphur Dioxide (SO$_2$), Oxides of Nitrogen (NO$_x$) and Ammonia (NH$_3$), recorded relatively less values than their respective annual average standards. An action plan for clean air was prepared by the Andhra Pradesh Pollution Control Board (APPBC) for the city. Road dust, vehicular emissions and construction activities were identified as major causes of air pollution in the city, particularly PM10. Consequently, the city scored a 'medium' on this count, because of its Clean Air Action Plan and its capacity to clearly identify the source of pollutants in its ambient air.

## Measuring GHG Emissions

**APPCB, GMC currently does not have systems in place to measure GHG and CO2 emissions. The city scores 'very low' with regard to the existence of a GHG emissions measurement and monitoring system.**

## Air Quality

The APPCB Guntur regional office monitors air, noise, water quality in the city. **The annual average Air Quality Index (AQI) of Guntur in 2019 was 32, falling within the Good (0−50) AQI category** range denoting 'minimal health impact'. **The city scored 'excellent' for its annual mean AQI.** The annual average levels of various other air pollutants recorded in the city, such as PM10, PM2.5, NO2 and SO2 along with their categorization are shown in Table 4.2. Based on USAF parameters, **the city scored 'medium' for PM10 and PM2.5 and 'excellent' for NO$_2$ and SO$_2$ levels.**

## Noise Pollution

The region office of APPCB Guntur also measures and monitors noise pollution levels in the city, thus earning the city an 'excellent' score for measuring and monitoring noise pollution.

Data for biochemical oxygen demand in the city's surface water bodies was not collected/ available.

**Table 4.2:** Annual mean levels of various air pollutants and their categorization, 2019

| Parameter | Annual mean in Guntur 2019 (µg/m3) | AQI Category (Range) |
|---|---|---|
| AQI | 32 | Good (0−50) |
| PM10 | 50.2 | Good (0-50) |
| PM 2.5 | 23.2 | Good (0-50) |
| NO2 | 18.5 | Good (0-50) |
| SO2 | 4.6 | Good (0-50) |

Source: APPCB − Guntur Region (2019); CPCB (AQI Category − Range)

## Tree Cover

Data for the city's tree cover is not available with GMC. According to the Andhra Pradesh Space Application Centre (APSAC), the total green cover in the erstwhile city area during May 2017 was 10.03 sq. km., thus constituting 22 per cent of Guntur's former city limits. As most of the newly added areas are under agriculture, the extent of green cover in the city is possibly more than 35 per cent.

## Incentives for Green Buildings

Andhra Pradesh Building Rules, 2017, has made provisions for promoting green buildings across all ULBs in the state. Financial incentives are provided for Green Building plans that have been rated by the Indian Green Building Council (IGBC), LEED India, The Energy and Resources Institute (TERI) or Green Rating for Integrated Habitat Assessment (GRIHA). The financial incentives include 20 per cent reduction on building permit fees, one-time reduction of 20 per cent on duty on transfer of property (surcharge on stamp duty) in case the property is sold within three years of construction, and incentives towards development charges. All Green Buildings with plot sizes above 300 sq. m. are required to comply with green norms, such as solar energy utilization, energy efficiency (lighting of common areas by solar energy/ LED devices), water conservation and management, waste management provisions, etc. Guntur city scored 'medium' for providing financial incentives for promoting green buildings.

## 4.4.9 Clean energy

There are eight indicators for assessing a city's current energy demand, access to renewable energy, energy efficiency, and accessibility of households to natural gas for cooking. For Guntur, data was collected for three of these indicators. The city's overall performance in this sector was 'upper medium'.

## Renewable Energy

**The stationary energy sector/ energy use emitted 6,98,649 Mt $CO_2$-eq, accounting for 62 per cent of the total GHG emissions in the city during 2015-16. The city's main source of energy supply is fossil fuels.** The percentage of total electrical energy in the city derived from renewable sources was less than one per cent (exact data was not available/ collected). Through its building byelaws, GMC has been promoting solar energy utilization by installing solar water heating systems and solar lighting for buildings with plot areas of more than 300 sq. m. The Guntur district office of New & Renewable Energy Development Corporation of Andhra Pradesh Ltd. (NREDCAP) provides technical assistance to GMC, other government, and private institutions in the city in installing, operating and maintaining renewable energy projects. GMC has installed solar rooftop panels on its main office building on Grand Trunk Road. Solar lights were installed in all new parks in the city. Energy audit of water pumps and replacement of inefficient pumps were also undertaken. GMC is considering a proposal for the installation of floating solar panels on one of the ponds in the city.

**Discharge of the city's sewage into the Peekalavaagu and Suddapallidonka drains, the absence of slaughterhouses, rise in the number of motor vehicles, and accumulated legacy waste at the Naidupet dumping yard are all key environmental concerns for the city.**

## Energy Compliance Building Codes

Through the Andhra Pradesh Building Rules, 2017, GMC has been promoting Energy Compliance Building Codes. All buildings with plot sizes above 300 sq. m. have provisions to comply with green norms, such as solar energy utilization, energy efficiency, water conservation and management, and waste management provisions. Compliance with the norms suggested by the Energy Compliance Building Codes of the Andhra Pradesh Building Rules, 2017, is mandatory for receiving building approvals for commercial and non-residential buildings with a plot area of 1,000 sq. m. or built-up area of 2,000 sq. m. The city scored 'excellent' for promoting eco-friendly techniques and/or the use of local/ renewable materials through building rules / codes.

## Energy Efficient Street Lighting

GMC has signed an agreement with M/S Energy Efficiency Services Limited (EESL) to replace conventional streetlights in the city with LED streetlights. Till the end of 2020, about 28,861 LED streetlights of five different wattages were installed, thus constituting 94 per cent of the existing streetlights in the city. The LED streetlights will significantly contribute towards GMC's energy cost savings and benefit the environment.

As per Census 2011, about 77 per cent of city households use liquefied petroleum gas (LPG)/ piped natural gas (PNG) for cooking. The city scored 'lower medium' on this indicator. The data for recent years was not available for this indicator.

Data for indicators such as energy use per capita (kWh), percentage of households with an authorized connection to electrical energy, and system average

interruption frequency index was not collected/ available.

## 4.4.10 Disaster risk management

There are six indicators to help assess a city's preparedness for handling natural disasters (floods, earthquakes, cyclones, etc.) and manmade disasters (such as fires). Data for five of these indicators was collected. The city's overall performance in this sector was 'low medium'.

Guntur is moderately vulnerable to cyclones and pluvial floods, but it is vulnerable to heatwaves, with maximum temperatures of approximately 45°C between March and May. **A Guntur City Disaster Management Plan was prepared in 2017 in line with state and district plans. The plan defines the role of the GMC and relevant agencies during different stages of managing a disaster. The city scored 'excellent' due to a city disaster management plan that was prepared/ updated in the last five years. However, the plan does not have hazard vulnerability maps/ risk maps for the main hazards threatening the city.** Moreover, these maps were not prepared for city level disaster management, as part of other studies/ projects. The city, therefore, scored 'very low' for the non-existence of hazard vulnerability maps/ risk maps.

The Guntur District Collectorate has a command control centre linked to hazard early warning systems. The collectorate office communicates information to the GMC in case an early warning is triggered. During such a warning or pandemic situation, the District Collector declares an emergency, upon which the GMC has to establish a City Emergency Operation Centre with the Commissioner, with itself as the Incident Commander. A similar setup was made functional during the COVID-19 pandemic situation in 2020. The city scored 'medium' on this aspect as it has access to information from a hazard early warning system, but no direct linkage with the city command control system.

As the city rarely experiences urban floods/ water stagnation, it does not have any flood risk assessment and management plan. As a result, the city scored 'very low' for not conducting a/n urban flood/ water stagnation risk assessment/ plan in the last five years.

**75%**
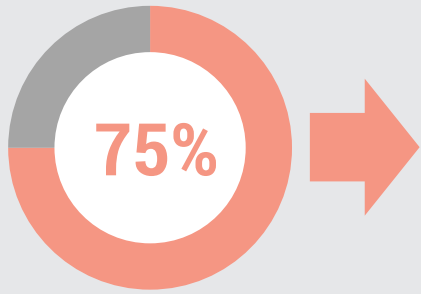
Guntur has two fire stations. About 75 per cent of the buildings in the city are within a 4-km distance of both, as shown in the Map 4.18. The buildings in newly added neighbourhoods are located beyond a 4-km radius.
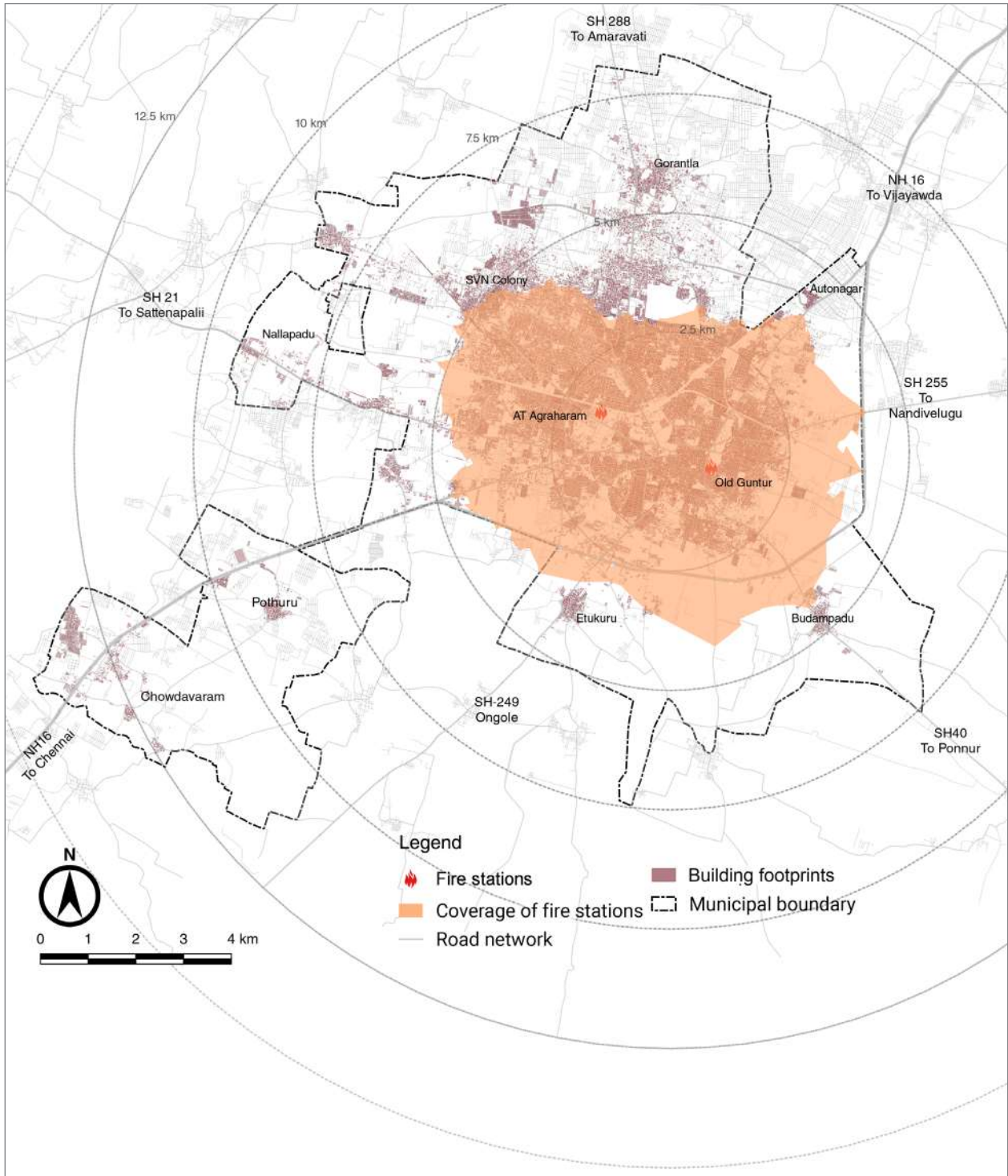


Map 4.18: Building catchment area of fire service facilities (4-km radius)                Data source: GMC; Map source: UN-Habitat

# 4.4.11 Governance and data management

There are 14 indicators to analyse the extent to which ULBs are effectively directing the planning and management of cities. Data for 13 indicators was collected for Guntur. The overall performance of the city in this sector was 'medium'.

GMC performs activities in line with the 74th Constitutional Amendment Act (CAA) and Andhra Pradesh State Municipal Corporations Act, 1994. GMC has been performing 17 out of these 18 functions stipulated in the Twelfth Schedule (Article 243W) of the Indian constitution. The function related to providing fire services in the city is undertaken by the State Disaster Response and Fire Services Department.

**In 2019, the GoAP initiated a ward secretariat system in Guntur as a step towards decentralized governance. For monitoring and implementing town planning related activities at the grassroots levels, a 'Ward Planning and Regulation Secretary' was appointed for each of the secretariat units in the city.** As of 2020, there were three town planning staff in the city for every 14,000 people, which was higher than the URDPFI recommendation. The city scored 'excellent' for the number of planners per capita.

GMC has been effectively implementing many local-level reforms, initiatives recommended by AMRUT, and central and state finance commissions in the areas of e-governance, devolution of funds, double-entry accounting, municipal tax improvement, energy and water management, the Swachh Bharat Mission, building byelaws, urban planning and city-level plans. In a few aspects of the above reform areas, the city has been facing challenges, such as scientific disposal of waste, credit rating, and increasing green cover to 15 per cent. Though the GIS base map of the city was prepared in 2019, the ZDP was not prepared with GIS mapping and, thus, the city scored 'very low' due to the absence of a GIS base Master Plan.

**The current development plan of Guntur was approved in 2006 for the horizon year 2021. During that period, no interim review or updation of the ZDP was undertaken, commensurate with the city's spatial growth and infrastructure requirements.** Therefore, the city scored 'very low'

with regard to review/ updation of a Master Plan. Preparation of a city Master Plan for the horizon year 2035 is underway. The existing Guntur ZDP and development control regulations are accessible to the public through the AMRDA website, thus earning the city an 'excellent' score for the initiative.

The city scored 'excellent' with regard to implementing various e-governance initiatives by the ULB, such as the availability of a ULB website, and online public service delivery and grievance redressal through both website and mobile application.

Although the GMC had established a command-and-control system in 2020, no municipal services were monitored through the system as of December 2020. Therefore, the city scored 'very low' for the number of municipal services managed through its command-and-control system.

GMC has citizen charter and appeal mechanisms in place, wherein the public can avail services, and make offline and online appeals, thus scoring 'excellent' on this parameter.

GMC does not have an open data portal and city data officer, thus scoring 'very low' in both these indicators. Details of total staff trained in various ULB functionary domains during 2019–2020 was not available either.

GMC also constituted various committees, such as the Municipal Committee/ Council, Ward Committee, Town Vending Committee and Project Coordination Committees in line with the recommendations of the 74th CAA, Street Vending Act, 2014. The District Planning Committee was constituted at the district level, in line with the recommendations of the 74th CAA.

Municipal elections in the city were conducted in March 2021 and a municipal council, standing committee and ward committees were formed with elected representatives headed by the Mayor. The proportion of women councillors in the municipal council was 44 per cent, earning the city an 'upper medium' score with regard to percentage of women councillors in the municipal council.

In the last three years, the city has not prepared any environmental status reports with action plans, thus earning a 'very low' score on this count.

# 4.4.12 Finance and economy

Out of the total 19 indicators in this sector, 13 are used for assessing the status of municipal finance in a city and the rest for analysing the performance of the city across various economic factors. Data for 12 indicators was collected. The city's overall performance in this sector was 'medium'.

## Financial Performance

The total annual revenue of GMC has been increasing over the last five financial years. The total annual revenue of GMC increased to INR 32,973.27 lakh in 2018-19 from INR 26,469.68 lakh in 2014-15 (see Figure 4.8). GMC's total annual expenditure also increased significantly over the years. Its total annual expenditure was INR 22,892.53 lakh in 2014-15 and INR 37,430.38 lakh in 2018-19, indicating that its expenditure needs were also growing in proportion to its revenue base. GMC recorded a deficit budget in 2018-19 (see Figure 4.8), thus earning it a 'very low' score on this parameter. Less contributions (20 per cent of total annual revenue) from state and central government grants is one of the reasons for its deficit budget in 2018-19.

**Figure 4.8:** Revenue and expenditure of GMC during five financial years (2014-15 to 2018-19)
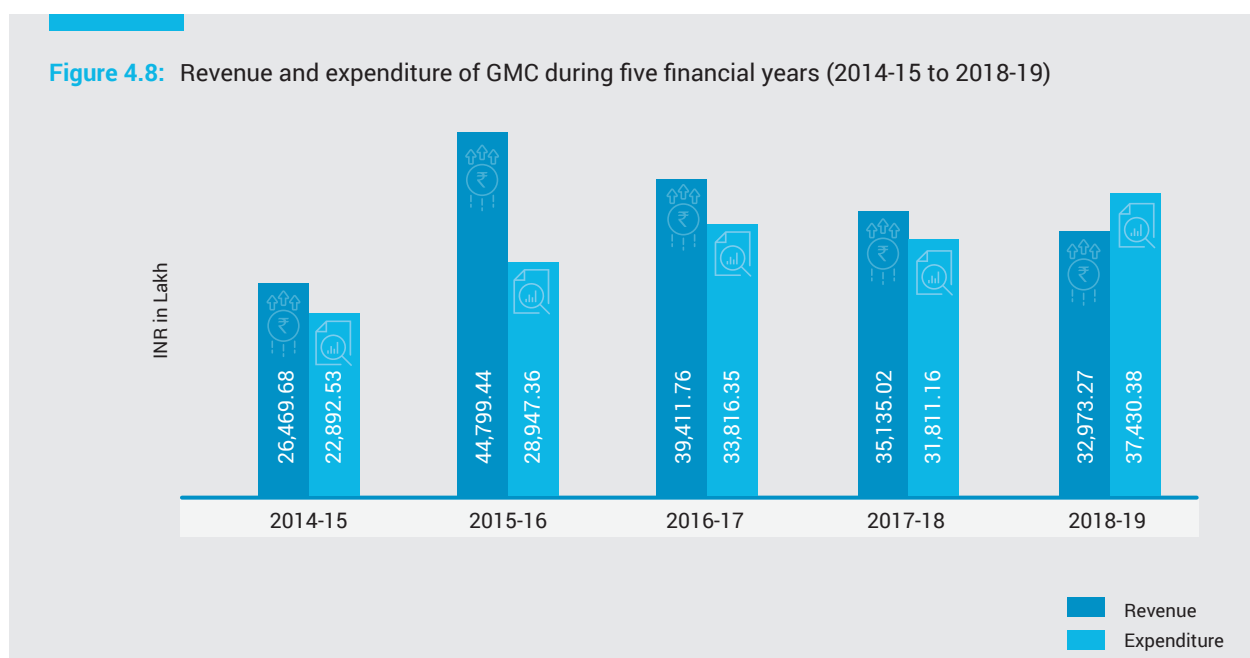


Source: GMC Municipal Budgets (2016-17 to 2020-21)

## Own Source Revenue

The average contribution from GMC's own source revenues (tax and non-tax) to its total revenues in the last five financial years was 50 per cent (see Figure 4.9). The city, therefore, scores 'excellent' with respect to its financial dependency on its own revenue earning sources.

