

Sustainable City Strategy - Mysuru

Sustainable Cities -
Integrated Approach Pilot (SCIAP)



SUBMITTED TO:



Mysuru City Corporation

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May 2022

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This report has been prepared under the Sustainable Urban Planning and Management component of the Sustainable Cities Integrated Approach Pilot (SCIAP) project funded by the Global Environment Facility (GEF-6). It documents the Sustainable City Strategies (SCS) which are intended to be targeted and cater to specifically identified issues for each of the five pilot cities - Bhopal, Guntur, Jaipur, Mysuru and Vijayawada during the City Profile and Diagnostic stage. 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. Knowledge material published by UN-Habitat, The World Bank, other agencies are referred to formulate the Sustainable City Strategies. While UN-Habitat checks data, information to the fullest extent possible, the responsibility for the accuracy of the data, information 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, information.

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SUSTAINABLE CITY STRATEGY- MYSURU

Sustainable Cities Integrated Approach Pilot (SCIAP)
Component 1: Sustainable Urban Planning and Management



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List of Acronyms

AMRUT	Atal Mission for Rejuvenation and Urban Transformation
DULT	Directorate of Urban Land Transport
DoIT&C	Department of Information Technology and Communication
EV	Electric Vehicle
EWS	Economically Weaker Section
FAR	Floor Area Ratio
FBC	Form Based Codes
GEF	Global Environment Facility
GHG	Greenhouse Gas
GIS	Geographical Information System
GoK	Government of Karnataka
GPSC	Global Platform for Sustainable Cities
INR	Indian Rupee
IPT	Intermediate Public Transport
ITS	Intelligent Transport System
KIADB	Karnataka Industrial Area Development Board
KMDS	Karnataka Municipal Data Society
KRED	Karnataka Renewable Energy Development Ltd.
KSNDMC	Karnataka State Natural Disaster Management Centre
KSPCB	Karnataka Pollution Control Board – Mysuru Regional Office
KSRTC	Karnataka State Road Transport Corporation
KSSIDC	Karnataka State Small Industrial Development Corporation
KUIDFC	Karnataka Urban Infrastructure Development and Finance Corporation
KWSDB	Karnataka Water Supply and Drainage Board
LIG	Low Income Group
LPA	Local Planning Area
MCC	Mysuru City Corporation
MLCP	Multi-level Car Park
MoEFCC	Ministry of Environment, Forests and Climate Change
MoHUA	Ministry of Housing and Urban Affairs
MSWM	Municipal Solid Waste Management
TCO₂-e	Tonnes of carbon dioxide equivalent
MTD	Metric Tonnes per Day
MUDA	Mysuru Urban Development Authority
NGO	Non-Governmental Organization
NGT	National Green Tribunal

NH	National Highway
NIUA	National Institute of Urban Affairs
NMSH	National Mission on Sustainable Habitat
NMT	Non-Motorized Transport
NUA	New Urban Agenda
NUP	National Urban Policy
PPH	Persons Per Hectare
PPP	Public Private Partnership
PwD	People with Disabilities
RoW	Right of Way
SBM	Swachh Bharat Mission
SAPCC	State Action Plan on Climate Change
SCIAP	Sustainable Cities – Integrated Approach Pilot
SCS	Sustainable City Strategies
SH	State Highway
SHG	Self Help Group
T&CP	Town & Country Planning Department
UDA	Urban Development Authority
ULB	Urban Local Body
UN-HABITAT	United Nations Human Settlements Program
UNIDO	United Nations Industrial Development Organization
URDPFI	Urban and Regional Development Plans Formulation and Implementation
USAF	Urban Sustainability Assessment Framework
USIR	Urban Sustainability Indicators Report
ZDP	Zonal Development Plan



St. Philomena's Church in Mysore

INTRODUCTION

1.1 Report Objectives

The Sustainable City Strategy (SCS) constitutes the final step of a three-step process under the Sustainable Cities Integrated Approach Pilot (SCIAP) Component 1 of the project. The first two steps being the application of the Urban Sustainability Assessment Framework (USAF) captured in the Urban Sustainability Indicators Report (USIR) and the City Profile and Diagnostic Report. The City Profile and Diagnostic Report identified very specific diagnostic issues, which were essentially the key problem areas, obstacles and developmental challenges being faced by Mysuru. These challenges were ascertained on the basis of evidence collected and assessed through the USAF¹. As the third and final step, this report documents the SCS for Mysuru, which is a spatial strategic plan with very specific actions and interventions designed to be targeted and impact-oriented on ground. These strategies will strengthen and enable city leadership and managers to drive future development based on quantifiable data and assessment using rationale decision-making.

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

- i) To identify strategic development opportunities for the city based on spatial evidence aligned with local, state, and national policies and regulations.
- ii) To design cross-sectoral and intra-sectoral strategies for an inclusive, sustainable, and resilient future development of the city, and contribute towards improving the city's climate emissions profile.
- iii) To design and develop area-based, transformative interventions to demonstrate change on ground.
- iv) To ascertain specific actions and interventions necessary for transformative impact over a five-year period.

- v) Recommend convergence with national/ state missions for financing and technical resources.

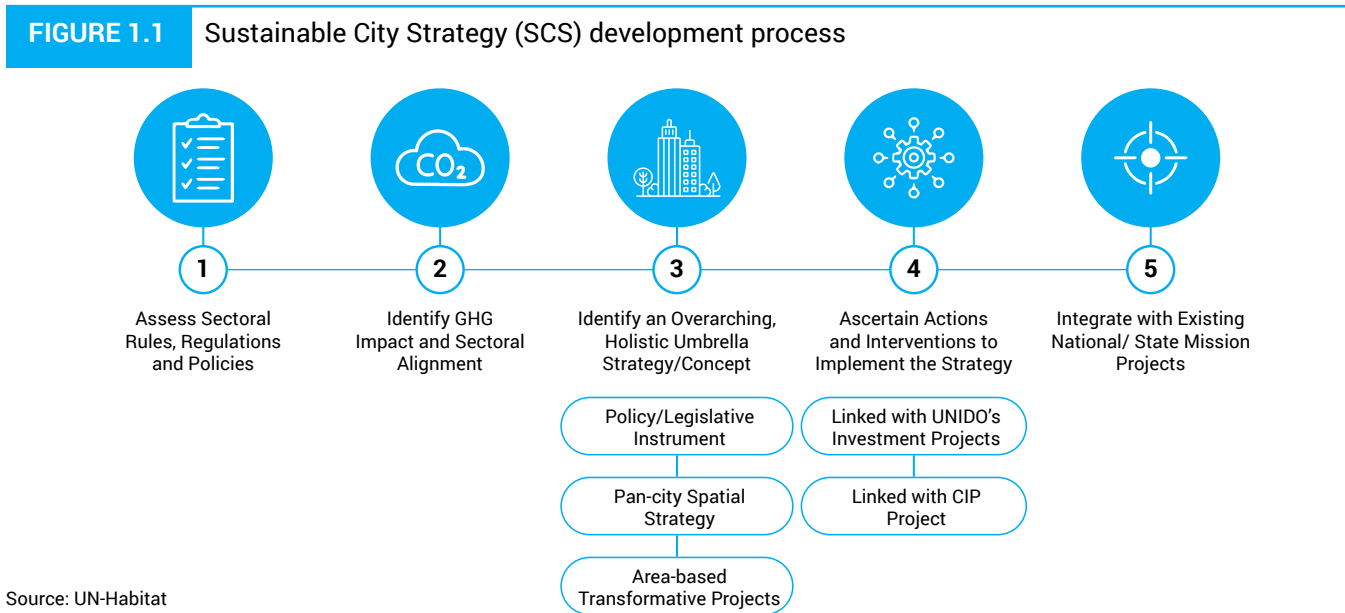
1.2 Approach and Methodology

The foundation of the SCS is in the New Urban Agenda (NUA) with the following five pillars (except Pillar 1, since it is beyond the scope of SCIAP) of the NUA having been the guiding document in framing the SCS:

- i) National Urban Policies (NUPs)
- ii) Rules and Regulations
- iii) Urban Planning and Design
- iv) Financing Urbanization
- v) Local Implementation

A detailed guidance note on the development of the SCS has been shared in Annex 1. The strategies could take the form of pan-city, intersectoral spatial interventions, area-based projects and even legislative/ policy-based instruments. Emphasis was given to the carbon footprint profile of sectors and the relationship with the intended strategic interventions to ensure that maximum carbon capturing is achieved. Significant effort has been made to ensure convergence with projects and sectors covered by the national missions and state schemes/policies with the recommended interventions.

The overarching steps followed for developing the SCS have been illustrated in Figure 1.1:



Source: UN-Habitat

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

1.3 Scope and Limitations

The SCS is intended to be very targeted and to cater to specifically identified issues in the previous stage of the project. SCS would complement a city's master plan and development plans by synergizing the proposed actions and interventions within the broad mandate and vision of these plans. SCS strengthens the implementation of the city's development vision by preparing specific actions and interventions for on-ground transformation and impact.

This SCS will help municipal corporations to identify the following:²

1. Where are the areas of growth and what type of growth?
2. Where should investments from various national and state missions/ schemes be located to maximize their impact on vulnerable social groups?
3. How can the existing natural and economic assets of the city be preserved and enhanced?
4. How can quality of life and equitable provision of urban amenities be enhanced?
5. How can interventions be prioritized to ensure practicality and maximum impact?

The following limitations need to be considered while assessing the strategic interventions:

1. The cost estimates have been calculated on block cost thumb rules derived from industry standards

being used in the national missions. All assumptions have been listed out in detail for context building and understanding.

2. The concept designs and spatial location of proposed interventions are shown for approach demonstration purpose only, the interventions would require detailed planning and engineering studies to arrive at accurate costing and spatial design.
3. The GHG savings given for the strategic interventions are based on very high-level standards and metrics since these must be calculated at the detailed design stage with site specific inputs.
4. The analysis of legislations and policies is limited to its high-level implication of diagnostics issues. The SCS does not intend to provide detailed assessment of legislative framework and amendments to the policy and legislative framework.
5. The data and information used in the SCS are based on secondary sources available in the public domain. Primary data collection is limited to site visits and stakeholder consultations.
6. In some cases, latest spatial data, specifically land use and population density, were not available with the Urban Local Bodies (ULBs) and many assumptions had to be made by the teams, which have been mentioned.

² <https://unhabitat.org/sites/default/files/2014/07/A-guide-for-Municipalities-Inclusive-and-Sustainable-Urban-Development-Planning-Volume-1.pdf>



Chamarajendra Circle

2

CITY DIAGNOSTICS

2.1 Climate Context and GHG Emission Profile

The District Disaster Management Plan (2017), states that the district experiences 792 mm of rainfall per annum, 50 per cent of which occurs during the south-west monsoon.³ It also suggests that the minimum temperature varies from 34–21°C in April to 16.4–28.5°C in January.

One study, looking at climate change over the period 1986–2016, suggests that climate variability and climate change impacts may lead to a gradual decrease in annual rainfall, and a general decrease in monthly temperature, but an increase in yearly summer and monsoon temperatures.⁴

According to a GEF-UNIDO study (2017)⁵, the GHG emission in Mysuru during 2015 and 2016 was 1,556,146 CO₂-e.⁶ The total emissions from each greenhouse gas (GHG) were, 1,432,030 CO₂, 3801.30 Mt CH₄, and 66.72 Mt N₂O. As shown in Figure 2.1, the stationary energy sector emitted 829,106 Mt CO₂-e, accounting for 53 per cent of the total GHG emissions during 2015-2016. The transportation sector emitted 602,924 Mt CO₂-e, 39 per cent of the total; while 114,162 Mt CO₂-e (seven per cent of the total) was emitted by the waste sector and 9,954.4 Mt CO₂-e, just 1 per cent, by the agriculture, forestry, and other land uses

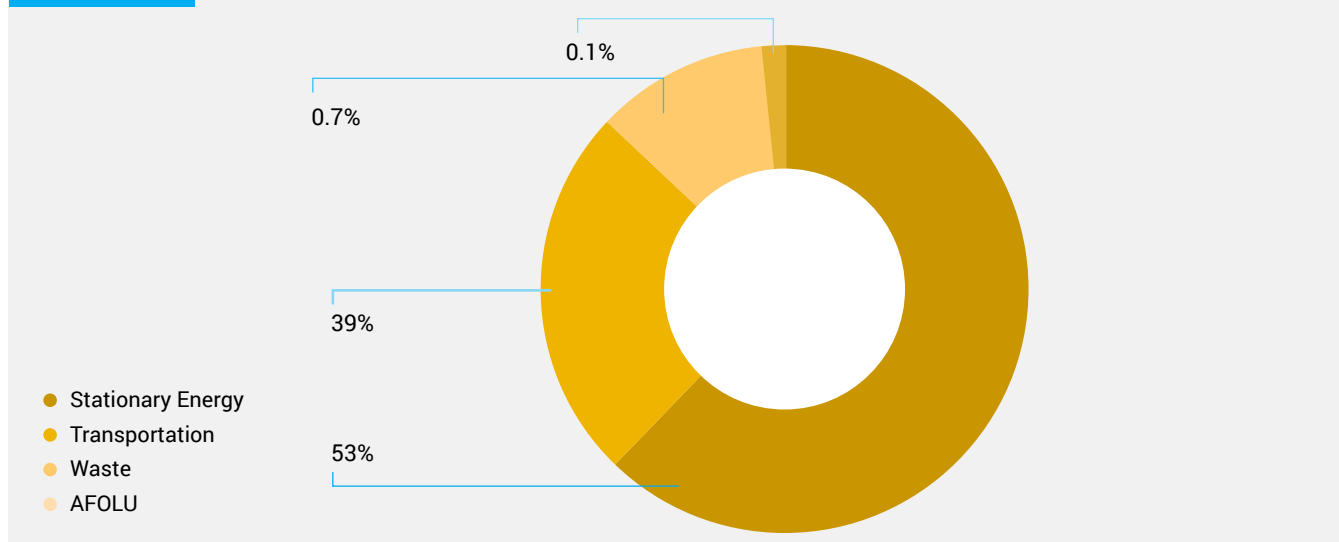
(AFOLU). There are no emissions from the IPPU sector, and the annual CO₂-e emissions per capita was 1.43 Mt CO₂-e/capita during 2015-2016.