**Figure 4.9:** Share of own source revenue to total revenue of GMC in five financial years
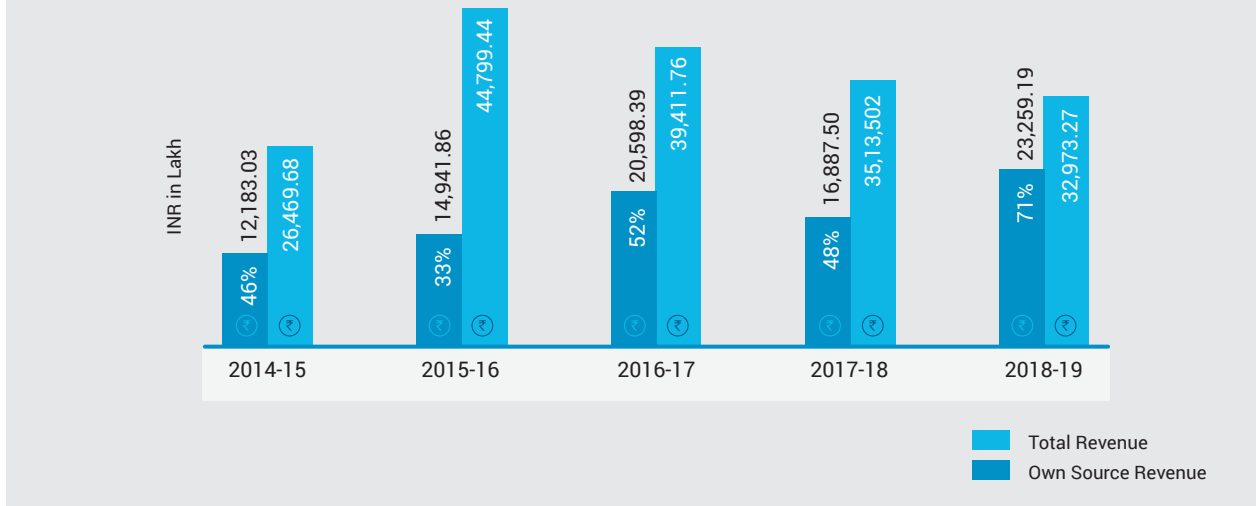
Source: GMC Municipal Budgets (2016-17 to 2020-21)

## Property Tax Collection Efficiency

Over the last five financial years, collection of property tax has been the main driver of GMC's revenues, followed by water and drainage user charges, building licence fee, penalization charges and hoarding fees.

**71%**

In 2020-21, GMC collected property tax worth INR 8,087 lakh (71 per cent) against total billed property tax of INR 113.65 lakh in the same fiscal year. Its property tax collection efficiency in 2019-20 was only 57 per cent, thus earning it a 'medium' score on this financial efficiency parameter.
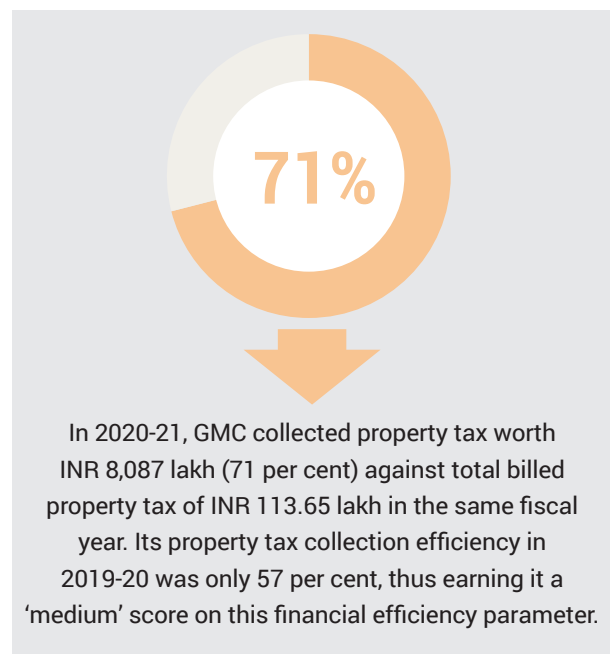
## Financial Dependency

The total grant amount received by GMC from state and central governments under various schemes in 2018-19 constituted only 20 per cent of its total revenue. The city scored 'excellent' for its low financial dependency on grants.

## Cost Recovery of Services

In 2018-19, the total operating revenues of GMC towards water supply services, sewerage, and solid waste management services with respect to their total operating expenses was 59 per cent, 57 per cent and six per cent, respectively, as

shown in Figure 4.10. The city earned an 'upper medium' for cost recovery in water supply and

sewerage services, and 'very low' for solid waste management.

**Figure 4.10:** GMC's cost recovery in water supply, wastewater and SWM services during 2018-19



Cost Recovery in services (%)

Water Supply — 59%
Sewarage — 57%
Solid Waste Management — 6%
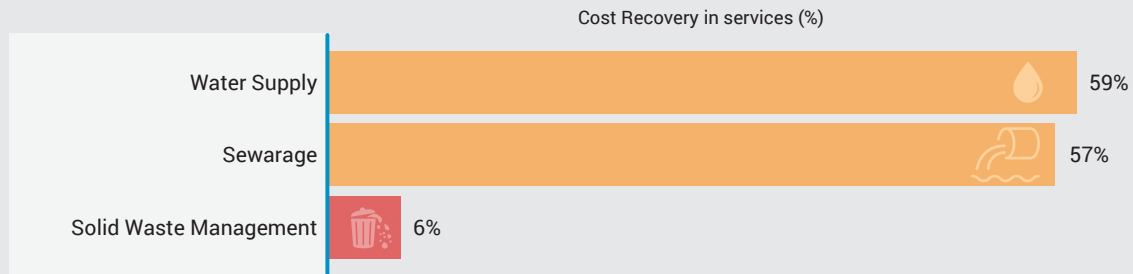
Source: SLB 2018-19, GMC

## Credit Rating

**GMC does not have a credit rating. Hence, the city scores 'very low' due to the absence of such rating, which is also one of the financial reforms that ULBs need to comply with, as per the AMRUT mission**. GMC is planning to procure the services of a credit rating agency in the financial year 2021-22.

## Economy

Like many cities in India, Guntur does not have a system for measuring its Gross Domestic Product (GDP). However, the Directorate of Economics and Statistics, Department of Planning (DoP), GoAP, had measured the Gross Value Added (GVA) for Guntur Mandal from 2014-15 to 2017-18. Key inferences of Guntur Mandal's domestic product in 2017-18 are listed under the socio-economic section of Chapter 2 in this report.

Data for indicators such as unemployment rate for people aged 15 years and above, Inequality Index based on consumption expenditure (Gini coefficient), percentage of workforce employed in the service sector, informal employment as percentage of total employment, GDP density as a percentage of the built-up area of the local government, etc., is not available.

# 05

# Strategic Diagnosis

## 5.1 IDENTIFICATION OF KEY STRATEGIC ISSUES

Through the application of the USAF, subsequent in-depth analysis of the results, secondary information collection and stakeholder consultation, a few patterns, development trajectories and trends were identified. As illustrated in Section 4.2 earlier, strengths were observed in strong city governance and management, which effectively maintained a clean and noise-free environment, conducted waste segregation and complete door-to-door collection, supporting Guntur to achieve its higher goal of becoming a sustainable and resilient city. There are also areas where Guntur needs significant improvement. These include improvements in sanitation and sewerage infrastructure, which has

a direct impact on underground pollution as well as of surface water bodies. In addition, the city needs to focus more attention on its disaster risk management tools and their application.

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

1. Inadequate public open spaces and conservation of water bodies
2. Sprawling and scattered development patterns
3. Poor / no organized public transportation in the city
4. Multiple deprivations in informal settlements

## 5.2 IN-DEPTH ANALYSIS OF KEY STRATEGIC ISSUES

### 5.2.1 Strategic issue 1: Inadequate public open spaces and conservation of water bodies

Inadequate public open spaces emerged as the foremost issue based on findings of the urban sectoral assessment[25] and consultations with GMC officials. The city scored 'very low' in three indicators for the Urban Form Public Space and Safety sector that measured the accessibility and service level of public open spaces[26] in the city.

Guntur's cityscape is characterized by several water bodies in the form of ponds. They are an inherent part of the city's natural heritage, as well as its cultural and recreational ecosystem, with a few ponds developed as public spaces.

**45%**

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

(USAF UPS 1.4)

**0.92 sq.m.**

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

(USAF UPS 1.5)

**1%**

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

(USAF UPS 1.7)
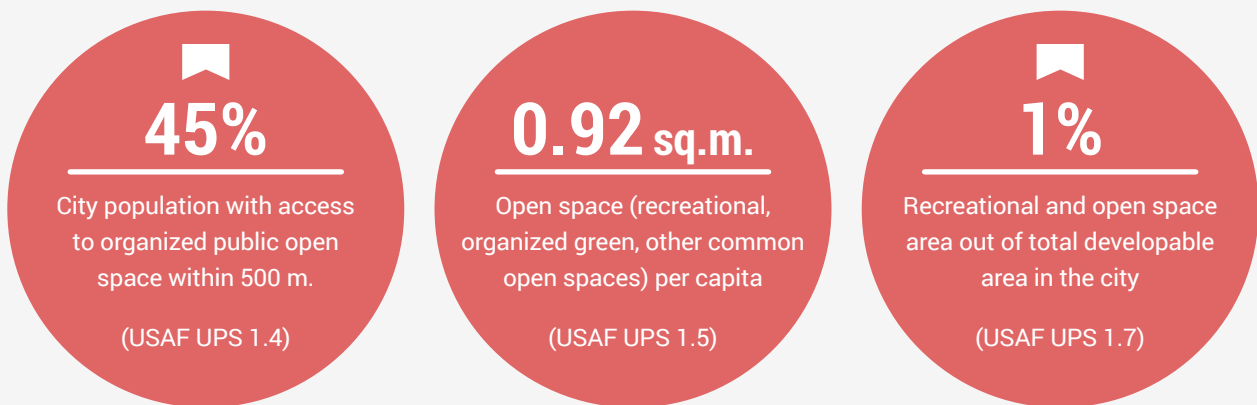
Public open spaces play a significant role in the reduction of GHGs, mitigation of the urban heat island effect, water conservation and overall public well-being and quality of life. The issue of 'inadequate public open spaces and conservation of water bodies' is interlinked to many other development and environment indicators across various USAF sectors, as shown in Figure 5.1 and Annexure 5.1.

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[25] The USAF was applied to 12 sectors integrated with spatial tools and USAF benchmarks/ thresholds were drawn on the synergies of other frameworks.

[26] 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 for formal structured sporting activities, such as team competitions, physical skill development and training); City-Wide Public Space Strategies: A Guidebook for City Leaders (2020), UN-Habitat.

**Figure 5.1:** Sectoral linkage of inadequate public open spaces & conservation of water bodies
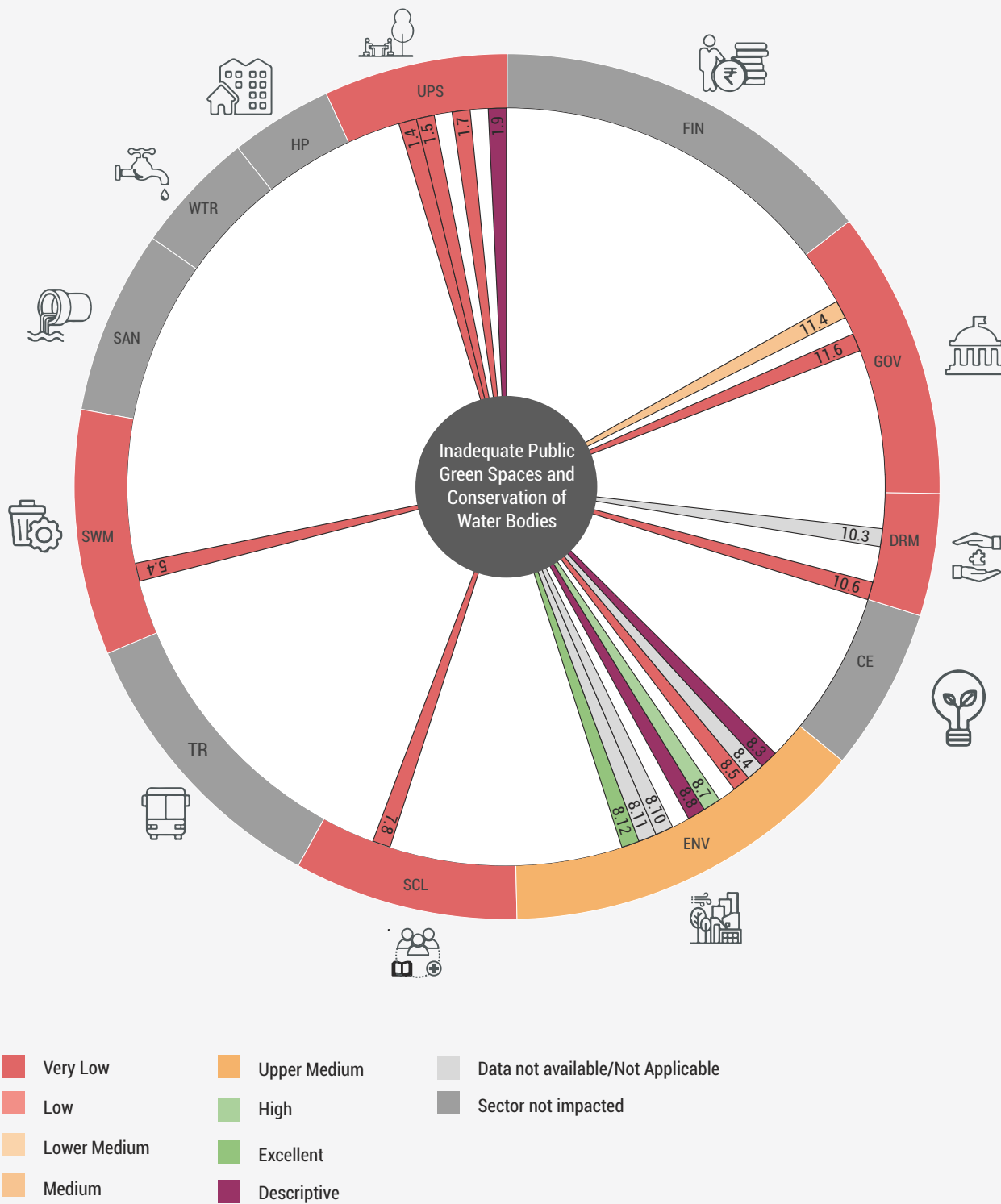


Source: UN-Habitat

## Inadequate Public Open Spaces

Development of parks and greenery in the city has been among the priority areas of GMC. Many new neighbourhood level parks were developed by GMC in the last decade through general funds, under programmes like AMRUT. However, these new parks and other open spaces have not been developed in proportion to the city's increasing population and its spatial extension. As of 2020, Guntur had about 25 parks, two stadiums, five water bodies with walking tracks and a playground / exhibition ground (see Map 5.1).

As discussed in Section 4.4.1 in greater detail, more than half of the city's population does not have access to any organized open space within 500 m. of their residences (see Map 5.1). Barring two parks, Manasasarovaram Park (22.25 Ha) and Gandhi Park (2.52 Ha), which constitute 85 per cent of the total area under parks, none of the other parks have an area suggested for a community park (1-5 Ha) or neighbourhood park (0.5-1 Ha) in accordance with URDPFI guidelines and AMRUT's Service Level Improvement Plan (SLIP) for green spaces and parks.[27]

With only 0.92 sq. m. of accessible open space per person (2019)[28] against a benchmark of 10-12 sq. m. per person, Guntur residents face severe shortage of open green spaces. In addition, the percentage of area allocated for recreational use in the proposed land use for Guntur Zone 2021 is 0.92 per cent. Even if this is fully implemented, it would still not meet the standard of 12-14 per cent (for large cities[29]) of developable area for recreational use as suggested by URDPFI guidelines. During the consultation with GMC Town Planning officials, it was learnt that the city lacked government owned vacant lands for developing new parks and other organized open spaces.

## Key Inferences

All the organized public open spaces in the city are in former municipal limits area

Two parks (Manasasarovaram Park and Gandhi Park) constitute 85% of the total area under parks in the city

Percentage of area proposed under recreational use in Guntur ZDP 2021 is only 0.92% of the total area

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[27] AMRUT's SLIP template for green spaces and parks recommend ULBs to analyse their area proportion categorized for parks into 5 segments as per URDPFI guidelines, such as housing area parks (less than 0.5 Ha), neighbourhood parks (0.5–1.0 Ha), community parks (1–5 Ha), district parks (5–25 Ha), and sub-city parks (25 Ha and above).

[28] Open space per person is calculated on the basis of the estimated population of 8.25 lakh in 2019

[29] URDPFI classifies a 'large city' as an urban settlement with a population range of 5–10 lakh, governed by a Municipal Corporation (UDPFRI Vol I, Pg. 4)
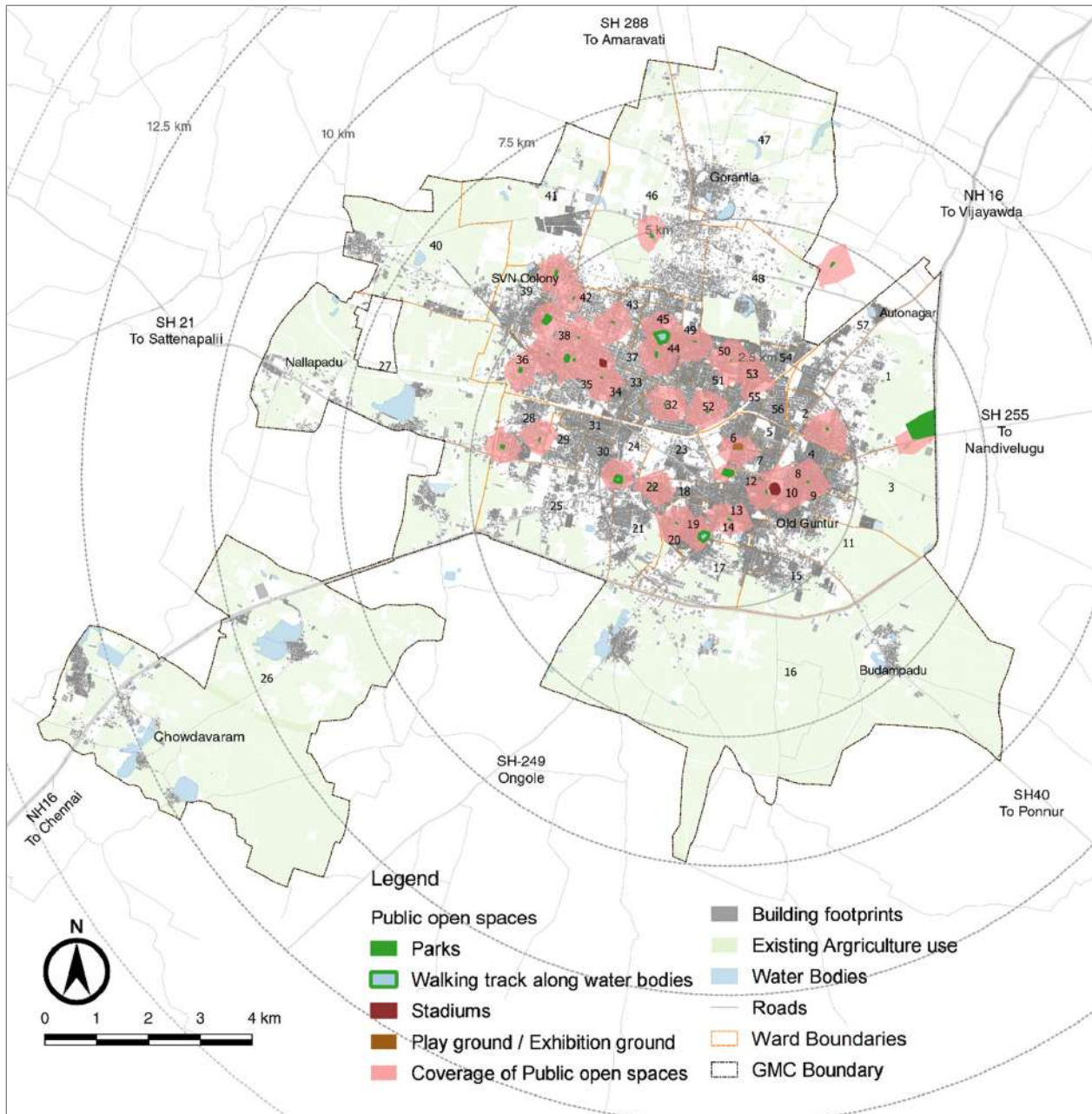
Map 5.1: Neighbourhoods in the city without organized open spaces

Source: UN-Habitat

# Lack of conservation of water bodies

Guntur has a large number of ponds, which were once used as sources of drinking water. These city ponds, although not officially recognized as 'heritage' sites, are important elements of the city's historical, natural, and cultural ecosystem. Over the last four decades, many ponds in the city, especially in the inner-city area, have deteriorated due to planned as well as unplanned urbanization (see Table 5.1). Prominent public facilities, such as the NTR Bus Stand and Kasu Brahmananda Reddy Stadium, were once water bodies. Over the years, many water bodies in the city have become silted and polluted, making the pond bed less functional for water recharge. The ponds have also become disconnected from their original inflow sources and now rainwater is their only water source.