2.2 Sectoral Assessment

Mysuru was assessed over the 12 Urban Sustainability Assessment Framework (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.

For Mysuru, 73 per cent of all indicators (96 out of the 131 indicators), were collected. Eighty-three per cent of all primary indicators were collected. Mysuru obtained a score of 3, 'medium' performance. The score obtained in each sector is illustrated in Figure 2.2. The top performing sectors were solid waste management, water, sanitation and finance. The least performing sectors were disaster risk management, governance, environment and ecology and transport.⁷

FIGURE 2.1 Mysuru City Conurbation Boundary with proposed land use



Source: Development Control Regulation, Master Plan 2031 (2012)

³ District Disaster Management Plan. (2017). District Disaster Management Authority Mysuru, Karnataka, November 2017. Doi: <https://cdn.s3waas.gov.in/s30d3180d672e08b4c5312dcdafdf6ef36/uploads/2018/08/2018081453.pdf>.

⁴ Megahed, A. and Srikantaswamy, S. (2020). "Study of the Indicators of Climate Change in Mysuru District, Karnataka, India." Atmospheric and Climate Sciences, 10, 159-167. Doi: 10.4236/acs.2020.102008.

⁵ GHG Accounting and Capacity Building for the Cities of Jaipur, Bhopal, Mysuru, Vijayawada and Guntur as a first step under the GEF-UNIDO-MoUD Project (2017).

⁶ This is the second lowest out of all five Sustainable Cities (Mysuru, Jaipur, Bhopal, Vijayawada, and Guntur).

⁷ Clean energy is not included in the low performing sectors since data for less than 50 per cent of the indicators were collected.

For the sector-wise indicator performance, refer to the Mysuru Urban Sustainability Indicators Report and for detailed sector-wise inferences refer to the section on Sectoral Context (Chapter 4.4) of the Mysuru City Profile and Diagnostic Report.⁸

2.3 Key Issues Diagnosed

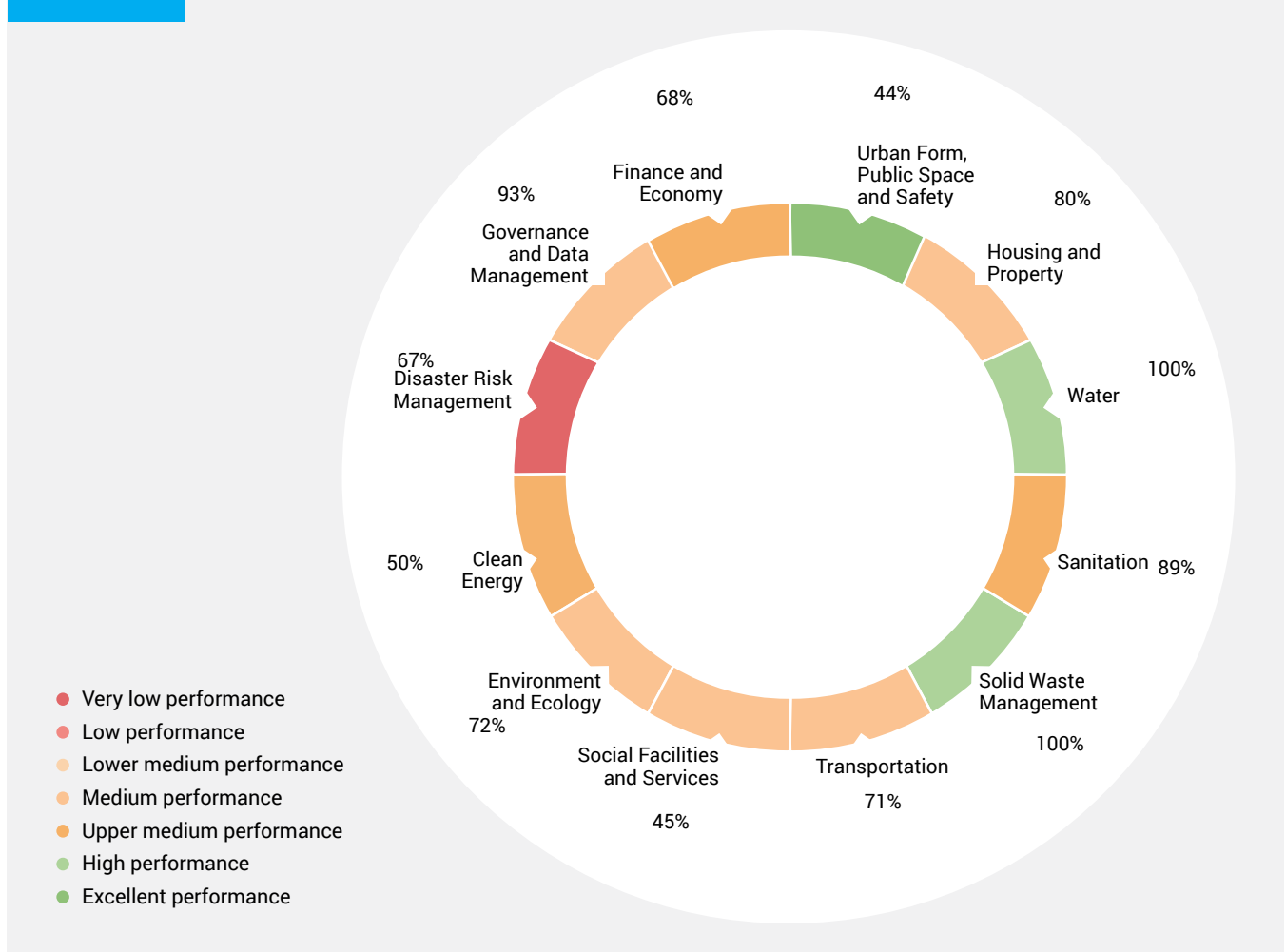
The city diagnostic study of Guntur has identified the following key spatial aspects, which are significant for identifying strategic issues as well as for developing sustainable city strategies.

City boundaries: The Mysuru Local Planning Area (LPA) includes the Mysuru city conurbation, as well as the smaller

urban center to the South, Nanjangud, and substantial agricultural lands. The Mysuru LPA covers approximately a total of 495 .32 sq. km. and is divided into 45 planning districts.⁹

The Mysuru city conurbation’s civic administration is the responsibility of the Mysuru Urban Development Authority (MUDA); however, within this area, the Mysuru city civic administration is the responsibility of the Mysuru City Corporation (MCC). The built-up area reaches beyond the MCC boundary and merges with several nearby villages that are under the authority of Panchayats, or village councils.¹⁰ The Mysuru city conurbation boundary is highlighted in yellow in Figure 2.3. It covers 292.42 sq. km and the current population (in 2021) is estimated to be 16.5 lakh.¹¹

FIGURE 2.2 Performance and percentage of indicators collected for the 12 USAF sectors



Source: UN-Habitat

⁸ This report is available on UN-Habitat India’s website. <https://www.unhabitat.org/in/knowledge>.

⁹ Master Plan II - 2031 Mysuru Nanjangud Local Planning Area. Zoning of Landuse and Development Control Regulations. Volume III.

¹⁰ This is based on the definition of Urban Extent (Angel, S. (2012). Planet of Cities. Lincoln Institute of Land Policy), although with limited population data (dated 2011), observations from Google Earth have also been considered.

¹¹ This variation in population refers to the three population projection methods used by MUDA in the Master Plan 2031, the Geometric, Trend and Exponential Method. This means that population data from 2011 is used as a basis for all proposals within this report (including those that consider population predictions).

The area within the smaller MCC boundary is divided into 65 administrative units or wards. In 2018, the MCC boundary was extended by 4.4 km; however, the ward boundaries remained the same.

Several factors have contributed to the urban expansion of Mysuru. A few recent projects that have triggered growth include an industrial zone to the Northwest of the MCC boundary, an airport expansion in the South as well as a new 'film city' development, and several transport sector infrastructure projects, including the construction of the outer ring-road, and highway connecting Mysuru with Bengaluru.

A planned peripheral ring-road, 5-6 km from the existing outer ring-road, may also contribute towards the city's expansion. Relevant city, state and national projects will be highlighted within each of the 'Strategic Responses' in the following chapters.

Population: Population data is based primarily on census data for the area within the MCC boundary, which uses ward-based administrative units. The population of Mysuru has grown 3.9 per cent per year, which is twice that of the state and district.¹² In 2011, the population of the MCC was approximately 8.9 lakh, and is predicted to be 21 lakh by 2031.¹³

Population density for the area within the MCC boundary averages at around 128 people per hectare (pph). The city is, therefore, predominantly in the low-medium density category, with 60 per cent of the city's area under 150 pph or less. Wards 54 and 59 have the highest number of people (31,422 and 27,026, respectively); however, a number of clustered wards in the city's north-eastern corner, as well as wards 50 and 22, have the highest population density within the MCC boundary (234–671 pph).¹⁴ See Annex 2 for the population data summary used for all strategic responses.



Mysuru–Nanjangud Local Planning Area Master Plan – 2031¹⁵

In 2012, the first LPA master plan iteration for the period 1997-2011 was revised and approved for the period up to

2031. This is currently under revision and is expected to be completed in 2022. The main objectives of this Mysuru–Nanjangud LPA for 2031 are:

1. To promote investment in non-polluting economic activities (technology and tourism)
2. To promote and conserve the cultural heritage, preserve the natural characteristics of the city and its environs through special Development Regulations
3. To have suitable planning measures to protect natural landscapes like water bodies, natural hills and valleys by declaring a “Special Eco-planning District”
4. To improve transport for peri-urban areas and de-concentration of economic activities.

This plan uses three main rings for zoning and regulations. These are – (a) Intensely Developed Area (Zone-A), which includes the central business district (CBD) and is within the inner ring road; (b) Moderately Developed Area (Zone-B), outside the inner ring road but within the outer ring road, including old extensions within the intermediate ring road, such as, Vidyaranya Puram, Ashok Puram, KM Puram, Jayanagar, Kesare Extension, Gayatri Puram, Gandhi Nagar and Shanthi Nagar; and (c) Sparsely Developed Area (Zone-C), outside the outer ring road but within the LPA.

The LPA Master Plan 2031 outlines the key land uses within the Mysuru city conurbation, and proposes the following changes in land use (see Table 2.1):

These objectives, proposals and key socio-spatial dynamics have formed the basis for developing the Strategic Responses outlined below. For more details on the city context, profile and data, please refer to Chapter 4: Existing Urban Analysis of the Mysuru City Profile and Diagnostic Report .

From the three lowest performing USAF sectors in the city, four strategic issues were identified using the lowest performing indicators from the respective sectors (see Section 4.4 of the Mysuru City Profile and Diagnostic Report). An inter-sectoral linkage was complemented by consultations with city officials to arrive at the following strategic issues:

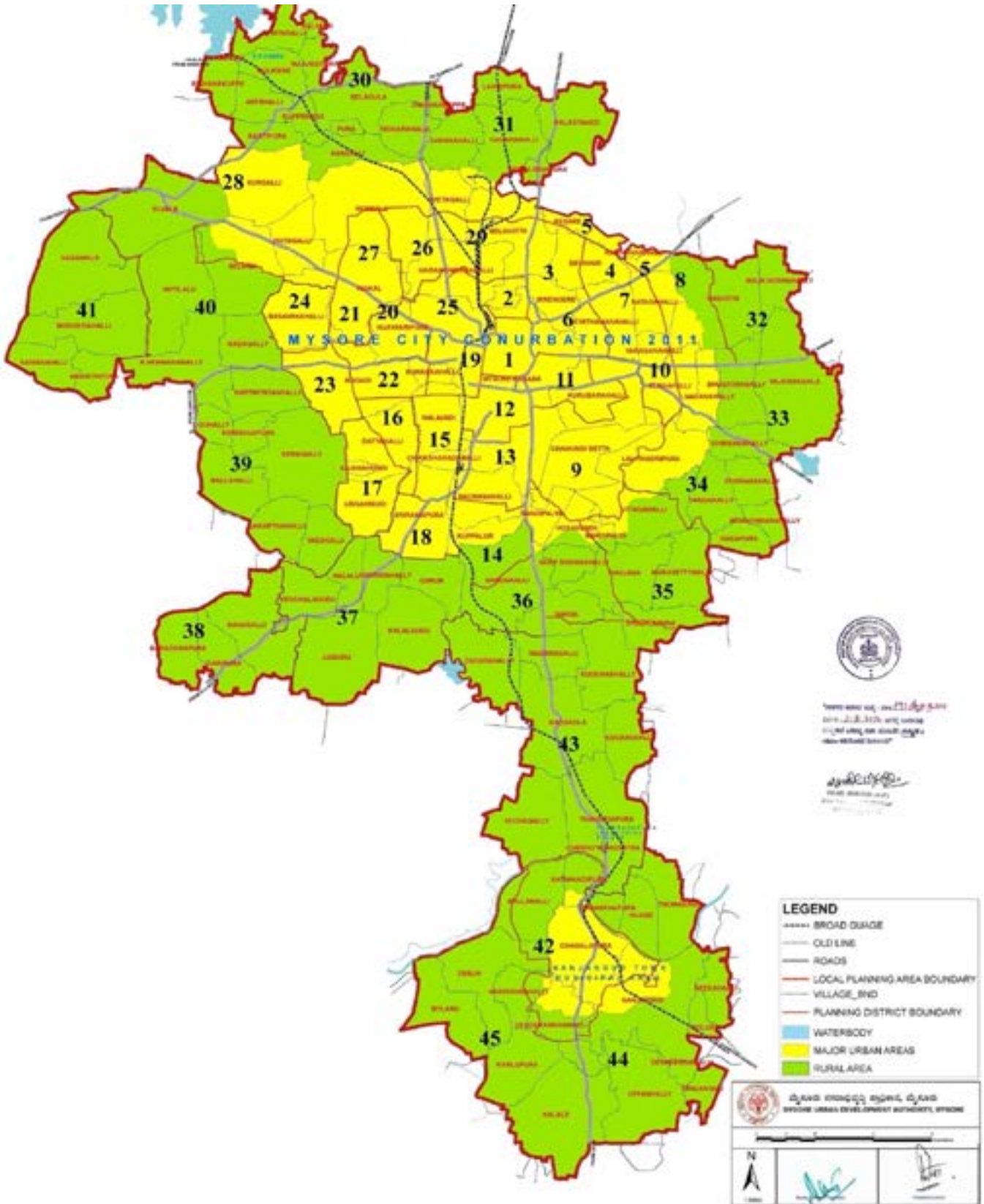
- 1) Increase in Urban Sprawl
- 2) Sub-optimal Use of Non-Motorized Transportation
- 3) Vulnerable Environment and Ecology
- 4) Lack of Digital Governance Initiatives

¹² Census of India, 2011. https://censusindia.gov.in/2011census/dchb/2923_PART_B_DCHB_MYSURU.pdf.

¹³ There are some variations in total population for 2011 between sources.

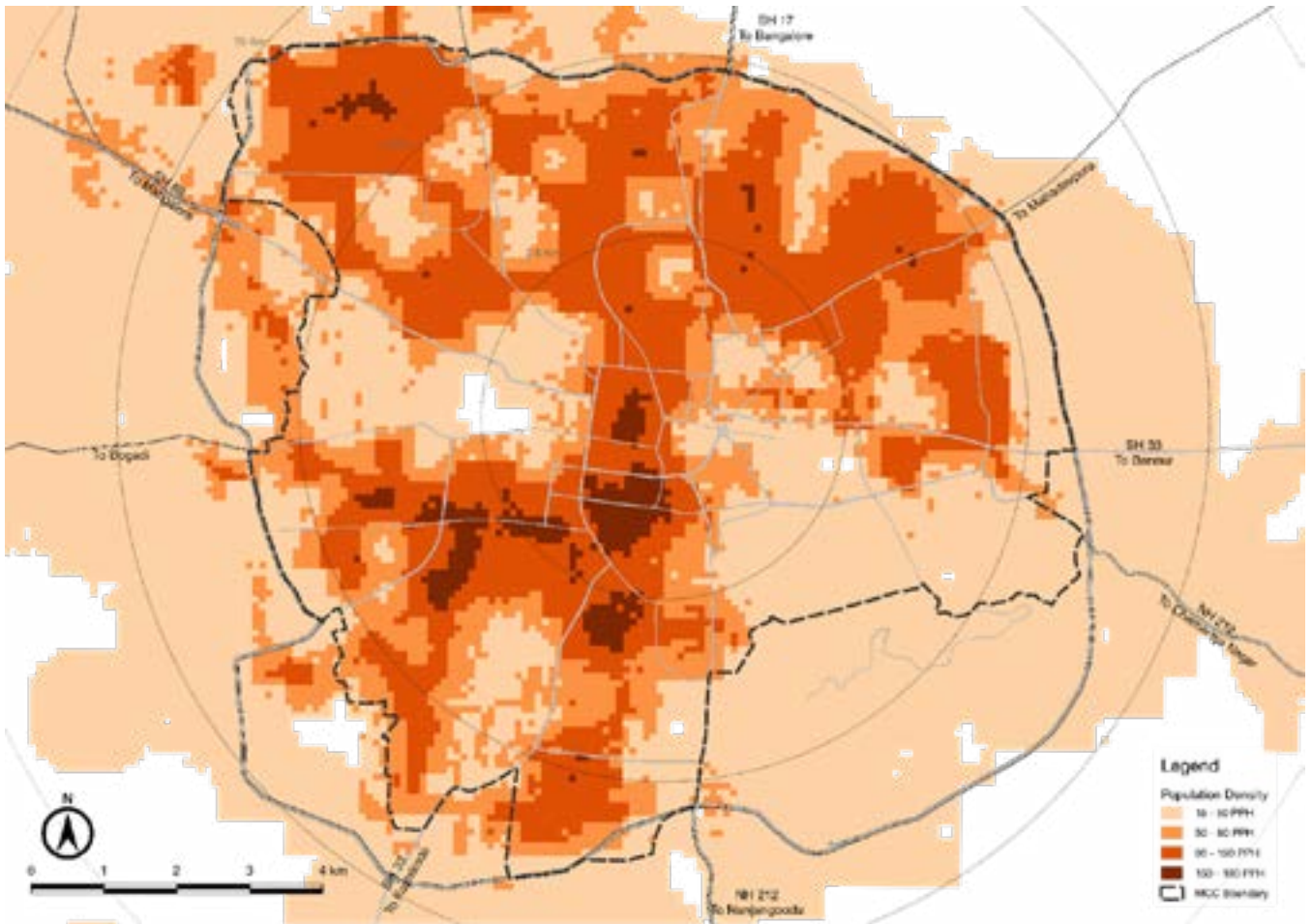
¹⁴ Census of India, 2011. https://censusindia.gov.in/2011census/dchb/2923_PART_B_DCHB_MYSURU.pdf.

¹⁵ Master Plan 2031 III. Development Control Regulation (2031).



Map 2. 1: Local planning area, Mysuru urban agglomeration and Mysuru city conurbation boundaries

Source: Development Control Regulation, Master Plan 2031 (2012)



Map 2.2: MCC boundary average population density map

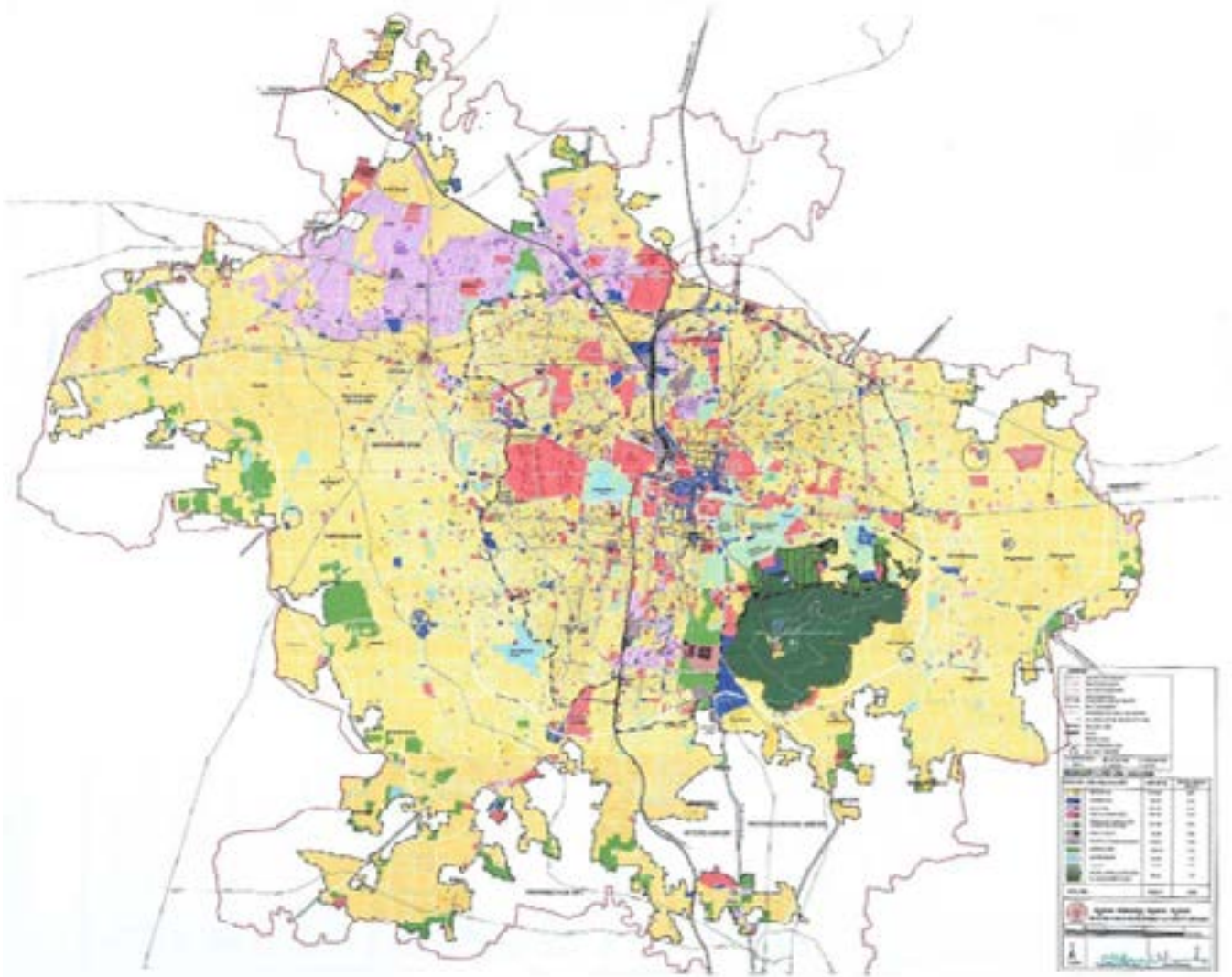
Map source: UN-Habitat

TABLE 2.1

Existing and proposed land use for Mysuru city conurbation area

Land use Category	Existing		Proposed Land-use	
	Area in ha	Percentage to Total Area (%)	Area in ha	Percentage to Total Area (%)
RESIDENTIAL	7,049.81	24.1	15,735.06	53.8
COMMERCIAL	467.52	1.6	800.88	2.7
INDUSTRIAL	1,320.49	4.5	1,812.7	6.2
PUBLIC/SEMI-PUBLIC	1,551.69	5.3	1,981.33	6.8
PUBLIC UTILITY	107.2	0.4	192.48	0.7
OPEN SPACE	772.87	2.6	1,611.62	5.5
TRAFFIC AND TRANSPORTATION	3,413.73	11.7	4,568.26	15.6
AGRICULTURE	13,455.56	46.0	1,098.16	3.8
WATER BODY	336.1	1.2	372.68	1.3
FOREST	766.5	2.6	763.92	2.6
SPECIAL AGRICULTURAL ZONE			305.41	1.0
TOTAL	29,241.48	100	29,242.51	100

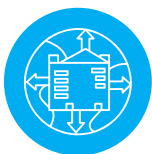
Source: Development Control Regulation, Master Plan 2031 (2012)



Map 2.3: Mysuru city conurbation with proposed land use

Source: Development Control Regulation, Master Plan 2031 (2012)

The key concerns identified in each strategic issue are summarized below. For the in-depth analysis of the strategic issues, refer to Chapter 5: Strategic Diagnosis of the Mysuru City Profile and Diagnostic Report.¹⁶



Increase in Urban Sprawl

Over the years, the built-up area of the city has extended beyond the MCC boundary (8,966 Ha) into the Mysuru city conurbation area (29,242 Ha).

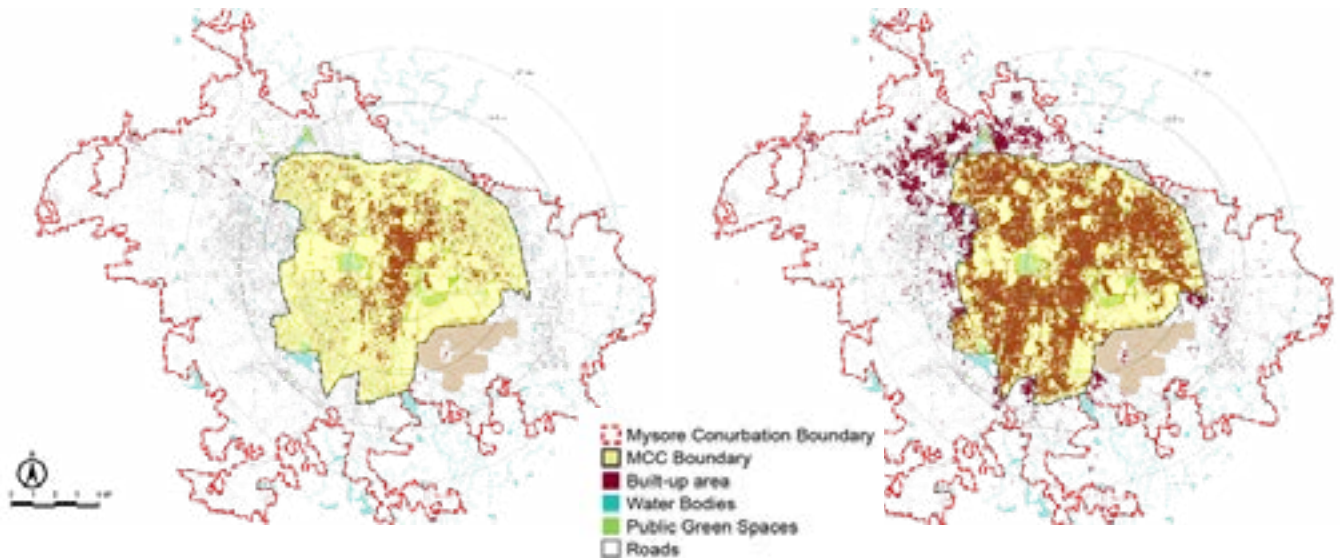
Mysuru has undergone low density city expansion. Between 1991 and 2021, the city's population grew from 5.88–16.5 lakh and the built-up area expanded accordingly.¹⁷ Development along the city's periphery has been increasingly characterized by privately developed, high-density apartment buildings that are incongruous with the city's traditional housing typology of single-family dwellings.