**Table 5.1:** Details of activities undertaken in a few encroached water bodies in the city

| Name of the water body | Original extent (Ha) | Extent encroached (Ha) | Percentage of extent encroached | Details of activities undertaken in encroachment area |
|---|---|---|---|---|
| Nallacheruvu | 53.06 | 50.20 | 95% | Permanent housing structures – House site *pattas*[30] were issued by the Guntur Mandal's revenue office for most houses, while the remaining buildings are encroachments. |
| Red Tank (Nandivelugu Road) | 6.61 | 4.79 | 72% | Godowns, commercial market – civil supply godowns were constructed and a portion of the site was allocated for a wholesale market by the Mandal's revenue office. |
| Pichikalagunta | 6.66 | 6.66 | 100% | Permanent housing structures – Partly issued house site pattas by the Mandal's revenue office; others are unauthorized encroachments. |
| Koritepadu Pond | 8.06 | 3.17 | 39% | Permanent housing structures – House site *pattas* were issued by the Mandal's revenue office. |
| Tank in Nandivelugu Road | 15.81 | 11.67 | 74% | Public park and head water works – Manasasarovaram Park & Takkelapadu Head Water Works (water pumping station, water treatment plant) were developed. |

Source: GMC Town Planning Department



Image 5.1: A view of Nallacheruvu – one of the encroached water bodies in the city          Source: UN-Habitat

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[30] Site or land *patta*, also referred to as 'Record of Rights' is the legal document for land ownership which is registered and issued by the Tehsildar of the particular Revenue office / division. Patta establishes the ownership of a person over a particular piece of land.
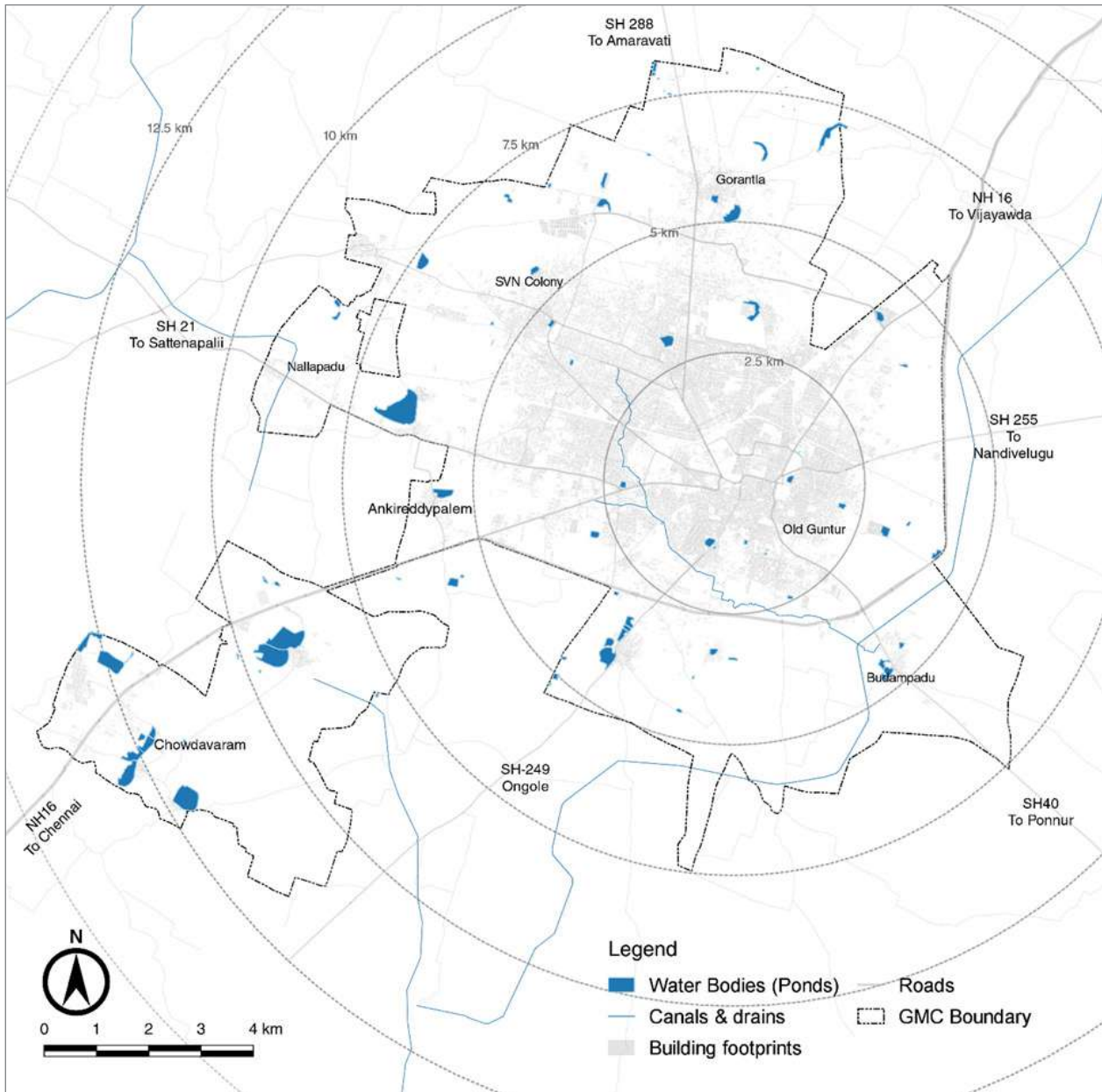
Map 5.2: Water bodies in Guntur

Data source: GMC; Map source: UN-Habitat

According to GMC (2020), the city has about 50 ponds (as per revenue records) admeasuring 418.65 Ha, constituting 3.3 per cent of the total city area. Of the total 50 ponds in the city, 41 ponds have been encroached by urbanization, translating to approximately 30 per cent of the area under water bodies. Water bodies in the inner-city area have faced more encroachments than those in peripheral areas (see Map 5.2).

As per Andhra Pradesh Building Rules 2017, no building/ development activity is allowed on the bed of the water bodies and at the Full Tank Level (FTL). A buffer zone of 30 m. from the FTL boundary of water bodies with an area of 10 Ha and above and a buffer zone of 9 m. from the FTL boundary of water bodies with area less than 10 Ha has to be maintained as a recreational/ green buffer zone and no building activity is allowed. The buffer zone may

be utilized (if proposed in the development plan) for roads with a minimum width of 12 m., and walking/cycle tracks (3.6 m.) within the 30 m. buffer strip, if feasible.

In the city, water body conservation buffer zones in the form of greenery, recreational areas and roads have been developed for some ponds. For many others, especially in peripheral areas, only bunds/embankments have been constructed.

## Key Inferences

Guntur has about 50 ponds, which are important elements of the city's historical, natural and cultural ecosystem.

Approximately 30 per cent of the area under water bodies (ponds) in the city has been encroached upon.

Almost all the ponds have become disconnected from their original inflow sources and now rainwater is their only water source.



Image 5.2: Gaddipadu Pond – an unprotected water body along the Mahatma Gandhi Inner Ring Road near the railway crossing

Source: UN-Habitat

1. Nallacheruvu (2004 & 2021)



2. Gujjanagundla Cheruvu (2004 & 2021)



3. Pond in Suddapallidonka (2004 & 2021)

Source: Google Earth

## 5.2.2  Strategic issue 2: Sprawling and scattered development patterns

Guntur is experiencing an undesirable urban development pattern resulting in low density habitation, increased travel time, high automobile dependency, loss of agricultural land and, consequently, higher GHG emissions. These concerns have been identified by examining growth patterns in Guntur during the last two decades through spatial analysis, review of documents, such as the ZDP 2021 and Clean Air Action Plan (2018), and consultations with GMC and AMRDA. The application of urban sectoral assessment has highlighted various interlinked factors/ development sectors (see Figure 5.2 and Annexure 5.2). Addressing urban sprawl is timely and of paramount importance, considering the ZDP is due in 2021 and the revised development plan is currently under preparation.

**Figure 5.2:**  Sectoral linkage of spawling and scattered development patterns



Legend:
- Very Low
- Low
- Lower Medium
- Medium
- Upper Medium
- High
- Excellent
- Descriptive
- Data not available/Not Applicable
- Sector not impacted

# Sprawl Development

As discussed in Section 4.2.1 in greater detail, between 2000 and 2018, the built-up area in the city increased from 29.30 sq. km. to 46.48 sq. km. (see Figure 5.3), while the population increased from 5.10 lakh to 8.15 lakh. The city witnessed rapid increase in built-up area after 2014.

Year 2000
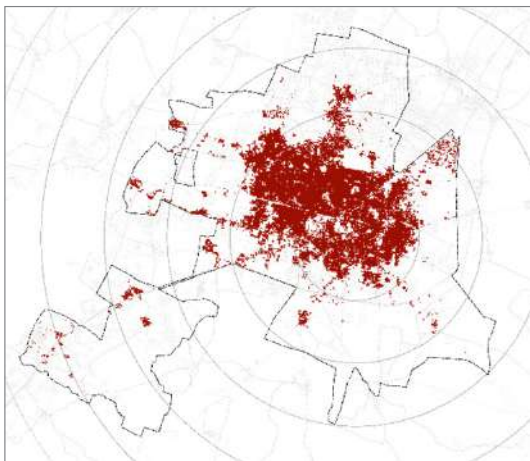
Year 2018
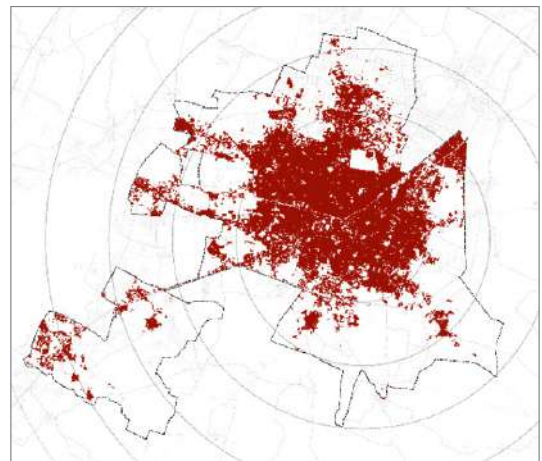


Figure 5.3: Built-up area of the city in 2000 and 2018

Source: UN-Habitat

**0% change in per capita built- up area in the city between 2000 and 2018 (USAF UPS 1.2)**

More than three-fourths of the city's built-up area lies within a 5-km radius of the city centre, with scope for further densification (see Map 5.3). Factors, such as expansion of municipal limits in 2012, formation of Andhra Pradesh as a separate state in 2014 and declaration of Amaravati as the new state capital in 2015, have significantly contributed to rapid increase of built-up area in the city. Urban growth has taken place primarily in the northern part of the city, away from the city core, in a scattered manner. Large scale construction of high-rise buildings by private developers have come up in areas with predominantly agricultural land, which lack adequate civic service infrastructure, such as water supply, sewerage network, public transport, organized parks, and open spaces to accommodate the rapid growth. However, factors such as road connectivity and lack of industrial activity have attracted the development. Further, growth has taken place along all the major road corridors forming a ribbon development pattern (see Map 5.3). The South-East part of the city has experienced lesser growth due to constraints such as a low-lying topography, the presence of an elevated national highway.

# Key Inferences

Scattered growth characterized by low density residential development towards the peripheral areas.

Sprawling growth along the road corridors (ribbon development) significantly happening along the corridors in North, North-East and West.

Congested core - A few areas in the city core has population density of more than 300 PPH.



Image 5.3: View of an undeveloped area in the northern suburbs of the city with high-rise buildings in the background along the JKC College Road

Source: UN-Habitat
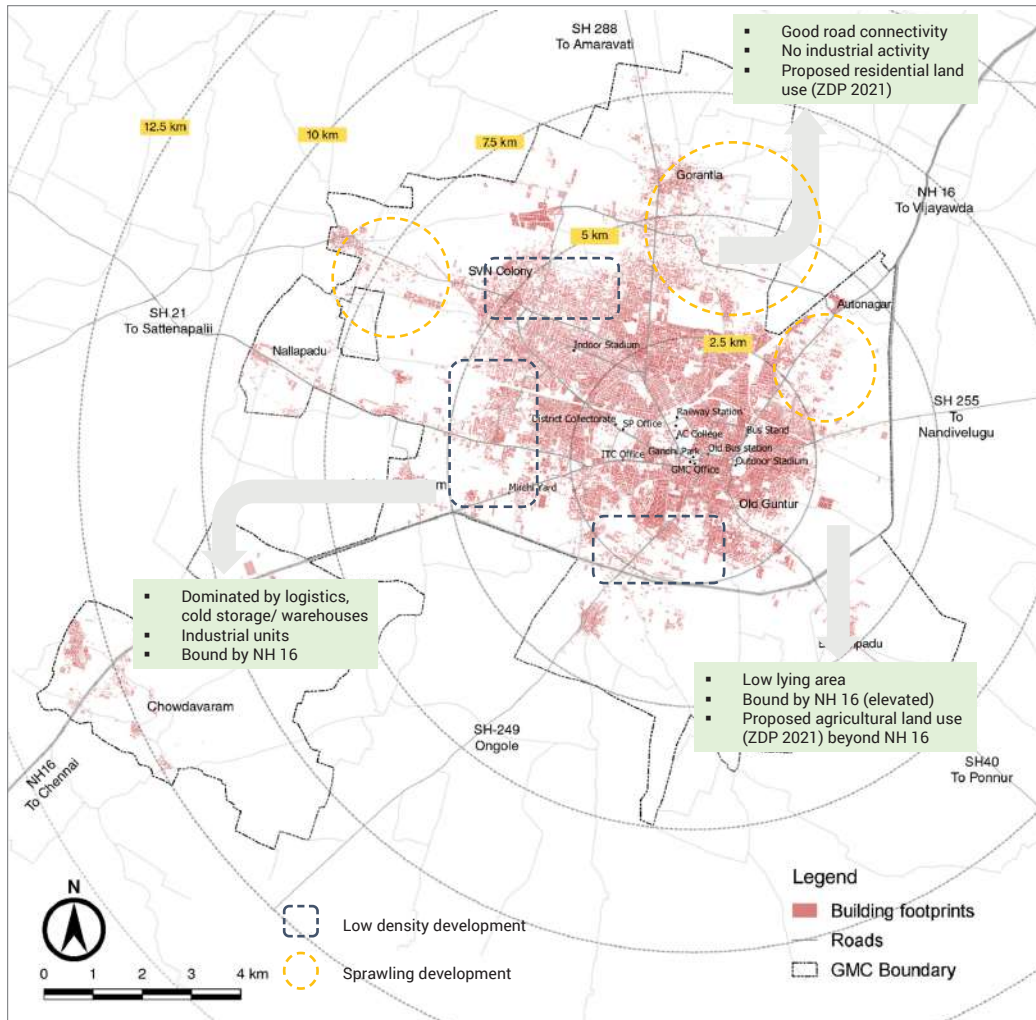
Map 5.3: A few localities experiencing sprawling and scattered development in the city          Source: UN-Habitat

The sprawling and scattered development in Guntur city's peripheral areas has significantly increased the serviceable area of GMC. This has, in turn, increased the capital investment on provisions for new infrastructure services and rise in operation and maintenance costs, thus impacting the municipal budget.
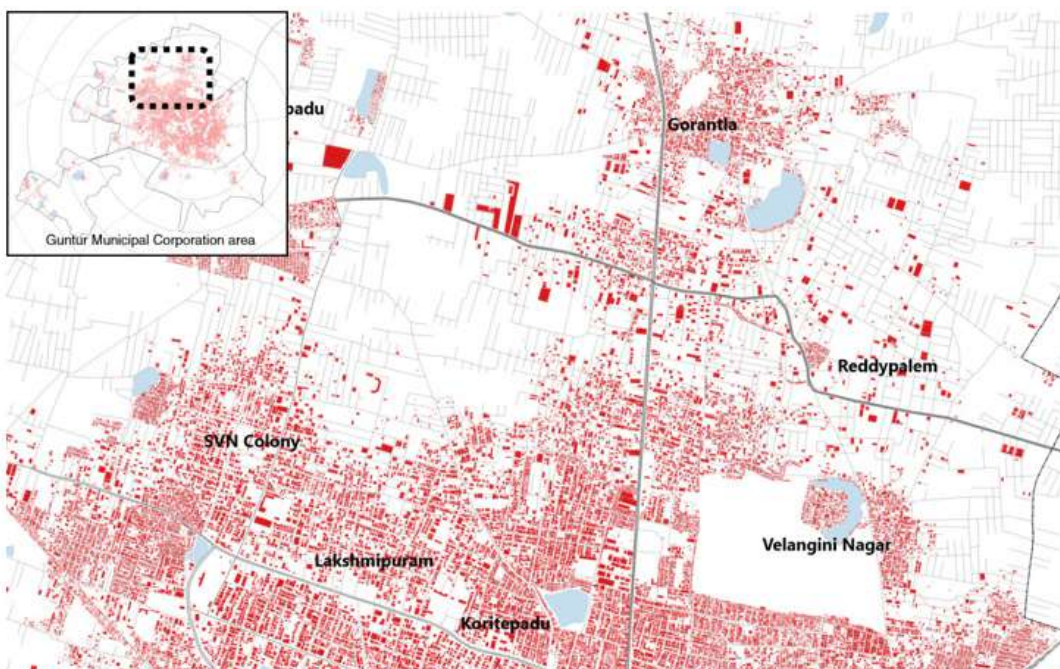


Figure 5.4: Scattered development in northern part of Guntur city          Source: UN-Habitat

# Urban Morphology Analysis

An urban morphology analysis (see Figure 5.5) was conducted by examining two area swatches (4 sq. km. each), one from the urban core (city swatch) and the other from the peripheral area within municipal limits (peripheral swatch). Both were measured in terms of building footprint ratio, road density and water supply network density. The analysis revealed the building footprint ratio to be nearly four times higher for the city swatch than the peripheral swatch, whereas the road density and water supply network density was only 1.25 times higher, showing the optimal utilisation of infrastructure in areas with high density urban growth.