As mentioned earlier, 60 per cent of Mysuru's population live in areas with less than 150 pph. The city's gross residential density is 185.55 pph, while its net residential density is 317.60 pph. An analysis of different areas of the city and the ratio of population density, built-up area, and road infrastructure (see Section 5.2.1 of the City Profile and Diagnostic Report)¹⁸, shows that semi-urban

¹⁶ This report is available on UN-Habitat India's website. <https://www.unhabitat.org.in/knowledge>.

¹⁷ The 1991 population data is taken from the 2011 Census, whereas the 2021 data is taken from the 2011 Master Plan (for the period 2011–2031).

¹⁸ This report is available on UN-Habitat India's website. <https://www.unhabitat.org.in/knowledge>.



Map 2.4 Mysuru's built-up area 1971–2011

Map source: UN-Habitat

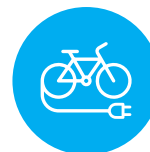
and suburban areas of the city have a high road coverage, but a low built footprint and population density. This supports the assumption that a large share of housing stock is organized as high-density apartment units. These residential apartments are often mono-functional, multi-storeyed, gated compounds, fragmented from the urban fabric. Rather than a gradual, radial population density from the city core outward, Mysuru has pockets of higher and lower population densities.

Such a development pattern has reduced the overall green coverage of the Mysuru conurbation area, increased residents' travel time from the city's peripheries to the city's core to access employment or facilities, and increased the cost of basic service provision, such as water and sanitation networks, disproportionate to its population growth.

This is evidenced in the well-covered, but high cost of service provision. Bus transit stops are located within 500-m. walking distance of 96 per cent of the population in the MCC boundary, schools are located within 800-m. walks of 65 per cent of the population and hospitals within 800-m walks of 70 per cent of the population within the MCC boundary. In addition, the current water capacity is 351.66 MLD, which far exceeds the current requirement. Due to the high, and in some cases excess service provision in tandem with low density urban peripheries, high density yet unintegrated apartment buildings and density pockets rather than radial density areas, Karnataka State Road Transport Corporation (KSRTC) has been unable to generate enough revenue, making losses of INR 22/running km of the public transport service.

As the city is growing with investments into key infrastructure projects, ways to support this growth most sustainably must be addressed. Therefore, this diagnosis suggests that:

- Housing typology can help to maintain consistent density (even if it is in keeping with the city's existing typology and density of 128 pph)
- Capacity assessment of infrastructure/ transit providers and digital governance can augment performance of the utilities and service providers
- 'Pockets' of high and low density, rather than concentric/ radial density will mean that service coverage for transport cannot be used fully (unlike schools, which can cater to 'pocket' density forms); this negative outcome can be reduced through infill development
- Infill development should be prioritized before greenfield development



Sub-optimal Use of Non-Motorized Transportation

The city performed poorly in five of the ten indicators under the transport sector for measuring mobility, safety, and accessibility. Non-motorized transport (NMT) in Mysuru dropped from 51 per cent in 2005 to 33 per cent in 2012. At the same time, the average trip length also extended from 2.5 km to 7.43 km.¹⁹ Furthermore, 36 per cent of the total

¹⁹ EMBARQ India Integrated Transportation Report & Comprehensive Traffic and Transportation Plan, 2012.

city emissions were from the transport sector (USAF TR. 8.9).²⁰ This suggests that growing reliance on motorized transportation is adversely impacting the city’s GHG emissions and urban environment.

Two different types of public bus models operate in the city, with the higher quality model operating within the city core. Mysuru is the first city in India to use an Intelligent transport system (ITS) and there are four main bus depots in the city.²¹ Although 98 per cent of the population within the MCC boundary can access a bus stop within 500-m. (USAF TR 6.1), the current bus provider, the Mysuru City Transport Division, under KSRTC, has been incurring financial losses.

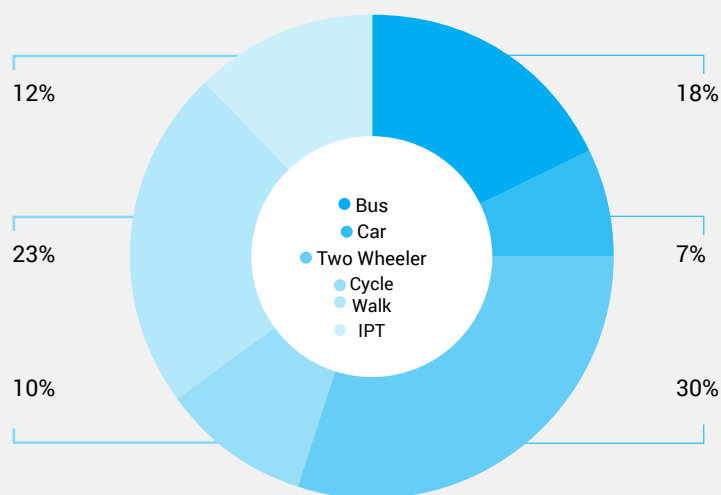
Seventy per cent of the city’s main roads have footpaths on either side, which are wider than 1.2 m. However, many of them are in poor condition or are encroached by hawkers or by informal parking (USAF TR 6.3).

Mysuru has launched the ‘Trin-Trin’ bicycle sharing system, with 50 docking stations that are predominantly within the city’s economic and heritage core. However, Mysuru only has 0.9 km of bicycle paths per 100,000 people vis-à-vis the benchmark of 25 km (USAF TR 6.2).²²

This suggests:

- A lack of integration between transport infrastructure provision and development in Mysuru, due to the inefficiencies public transport.
- As the city expands, secondary economic centres may assist in providing services and reducing travel distances
- Enabling cycling projects must be supported by adequate street infrastructure to improve safety
- Hawker zones are necessary to manage informal economic activities in shared public spaces

FIGURE 2.3 Mysuru modal share for 2012



Source: Development Control Regulation, Master Plan 2031 (2012), SLBs for Urban Transport, MoUD, Government of India, 2012



Vulnerable Environment and Ecology

The city performed poorly in five out of 18 indicators in the Environment and Ecology sector, measuring environmental conditions, GHG and air quality levels. There is no Clean

Air Action Plan for Mysuru, and the GHG emissions measurement and monitoring system is lacking as per the USAF indicators (USAF ENV 8.1 and ENV 8.2).²³ There are also limited actions by the MCC regarding conservation and management of urban biodiversity (USAF ENV 8.5). There has been a significant loss in green coverage within the LPA due to urban expansion. The protected zones around Chamundi Hill have been encroached and are prone to landslides.

²⁰ GHG Accounting and Capacity Building for the Cities of Jaipur, Bhopal, Mysuru, Vijayawada, and Guntur as a first step under the GEF-UNIDO-MoUD Project (2017).
²¹ https://darpg.gov.in/sites/default/files/Mysuru%20ITS_0.pdf.
²² All benchmarking is taken from; Ministry of Urban Development (2013). Service Level Benchmark in Urban Transport for Indian Cities. Available online at: https://mohua.gov.in/upload/uploadfiles/files/VoulmeI_Methodologyreport_final03.pdf.
²³ The most recent GHG emissions monitoring was undertaken by UNIDO in September 2017 with the International Institute for Energy Conservation, which summarizes the city’s GHG emissions along with Jaipur, Bhopal, Guntur, and Vijayawada.

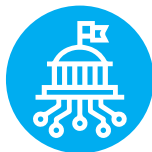
Almost 88 per cent of residents within the MCC boundary can access a park within a 500-m walk (USAF UPS 1.4). However, only 6.25 sq. m. open space (recreational, organized green, other common open spaces) is allocated per capita (USAF UPS 1.5), which is below the URDPFI benchmark of 10-12 sq. m./person, and the WHO benchmark of 9 sq. m./person.²⁴ Open space makes up 2.6 per cent of the city's total developable area (USAF UPS 1.7). This may increase when considering the large amount of public and semi-public (5.31 per cent) and forest (2.62 per cent) areas.

This suggests:

- Maintenance of existing public spaces (including heritage sites) and vulnerable or sensitive ecological areas can increase green coverage and help to prevent encroachment. The city lacks ecological maintenance programmes.
- Identification of green coverage potential across the MCC boundary is necessary to maintain and increase access to green and open space as the city grows, and to increase the city's GHG savings potential. The city has some green coverage but could increase its 'functional' green spaces.

Both systems involve collecting data to improve service provision to promote public transport and NMT use.²⁶ At present, only two services are managed through a command and control system (USAF GOV 11). In addition, there is a GI-based master plan; however, this is outdated. There is no city data officer dedicated to monitor data collection between government agencies (USAF GOV 11.12). There is also no open data portal for the city (USAF GOV 11.14). Finally, there is no online citizen appeal mechanism (USAF GOV 11.11) in place.

The two key goals of digital governance are to ensure that decision making is 'contextual' (a better understanding of changing citizen needs and more specific and adaptable policies) and 'coordinated' (integrated, shared, aligned, easy access platform to share information and capabilities across government sectors, and between government bodies).²⁷ Mysuru lacks systems for shared data collection and monitoring. This is particularly important for evidence-based environmental conservation and climate change mitigation, city growth, service capacity and provision, as well as tourism management.



Lack of Digital Governance Initiatives

Two prominent digital governance initiatives have been implemented in Mysuru. These include an ITS bus system, which was implemented in 2009 by KSRTC, Central Institute of Road Transport and eGestalt.²⁵ Trin-Trin, a bicycle sharing system with around 50 docking stations was implemented with partial funding from the World Bank, under the Global Environment Facility (GEF) Grant, planned and implemented by the Directorate of Urban Land Transport (DULT) functioning under the Urban Development Department of the State Government of Karnataka and MCC.

²⁴ WHO, URDPFI guidelines

²⁵ Detailed Project Report – Intelligent Transport System & Ethanol Diesel. 2009. Available online at: <https://static.abhibus.com/ks/pdf/DPR-ITS.pdf>.

²⁶ For more detailed information on the Mysuru ITS see the World Bank Case Study; <https://www.ssatp.org/sites/ssatp/files/publications/Toolkits/ITS%20Toolkit%20content/case-studies/Mysuru-india.html>.

²⁷ World Bank. Digital Development. Available online at: <https://www.worldbank.org/en/topic/digitaldevelopment/brief/digital-government-for-development>.



Devaraja Market

3

APPROACH

As an overarching response to the four key issues identified, and after consulting MCC and MUDA officials as part of the Mysore Mission (November 2021), the following goal was identified:

“To cater to the two dynamics that are rising due to Mysuru’s aspiration to be a modern work sector whilst retaining its identity as a cultural and heritage hub”

Mysuru’s heritage sites, natural resources and green spaces, traditional building vernacular and urban form contribute to the character of the city and are assets that require active preservation while the city continues to grow. For example, Chamundi Hill, which is a key natural and heritage site, is polluted by visitors and recently experiencing landslides. Along its peripheries, where the city is expanding, public spaces are not maintained nor planted to maintain a high green coverage. In the same peripheral area, new apartment buildings are coming up that are incongruous with the city’s historical vernacular.

Therefore, a careful balance between the city’s growth and new industrial development with its cultural significance can be addressed through planning tools, monitoring frameworks, unified data governance and financial incentives, and building on the already high renewable energy production and pioneering NMT schemes, this can provide an opportunity for Mysuru to maintain its existing reputation as a model of sustainable growth.

As the city’s structure and development pattern is so fundamental to its history (see Section 4.2.1: City Development Pattern of the Mysuru City Profile and Diagnostic Report)²⁸, the following Strategic Responses have used an approach that conforms, rather than redresses this factor. The following Strategic Responses are guided by a set of core planning principles (see Section 3.1 below) and are underpinned by the proposal of form-based codes (see Section 3.2), which is a tool to support both the city’s growth as well as preservation.

3.1 Core Planning Principles

3.1.1 Principle 1: Compact city

Compact cities are relatively higher density, mixed-use settlements, which enable high per capita access to urban amenities, facilities and public open space within

a given area. Densification has the potential to counter the tendency for sprawl and the consequential high cost of infrastructure, while leveraging the positive aspects of urbanization.²⁹

Compact city development provides an opportunity for a guided densification process and planned urban regeneration, redevelopment, and revitalization of the urban core through infill development. This approach also offers opportunities for slum upgrading, innovation in housing typologies and layouts, brownfield development and building refurbishment. Compact urban settlements may also lead to a significant reduction in the overall GHG emissions for the city, due to shorter travel distances that are convenient for walking or other NMT, reduced emissions from materials used for the construction of new housing, public services, and infrastructure, as well as more efficient usage of existing facilities. A compact city may increase economic opportunities as more places of livelihood become accessible within shorter distances, especially for the urban poor. It can also improve quality of life and public health.

Compact development may also improve community well-being by ensuring that a variety of basic services, infrastructure and employment are within reach of mixed-income housing. This development pattern also helps to ensure that the urban poor are not marginalized.³⁰

3.1.2 Principle II: Complete streets

‘Complete streets’ is an urban planning concept for creating ‘streets for all’. Aside from the needs of motorists, it especially focuses on the needs of the most vulnerable road users, including pedestrians, cyclists, other NMT users, and public transport users in the design, planning, operation, and maintenance of our streets. It calls for the equitable allocation of road space while prioritising the safe, comfortable, and unobstructed mobility of road users of all ages, abilities, incomes, and ethnicities.

Complete streets help to create liveable communities by enabling high-performing sustainable transportation networks and enjoyable public spaces, especially benefitting the urban poor and underserved communities. This may lead to long-term positive impacts on public health, safety, land value, as well as the environment.

²⁸ This report is available on UN-Habitat India’s website. <https://www.unhabitat.org.in/knowledge>.

²⁹ Planning Compact Cities: Exploring the Possibilities and Limits of Densification, UN-Habitat, 2017; https://unhabitat.org/sites/default/files/documents/2019-06/planning_compact_cities_exploring_the_possibilities_and_limits_of_densification.pdf.

³⁰ Planning Compact Cities: Exploring the Possibilities and Limits of Densification, UN-Habitat, 2017; https://unhabitat.org/sites/default/files/documents/2019-06/planning_compact_cities_exploring_the_possibilities_and_limits_of_densification.pdf.

In India, this principle is reflected in the National Urban Transport Policy (NUTP), which prioritizes planning for pedestrian and NMT modal needs over private motorized transport, as well as the equitable allocation of road space, and enabling universally accessible streets.³¹

3.1.3 Principle III: Eco-sensitive city

Urbanization, if managed improperly, will have a full-size and irreversible impact on the natural ecosystem and biodiversity of a region. Human settlements and urban growth should be deliberate and evolved sensitively, in balance with these present ecological systems. Thus, the natural ecology of any urban area must be actively preserved to maintain the balance between the built and natural environment.

Education and community participation may go an extended way in increasing public sensitivity to the urgent and long-term environmental issues of the city, which could impact residents in the short or long-term. Bringing in the community as a key stakeholder in urban and ecologically sensitive projects, may lead to more transformative and sustained consequences.³²

3.1.4 Principle IV: Data-driven city

Data-driven cities use data to improve the urban environment. They quantify, collect, and analyse aspects of urban life so that evidence-based decisions can be made to improve the efficiency, quality or availability of urban services and environment.

The data-driven city implements datafication for enhancing and optimizing its operations, functions, services, strategies, and policies. Broadly, datafication consists of the collective tools, processes, methods, techniques and technologies used to transform a city to a data-driven enterprise.

People-centred data driven cities work to champion this approach by:

- **Empowering people (community):** Centring smart city activities on people's needs by grounding smart city infrastructure and services in a commitment to human rights, and maximizing community participation, representation, transparency, and control. Smart cities should provide digital public goods that are open, transparent, accessible, and interoperable.
- **Making access to technology equitable (digital equity):** Building a foundation of universal access to affordable internet, digital skills, and digital devices.
- **Managing data & digital infrastructure responsibly (infrastructure):** Improving the convenience and accessibility of services through digitalization and by creating a data governance framework that sets standards and responsibilities for effectiveness, accountability and inclusivity.
- **Building trust by securing digital assets (security):** Safeguarding public trust by putting cybersecurity measures in place that protect data and infrastructure.
- **Building multi-stakeholder capacity (capacity):** Collaborating with diverse stakeholders to build smart city projects, infrastructure and services. Expanding the capacity of city staff for digital transformation. Evaluating the need for technology and addressing equity, environmental justice, and social justice in smart city initiatives.

Collectively, these elements form the people-centred, data-driven cities framework developed by UN-Habitat to help local governments take a multi-stakeholder approach to digital transformation that realizes sustainability, inclusivity, prosperity, and human rights.

One of the outcomes of a data-driven city is sustainable development. It is increasingly composed of and monitored by ICT of ubiquitous computing and, thus, has the ability of using advanced technologies and solutions (i.e., horizontal information systems, operations centres, service agencies, research centres, innovation and living labs, and strategic planning and policy offices) for generating, storing, processing, analysing, and harnessing urban data for enhanced decision-making and deep insights on sustainability, efficiency, resilience, and the quality of life.³³

³¹ National Urban Transport Policy, MoHUA, Government of India, <https://www.mohua.gov.in/upload/uploadfiles/files/TransportPolicy.pdf>.

³² Environmental Change through participation, UNESCAP 2019, <https://www.unescap.org/sites/default/files/Environmental%20Change%20Through%20Participation.pdf>.

³³ Data Smart Cities Strategy, Smartnet – NIUA, [DataSmart_Cities_Strategy.pdf](https://www.niua.org/DataSmart_Cities_Strategy.pdf) (niua.org).

3.2 Guiding Instrument: Form-based Codes

3.2.1 Form-based codes as a city-wide approach to urban fabric

Form-based codes are a tool that can significantly assist in promoting the approach – “to cater to the two dynamics that are rising due to Mysuru’s aspiration to be a modern work sector whilst retaining its identity as a cultural and heritage hub” across various sectors and scales.

Unlike traditional zoning, form-based codes emphasize the importance of physical form, ensuring the maintenance of the character of the built environment and predictable outcome of the new development. The strategic responses and form-based codes work together to achieve mutual goals while promoting preservation of vernacular urban pattern and environmental assets.

Public participation is a crucial element in developing form-based codes, especially for preserving the character of historic districts and resources and developing design standards. It is suggested that various public hearings and charrettes be conducted at various stages of the development of form-based codes to ensure large and very diverse representation of residents from the involved neighbourhoods. Targeted placemaking activities may help in both defining areas of specific urban morphology as well as in developing and validating design recommendations.

As indicated in Map 3.1, six areas are identified on the basis of urban morphology, the character of the built environment, transport, and environmental preconditions. This report suggests a preliminary identification of morphological zones for further reference; however, a further participatory study would be carried out to ensure that the future spatial interventions are based on community ideas of how their city should look. The current preliminary suggestion identifies six areas that represent the city’s unique heritage and emerging development priorities:

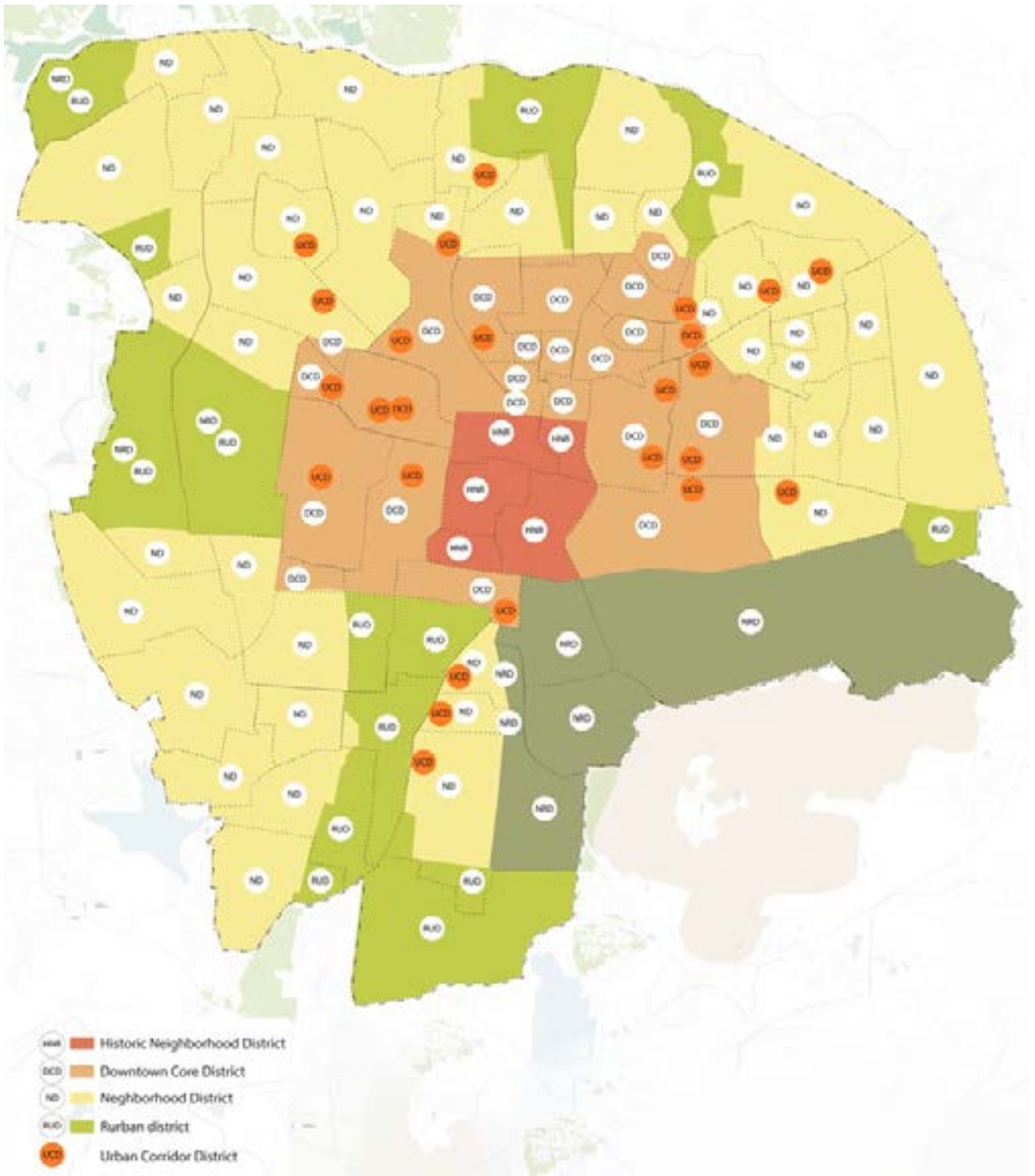
1. **Historic Neighbourhood District (HND):** The area of the heritage precinct that contains houses and residential buildings characterized by traditional and generous architectural elements. The architectural details should be preserved, and the character enhanced by design interventions such as signages and pedestrian paths.

2. **Natural Preserve District (NPD):** This is intended to preserve areas that contain traditional framing and are adjacent to Chamundi Hill. The area contains active and passive open spaces and urban parks, sustainable agricultural uses and recreation facilities. Construction is not encouraged beyond the permitted functions.
3. **Downtown Core District (DCD):** The DCD consists of higher density, mixed-use residential areas that surround the HND. The area should promote a highly walkable environment. New development should define the public realm and promote visible activity along the streetscape.
4. **Neighborhood District (ND):** This district is mainly residential in character and includes a mix of residential, commercial, and public uses. The infill development should be planned according to UN-Habitat planning principles, following the recommended proportions and traditional architectural style.
5. **Rurban District (RD):** The RD contains several rural lands and community gardens integrated into the built environment. Current water and green assets should be protected to ensure green buffers. Since the area is prone to floods, the district may contain rain gardens and bioswales to promote hazard mitigation interventions and rain harvesting techniques.
6. **Urban Corridor District (UCD):** This area may be present in one of the other districts, adjacent to the city’s major transport arteries. Where applicable, the UCD should be a primary area for infill development, promoting a higher density, mixed-use environment with allocation of commercial uses along the major streets. Pedestrian pathways along the streets should include necessary pedestrian-oriented infrastructure that allow this district to be a highly walkable one.

3.2.2 Relevance to strategic recommendations

Form-based codes are directly linked with a considerable number of recommendations. They assist in achieving strategic goals while creating a unified urban landscape with a historic character and period elements.

How form-based codes help in achieving strategic responses is summarized in Table 3.1:
















Map 3.1: Map of approximate morphological zones for the form-based code application




Map source: UN-Habitat

TABLE 3.1

Relevance of form-based codes to strategic interventions

Issue		Intervention	Form-based codes recommendations
Sub-optimal use of NMT		<ul style="list-style-type: none"> Increase NMT & PT infrastructure Improve NMT in heritage core 	<ul style="list-style-type: none"> Ensure continuous sidewalks, zero barriers & pedestrian-friendly infrastructure ensuring safety Internal collector roads to have a more public function The new development (infill) should include pockets of public space adjacent to internal roads (public space may include elements like bike sharing hubs) Wide sidewalks along major transport corridors should be maintained to ensure sufficient space for commercial activities, walking, cycling, etc.
Vulnerable ecology & sub-optimal use of NMT	 	<ul style="list-style-type: none"> Road improvements 	<ul style="list-style-type: none"> Ensure continuous sidewalks, zero barriers and pedestrian-friendly infrastructure ensuring safety Ensure pedestrian-friendly access to be integrated into the pedestrian realm Install terraces for shading Recommendation on minimum width Clear signages for convenience of people with disabilities (PwDs)
Vulnerable ecology		<ul style="list-style-type: none"> Road improvements 	<ul style="list-style-type: none"> Low vegetation to be used as safety buffer Drainage might be transformed into bio-drainage with context-specific vegetation for water runoff filtering Streets should have additional vegetation to increase the perception of highly vegetated area Current public spaces should be linked to the blue and green networks through additional planting along the streets, green stripes, bioswales, etc.
		<ul style="list-style-type: none"> Preservation & leveraging of Chamundi Hill 	<ul style="list-style-type: none"> Ensure compatibility with Chamundi Hill, the heights of new development should comply with average indicator and not exceed it To maintain the character of the "natural" district, blocks should include green roofing, which can be multipurpose (recreational space, rain harvesting, community garden)
		<ul style="list-style-type: none"> Farming on peri-urban vacant land 	<ul style="list-style-type: none"> Public spaces close to agricultural lands/ functions may include rain gardens and bioswales to ensure water runoff filtration To maintain the transition from an urban area to agricultural lands, the block design might include more "green" elements such as vegetated roofing and green internal courtyards. Public spaces should be "green" in nature and include parks, recreational areas, community gardens and elements of traditional agricultural/ farming practices
		<ul style="list-style-type: none"> Increase green cover within built-up area 	<ul style="list-style-type: none"> Unused plots adjacent to main street frontages to be utilized for pocket parks/ additional vegetation Current public spaces should be linked to the blue and green networks through additional planting along the streets, green stripes, bioswales, etc. Public spaces should be "green" and include parks, recreational areas, community gardens and elements of traditional agricultural/ farming practices.
Vulnerable ecology		<ul style="list-style-type: none"> Neighborhood scale actions/ community engagement & capacity building 	<ul style="list-style-type: none"> Participatory placemaking
	Increase in low density urban sprawl & vulnerable ecology	 	<ul style="list-style-type: none"> Densify the built-up area
Vulnerable ecology & increase in low density urban sprawl	 	<ul style="list-style-type: none"> Sustainable, dense, and vernacular design code 	<ul style="list-style-type: none"> Morphology of the area and level of the built-up area should be maintained; new development should be limited to ensure most of the land is open and green. Functions of the urban form should be as per permitted ones to suit the context and cultural environment. Unused plots adjacent to main streets, but insufficient for infill, should be utilized to develop active street frontage. Pocket parks/ additional vegetation to maintain the visual permeability of urban form might be tactically proposed

Issue		Intervention	Form-based codes recommendations
		<ul style="list-style-type: none"> Increase green cover of built-up area 	<ul style="list-style-type: none"> Each shop should have pedestrian-friendly access and be integrated with the pedestrian realm. Development should consider design elements that promote local identity, installation of terraces shading Existing elements and characteristics should be identified and integrated into the new context (terrace styles, window shutters, dimensions of the street enclosure, veranda styles, shadings, signage fonts, elements of public art, etc.)
Sub-optimal use of NMT & Increase in low density urban sprawl		<ul style="list-style-type: none"> Develop multi-modal intersections at Neighborhood Centers 	<ul style="list-style-type: none"> Ensure integration of public spaces into the comprehensive system of public space through pedestrian crossings, indications on pavements, etc.