City Swatch
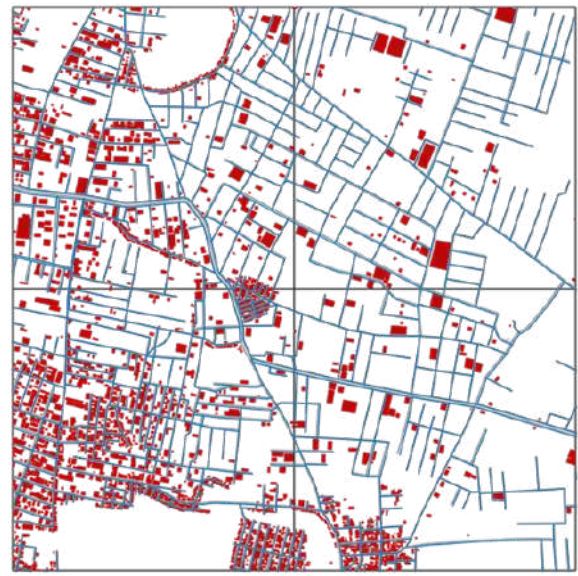


Peripheral Swatch
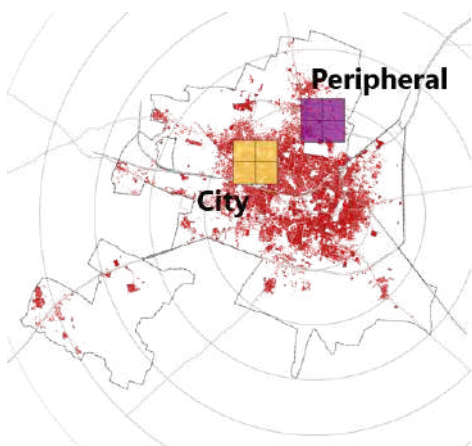


██ Building footprints    ── Roads    ── Water supply line

|  | City Swatch | Peripheral Swatch |
|---|---|---|
| Patch Area (sq.km) | 4.0 | 4.0 |
| Built Footprint (sq.km) | 1.1 | 0.3 |
| Built Footprint Ratio (%) | 27.5 | 7.5 |
| Road Length (km) | 101.9 | 78.1 |
| Road Density (km/sq.km) | 25.5 | 19.5 |
| Water supply network (km) | 101.9 | 78.4 |

Figure 5.5: Urban morphology analysis

Data source: GMC; Figure source: UN-Habitat

## Loss of Agricultural Land

The ZDP 2021 has proposed converting about 53 per cent of the agriculture land in the city (as of 2004) to various developable uses. As discussed in Section 4.2.5, a large extent of the city, especially to the East and West, proposed for various developable uses in ZDP 2021 are still under agricultural land use.

In 2017, the extent of vacant land in the ZDP area[31] was 25.70 sq. km. (2,570 Ha or 15 per cent of the total area). Taking this as the base, approximately 10 per cent of GMC area, i.e., 12.8 sq. km. (1,280 Ha) may be vacant land. This vacant land area is proposed for residential and other developable uses in the ZDP 2021. This considerable vacant land is both an opportunity for accommodating the city's population growth and as well an undesirable situation, possibly facilitating sprawled development.

**53%** → Percentage of agricultural land proposed for future development uses in the Master Plan (USAF UPS 1.3)

## Land Carrying Capacity

UN-Habitat's five Principles for Sustainable Urban Development state that compact cities should aim at developing the recommended density of 150 PPH.[32] If this density parameter is applied to the present conditions of the available vacant land[33]

within GMC limits, it could inhabit up to 1,92,000 people, about 23 per cent of the city's existing population. Adding the city's existing population and the population that could be accommodated in the vacant land, a total population of 10.17 lakh could accommodate in the city (see Table 5.2).

The population projection of the city for 2026 is 9.87 lakh and that for 2031 is 10.85 lakh.[34] Thus, the city's existing urbanized land, including vacant land, has the potential to accommodate the expected population growth till 2026, if provided with adequate infrastructure and civic services, including improved access to public transport.

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[31] ZDP area covers approximately 174 sq. km., while the GMC area covers 128 sq. km.

[32] A new strategy of sustainable neighbourhood planning: Five Principles; UN-Habitat (2015)

[33] Vacant land in this context are land parcels identified under vacant land use in the existing draft land use plan (2017). This is not only the land converted for residential or other developable uses.

[34] Situation Analysis Report, Guntur (2016), prepared under the Capacity Building for Urban Development Project (CBUD); MoHUA, GoI and The World Bank

**Table 5.2:** Vacant land carrying capacity (approximation)

| | |
|---|---|
| Estimated vacant land within GMC – 10% | 1,280 Ha |
| Recommended population density | 150 PPH |
| Population that can be accommodated | 1,92,000 |
| Existing population (8.25 lakh) + Population that can be accommodated in vacant land | 10,17,000 |

Source: UN-Habitat

## High Automobile Dependency

Sprawling development patterns create the need to travel large distances for work and to access various services/ facilities. The residents of Guntur mainly rely on personal motorized vehicles and auto-rickshaws. In 2017, about 92 per cent of the city's vehicular composition included motor bikes, cars, and auto-rickshaws. Due to the sprawling development, the use of personalized motor vehicles tends to increase further, causing more GHG emissions. The absence of formal public transportation in the city also contributes to increase in usage of personal motor vehicles, which use fossil fuels.

**25%**

Transport sector's share of city's total emissions during 2015-16 Annual $CO_2$-eq emissions from the city's transportation sector: 2,78,489 Mt $CO_2$-eq (2015-16) (USAF TR 8.9)
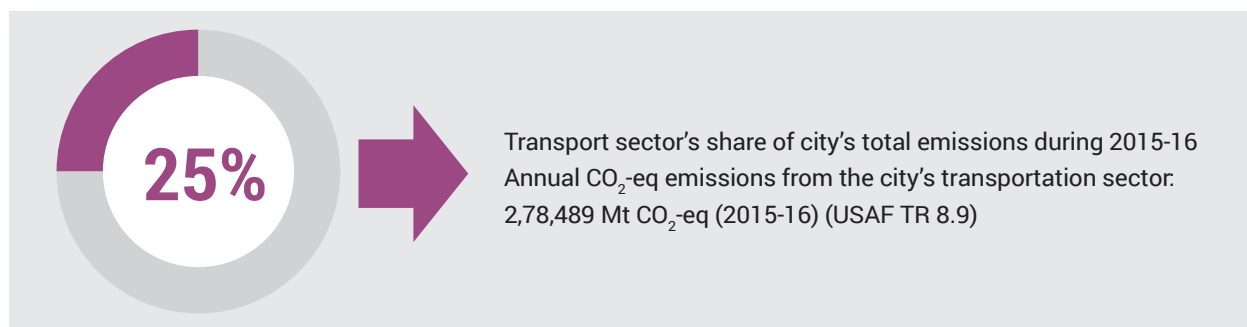
## 5.2.3 Strategic issue 3: Poor/ Unorganized public transport and NMT infrastructure

Public transportation is an essential component for building sustainable cities. Efficient public transport systems provide economic and social benefits with opportunities that improve the quality of life. Findings from the urban sectoral assessment, consultations with GMC, AMRDA, APSRTC, local NGOs and review of the City Clean Air Action Plan (2019) have highlighted various aspects of inadequate public transport and lack of supporting infrastructure in the city.

**As Guntur is projected to become a million-plus population city in the next four or five years, immediate action on addressing the challenges of public transportation assumes high priority.**

The urban sectoral assessment has revealed that details for many public transportation indicators are not available (see Section 4.4.6) for the city, as its existing public transport system is not formalized. The issue of public transportation is interlinked with six sectors (see Figure 5.6) with strong linkages to the environment, social services and facilities, disaster risk management, urban form, public space, and safety. The interlinkage indicators across the USAF sectors, along with their respective scores, is shown in Annexure 5.3.

**Figure 5.6:** Sectoral linkage of poor/ unorganized public transport and NMT infrastructure



Legend:
- Very Low
- Low
- Lower Medium
- Medium
- Upper Medium
- High
- Excellent
- Descriptive
- Data not available/Not Applicable
- Sector not impacted
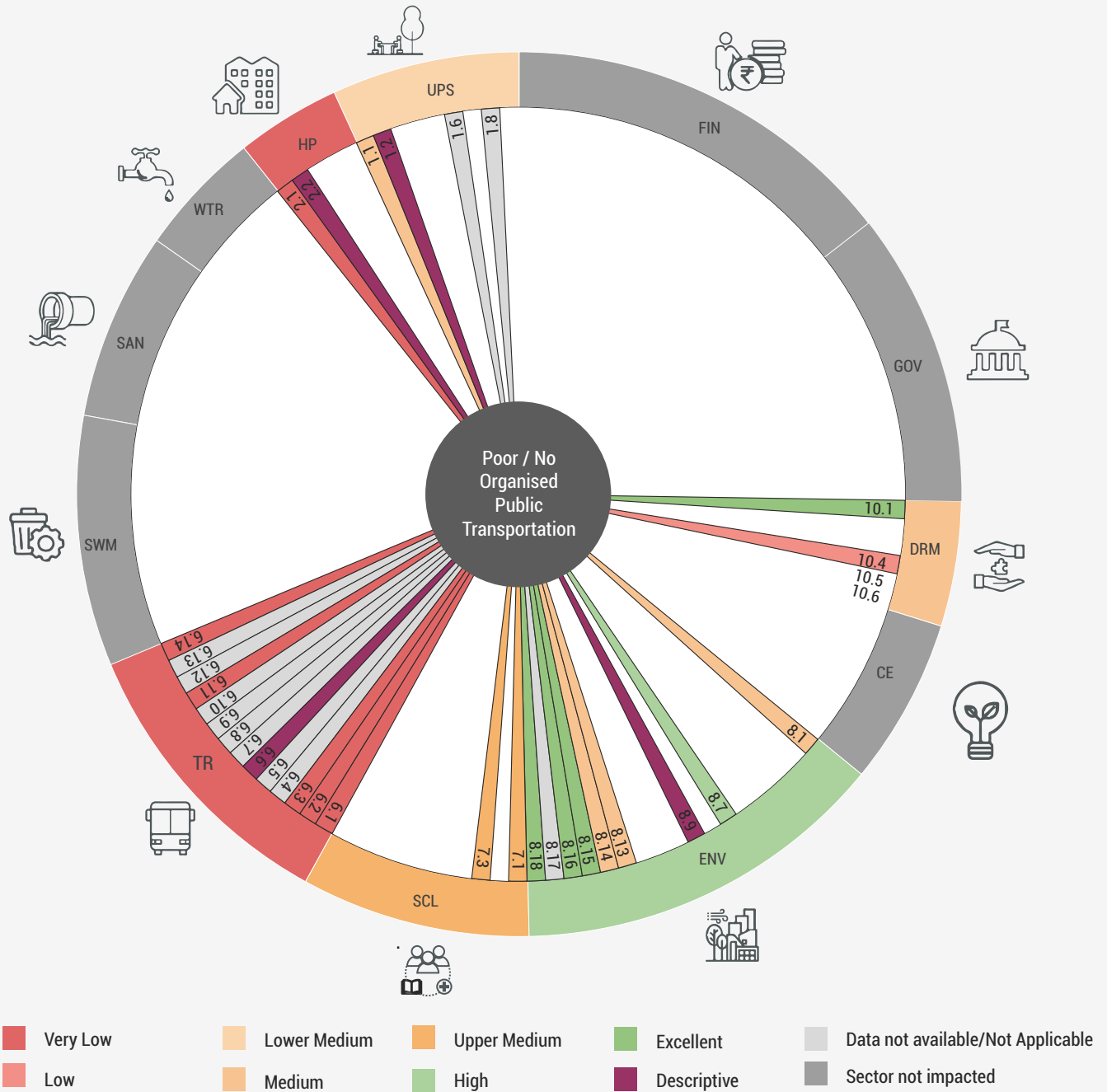
Source: UN-Habitat

## Poor Public Transportation System

In Guntur, buses are the only form of public transport. The city has a total of 63 minibuses, each with a 30-seating capacity. These bus services are operated by six different private agencies along major city corridors covering key transportation nodes, government offices and commercial centres (see Map 5.5). In addition, the intercity bus services operated by APSRTC also serve the city. However, there is lack of public information and awareness about bus services in the city, especially for those operated by private agencies. There is no public information system in place for private buses. It was learnt that these private services do not have a

fixed timetable, and function on the basis of demand. Both private and state operated services offer limited access to peripheral zones and neighbourhoods away from the major roadway network (see Map 5.4).
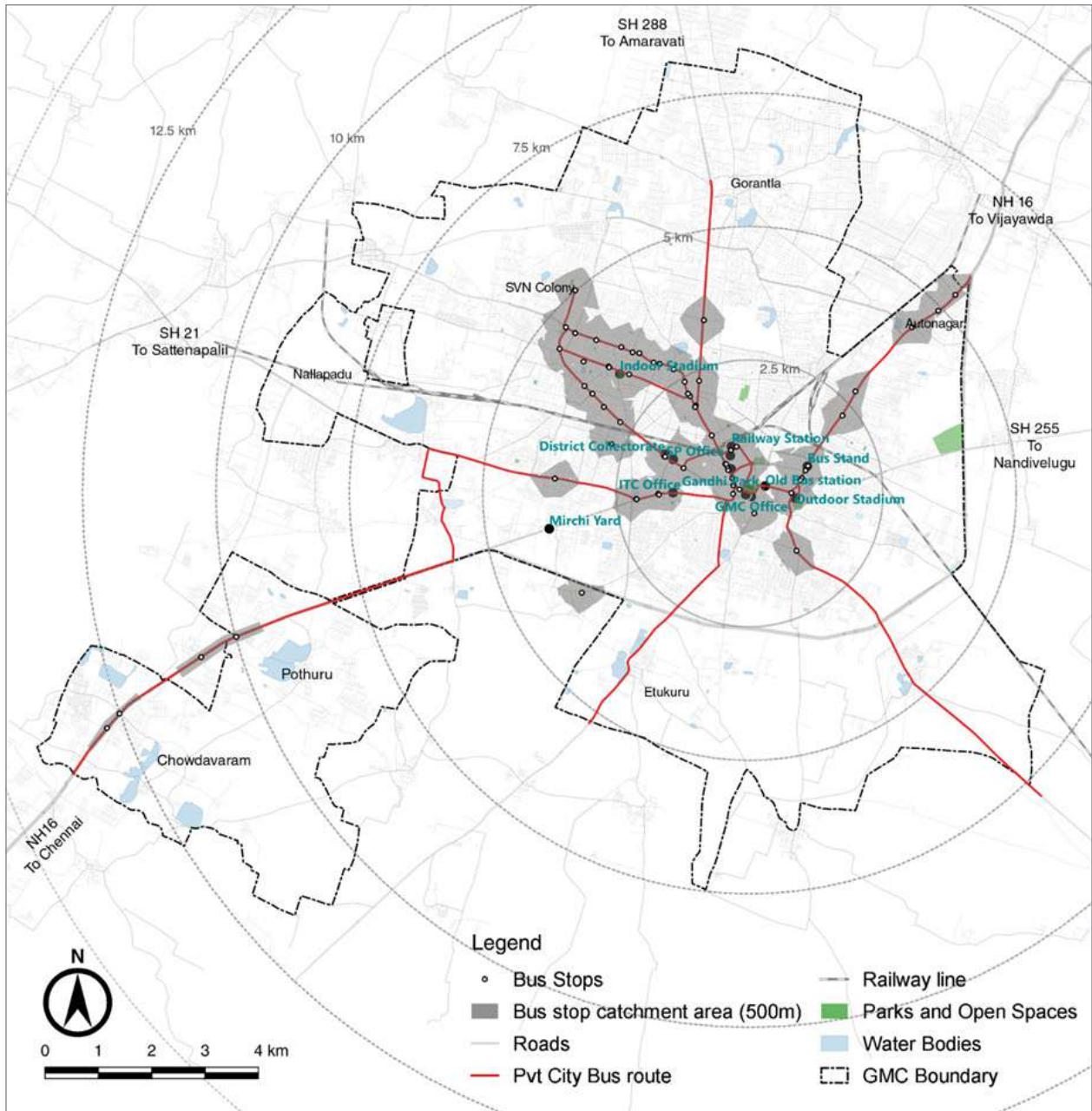


Map 5.4: Road corridors served by private buses and bus stop catchment area

On a few bus routes, there are no bus stops. The buses stop for users wherever requested, thus interrupting the traffic flow. Most of the existing bus stops in the city are located along the Inner Ring Road and the core city area along the main roads (see Map 5.4).

Image 5.4: City buses operated by private agencies in the city                    Source: UN-Habitat
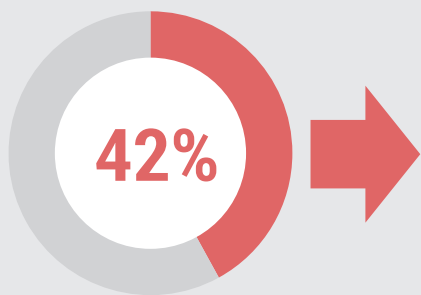
**42%** → Population with access to public transport (bus stop) within 500 m. of their residences (USAF TR 6.1)

## High Dependency on Shared Auto-rickshaws

Shared auto-rickshaw is the major mode of transport (intermediate public transport) in the city. As of 2017, auto-rickshaws constituted nearly 29 per cent of the city's vehicular population (see Figure 5.7). Shared auto-rickshaws serve all the major roads in the city, including the routes not served by bus services. Many interior areas in the city are also served by shared auto-rickshaws.

## Contribution to GHG Emissions

The city's vehicular composition (2017) shows that personal motor vehicles, such as motorcycles and cars constitute 64 per cent of the vehicular population (see Figure 5.7). High dependence on private vehicles may lead to scattered and sprawling development patterns, as discussed in Section 5.2.2. In total, about 98 per cent of the vehicles in the city are motor vehicles (see Figure 5.7). Most of the motor vehicles in the city run on fossil fuels, thus significantly contributing to air pollution. During 2015-16, emissions from the city's transportation sector stood at 2,78,489 Mt $CO_2$-eq, which constituted 24.8 per cent of the city's total emissions (USAF TR 8.9).[35]

To curb the increase in pollution levels, the Guntur Clean Air Action Plan (2019) has recommended various strategies, including the introduction of e-auto rickshaws, zero-emission battery operated vehicles, especially in commercial areas with high foot falls, creating electric charging infrastructure, introducing a city bus service with an appropriate fleet size of small buses, developing pedestrian and cycle friendly corridors.