-  - Strategic Response to Vulnerable Ecology
-  - Strategic Response to Sub-optimal Use of NMT
-  - Strategic Response to Increase in Low Density Urban Sprawl

3.2.3 Snapshots of form-based codes application across identified patterns and scales

To ensure a comprehensive design approach to the built environment, the current recommendation of form-based codes suggests a cross-scalar system of design interventions that focus on at least four basic elements/levels, such as:

- Urban form (pattern):** The level of recommendations considers a set of buildings that form an urban pattern

- Streets:** The level of recommendations consider street elements (sidewalls, pedestrian infrastructure, parking, etc.) and adjacent areas
- Public space:** The level of recommendations considers public space network and pedestrian-oriented infrastructure
- Block:** The level of recommendations considers physical elements of buildings, such as façades, terraces and entrances.

A snapshot or potential interventions for each morphological district is provided below:

Historic Neighbourhood District

FIGURE 3.1 Snapshot of potential recommendations (right)



Map 3 2: Approximate morphological zone – “Historic Neighbourhood District” (left)

Source: UN-Habitat

TABLE 3.2

Relevance of Historic Neighbourhood District (form-based codes) to Strategic Interventions

Urban dimension	Recommendation	Strategy
Urban form	The functions of the urban form should be as per permitted ones to suit the context and cultural environment. Unused plots adjacent to main street frontages that are insufficient for infill should be utilized for pocket parks/ additional vegetation to maintain the visual permeability of the urban form.	
Streets	Arterial roads should have a continuous pedestrian realm. That implies continuous sidewalks, zero barriers and pedestrian-friendly infrastructure, ensuring safety for all street users. A sense of the street enclosure should be considered to create a more pedestrian-friendly environment.	
	Low vegetation should be used as a safety buffer instead of current plastic fencing. Low vegetation will allow facades to be observed while providing better safety. Higher vegetation may be used to emphasize the street enclosure.	
	Each shop should have pedestrian-friendly access and be integrated with the pedestrian realm. Installation of terraces shading may be installed if there is sufficient width. The minimum width allowing two people to socialize while walking and a person in a wheelchair to turn is 3 m.	
	Internal collector roads might have a more public function depending on the route (the route to a landmark should be considered as a street for interaction). Such streets should include more spaces for rest and interaction, convenient signages and vegetation.	
	Corner buildings may have clear signages indicating the street name and the nearest landmark.	
Public space	Ensure integration of public spaces into the comprehensive system of public space through pedestrian crossings and indications on pavements.	
Block	The public interface of the buildings should interact with the scale of the roads.	
	To maintain the sense of history, the existing elements and characteristics should be identified and integrated into the new context (terrace styles, window shutters, dimensions of the street enclosure, veranda styles, shadings, signage fonts, element of public art, etc.)	

Source: UN-Habitat

Downtown Core District

FIGURE 3.2








Snapshot of potential recommendations (right)



Map 3 3: Approximate morphological zone – “Downtown Core District” (left)

Source: UN-Habitat

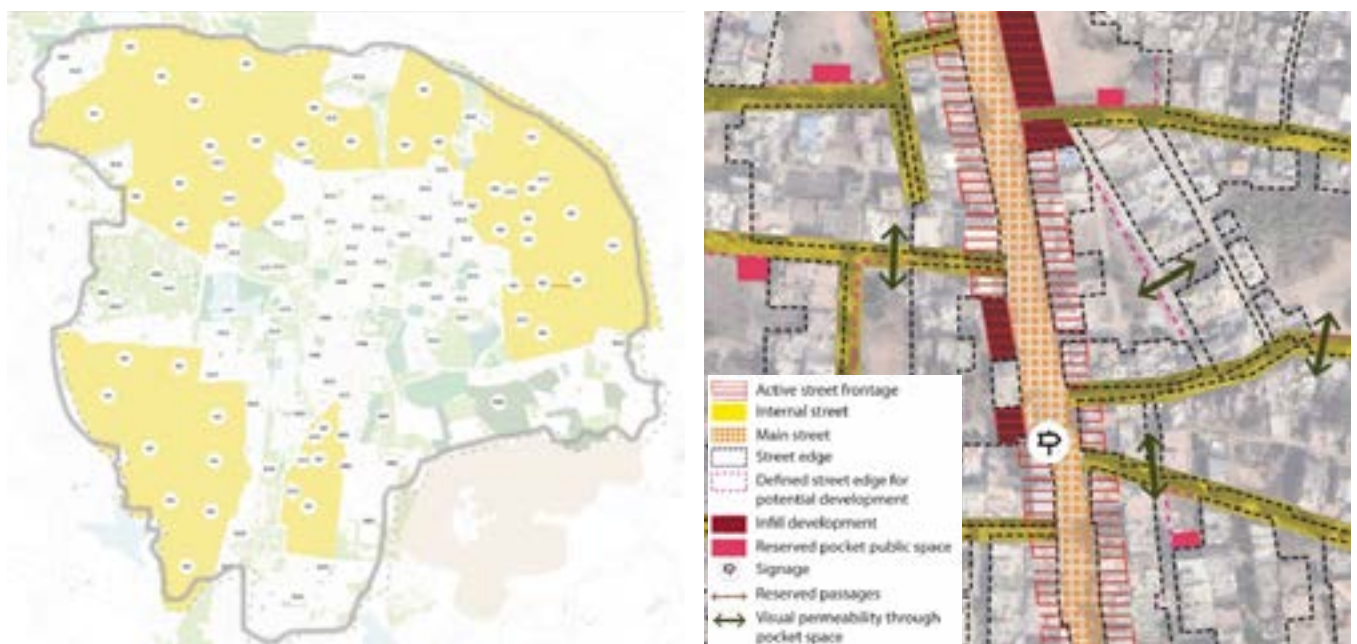
TABLE 3.3 Relevance of Downtown Core District (form-based codes) to Strategic Interventions

Urban dimension	Recommendation	Strategy
Urban form	<p>The morphology of the area and the level of the built-up area should be maintained; new and infill development should retain the current pattern. Tactical infill has to comply with architectural style.</p> <p>The functions of the urban form should be as per permitted ones to suit the context and cultural environment.</p>	
Streets	<p>Arterial roads should have a continuous pedestrian realm. That implies continuous sidewalks, zero barriers and pedestrian-friendly infrastructure ensuring safety for all street users and sense of the street enclosure.</p> <p>The new development should ensure the alignment with the related street frontage and average setbacks.</p> <p>Low vegetation should be used as a safety buffer instead of current plastic fencing. Low vegetation will allow facades to be observed while providing better safety. Higher vegetation may be used to emphasize the street enclosure.</p> <p>Each shop should have pedestrian-friendly access and be integrated with the pedestrian realm. Installation of terrace shading may be installed if there is sufficient width. The minimum width allowing two people to socialize while walking and a person in a wheelchair to turn is 3 m.</p> <p>Internal collector roads might have a more public function depending on the route (route to a landmark should be considered as a street for interaction). Such streets should include more spaces for rest and interaction, convenient signage, and vegetation.</p> <p>Corner of buildings may have clear signages indicating the street name and the nearest landmark. Paths convenient for PwDs should be indicated.</p>	    
Public space	Ensure integration of public spaces into the comprehensive system of public space through pedestrian crossings and indications on pavements.	
Block	To maintain the sense of history, existing elements and characteristics should be identified and integrated into the new context (terrace styles, window shutters, dimensions of the street enclosure, veranda styles, shadings, signage fonts, element of public art, etc.)	

Source: UN-Habitat

Neighbourhood District

FIGURE 3.3 Snapshot of potential recommendations (right)



Map 3 4: Approximate morphological zone – “Neighbourhood District” (left)

Source: UN-Habitat

TABLE 3.4

Relevance of Residential Neighbourhood District (form-based codes) to Strategic Interventions

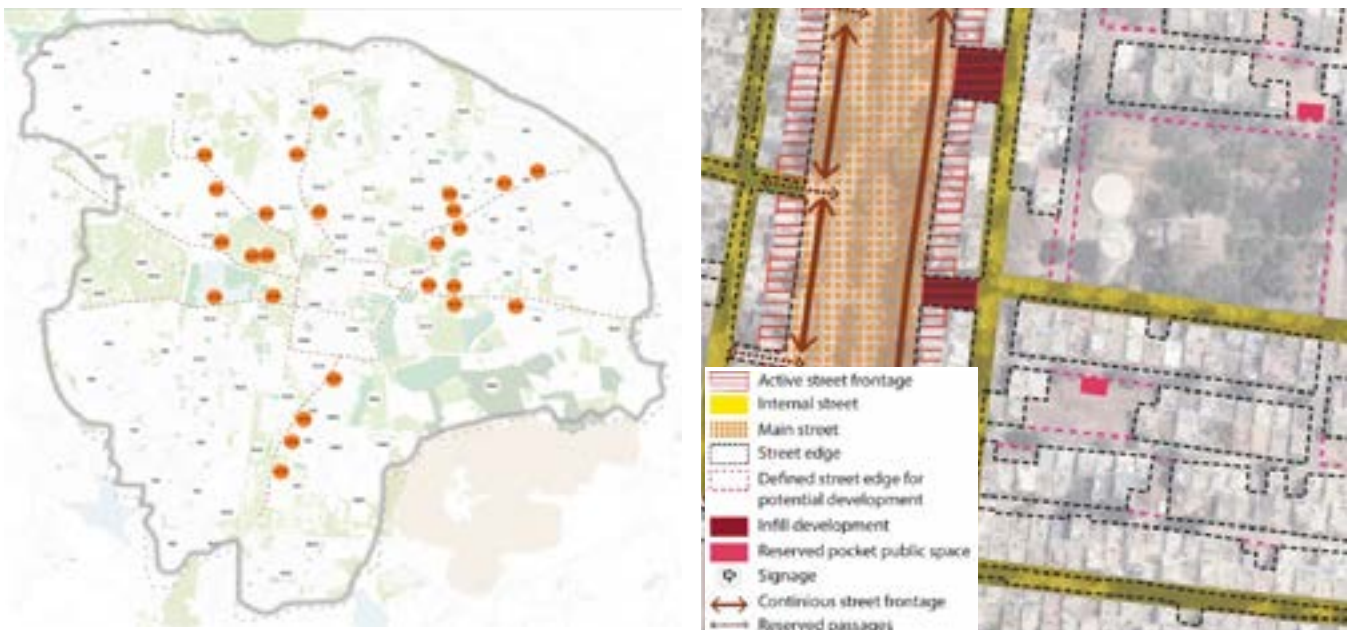
Urban dimension	Recommendation	Strategy
Urban form	The morphology of the area and the level of the built-up area should be maintained; new and infill development should retain the current pattern. Tactical infill must comply with architectural style.	
Streets	The new development should ensure alignment with related street frontages and average setbacks. Arterial roads should have a continuous pedestrian realm. That implies continuous sidewalks, zero barriers and pedestrian-friendly infrastructure ensuring safety for all street users and a sense of the street enclosure. Each shop should have pedestrian-friendly access and be integrated with the pedestrian realm. Installation of terrace shading may be installed if there is sufficient width. The minimum width allowing two people to socialize while walking and a person in a wheelchair to turn is 3 m.	
Public space	Ensure integration of public spaces into the comprehensive system of public space through pedestrian crossings and indications on pavements. N development (infill) should include pocket public space that can be adjacent to the internal roads, contributing to the continuity of the public space network. A clear signage system should be installed in several public spaces indicating how to get to the key landmarks and useful information on the modality of travel (bike, e-autorickshaw, public transport, walking, etc.). Path/s convenient for PwDs should be indicated.	
Block	To maintain the sense of history, existing elements and characteristics should be identified and integrated into the new context (terrace styles, window shutters, dimensions of the street enclosure, veranda styles, shadings, signage fonts, elements of public art, etc.)	

Source: UN-Habitat

Urban Corridor District

FIGURE 3.4

Snapshot of potential recommendations (right)



Map 3 5: Approximate morphological zone – “Urban Corridor District” (left)

Source: UN-Habitat

TABLE 3.5 Relevance of Urban Corridor District (form-based codes) to Strategic Interventions

Urban dimension	Recommendation	Strategy
Urban form	<p>The functions of the urban form should be as per permitted ones to suit the context and cultural environment.</p> <p>If the area adjacent to the main street is appropriate for infill, the development should be prioritized, ensuring compliance with architectural style, and creating an active street frontage.</p> <p>Unused plots adjacent to main streets, but insufficient for infill, should be utilized to develop active street frontages. Pocket parks/ additional vegetation to maintain the visual permeability of urban form might be tactically proposed.</p>	
Streets	<p>Arterial road should have a continuous pedestrian realm. That implies continuous sidewalks, barriers and pedestrian friendly infrastructure ensuring safety for all street users and a sense of the street enclosure.</p> <p>Low vegetation should be used as a safety buffer instead of current plastic fencing. Low vegetation will allow façades to be observed while providing better safety. Higher vegetation may be used to emphasize the street enclosure.</p> <p>Each shop should have pedestrian-friendly access and be integrated with the pedestrian realm. Installation of terrace shading may be installed if there is sufficient width. The minimum width allowing two people to socialize while walking and a person in a wheelchair to turn is 3 m.</p> <p>Where applicable street drainage might be transformed into bio-drainage with context-specific vegetation for water runoff filtering.</p>	
Public space	Wide sidewalks along the major transport corridor should be maintained, ensuring sufficient space for commercial activities, walking, cycling, places for rest and interaction.	
Block	<p>To maintain the sense of history, existing elements and characteristics should be identified and integrated into the new context (terrace styles, window shutters, dimensions of the street enclosure, veranda styles, shadings, signage fonts, elements of public art, etc.)</p> <p>Ensure the continuity of street frontage. In case two separate shops/ commercial buildings are sharing walls; they can maintain a continuous verandah space to have a more active interface with the public.</p> <p>In the case of two separate shops, the distance should be appropriate to create a pedestrian-friendly space/ pocket park or a passage.</p>	

Source: UN-Habitat

Rurban District

FIGURE 3.5 Snapshot of potential recommendations (right)











Map 3 6: Approximate morphological zone – “Rurban District” (left)

Source: UN-Habitat

TABLE 3.6

Relevance of Rurban District (form-based codes) to Strategic Interventions

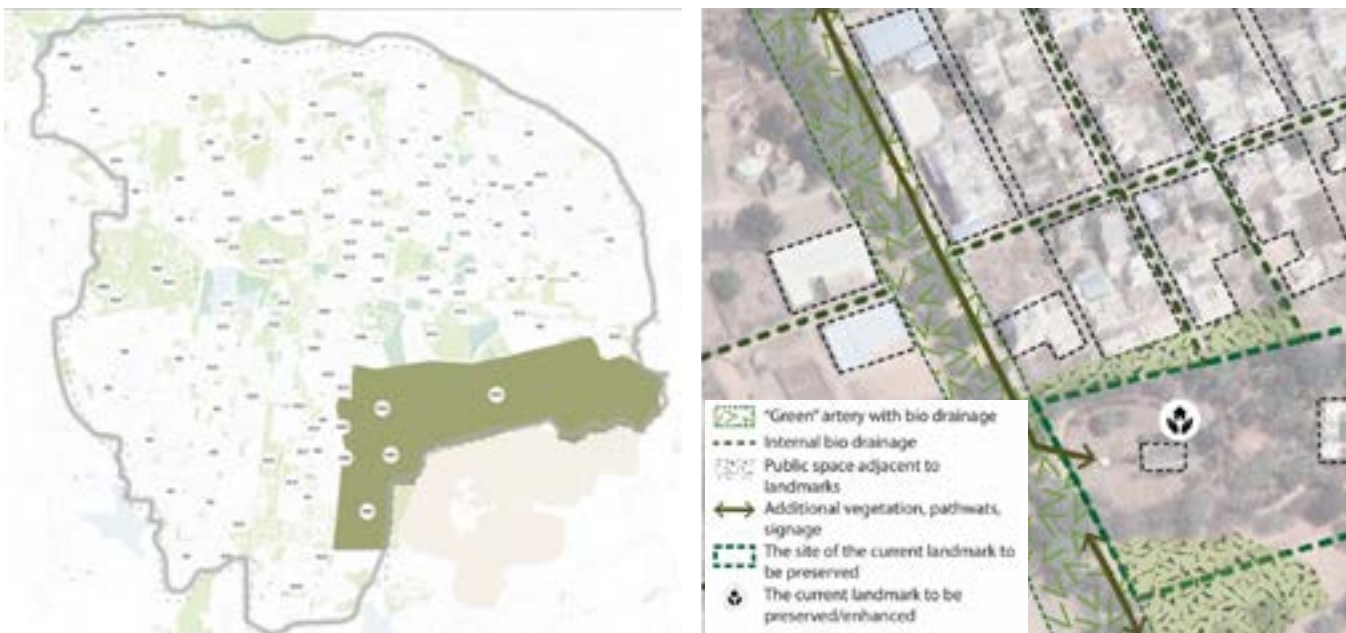
Urban dimension	Recommendation	Strategy
Urban form	The urban morphology and level of the built-up area should include vast green spaces (already existing). The quality of such green and open spaces should be evaluated and further proposed for preservation/ transformation into a park, community garden, recreational area, etc.	
Streets	The streets, especially newly planned ones, should ensure a drainage system that incorporates context-specific vegetation that filters water runoff. Topography and adjacent agricultural/ green spaces should be considered.	
	Streets connecting recreational areas, green spaces, parks should have additional vegetation to increase the perception of a highly vegetated area.	
Public space	The current public spaces should be linked to the blue and green networks through additional planting along the streets, green stripes, bioswales, etc.	
	Public spaces should be "green" in nature, include parks, recreational areas, community gardens.	
	Public spaces close to agricultural lands/ functions may include rain gardens and bioswales to ensure water runoff filtration.	
Block	To maintain the transition from an urban area to agricultural lands, the block design might include more "green" elements such as vegetated roofing and green internal courtyards.	
	To maintain the sense of history and ensure compatibility with Chamundi Hill, the heights of new development should comply with the average indicator and not exceed it.	

Source: UN-Habitat

Natural Preserve District

FIGURE 3.6









Snapshot of potential recommendations (right)



Map 3 7: Approximate morphological zone – “Natural Preserve District” (left)

Source: UN-Habitat

TABLE 3.7 Relevance of Natural Preserve District (form-based codes) to Strategic Interventions

Urban dimension	Recommendation	Strategy
Urban form	The morphology of the area and the level of the built-up area should be maintained; new development should be limited to ensure most of the land is open and green. The functions of the urban form should be as per permitted ones to suit the context and cultural environment.	
Streets	Newly planned streets should ensure a drainage system that incorporates context-specific vegetation that filters water runoff. Topography and adjacent agricultural/ green spaces should be considered.	
Public space	Public spaces should be "green" in nature and include parks, recreational areas, community gardens and elements of traditional agricultural/ farming practices. Current public spaces should be linked to the comprehensive system of public spaces and streets through pedestrian infrastructure (crossings, pathways) Current public spaces should be linked to the blue and green networks through additional planting along the streets, green stripes, bioswales, etc. Public spaces close to agricultural lands/ functions may include rain gardens and bioswales to ensure filtration of water runoff.	   
Block	To maintain the sense of history and ensure compatibility with Chamundi Hill, the heights of new development should comply with the average indicator and not exceed it. To maintain the character of the "natural" district, blocks should include green roofing, which can be multi-purpose (recreational spaces, rain harvesting, community gardens, etc.).	 

Source: UN-Habitat

3.2.4 Demonstration of detailed design interventions in the selected area

FIGURE 3.7 Application of design elements and other strategic recommendations for Mysuru–Trichy Road

Source: UN-Habitat

The demonstration of detailed design interventions in selected areas aim to showcase practical application of the form-based codes that define a design framework to preserve the unique character of Mysuru and are linked to city-wide responses. The selected area of the Mysuru–Trichy Road was identified due to its proximity to heritage sites and their impact on design interventions and variety of actions across different scales that also target key problematic issues. The selected area also provides opportunities to pilot city-wide strategies emphasizing strong interlinkages between the strategies and proposed design frameworks.

As illustrated in Figure 3-7, the suggested design interventions along Mysuru–Trichy Road in the HND include targeted infill development, street redesign to improve walkability and public space recommendation to emphasize the unique historic character of Mysuru. The snapshots of design recommendations provide practical guidance for targeted actions ensuring both short-term and long-term impact. For instance, while the infill development drives densification to meet the needs of compact development, the street/ intersection redesign will act as a “quick-win” initiative once implemented, providing immediate impact for local communities such as better public space and safer

streets. In addition, the targeted actions that are in line with a broader vision will allow for more focused financing in a coordinated manner.

3.2.5 Targeted infill development

The proposed targeted infill development is designed in according with form-based recommendations to:

- Promote a more walkable environment (with a possibility to cycle) by allocating sufficient spaces for pedestrian sidewalks, promotion of pedestrian priority interval streets, pocket public spaces and sheltered passages/ terraces to create more shade.
- Ensure a continuous pedestrian realm by promoting active street frontages (especially along the main streets) with small retail, commercial and public uses, continuous sidewalks, and pedestrian-friendly infrastructure (safe crossings).
- Create a more human-scale and pedestrian-friendly environment by creating a sense of the street enclosure through new infill development, vegetation, and temporary structures (marketplaces).

FIGURE 3.8 Targeted infill development in compliance with form-based codes

Targeted infill development complied with the Form Based Codes



- Green roof/community garden
- Small retail/marketplace
- Playground
- Pocket public space
- Signage
- Bicycle parking
- Infill development
- Pedestrian oriented space
- Green roof/community garden
- Sheltered terrace
- Bicycle lane
- Reserved passages for visual permeability

Form Based Codes recommendations



- Active street frontage
- Internal street
- Main street
- Street edge
- Signage
- Visual permeability through pocket space

Source: UN-Habitat

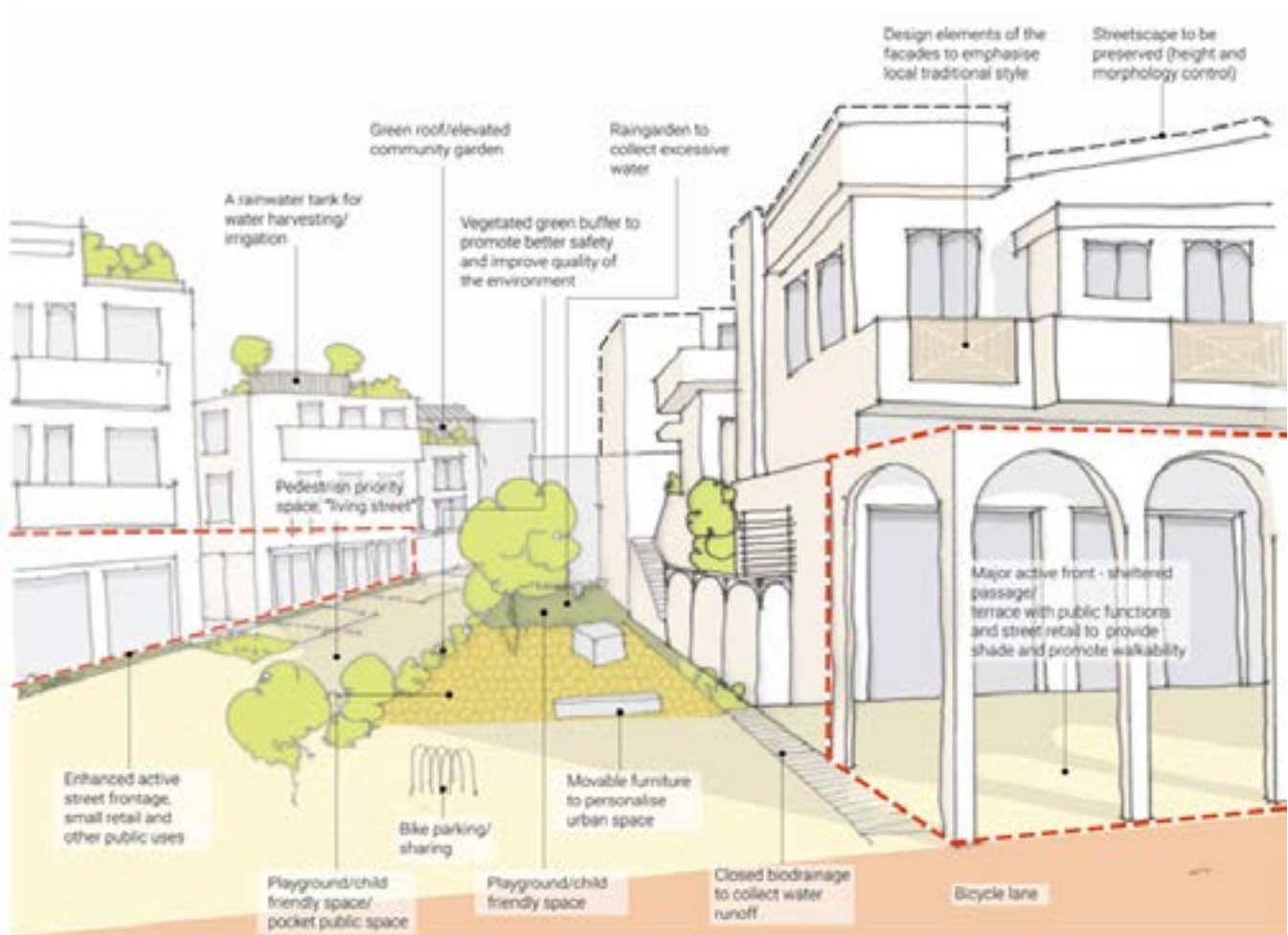
- Ensure visual permeability of the urban fabric by reserving pedestrian passages and promoting pocket public spaces.
- Promote additional vegetation, green safety buffers, elements of water sensitive design such as raingardens and bio-drainage along the main arteries.
- Emphasize local character through design elements such as terraces, façade elements, balconies, window shutters, etc.
- Promote a convenient signage system (indicating routes to key landmarks) for both residents and visitors with a special focus on PwDs.
- Integrate blue and green infrastructure into the system of public space through promotion of raingardens and bioswales to collect excessive water runoff. In addition, water collection tanks maybe installed on top of new development for irrigation of proposed community gardens.
- Install street furniture along major movement paths to create a more vibrant environment where street users can rest and interact.