## Key Inferences

- Insufficient bus stops in the city. A few major road corridors do not have any bus stops
- Lack of public information and awareness about bus services operated by private agencies
- Shared auto-rickshaw is the major mode of transport (intermediate public transport) in the city
- High dependency on personal motor vehicles; transportation sector is one of the major contributors of GHG emissions in the city
- The city has poor NMT infrastructure. Encroachment of footpaths by shopkeepers, hawkers, and road carriageway by on-street vehicular parking are prevalent

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[35] 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)

**Figure 5.7:** Vehicle composition in Guntur city (2017)



Bar chart values:
- Motorcycle: 57.1%
- Car: 7.4%
- Auto-rikshaw: 28.6%
- Bus: 2.7%
- Goods Carrier: 2.3%
- Bicycle: 1.5%
- Cycle Rickshw: 0.4%
- Others: 0.1%
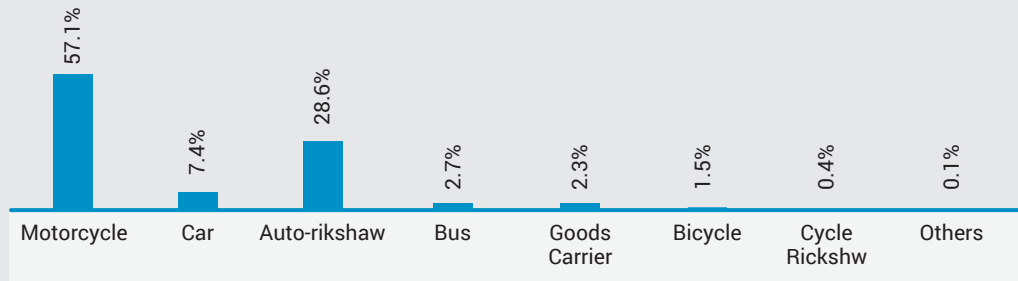
Source: AMRDA

# Poor Non-Motorized Transport (NMT) Infrastructure

NMT plays a crucial role as a mode for last-mile connectivity. As mentioned in Section 4.4.2, most of the government offices, public transportation nodes, commercial and recreation areas lie within 1.5 km of the city centre. Further, about

80 per cent of the city's population live within a 5-km radius of the core city. These distances can be suitably covered on foot or on cycle. The existing infrastructure in the city supporting NMT is insufficient. Only a 9-km stretch of the city's main roads have footpaths on either side. Most of the Inner Ring Road and a few other roads have footpaths on one side of the road, which are unutilized, lack maintenance, and are occupied by street hawkers and shops. Though sufficient road width is available along many stretches, the roads are unsafe for pedestrians and cyclists due to on-street vehicular parking, encroachment by street hawkers and absence of supporting infrastructure.

**0 km**
Stretch of cycle path/ bike lane per 100,000 population
(USAF TR 6.2)

**13%**
Percentage of major roads with footpaths wider than 1.2 m
(USAF TR 6.3)



Image 5.5: Cyclists riding along the Inner Ring Road

Source: UN-Habitat

Image 5.6: An encroached footpath near the District Collector's Office                    Source: UN-Habitat



Image 5.7: An ill maintained footpath near Shankar Vilas Railway Over Bridge              Source: UN-Habitat

## 5.2.4   Strategic issue 4: Multiple deprivations in informal settlements

Based on the findings of the urban assessment and existing situational assessment of the city, informal settlements (slums) are identified as one of the key areas of concern in Guntur city. This issue is high in magnitude as the city has 173 slums that are home to about 28 per cent of its households. This is much higher than the national urban average of 17 per cent (as per Census 2011). All the slums are located within ~6.19 sq. km. of the core city area.

The application of urban sectoral assessment to the broad issue of 'informal settlements' has

highlighted various other interlinked indicators across 11 sectors (see Figure 5.8). Findings from the interlinkage analysis have ascertained specific issues the city slums face. The key findings are discussed below.

The interlinkage indicators across urban assessment sectors along with their respective scoring is shown in Annexure 5.4.

**28%** → Percentage of city households living in slum settlements (USAF HP 2.1)

**5%** → Percentage of city area covered by slum settlements (USAF HP 2.2)
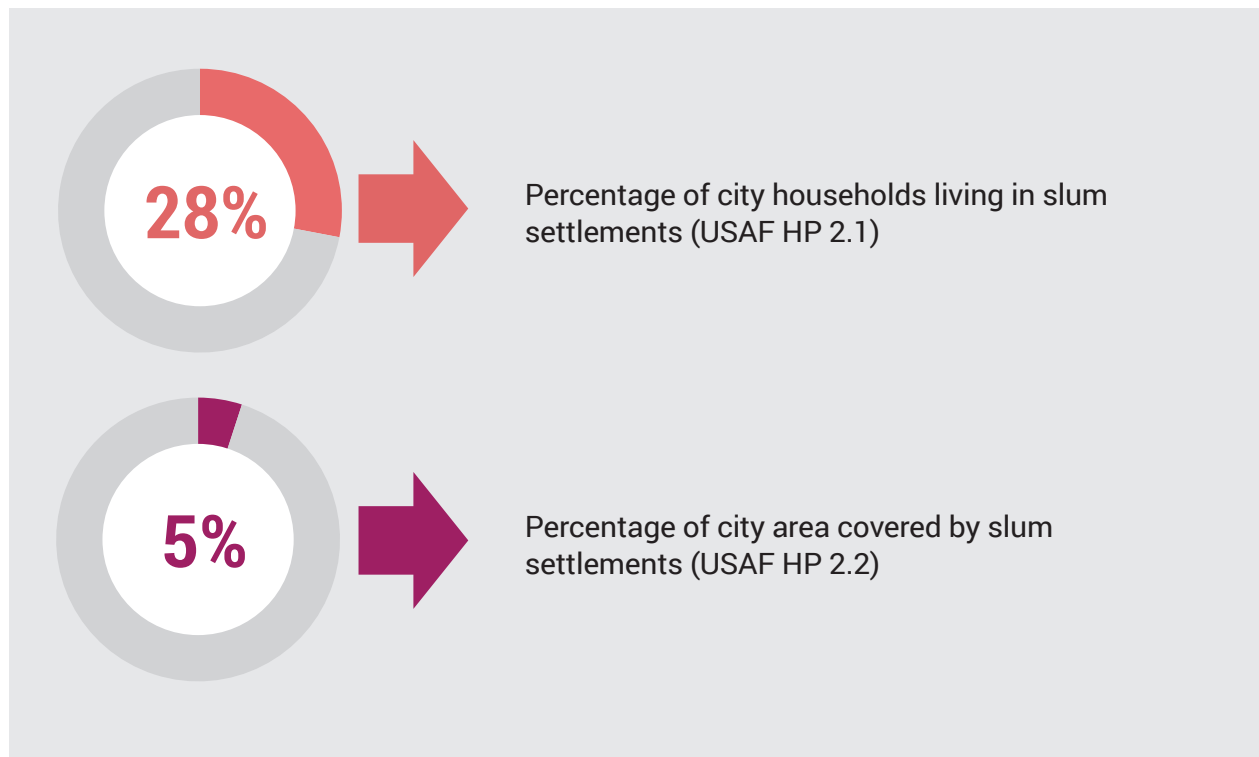
**Figure 5.8:** Sectoral linkage of the issue multiple deprivations in informal settlements
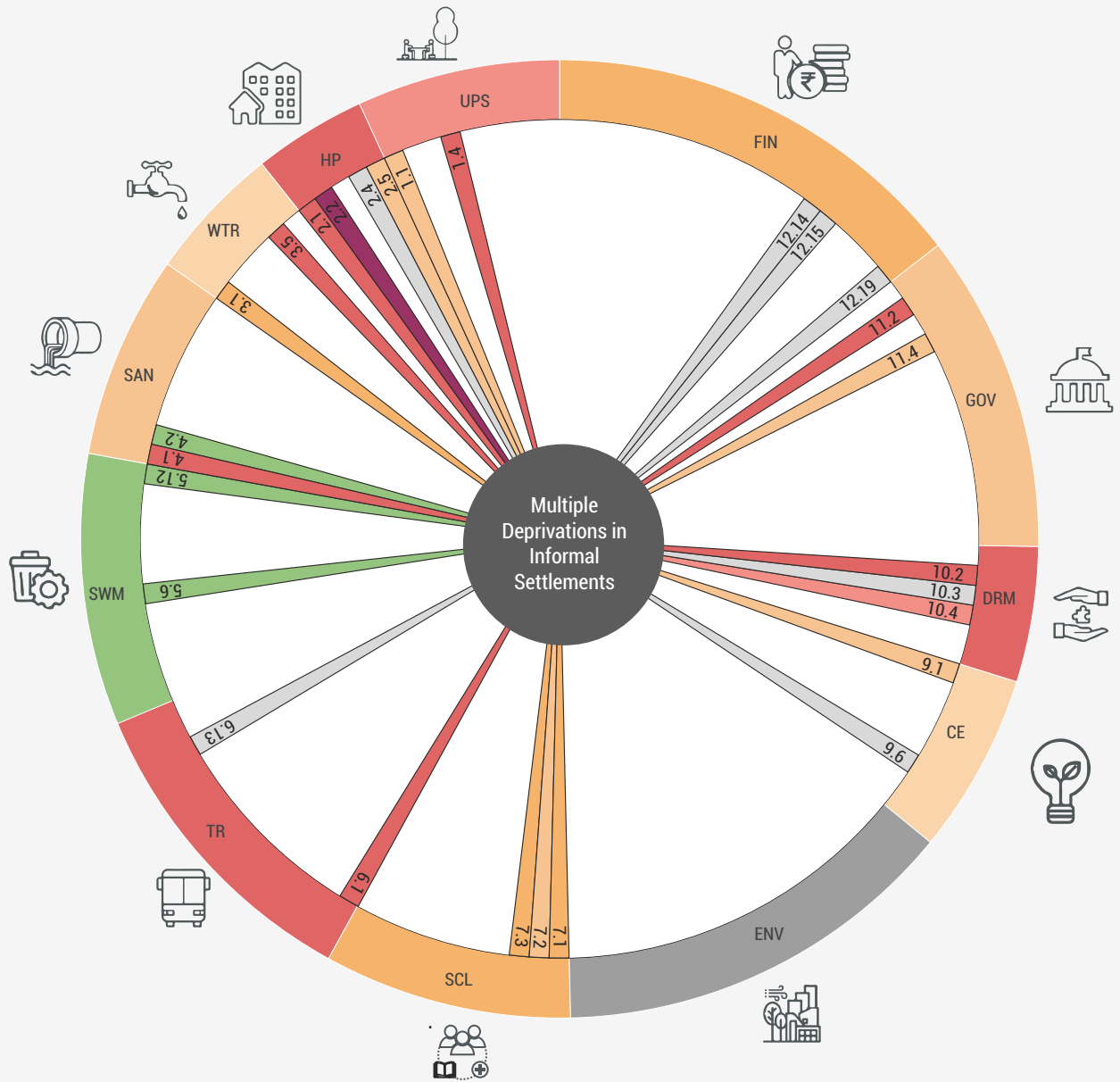


Multiple Deprivations in Informal Settlements

UPS
FIN
HP
WTR
SAN
SWM
TR
SCL
ENV
CE
DRM
GOV

1.1
1.4
2.4
2.5
2.2
1.2
3.5
3.1
4.2
4.1
5.12
5.6
6.13
6.1
7.3
7.2
7.1
9.6
9.1
10.4
10.3
10.2
11.4
11.2
12.19
12.15
12.14

Very Low
Low
Lower Medium
Medium
Upper Medium
High
Excellent
Descriptive
Data not available/Not Applicable
Sector not impacted

Source: UN-Habitat

## Location and Magnitude of Slums

The city has 173 slum settlements comprising 133 notified and 40 non-notified slums. All the slums are located within the former city limits (see Map 5.5). About 13.5 per cent of the former city limits fall under slum settlements. The population in 14 slums is more than 2,500. The slum settlements are densely populated with an average density of 305 PPH, with the population density in 25 slums being more than 500 PPH.
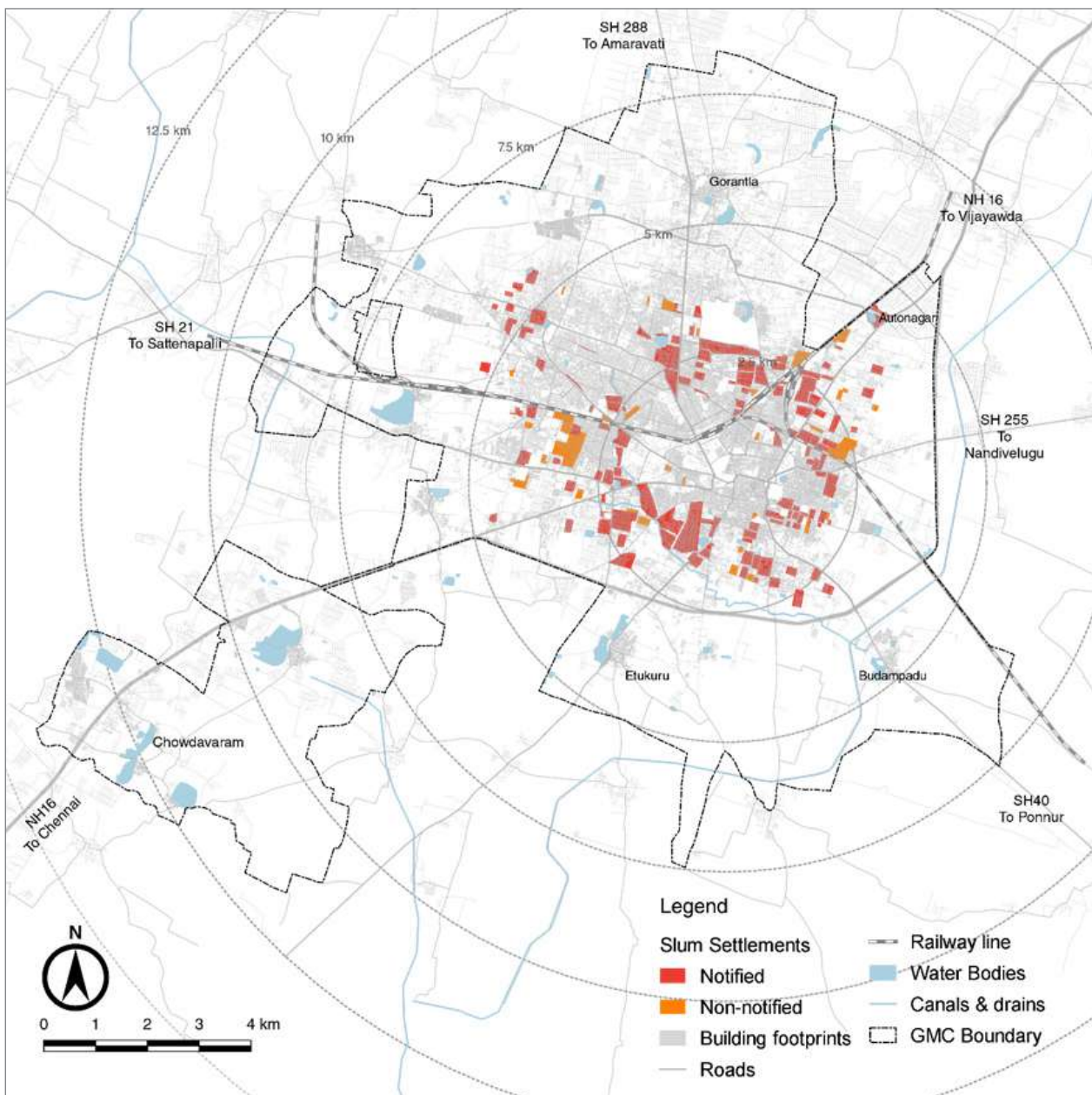


Map 5.5: Location of notified and non-notified slums in the city                                      Source: UN-Habitat

## Access to Services

Only less than one-fourth of the building units in slums have access to open public spaces and public transport (bus stops) within a walking distance of 500 m. The service coverage of building units in slums with regard to healthcare services, schools and fire stations is more than 90 per cent (see Table 5.3).

With regard to coverage of five services, out of 173 slums, 102 slums (59 per cent) have access to any three of the five services within the desirable distance. Twenty-seven slums (16 per cent) have access to any four out of five services and five slums (three per cent) have access to all the services. About 39 slums (23 per cent) have access to only two or less services. Two slums (Maddirala Nagar and Banjaranaik Colony) have no access to any of the services within the desirable distance (see Map 5.6).

**Table 5.3:**    Accessibility of slum properties to five USAF services

| USAF Indicator | Service Coverage | Distance | Building units in slums with access (%) |
|---|---|---|---|
| UPS 1.4 | Access to public open spaces | 500 m | 23% |
| TR 1.6 | Access to public transport (bus stop) | 500 m | 20% |
| SCL 7.1 | Access to healthcare services | 800 m | 93% |
| SCL 7.3 | Access to schools | 800 m | 92% |
| DRM 10.4 | Access to fire services | 4 km | 89% |

Source: UN-Habitat analysis



Map 5.6: Coverage of five services (public transport, parks, hospitals, schools & fire stations) in slum settlements

Source: UN-Habitat

## Infrastructure Coverage

Based on the spatial analysis of the GIS database provided by GMC, as of 2019, 17 slum settlements did not have access to the water supply network and six slums did not have streetlights. All the slum households, however, had access to toilet facilities. All slum households were serviced by door-to-door collection of solid waste; and all the slum settlements had metalled *(pucca)* approach roads.

## Housing in Slums

Details on the type of housing structure in slum settlements are not available. Upgradation of kutcha houses to *pucca*[36], construction of new pucca houses for the urban poor in the city, including slum settlements, was undertaken through various central and state government programmes.

## Vulnerable Slums

As per SLB 2018-19, Guntur city does not have water logging areas. A few slums in the city are located near the railway track and water bodies. In 14 slums, more than 10 properties fall within the buffer limits of the railway track (30 m.), canals (2 m.) and ponds (9 m.).

Secure land tenure is important for slum dwellers as an authentic recognition of their residential status. In only 34 slums (20 per cent) the slum dwellers have patta land. In 50 slums (29 per cent), B-Forms were issued to the dwellers and in three slums, B-Forms were partly issued. The residents of 86 slums (50 per cent) have no rights to the land. These include all the 40 non-notified slums.

With regard to ownership of land, 91 slums (53 per cent) in the city are located on private lands and nine are on land belonging to religious associations (endowments/ Wakf Board/ church, etc.). About 65 slums (38 per cent) are located on government land, including municipal land.

## Key Inferences

- All 173 slums in the city are located in former city limits area.
- 23 per cent (40) slums in the city are non-notified.
- Nine per cent (14) slums have population more than 2,500.
- 14 per cent (25 no.) slums have population density of more than 500 PPH.
- Less than one-fourth of building units in slums have access to public open spaces, bus stops within an accessible distance of 500 m.
- 23 per cent (39) slums have access to only two or less services out of five services.
- In eight per cent (14) slums, more than 10 properties fall within the railway line or water body buffer.
- In 50 per cent (86) slums, the slum dwellers have no rights on the land. These include all the 40 non-notified slums.
- Five per cent (9) slums are located on land owned by religious associations and 53 per cent (91) are on private land.

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[36] The Census of India defines a *'kutcha'* house as that whose walls and roof are made of temporary materials and have to be replaced frequently (such as grass, bamboo, mud, grass and thatch, among others). The Census of India defines a *'pucca'* house as that whose walls are made of either stones (packed with lime or cement mortar) or G.I./ metal/ asbestos sheets, fired bricks, cement or concrete and whose roof is made of either machine-made tiles or cement tiles, fired bricks, cement bricks, stones, slate, G.I./ metal/ asbestos sheets or concrete.

Image 5.8: Houses along the drain in Old Guntur area                                     Source: UN-Habitat

# Assessment of Deprivations in Informal Settlements

As discussed above, many slums in the city face problems of overcrowding, low access to civic services, infrastructure coverage and insecure tenure. **During the consultations with GMC officials, it was learnt that several slums in the city enjoy a similar level of infrastructure and services as developed areas of the city and that these settlements do not exhibit the character of a 'slum'**[37]. Infrastructure upgradation, provision of housing, skill training, various other welfare development schemes were implemented in many slums under various central and state government programmes. Considering these aspects, the GMC officials felt the need to de-notify slums that have access to common civic services and facilities of the city.

A scoring-based assessment was developed to assess the deprivations faced by slum settlements.

Based on the findings discussed above, parameters were identified (see Figure 5.9) and scores assigned (see Table 5.4). The scores were assigned such that slums with a low score had more deficiencies and vice versa. The maximum score that can be assigned to a slum with better conditions is '15'.



**Figure 5.9:** Paraments identified to assess deprivations in informal settlements
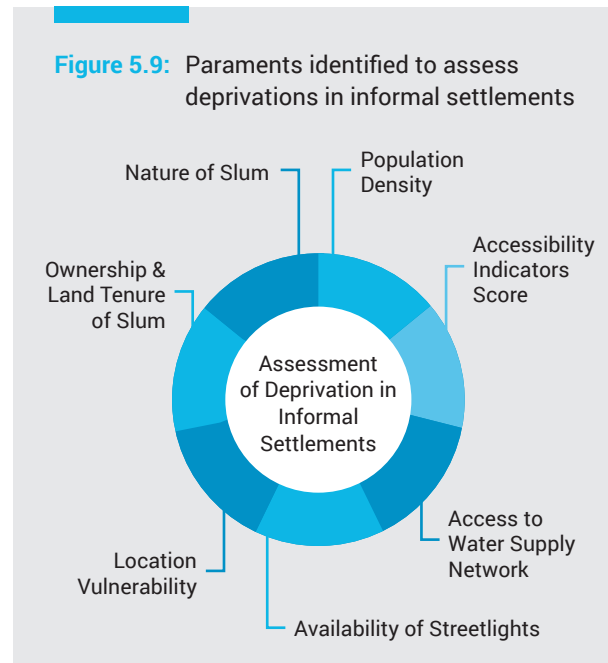
Source: UN-Habitat

**Table 5.4:** Parameter-wise scoring criteria for slum settlements

| Parameter | Assigned Score | | |
| --- | --- | --- | --- |
| | 0 | 1 | 2 |
| Nature of Slum | Non-notified | - | Notified |
| Population Density (PPH) | >500 | 301-500 | <300 |
| Accessibility Score | <2 | 3 | 4 or 5 |
| Water Supply | No | - | Yes |
| Streetlighting | No | - | Yes |
| Location Vulnerability | Within buffer limits | - | No Vulnerability |
| Ownership of Land | Religious agencies/ Private land | Private & Government | Government |
| Land Tenure | Patta land | B-Forms / Partly B-Forms | No rights |

Data source: GMC Town Planning Department

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[37] UN-Habitat (2003) defines slum as contiguous settlements where inhabitants are characterized by: (i) insecure residential status, (ii) inadequate access to safe water, (iii) inadequate access to sanitation and other basic infrastructure, (iv) poor structural quality of housing, and (v) overcrowding.

During the assessment of slums, it was found that 40 slums scored between 12 and 14 (23 per cent). About 106 slums (61 per cent) scored between '9' and '11', indicating that they lack in two or three aspects/ facilities. Provision for inadequate/ non-existent facilities will improve the living conditions of these slums. Twenty-one slums (12 per cent) have scored between '7' and '8', indicating multiple deficiencies. Six slums (three per cent) obtained the lowest score of '6', showing serious lack of facilities (see Map 5.7).

See Annexure 5.5 for parameter-wise scoring and total scores obtained by slum settlements.



Map 5.7: Scores obtained by slum settlements

## No Slums within the Extended City Boundary

As per GMC records, there are no slums in the 10 villages added to the city limits in 2012. These areas are currently experiencing, or are characterised, by rapid urban growth, significantly around transit corridors and large, available vacant lands due to conversion of agricultural land use. These areas have less access to public transport, organized green spaces and are under-serviced with respect to water supply, sewerage, and drainage network. Further, the ZDP 2021 had proposed rapidly developing areas to the North, North-East and West of the city for developable uses. These aspects might lead to formation of new slums in these newly added areas of the city, hence there is an immediate need to initiate interventions to prevent the formation of any new slum settlements.

# ANNEXURE

## Annexure 4.1: Indicator-wise scoring (overall performance) of Guntur across USAF sectors

### UPS
| # | Indicator |
|---|---|
| 1.1 | Street lighting coverage |
| 1.2 | Change in Built-up area |
| 1.3 | Agri to developable in MP |
| 1.4 | 500m to parks/open space |
| 1.4 | Per capita open space |
| 1.6 | Pedestrian fatalities % |
| 1.7 | Recreational/open space % |
| 1.8 | Safety rating |
| 1.9 | ULB parks expenditure |

### HP
| # | Indicator |
|---|---|
| 2.1 | % Slum HHs |
| 2.2 | % city land under slum |
| 2.3 | % Owner occupied units |
| 2.4 | 30% > Income on accommodation |
| 2.5 | % HH 1Room |

### WTR
| # | Indicator |
|---|---|
| 3.1 | % HH pipe connection |
| 3.2 | % quality of water |
| 3.3 | resource assessment plan |
| 3.4 | % non revenue |
| 3.5 | supply per capita |
| 3.6 | metering connections |

### SAN
| # | Indicator |
|---|---|
| 4.1 | % Sewage network connection |
| 4.2 | %HH toilet access |
| 4.3 | % Sewage treated before discharge |
| 4.4 | % Wastewater passed treatment standard |
| 4.5 | % Wastewater recycled |
| 4.6 | % Sewage treated in plant |
| 4.7 | % Industries complying CPCB |
| 4.8 | FSSM Action Plan/bye laws |
| 4.9 | % PT google maps |

### SWM
| # | Indicator |
|---|---|
| 5.1 | % Wet waste processed |
| 5.2 | % Dry waste separated recycling |
| 5.3 | % Solid waste for energy/processing |
| 5.4 | % Solid waste in dumps, water bodies, burnt |
| 5.5 | % Waste remediated |
| 5.6 | % Wards segregating waste |
| 5.7 | ICT monitoring C&T, GVP, staff |
| 5.8 | % waste pickers integrated |
| 5.9 | % C&D collected |
| 5.10 | %Hazardous waste processed |
| 5.11 | solid waste (kg/capita/day) |
| 5.12 | % Wards D2D collection |

### TR
| # | Indicator |
|---|---|
| 6.1 | % Pop. 500m PT |
| 6.2 | Km bicycle path/100,000 |
| 6.3 | % Roads with footpath |
| 6.4 | % Increase PT ridership |
| 6.5 | % clean energy vehicles |
| 6.6 | Road density |
| 6.7 | Avg travel speed |
| 6.8 | % Share NMT |
| 6.9 | Street intersection density |
| 6.10 | % Road PT/100,000 |
| 6.11 | road accidents/100,000 |
| 6.12 | differently-abled bus accessibility |
| 6.13 | workplace accessibility 30mn |
| 6.14 | % ULB area streets |

### SCL
| # | Indicator |
|---|---|
| 7.1 | % Pop. 800m healthcare |
| 7.2 | % Female literate |
| 7.3 | % Pop. 800m schools |
| 7.4 | change decadal pop. growth |
| 7.5 | City dependency ratio |
| 7.6 | Under 5 mortality |
| 7.7 | Hospital bed density/10,000 |
| 7.8 | % Reduction vector disease |
| 7.9 | % Reduction waterborne disease |
| 7.10 | % Schools digital access |
| 7.11 | % Mobile network subscriptions |

### ENV
| # | Indicator |
|---|---|
| 8.1 | Clean Air Action Plan |
| 8.2 | GHG measurement system |
| 8.3 | Annual GHG emissions |
| 8.4 | % Tree cover |
| 8.5 | Biodiversity conservation |
| 8.6 | No. of green building incentives |
| 8.7 | Annual AQI |
| 8.8 | Annual GHG /capital |
| 8.9 | Emissions from transport |
| 8.10 | Biochemical Oxygen Demand |
| 8.11 | Trees per inhabitant |
| 8.12 | Land use zoning environmental protection |
| 8.13 | Annual PM10 |
| 8.14 | Annual PM2.5 |
| 8.15 | Annual NO2 |
| 8.16 | Avg. daily SO2 |
| 8.17 | Annual methane emissions |
| 8.18 | Noise pollution regulations |

### CE
| # | Indicator |
|---|---|
| 9.1 | % HH using LPG |
| 9.2 | % Energy from renewable sources |
| 9.3 | % Pop. Access renewable energy |
| 9.4 | % Energy efficient street lighting |
| 9.5 | Energy use/capita |
| 9.6 | %HH authorized energy connection |
| 9.7 | Building codes consider eco-technologies |
| 9.8 | System Average Interruption |

### DRM
| # | Indicator |
|---|---|
| 10.1 | Disaster Management Plan |
| 10.2 | Hazard/risk maps |
| 10.3 | % HHs in risk area |
| 10.4 | % Buildings in 4km fire service |
| 10.5 | Hazard warning system |
| 10.6 | Flood risk plan |

### GOV
| # | Indicator |
|---|---|
| 11.1 | Planners/capita |
| 11.2 | Years since MP updated |
| 11.3 | No. Services Command Centre |
| 11.4 | No. of functions by ULB |
| 11.5 | GIS based MP |
| 11.6 | Environmental status report |
| 11.7 | % staff trained |
| 11.8 | No. of E-gov initiatives |
| 11.9 | MP accessible online |
| 11.10 | No. of ULB committees |
| 11.11 | citizen charter |
| 11.12 | City data officer |
| 11.13 | % Women councillors |
| 11.14 | Open data portal |

### FIN
| # | Indicator |
|---|---|
| 12.1 | Credit rating |
| 12.2 | % Property tax collected |
| 12.3 | % Grants received |
| 12.4 | GDP per capita |
| 12.5 | Change own source revenue |
| 12.6 | Operating margin |
| 12.7 | % Annual debt service |
| 12.8 | % Debt in overall budget |
| 12.9 | % Properties covered tax net |
| 12.10 | Capital expenditure efficiency |
| 12.11 | Water supply cost recovery |
| 12.12 | Sanitation cost recovery |
| 12.13 | Solid waste cost recovery |
| 12.14 | Unemployment rate |
| 12.15 | Inequality index Gini |
| 12.16 | Workforce employed |
| 12.17 | % Capital expenditure |
| 12.18 | GDP density of built up |
| 12.19 | % Informal employment |

## Annexure 5.1: Interlinkage of issue 1 – 'Inadequate public open spaces and conservation of water bodies' with indicators across the urban assessment sectors

**UPS**
- 1.1 Street lighting coverage
- 1.2 Change in Built-up area
- 1.4 500m to parks/open space
- 1.5 Per capita open space
- 1.6 Pedestrian fatalities %
- 1.7 Recreational/ open space %
- 1.8 Safety rating
- 1.9 ULB parks expenditure

**HP**
- 2.1 % Slum HHs
- 2.2 % city land under slum
- 2.3 % Owner occupied units
- 2.4 30% > Income on accommodation
- 2.5 % HH 1Room

**WTR**
- 3.1 % HH pipe connection
- 3.2 % quality of water
- 3.3 resource assessment plan
- 3.4 % non revenue
- 3.5 supply per capita
- 3.6 metering connections

**SAN**
- 4.1 % Sewage network connection
- 4.2 %HH toilet access
- 4.3 % Sewage treated before discharge
- 4.4 % Wastewater treatment standard
- 4.5 % Wastewater recycled
- 4.6 % Sewage treated in plant
- 4.7 % Industries complying CPCB
- 4.8 FSSM Action Plan/ bye laws
- 4.9 % PT google maps

**SWM**
- 5.1 % Wet waste processed
- 5.2 % Dry waste separated recycling
- 5.3 % Solid waste for energy/ processing
- 5.4 % Solid waste in dumps, water bodies, burnt
- 5.5 % Waste remediated
- 5.6 % Wards segregating waste
- 5.7 ICT monitoring C&T, GVP, staff
- 5.8 % waste pickers integrated
- 5.9 % C&D collected
- 5.10 %Hazardous waste processed
- 5.11 solid waste (kg/capita/day)
- 5.12 % Wards D2D collection

**TR**
- 6.1 % Pop. 500m PT
- 6.2 Km bicycle path/ 100,000
- 6.3 % Roads with footpath
- 6.4 % Increase PT ridership
- 6.5 % clean energy vehicles
- 6.6 Road density
- 6.7 Avg travel speed
- 6.8 % Share NMT
- 6.9 Street intersection density
- 6.10 % Road PT/ 100,000
- 6.11 road accidents/ 100,000
- 6.12 differently-abled bus accessibility
- 6.13 workplace accessibility 30min
- 6.14 % ULB area streets

**SCL**
- 7.1 % Pop. 800m healthcare
- 7.2 % Female literate
- 7.3 % Pop. 800m schools
- 7.4 change decadal pop. growth
- 7.5 City dependency ratio
- 7.6 Under 5 mortality
- 7.7 Hospital bed density/ 10,000
- 7.8 % Reduction vector disease
- 7.9 % Reduction waterborne disease
- 7.10 % Schools digital access
- 7.11 % Mobile network subscriptions

**ENV**
- 8.1 Clean Air Action Plan
- 8.2 GHG measurement system
- 8.3 Annual GHG emissions
- 8.4 % Tree cover
- 8.5 Biodiversity conservation
- 8.6 No. of green building incentives
- 8.7 Annual AQI
- 8.8 Annual GHG /capital
- 8.9 Emissions from transport
- 8.10 Biochemical Oxygen Demand
- 8.11 Trees per inhabitant
- 8.12 Land use zoning environmental protection
- 8.13 Annual PM10
- 8.14 Annual PM2.5
- 8.15 Annual NO2
- 8.16 Avg. daily SO2
- 8.17 Annual methane emissions
- 8.18 Noise pollution regulations

**CE**
- 9.1 % HH using LPG
- 9.2 % Energy from renewable sources
- 9.3 % Pop. Access renewable energy
- 9.4 % Energy efficient street lighting
- 9.5 Energy use/ capita
- 9.6 %HH authorized energy connection
- 9.7 Building codes consider eco-technologies
- 9.8 System Average Interruption

**DRM**
- 10.1 Disaster Management Plan
- 10.2 Hazard/ risk maps
- 10.3 % HHs in risk area
- 10.4 % Buildings in 4km fire service
- 10.5 Hazard warning system
- 10.6 Flood risk plan

**GOV**
- 11.1 Planners per capita
- 11.2 Years since MP updated
- 11.3 No. Services Command Centre
- 11.4 No. of functions by ULB
- 11.5 GIS based MP
- 11.6 Environmental status report
- 11.7 % staff trained
- 11.8 No. of E-gov initiatives
- 11.9 MP accessible online
- 11.10 No. of ULB committees
- 11.11 citizen charter
- 11.12 City data officer
- 11.13 % Women councillors
- 11.14 Open data portal

**FIN**
- 12.1 Credit rating
- 12.2 % Property tax collected
- 12.3 % Grants received
- 12.4 GDP per capita
- 12.5 Change own source revenue
- 12.6 Operating margin
- 12.7 % Annual debt service
- 12.8 % Debt in overall budget
- 12.9 % Properties covered tax net
- 12.10 Capital expenditure efficiency
- 12.11 Water supply cost recovery
- 12.12 Sanitation cost recovery
- 12.13 Solid waste cost recovery
- 12.14 Unemployment rate
- 12.15 Inequality index Gini
- 12.16 Workforce employed
- 12.17 % Capital expenditure
- 12.18 GDP density of built up

# Annexure 5.2: Interlinkage of issue 2 – 'Sprawling and scattered development patterns' with indicators across the urban assessment sectors

| UPS | HP | WTR | SAN | SWM | TR | SCL | ENV | CE | DRM | GOV | FIN |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 1.1 Street lighting coverage | 2.1 % Slum HHs | 3.1 % HH pipe connection | 4.1 % Sewage network connection | 5.1 % Wet waste processed | 6.1 % Pop. 500m PT | 7.1 % Pop. 800m healthcare | 8.1 Clean Air Action Plan | 9.1 % HH using LPG | 10.1 Disaster Management Plan | 11.1 Planners per capita | 12.1 Credit rating |
| 1.2 Change in Built-up area | 2.2 % city land under slum | 3.2 % quality of water | 4.2 %HH toilet access | 5.2 % Dry waste separated recycling | 6.2 Km bicycle path/ 100,000 | 7.2 % Female literate | 8.2 GHG measurement system | 9.2 % Energy from renewable sources | 10.2 Hazard/ risk maps | 11.2 Years since MP updated | 12.2 % Property tax collected |
| 1.3 Agri to developable in MP | 2.3 % Owner occupied units | 3.3 resource assessment plan | 4.3 % Sewage treated before discharge | 5.3 % Solid waste for energy/ processing | 6.3 % Roads with footpath | 7.3 % Pop. 800m schools | 8.3 Annual GHG emissions | 9.3 % Pop. Access renewable energy | 10.3 % HHs in risk area | 11.3 No. Services Command Centre | 12.3 % Grants received |
| 1.4 500m to parks/open space | 2.4 30% > Income on accommodation | 3.4 % non revenue | 4.4 % Wastewater passed treatment standard | 5.4 % Solid waste in dumps, water bodies, burnt | 6.4 % Increase PT ridership | 7.4 change decadal pop. growth | 8.4 % Tree cover | 9.4 % Energy efficient street lighting | 10.4 % Buildings in 4km fire service | 11.4 No. of functions by ULB | 12.4 GDP per capita |
| 1.5 Per capita open space | 2.5 % HH 1Room | 3.5 supply per capita | 4.5 % Wastewater recycled | 5.5 % Waste remediated | 6.5 % clean energy vehicles | 7.5 City dependency ratio | 8.5 Biodiversity conservation | 9.5 Energy use/ capita | 10.5 Hazard warning system | 11.5 GIS based MP | 12.5 Change own source revenue |
| 1.6 Pedestrian fatalities % | | 3.6 metering connections | 4.6 % Sewage treated in plant | 5.6 % Wards segregating waste | 6.6 Road density | 7.6 Under 5 mortality | 8.6 No. of green building incentives | 9.6 %HH authorized energy connection | 10.6 Flood risk plan | 11.6 Environmental status report | 12.6 Operating margin |
| 1.7 Recreational/ open space % | | | 4.7 % Industries complying CPCB | 5.7 ICT monitoring C&T, GVP, staff | 6.7 Avg travel speed | 7.7 Hospital bed density/ 10,000 | 8.7 Annual AQI | 9.7 Building codes consider eco-technologies | | 11.7 % staff trained | 12.7 % Annual debt service |
| 1.8 Safety rating | | | 4.8 FSSM Action Plan/ bye laws | 5.8 % waste pickers integrated | 6.8 % Share NMT | 7.8 % Reduction vector disease | 8.8 Annual GHG /capital | 9.8 System Average Interruption | | 11.8 No. of E-gov initiatives | 12.8 % Debt in overall budget |
| 1.9 ULB parks expenditure | | | 4.9 % PT google maps | 5.9 % C&D collected | 6.9 Street intersection density | 7.9 % Reduction waterborne disease | 8.9 Emissions from transport | | | 11.9 MP accessible online | 12.9 % Properties covered tax net |
| | | | | 5.10 %Hazardous waste processed | 6.10 % Road PT/ 100,000 | 7.10 % Schools digital access | 8.10 Biochemical Oxygen Demand | | | 11.10 No. of ULB committees | 12.10 Capital expenditure efficiency |
| | | | | 5.11 solid waste (kg/capita/day) | 6.11 road accidents/ 100,000 | 7.11 % Mobile network subscription | 8.11 Trees per inhabitant | | | 11.11 citizen charter | 12.11 Water supply cost recovery |
| | | | | 5.12 % Wards D2D collection | 6.12 differently-abled bus accessibility | | 8.12 Land use zoning environmental protections | | | 11.12 City data officer | 12.12 Sanitation cost recovery |
| | | | | | 6.13 workplace accessibility 30min | | 8.13 Annual PM10 | | | 11.13 % Women councillors | 12.13 Solid waste cost recovery |
| | | | | | 6.14 % ULB area streets | | 8.14 Annual PM2.5 | | | 11.14 Open data portal | 12.14 Unemployment rate |
| | | | | | | | 8.15 Annual NO2 | | | | 12.15 Inequality index Gini |
| | | | | | | | 8.16 Avg. daily SO2 | | | | 12.16 Workforce employed |
| | | | | | | | 8.17 Annual methane emissions | | | | 12.17 % Capital expenditure |
| | | | | | | | 8.18 Noise pollution regulations | | | | 12.18 GDP density of built up |
| | | | | | | | | | | | 12.19 % Informal employment |

# Annexure 5.3: Interlinkage of issue 3 – 'Poor/ unorganized public transport and NMT infrastructure' with indicators across the urban assessment sectors

| UPS | | HP | | WTR | | SAN | | SWM | | TR | | SCL | | ENV | | CE | | DRM | | GOV | | FIN | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1.1 | Street lighting coverage | 2.1 | % Slum HHs | 3.1 | % HH pipe connection | 4.1 | % Sewage network connection | 5.1 | % Wet waste processed | 6.1 | % Pop. 500m PT | 7.1 | % Pop. 800m healthcare | 8.1 | Clean Air Action Plan | 9.1 | % HH using LPG | 10.1 | Disaster Management Plan | 11.1 | Planners per capita | 12.1 | Credit rating |
| 1.2 | Change in Built-up area | 2.2 | % city land under slum | 3.2 | % quality of water | 4.2 | %HH toilet access | 5.2 | % Dry waste separated recycling | 6.2 | Km bicycle path/ 100,000 | 7.2 | % Female literate | 8.2 | GHG measurement system | 9.2 | % Energy from renewable sources | 10.2 | Hazard/ risk maps | 11.2 | Years since MP updated | 12.2 | % Property tax collected |
| 1.3 | Agri to developable in MP | 2.3 | % Owner occupied units | 3.3 | resource assessment plan | 4.3 | % Sewage treated before discharge | 5.3 | % Solid waste for energy/ processing | 6.3 | % Roads with footpath | 7.3 | % Pop. 800m schools | 8.3 | Annual GHG emissions | 9.3 | % Pop. Access renewable energy | 10.3 | % HHs in risk area | 11.3 | No. Services Command Centre | 12.3 | % Grants received |
| 1.4 | 500m to parks/open space | 2.4 | 30% > Income on accommodation | 3.4 | % non revenue | 4.4 | % Wastewater passed treatment standard | 5.4 | % Solid waste in dumps, water bodies, burnt | 6.4 | % Increase PT ridership | 7.4 | change decadal pop. growth | 8.4 | % Tree cover | 9.4 | % Energy efficient street lighting | 10.4 | % Buildings in 4km fire service | 11.4 | No. of functions by ULB | 12.4 | GDP per capita |
| 1.5 | Per capita open space | 2.5 | % HH 1Room | 3.5 | supply per capita | 4.5 | % Wastewater recycled | 5.5 | % Waste remediated | 6.5 | % clean energy vehicles | 7.5 | City dependency ratio | 8.5 | Biodiversity conservation | 9.5 | Energy use/ capita | 10.5 | Hazard warning system | 11.5 | GIS based MP | 12.5 | Change own source revenue |
| 1.6 | Pedestrian fatalities % | | | 3.6 | metering connections | 4.6 | % Sewage treated in plant | 5.6 | % Wards segregating waste | 6.6 | Road density | 7.6 | Under 5 mortality | 8.6 | No. of green building incentives | 9.6 | %HH authorized energy connection | 10.6 | Flood risk plan | 11.6 | Environmental status report | 12.6 | Operating margin |
| 1.7 | Recreational /open space % | | | | | 4.7 | % Industries complying CPCB | 5.7 | ICT monitoring C&T, GVP, staff | 6.7 | Avg travel speed | 7.7 | Hospital bed density/ 10,000 | 8.7 | Annual AQI | 9.7 | Building codes consider eco-technologies | | | 11.7 | % staff trained | 12.7 | % Annual debt service |
| 1.8 | Safety rating | | | | | 4.8 | FSSM Action Plan/ bye laws | 5.8 | % waste pickers integrated | 6.8 | % Share NMT | 7.8 | % Reduction vector disease | 8.8 | Annual GHG /capital | 9.8 | System Average Interruption | | | 11.8 | No. of E-gov initiatives | 12.8 | % Debt in overall budget |
| 1.9 | ULB parks expenditure | | | | | 4.9 | % PT google maps | 5.9 | % C&D collected | 6.9 | Street intersection density | 7.9 | % Reduction waterborne disease | 8.9 | Emissions from transport | | | | | 11.9 | MP accessible online | 12.9 | % Properties covered tax net |
| | | | | | | | | 5.10 | %Hazardous waste processed | 6.10 | % Road PT/ 100,000 | 7.10 | % Schools digital access | 8.10 | Biochemical Oxygen Demand | | | | | 11.10 | No. of ULB committees | 12.10 | Capital expenditure efficiency |
| | | | | | | | | 5.11 | solid waste (kg/capita/day) | 6.11 | road accidents/ 100,000 | 7.11 | % Mobile network subscriptions | 8.11 | Trees per inhabitant | | | | | 11.11 | citizen charter | 12.11 | Water supply cost recovery |
| | | | | | | | | 5.12 | % Wards D2D collection | 6.12 | differently-abled bus accessibility | | | 8.12 | Land use zoning environmental protection | | | | | 11.12 | City data officer | 12.12 | Sanitation cost recovery |
| | | | | | | | | | | 6.13 | workplace accessibility 30min | | | 8.13 | Annual PM10 | | | | | 11.13 | % Women councillors | 12.13 | Solid waste cost recovery |
| | | | | | | | | | | 6.14 | % ULB area streets | | | 8.14 | Annual PM2.5 | | | | | 11.14 | Open data portal | 12.14 | Unemployment rate |
| | | | | | | | | | | | | | | 8.15 | Annual NO2 | | | | | | | 12.15 | Inequality index Gini |
| | | | | | | | | | | | | | | 8.16 | Avg daily SO2 | | | | | | | 12.16 | Workforce employed |
| | | | | | | | | | | | | | | 8.17 | Annual methane emissions | | | | | | | 12.17 | % Capital expenditure |
| | | | | | | | | | | | | | | 8.18 | Noise pollution regulations | | | | | | | 12.18 | GDP density of built up |
| | | | | | | | | | | | | | | | | | | | | | | 12.19 | % Informal employment |

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# Annexure 5.4: Interlinkage of issue 4 – 'Multiple deprivations in informal settlements' with indicators across the urban assessment sectors

| # | UPS | HP | WTR | SAN | SWM | TR | SCL | ENV | CE | DRM | GOV | FIN |
|---|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| 1 | **1.1** Street lighting coverage | **2.1** % Slum HHs | **3.1** % HH pipe connection | **4.1** % Sewage network connection | 5.1 % Wet waste processed | **6.1** % Pop. 500m PT | **7.1** % Pop. 800m healthcare | 8.1 Clean Air Action Plan | **9.1** % HH using LPG | **10.1** Disaster Management Plan | **11.1** Planners per capita | 12.1 Credit rating |
| 2 | 1.2 Change in Built-up area | **2.2** % city land under slum | 3.2 % quality of water | **4.2** % HH toilet access | 5.2 % Dry waste separated recycling | 6.2 Km bicycle path/ 100,000 | **7.2** % Female literate | 8.2 GHG measurement system | 9.2 % Energy from renewable sources | **10.2** Hazard/ risk maps | **11.2** Years since MP updated | **12.2** % Property tax collected |
| 3 | 1.3 Agri to developable in MP | 2.3 % Owner occupied units | 3.3 resource assessment plan | 4.3 % Sewage treated before discharge | 5.3 % Solid waste for energy/ processing | 6.3 % Roads with footpath | **7.3** % Pop. 800m schools | 8.3 Annual GHG emissions | 9.3 % Pop. Access renewable energy | **10.3** % HHs in risk area | 11.3 No. Services Command Centre | 12.3 % Grants received |
| 4 | **1.4** 500m to parks/ open space | **2.4** 30% > Income on accommodation | 3.4 % non revenue | 4.4 % Wastewater passed treatment standard | 5.4 % Solid waste in dumps, water bodies, burnt | 6.4 % Increase PT ridership | 7.4 change decadal pop. growth | 8.4 % Tree cover | 9.4 % Energy efficient street lighting | **10.4** % Buildings in 4km fire service | **11.4** No. of functions by ULB | 12.4 GDP per capita |
| 5 | 1.5 Per capita open space | **2.5** % HH 1Room | **3.5** supply per capita | 4.5 % Wastewater recycled | 5.5 % Waste remediated | 6.5 % clean energy vehicles | 7.5 City dependency ratio | 8.5 Biodiversity conservation | 9.5 Energy use/ capita | 10.5 Hazard warning system | 11.5 GIS based MP | 12.5 Change own source revenue |
| 6 | 1.6 Pedestrian fatalities % | | 3.6 metering connections | 4.6 % Sewage treated in plant | **5.6** % Wards segregating waste | 6.6 Road density | 7.6 Under 5 mortality | 8.6 No. of green building incentives | **9.6** %HH authorized energy connection | 10.6 Flood risk plan | 11.6 Environmental status report | 12.6 Operating margin |
| 7 | 1.7 Recreational/open space % | | | 4.7 % Industries complying CPCB | 5.7 ICT monitoring C&T, GVP, staff | 6.7 Avg travel speed | 7.7 Hospital bed density/ 10,000 | 8.7 Annual AQI | 9.7 Building codes consider eco-technologies | | 11.7 % staff trained | 12.7 % Annual debt service |
| 8 | 1.8 Safety rating | | | 4.8 FSSM Action Plan/ bye laws | 5.8 % waste pickers integrated | 6.8 % Share NMT | 7.8 % Reduction vector disease | 8.8 Annual GHG /capital | 9.8 System Average Interruption | | 11.8 No. of E-gov initiatives | 12.8 % Debt in overall budget |
| 9 | 1.9 ULB parks expenditure | | | 4.9 % PT google maps | 5.9 % C&D collected | 6.9 Street intersection density | 7.9 % Reduction waterborne disease | 8.9 Emissions from transport | | | 11.9 MP accessible online | 12.9 % Properties covered tax net |
| 10 | | | | | 5.10 %Hazardous waste processed | 6.10 % Road PT/ 100,000 | 7.10 % Schools digital access | 8.10 Biochemical Oxygen Demand | | | 11.10 No. of ULB committees | 12.10 Capital expenditure efficiency |
| 11 | | | | | 5.11 solid waste (kg/capita/day) | 6.11 road accidents/ 100,000 | 7.11 % Mobile network subscriptions | 8.11 Trees per inhabitant | | | 11.11 citizen charter | 12.11 Water supply cost recovery |
| 12 | | | | | **5.12** % Wards D2D collection | 6.12 differently-abled bus accessibility | | 8.12 Land use zoning environmental protection | | | 11.12 City data officer | 12.12 Sanitation cost recovery |
| 13 | | | | | | **6.13** workplace accessibility 30min | | 8.13 Annual PM10 | | | 11.13 % Women councillors | 12.13 Sold waste cost recovery |
| 14 | | | | | | 6.14 % ULB area streets | | 8.14 Annual PM2.5 | | | 11.14 Open data portal | **12.14** Unemployment rate |
| 15 | | | | | | | | 8.15 Annual NO2 | | | | **12.15** Inequality index Gini |
| 16 | | | | | | | | 8.16 Avg. daily SO2 | | | | 12.16 Workforce employed |
| 17 | | | | | | | | 8.17 Annual methane emissions | | | | 12.17 % Capital expenditure |
| 18 | | | | | | | | 8.18 Noise pollution regulations | | | | 12.18 GDP-density of built up |

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# Annexure 5.5: Parameter-wise scores and total score obtained by slum settlements

| S. no | Name of The Slum | Ward No | Nature of slum Score | Population Density Score | Accessibility Score | Water supply availability Score | Availability of Street Lighting Score | Location Vulnerability Score | Ownership of Land Score | Land Tenure Score | Total Score |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | Banjaranaik Colony | 17 | 1 | 1 | 0 | 0 | 0 | 2 | 2 | 0 | 6 |
| 2 | Gandhi Nagar | 25 | 0 | 2 | 0 | 2 | 2 | 0 | 0 | NA | 6 |
| 3 | Kabadigudem Extn. | 17 | 0 | 1 | 1 | 0 | 2 | 2 | 0 | NA | 6 |
| 4 | Fathima Puram | 25 | 0 | 0 | 2 | 2 | 2 | 0 | 0 | NA | 6 |
| 5 | Siva Nagaraju Colony, Abhudaya Colony | 57 | 0 | 1 | 1 | 2 | 0 | 0 | 2 | NA | 6 |
| 6 | Abralapet | 1 | 0 | 1 | 1 | 2 | 2 | 0 | 0 | NA | 6 |
| 7 | Nethaji Nagar | 57 | 1 | 1 | 0 | 2 | 2 | 0 | 0 | 1 | 7 |
| 8 | Immanuel Pet | 54 | 1 | 0 | 1 | 2 | 2 | 0 | 0 | 1 | 7 |
| 9 | Mangaladas Nagar Ext. | 53 | 1 | 1 | 0 | 2 | 2 | 0 | 0 | 1 | 7 |
| 10 | Prakash Nagar | 54 | 1 | 0 | 1 | 2 | 2 | 0 | 0 | 1 | 7 |
| 11 | Ntr Colony | 56 | 1 | 1 | 1 | 2 | 2 | 0 | 0 | 0 | 7 |
| 12 | Gaddipadu | 1 | 1 | 1 | 0 | 2 | 2 | 0 | 0 | 1 | 7 |
| 13 | Sri Krishna Nagar | 2 | 1 | 1 | 1 | 0 | 2 | 2 | 0 | NA | 7 |
| 14 | Ram Rahim Colony | 11 | 1 | 1 | 0 | 0 | 2 | 2 | 0 | 1 | 7 |
| 15 | Maddirala Nagar | 25 | 0 | 1 | 0 | 2 | 2 | 2 | 0 | NA | 7 |
| 16 | Nandamuri Colony | 21 | 0 | 2 | 0 | 0 | 2 | 2 | 1 | NA | 7 |
| 17 | Pig Rearing Colony | 24 | 0 | 2 | 1 | 0 | 0 | 2 | 2 | NA | 7 |
| 18 | Narsi Reddy Colony | 21 | 0 | 2 | 1 | 0 | 2 | 2 | 0 | NA | 7 |
| 19 | Venkatadripet | 49 | 1 | 0 | 1 | 2 | 2 | 0 | 0 | 2 | 8 |
| 20 | Sri Krishna Nagar Extension | 2 | 1 | 2 | 1 | 0 | 2 | 2 | 0 | NA | 8 |
| 21 | Bavaji Nagar | 10 | 1 | 1 | 0 | 2 | 2 | 2 | 0 | 0 | 8 |
| 22 | Shabha Hussain Nagar | 11 | 1 | 0 | 1 | 2 | 2 | 2 | 0 | 0 | 8 |
| 23 | Sugalis Colony | 20 | 1 | 1 | 0 | 2 | 2 | 2 | 0 | 0 | 8 |
| 24 | Koyadorala Colony | 28 | 1 | 2 | 0 | 0 | 2 | 2 | 0 | 1 | 8 |
| 25 | Katikaparula Colony | 29 | 1 | 2 | 0 | 0 | 2 | 2 | 0 | 1 | 8 |
| 26 | Gandhi Nagar, Netaji Nagar | 3 | 0 | 2 | 0 | 2 | 2 | 2 | 0 | NA | 8 |
| 27 | Sugali Colony | 28 | 0 | 0 | 0 | 2 | 2 | 2 | 2 | NA | 8 |
| 28 | Hanumaiah Nagar | 39 | 1 | 1 | 1 | 2 | 2 | 2 | 0 | 0 | 9 |
| 29 | Chandraiah Nagar | 39 | 1 | 0 | 1 | 2 | 0 | 2 | 2 | 1 | 9 |
| 30 | Arundhati Nagar | 49 | 1 | 1 | 0 | 2 | 2 | 2 | 0 | 1 | 9 |
| 31 | Mangaldass Nagar | 50 | 1 | 1 | 1 | 2 | 2 | 2 | 0 | 0 | 9 |
| 32 | Rami Reddythota | 55 | 1 | 0 | 1 | 2 | 2 | 2 | 0 | 1 | 9 |
| 33 | Israilpet | 53 | 1 | 1 | 1 | 2 | 2 | 0 | 2 | 0 | 9 |
| 34 | Vinobha Nagar | 53 | 1 | 1 | 1 | 2 | 2 | 2 | 0 | 0 | 9 |
| 35 | Tarakarama Nagar | 57 | 1 | 2 | 1 | 0 | 2 | 2 | 0 | 1 | 9 |
| 36 | Azad Nagar | 4 | 1 | 1 | 1 | 2 | 2 | 2 | 0 | NA | 9 |
| 37 | Mugdam Nagar | 1 | 1 | 1 | 1 | 2 | 2 | 2 | 0 | NA | 9 |

| S. no | Name of The Slum | Ward No | Nature of slum Score | Population Density Score | Accessibility Score | Water supply availability Score | Availability of Street Lighting Score | Location Vulnerability Score | Ownership of Land Score | Land Tenure Score | Total Score |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 38 | Mallaalingam Nagar | 57 | 1 | 0 | 2 | 2 | 2 | 2 | 0 | NA | 9 |
| 39 | Azad Nagar Extension | 57 | 1 | 1 | 1 | 2 | 2 | 2 | 0 | NA | 9 |
| 40 | Kabadigudem | 1 | 1 | 1 | 1 | 2 | 2 | 2 | 0 | NA | 9 |
| 41 | Suryadevara Peta | 9 | 1 | 0 | 0 | 2 | 2 | 2 | 2 | 0 | 9 |
| 42 | Ankamma Nagar | 11 | 1 | 1 | 1 | 2 | 2 | 2 | 0 | 0 | 9 |
| 43 | Rajeswara Rao Colony | 15 | 1 | 0 | 1 | 2 | 2 | 2 | 1 | 0 | 9 |
| 44 | New Jute Mill Colony | 30 | 1 | 1 | 1 | 2 | 2 | 2 | 0 | NA | 9 |
| 45 | Chenchula Colony | 21 | 1 | 2 | 1 | 0 | 2 | 2 | 0 | 1 | 9 |
| 46 | Krishna Babu Nagar | 22 | 1 | 1 | 0 | 2 | 0 | 2 | 2 | 1 | 9 |
| 47 | Raghav Nagar | 25 | 0 | 2 | 1 | 2 | 2 | 2 | 0 | NA | 9 |
| 48 | Chavali Narayanamma Nagar (Karanam Gari Bazar) | 25 | 0 | 2 | 1 | 2 | 2 | 2 | 0 | NA | 9 |
| 49 | Kuglar Hospital Area | 24 | 0 | 2 | 1 | 2 | 2 | 2 | 0 | NA | 9 |
| 50 | Fakirgudem | 14 | 0 | 2 | 1 | 0 | 2 | 2 | 2 | NA | 9 |
| 51 | Karmikula Colony | 17 | 0 | 2 | 1 | 2 | 2 | 2 | 0 | NA | 9 |
| 52 | Kotha Lakshma Reddy Nagar | 39 | 0 | 2 | 1 | 2 | 2 | 2 | 0 | NA | 9 |
| 53 | Gorila Doddi | 39 | 0 | 0 | 1 | 2 | 2 | 2 | 2 | NA | 9 |
| 54 | Gundaraopet | 36 | 0 | 0 | 1 | 2 | 2 | 2 | 2 | NA | 9 |
| 55 | Bhajarang Nagar | 54 | 0 | 2 | 1 | 2 | 2 | 2 | 0 | NA | 9 |
| 56 | Adarsh Nagar | 11 | 0 | 2 | 1 | 2 | 2 | 2 | 0 | NA | 9 |
| 57 | Ramireddy Nagar | 15 | 0 | 2 | 1 | 2 | 2 | 2 | 0 | NA | 9 |
| 58 | Huzur Nagar | 14 | 0 | 2 | 1 | 2 | 2 | 2 | 0 | NA | 9 |
| 59 | Sriram Nagar | 15 | 0 | 2 | 1 | 2 | 2 | 2 | 0 | NA | 9 |
| 60 | Venkata Krishna Colony | 14 | 0 | 2 | 1 | 2 | 2 | 2 | 0 | NA | 9 |
| 61 | Santhosh Nagar | 54 | 0 | 2 | 1 | 2 | 2 | 2 | 0 | NA | 9 |
| 62 | Brodipet Extn. | 29 | 0 | 2 | 1 | 2 | 2 | 2 | 0 | NA | 9 |
| 63 | Mutyala Reddy Nagar Extn. | 28 | 0 | 2 | 0 | 2 | 2 | 2 | 1 | NA | 9 |
| 64 | Gudesevasula Colony | 39 | 0 | 0 | 1 | 2 | 2 | 2 | 2 | NA | 9 |
| 65 | Stambalagaruvu | 34 | 1 | 1 | 2 | 2 | 2 | 2 | 0 | 0 | 10 |
| 66 | Brodipet Kalava Poramboku | 35 | 1 | 0 | 1 | 2 | 2 | 2 | 1 | 1 | 10 |
| 67 | Basavataraka Nagar | 33 | 1 | 0 | 0 | 2 | 2 | 2 | 2 | 1 | 10 |
| 68 | Gouthami Nagar | 45 | 1 | 0 | 1 | 2 | 2 | 2 | 2 | NA | 10 |
| 69 | Potti Sri Ramulu Nagar | 45 | 1 | 1 | 2 | 2 | 2 | 2 | 0 | 0 | 10 |
| 70 | Bongaralabeedu | 49 | 1 | 1 | 1 | 2 | 2 | 2 | 0 | 1 | 10 |
| 71 | Jagjeevanram Colony | 57 | 1 | 0 | 0 | 2 | 2 | 2 | 2 | 1 | 10 |
| 72 | Vengaiah Nagar | 50 | 1 | 1 | 1 | 2 | 2 | 2 | 0 | 1 | 10 |

| S. no | Name of The Slum | Ward No | Nature of slum Score | Population Density Score | Accessibility Score | Water supply availability Score | Availability of Street Lighting Score | Location Vulnerability Score | Ownership of Land Score | Land Tenure Score | Total Score |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 73 | Tamma Ranga Reddy Nagar | 53 | 1 | 1 | 0 | 2 | 2 | 2 | 0 | 2 | 10 |
| 74 | Timmaiah Nagar | 57 | 1 | 1 | 0 | 2 | 2 | 2 | 0 | 2 | 10 |
| 75 | Rtc Colony | 54 | 1 | 2 | 1 | 2 | 2 | 2 | 0 | 0 | 10 |
| 76 | Ambedkar Nagar | 57 | 1 | 1 | 1 | 2 | 2 | 2 | 0 | 1 | 10 |
| 77 | Vasavi Nagar | 4 | 1 | 2 | 0 | 2 | 2 | 2 | 0 | 1 | 10 |
| 78 | Rajagopala Nagar | 5 | 1 | 2 | 0 | 2 | 2 | 2 | 0 | 1 | 10 |
| 79 | Alli Nagar | 2 | 1 | 1 | 2 | 2 | 2 | 2 | 0 | NA | 10 |
| 80 | Lakshmi Nagar | 1 | 1 | 2 | 1 | 2 | 2 | 2 | 0 | 0 | 10 |
| 81 | Mugdum Nagar Extension | 57 | 1 | 2 | 1 | 2 | 2 | 2 | 0 | NA | 10 |
| 82 | Md. Jani Nichhentha Nagar | 2 | 1 | 2 | 1 | 2 | 2 | 2 | 0 | NA | 10 |
| 83 | Vaddigudem | 10 | 1 | 0 | 1 | 2 | 2 | 2 | 2 | NA | 10 |
| 84 | Fathima Nagar | 3 | 1 | 0 | 2 | 2 | 2 | 2 | 0 | 1 | 10 |
| 85 | Pamula Colony | 20 | 1 | 1 | 1 | 0 | 2 | 2 | 2 | 1 | 10 |
| 86 | Suddapalli Donka | 15 | 1 | 2 | 1 | 2 | 0 | 2 | 0 | 2 | 10 |
| 87 | Sai Baba Colony | 15 | 1 | 1 | 1 | 2 | 2 | 2 | 0 | 1 | 10 |
| 88 | Bibi Nagar | 17 | 1 | 2 | 1 | 2 | 2 | 2 | 0 | NA | 10 |
| 89 | Rehabilitation Colony | 24 | 1 | 0 | 0 | 2 | 2 | 2 | 2 | 1 | 10 |
| 90 | Sri Lakshmi Nagar | 31 | 1 | 1 | 0 | 2 | 2 | 2 | 0 | 2 | 10 |
| 91 | Chandrababu Naidu Colony | 24 | 1 | 1 | 0 | 2 | 2 | 2 | 2 | 0 | 10 |
| 92 | Yathiraja Nagar | 39 | 0 | 1 | 1 | 2 | 2 | 2 | 2 | NA | 10 |
| 93 | Bhavanipuram | 1 | 0 | 2 | 2 | 2 | 2 | 2 | 0 | NA | 10 |
| 94 | Durga Nagar | 15 | 0 | 2 | 0 | 2 | 2 | 2 | 2 | NA | 10 |
| 95 | Vikalangula Colony | 15 | 0 | 1 | 1 | 2 | 2 | 2 | 2 | NA | 10 |
| 96 | Vaddera Colony (Svn Colony) | 25 | 0 | 2 | 2 | 0 | 2 | 2 | 2 | NA | 10 |
| 97 | Samatha Nagar, Behind Medical Hostel | 28 | 0 | 2 | 0 | 2 | 2 | 2 | 2 | NA | 10 |
| 98 | Kalakarula Colony | 15 | 0 | 1 | 1 | 2 | 2 | 2 | 2 | NA | 10 |
| 99 | Nirupedala Colony | 21 | 0 | 0 | 2 | 2 | 2 | 2 | 2 | NA | 10 |
| 100 | Devapuram | 34 | 1 | 1 | 1 | 2 | 2 | 2 | 1 | 1 | 11 |
| 101 | Georgepet | 35 | 1 | 1 | 1 | 2 | 2 | 2 | 1 | 1 | 11 |
| 102 | Cobaldpet | 38 | 1 | 2 | 1 | 2 | 2 | 2 | 0 | 1 | 11 |
| 103 | Gujjanagundla | 44 | 1 | 1 | 1 | 2 | 2 | 2 | 2 | NA | 11 |
| 104 | Nayee Brahmin Colony | 39 | 1 | 1 | 0 | 2 | 2 | 2 | 2 | 1 | 11 |
| 105 | Ratnapuri Colony | 39 | 1 | 1 | 2 | 2 | 2 | 2 | 0 | 1 | 11 |
| 106 | Ganesh Nagar | 38 | 1 | 1 | 0 | 2 | 2 | 2 | 2 | 1 | 11 |
| 107 | Mallikharjunapet | 43 | 1 | 1 | 1 | 2 | 2 | 2 | 0 | 2 | 11 |
| 108 | Mahaboob Nagar, Arundelpet | 44 | 1 | 2 | 1 | 2 | 2 | 2 | 0 | 1 | 11 |

| S. no | Name of The Slum | Ward No | Nature of slum Score | Population Density Score | Accessibility Score | Water supply availability Score | Availability of Street Lighting Score | Location Vulnerability Score | Ownership of Land Score | Land Tenure Score | Total Score |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 109 | Sanjeevaiah Nagar | 50 | 1 | 1 | 2 | 2 | 2 | 2 | 0 | 1 | 11 |
| 110 | Velangini Nagar | 52 | 1 | 2 | 0 | 2 | 2 | 2 | 2 | 0 | 11 |
| 111 | Sarada Colony | 53 | 1 | 1 | 0 | 2 | 2 | 2 | 2 | 1 | 11 |
| 112 | Navabharath Muta Maistry Colony | 49 | 1 | 2 | 2 | 0 | 2 | 2 | 0 | 2 | 11 |
| 113 | Venkata Rao Nagar Colony & Extension | 54 | 1 | 1 | 1 | 2 | 2 | 0 | 2 | 2 | 11 |
| 114 | Jakeer Hussain Nagar | 2 | 1 | 1 | 1 | 2 | 2 | 2 | 0 | 2 | 11 |
| 115 | Anandapet, Yanadi Colony | 57 | 1 | 1 | 1 | 2 | 2 | 2 | 2 | 0 | 11 |
| 116 | Bhagat Singhnagar | 1 | 1 | 1 | 1 | 2 | 2 | 2 | 2 | NA | 11 |
| 117 | Swarnakarula Colony | 11 | 1 | 1 | 1 | 2 | 2 | 2 | 2 | NA | 11 |
| 118 | Indira Priya Darsini Colony | 9 | 1 | 1 | 1 | 2 | 2 | 2 | 2 | 0 | 11 |
| 119 | Nallakunta | 11 | 1 | 1 | 1 | 2 | 2 | 2 | 2 | 0 | 11 |
| 120 | Subbareddy Nagar | 15 | 1 | 1 | 0 | 2 | 2 | 2 | 2 | 1 | 11 |
| 121 | Joseph Nagar | 13 | 1 | 2 | 1 | 2 | 2 | 2 | 0 | 1 | 11 |
| 122 | Sundaranandanav-anam | 20 | 1 | 0 | 2 | 2 | 2 | 2 | 0 | 2 | 11 |
| 123 | Mahathma Gandhi Nagar | 14 | 1 | 1 | 1 | 2 | 2 | 2 | 0 | 2 | 11 |
| 124 | Sai Krishna Nagar | 14 | 1 | 2 | 0 | 2 | 2 | 2 | 2 | 0 | 11 |
| 125 | Kalyani Nagar | 14 | 1 | 2 | 0 | 2 | 2 | 2 | 2 | 0 | 11 |
| 126 | Sai Baba Nagar | 15 | 1 | 2 | 0 | 2 | 2 | 2 | 0 | 2 | 11 |
| 127 | Mohammad Jani Rajakula Colony | 17 | 1 | 1 | 0 | 2 | 2 | 2 | 2 | 1 | 11 |
| 128 | Sramikula Colony | 17 | 1 | 1 | 1 | 2 | 2 | 2 | 0 | 2 | 11 |
| 129 | Kidambi Colony | 14 | 1 | 2 | 0 | 2 | 2 | 2 | 0 | 2 | 11 |
| 130 | Workers Colony | 31 | 1 | 0 | 1 | 2 | 2 | 2 | 2 | 1 | 11 |
| 131 | Yanadi Colony | 25 | 0 | 2 | 1 | 2 | 2 | 2 | 2 | NA | 11 |
| 132 | Samatha Nagar | 25 | 0 | 2 | 1 | 2 | 2 | 2 | 2 | NA | 11 |
| 133 | Chaitanya Nagar | 2 | 0 | 2 | 1 | 2 | 2 | 2 | 2 | NA | 11 |
| 134 | Rajarajeswari Nagar | 36 | 1 | 1 | 2 | 2 | 2 | 2 | 1 | 1 | 12 |
| 135 | Koritepadu | 34 | 1 | 1 | 2 | 2 | 2 | 2 | 0 | 2 | 12 |
| 136 | Brodipet Donka | 38 | 1 | 1 | 2 | 2 | 2 | 2 | 2 | 0 | 12 |
| 137 | Tufan Nagar | 45 | 1 | 1 | 1 | 2 | 2 | 2 | 2 | 1 | 12 |
| 138 | Sanjay Gandhi Nagar | 37 | 1 | 1 | 1 | 2 | 2 | 2 | 2 | 1 | 12 |
| 139 | Burial Ground (Bongaralabeedu) | 49 | 1 | 1 | 2 | 2 | 2 | 2 | 2 | 0 | 12 |
| 140 | Priya Banjara Colony' | 51 | 1 | 1 | 1 | 2 | 2 | 2 | 2 | 1 | 12 |
| 141 | Sitarama Nagar | 54 | 1 | 2 | 1 | 2 | 2 | 2 | 0 | 2 | 12 |
| 142 | Manipuram | 55 | 1 | 1 | 2 | 2 | 2 | 0 | 2 | 2 | 12 |
| 143 | Weavers Colony | 5 | 1 | 2 | 1 | 2 | 2 | 2 | 0 | 2 | 12 |
| 144 | Paramayyakunta | 2 | 1 | 2 | 2 | 2 | 2 | 2 | 0 | 1 | 12 |

| S. no | Name of The Slum | Ward No | Nature of slum Score | Population Density Score | Accessibility Score | Water supply availability Score | Availability of Street Lighting Score | Location Vulnerability Score | Ownership of Land Score | Land Tenure Score | Total Score |
|-------|------------------|---------|---------------------|--------------------------|---------------------|----------------------------------|----------------------------------------|------------------------------|-------------------------|-------------------|-------------|
| 145 | Lalbahadur Nagar | 4 | 1 | 2 | 1 | 2 | 2 | 2 | 2 | 0 | 12 |
| 146 | Golusukondalarao Nagar | 2 | 1 | 2 | 1 | 2 | 2 | 2 | 2 | 0 | 12 |
| 147 | Balaji Nagar Extension | 56 | 1 | 2 | 1 | 2 | 2 | 2 | 0 | 2 | 12 |
| 148 | Gandhi Nagar | 8 | 1 | 1 | 1 | 2 | 2 | 2 | 2 | 1 | 12 |
| 149 | Sampath Nagar | 3 | 1 | 1 | 2 | 2 | 2 | 2 | 0 | 2 | 12 |
| 150 | Indiragandhi Nagar | 9 | 1 | 1 | 1 | 2 | 2 | 2 | 2 | 1 | 12 |
| 151 | Damodaram Saneevaiah Nagar | 10 | 1 | 0 | 2 | 2 | 2 | 2 | 2 | 1 | 12 |
| 152 | Lakshmi Raghuramaiahnagar | 9 | 1 | 1 | 1 | 2 | 2 | 2 | 2 | 1 | 12 |
| 153 | Akulavari Thota | 3 | 1 | 2 | 1 | 2 | 2 | 2 | 0 | 2 | 12 |
| 154 | A T Agraharam | 9 | 1 | 1 | 2 | 2 | 2 | 2 | 0 | 2 | 12 |
| 155 | Hanuman Nagar | 10 | 1 | 2 | 1 | 2 | 2 | 2 | 0 | 2 | 12 |
| 156 | Srinivasarao Thota | 9 | 1 | 2 | 1 | 2 | 2 | 2 | 0 | 2 | 12 |
| 157 | Seethamma Colony | 14 | 1 | 2 | 1 | 2 | 2 | 2 | 2 | 0 | 12 |
| 158 | K V P Colony | 15 | 1 | 1 | 1 | 2 | 2 | 2 | 2 | 1 | 12 |
| 159 | Sivaram Nagar | 17 | 1 | 1 | 2 | 2 | 2 | 2 | 0 | 2 | 12 |
| 160 | Menaka Gandhi Nagar | 19 | 1 | 2 | 1 | 2 | 2 | 2 | 0 | 2 | 12 |
| 161 | Sugali Colony | 30 | 1 | 1 | 1 | 2 | 2 | 2 | 2 | 1 | 12 |
| 162 | Bhanuprasad & Sasankgoyal Colony | 29 | 1 | 1 | 1 | 2 | 2 | 2 | 2 | 1 | 12 |
| 163 | Peeru Thota | 45 | 1 | 2 | 2 | 2 | 2 | 2 | 0 | 2 | 13 |
| 164 | Naidupet | 38 | 1 | 2 | 2 | 2 | 2 | 2 | 2 | NA | 13 |
| 165 | Vasantarayapuram | 55 | 1 | 2 | 2 | 2 | 2 | 2 | 0 | 2 | 13 |
| 166 | Shop Employees' Colony | 2 | 1 | 2 | 2 | 2 | 2 | 2 | 0 | 2 | 13 |
| 167 | Ramanamakshetram Extension | 9 | 1 | 2 | 2 | 2 | 2 | 2 | 0 | 2 | 13 |
| 168 | Gorrelamandi | 9 | 1 | 2 | 2 | 2 | 2 | 2 | 0 | 2 | 13 |
| 169 | Yesu Bhakta Nagar | 17 | 1 | 2 | 2 | 2 | 2 | 2 | 0 | 2 | 13 |
| 170 | Santhi Nagar | 18 | 1 | 2 | 2 | 2 | 2 | 2 | 0 | 2 | 13 |
| 171 | Krishna Babu Colony | 28 | 1 | 2 | 1 | 2 | 2 | 2 | 2 | 1 | 13 |
| 172 | Vengalarao Nagar | 44 | 1 | 2 | 2 | 2 | 2 | 2 | 2 | 1 | 14 |
| 173 | Balaji Nagar | 4 | 1 | 2 | 1 | 2 | 2 | 2 | 2 | 2 | 14 |

NA- Data Not Available

## Notes:

## Notes:

SHILPA DIGITAL STUDIO'S

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