The recommendations tackle different dimensions – such as, urban fabric, streets, public space and blocks – and are translated into design actions as illustrated in Figure 3-9.

As shown in Figure 3-10, the application of form-based codes for the city's Agrahara Circle emphasizes the intersection as a safe public space that should strengthen the sense of local identity. The current first floor should contain commercial and public functions to ensure active street frontage that will facilitate vibrant urban environment.

The space dedicated for pedestrian use should be better defined to promote better safety and prevent encroachment of the sidewalks by vehicles. For that purpose, low rise vegetation should be proposed. Using low rise vegetation instead of fencing will improve the quality of the environment

FIGURE 3.9 Targeted infill development in compliance with form-based codes

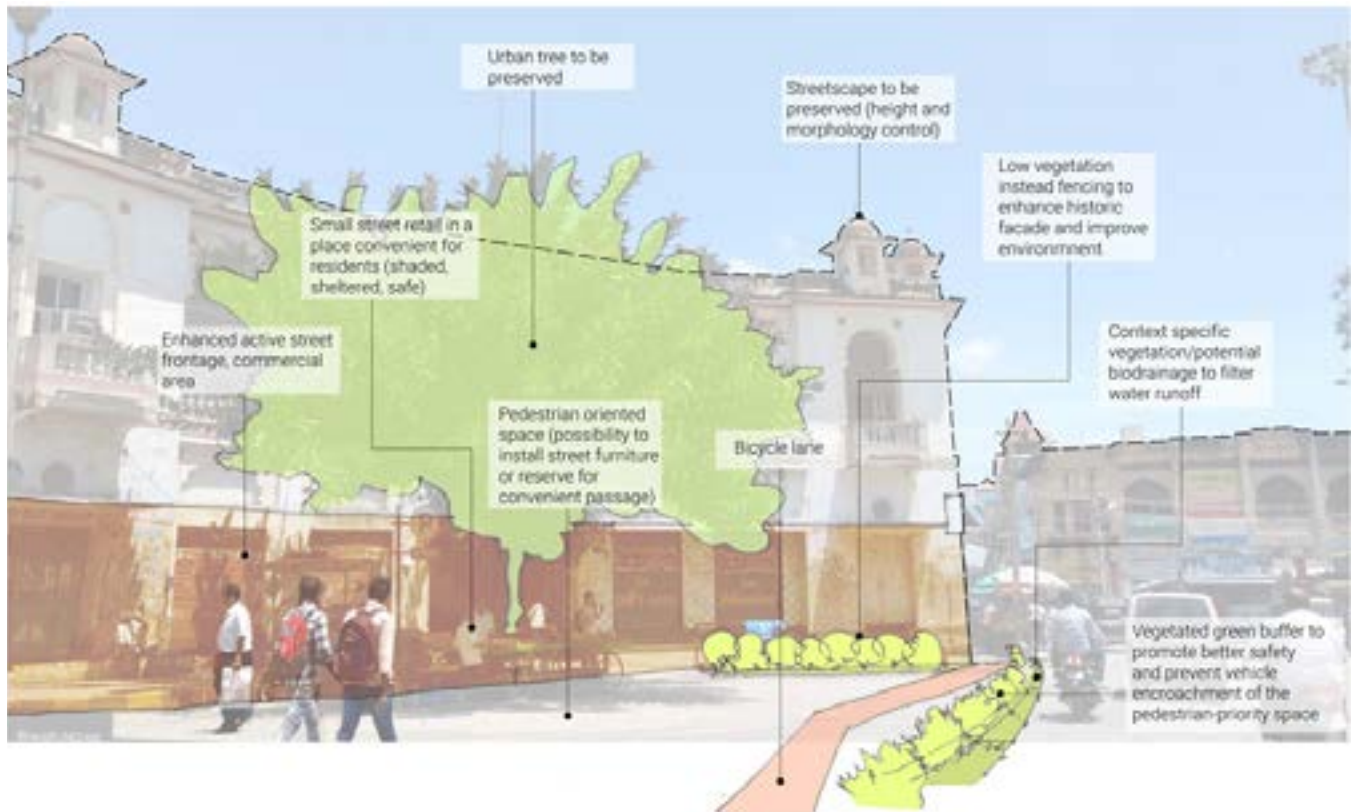


Source: UN-Habitat

while providing barrier-free environment and creating a more visually pleasant space. Specific vegetation will significantly contribute to the urban resilience, bioswales and bio-drainage along the major arteries will collect and filter excessive water runoff.

In addition, existing urban trees should be preserved and the use of shaded space enhanced. For example, small street retail and a small marketplace may be located under large-crown trees. The current streetscape of the human-scale urban environment that contributes to a sense of the historic city should be maintained.

FIGURE 3.10 Form-based codes recommendations for street redesign



Source: UN-Habitat

3.2.6 Redesigning the street

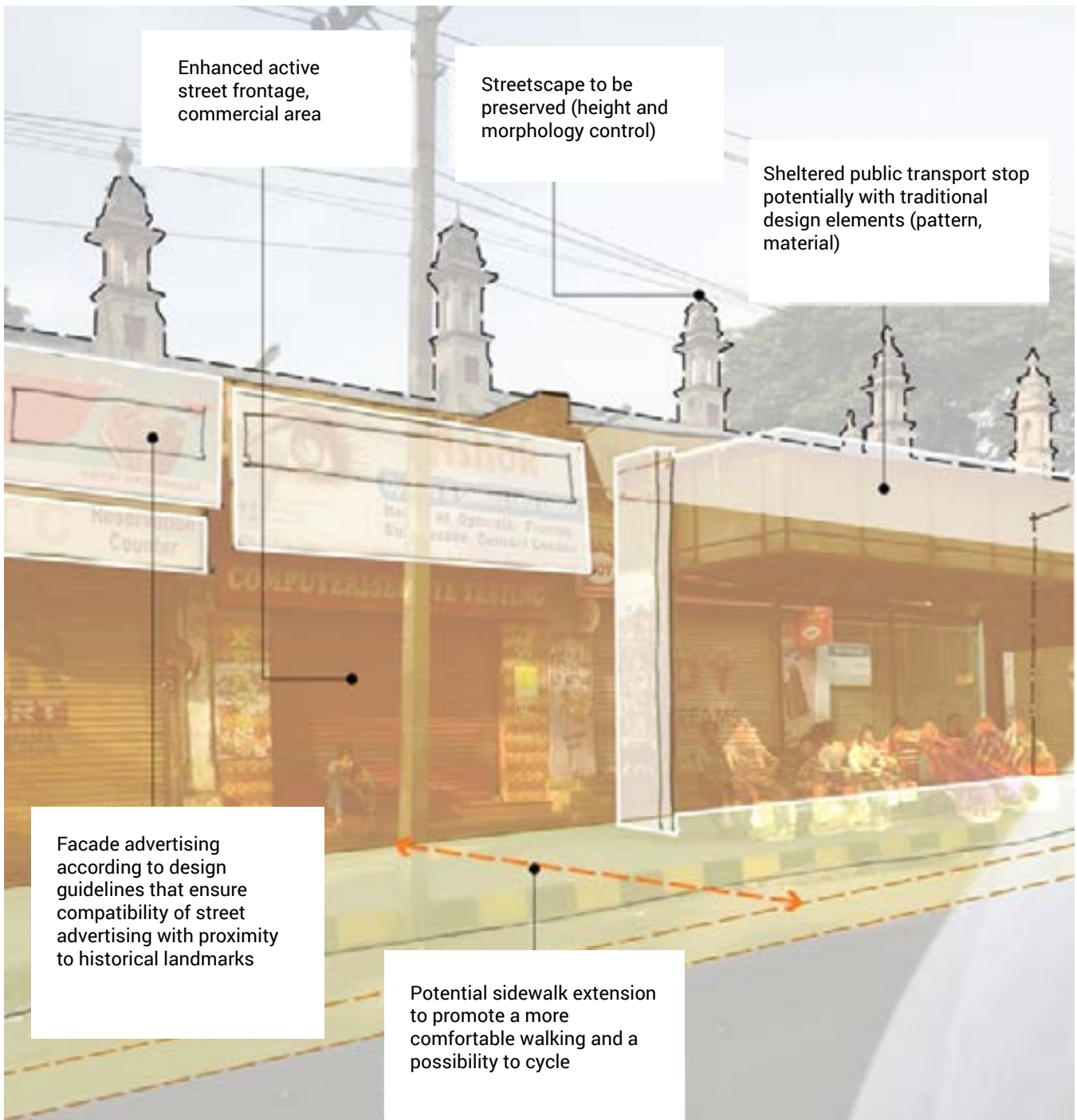
The application of the form-based codes to streets helps transform them into a system of walkable and safe network of public spaces. Streets play a vital role in the perception of the urban environment and should be given great attention in the HND.

Where possible, it is suggested that the vibrant environment through the promotion of commercial and public functions on the first floor be maintained. Advertising and signage guidelines to be compatible with the historic sites to ensure harmony. This implies that signages and advertising boards/posters should not draw attention away from the historical sites. The footpaths where possible/ applicable, may be widened to a three-metre width, which is comfortable for pedestrian flow and accommodates wheelchairs to turn safely (IRC:103-2012, 6.1.5.2).

The street infrastructure where applicable should emphasize the local character of Mysuru. For example, the public transport stops may be redesigned to include local materials/ patterns, clear signages, and information for passengers. Though these are the underlying recommendations, a more detailed set of principles should be defined according to the street character and morphology.

As shown in Figure 3-12, the application of form-based codes for Vijayanagar Main Road establishes the importance of NMT friendly street that will facilitate a continuous public realm and help achieve a safe, efficient, affordable, integrated, and low-carbon transport system with active and vibrant street frontages.

FIGURE 3.11 Form based codes recommendations for street redesign



Source: UN-Habitat

IMAGE 3.1

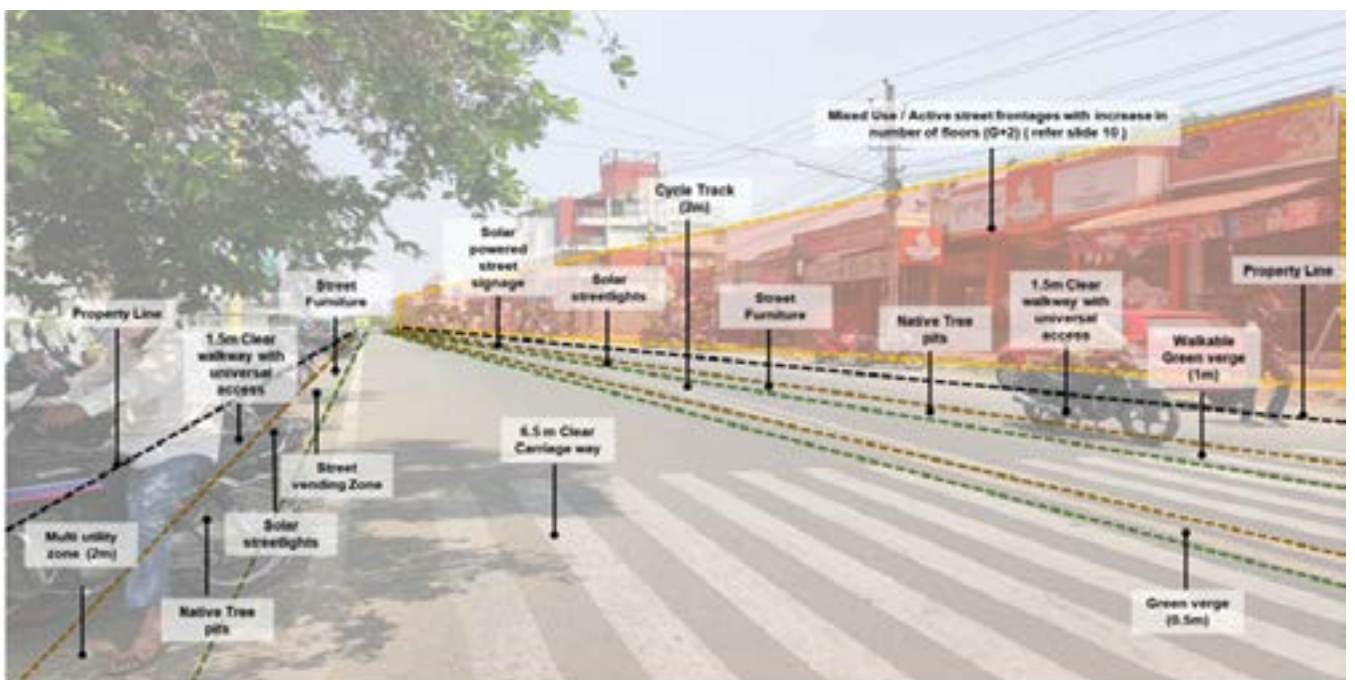
Vijayanagar Main Road (Before)



Source: UN-Habitat

FIGURE 3.12

Form based codes recommendations for street redesign (Vijayanagar Main Road)



Source: UN-Habitat

FIGURE 3.13 Indicative Vijayanagar Main Road rendering (after)

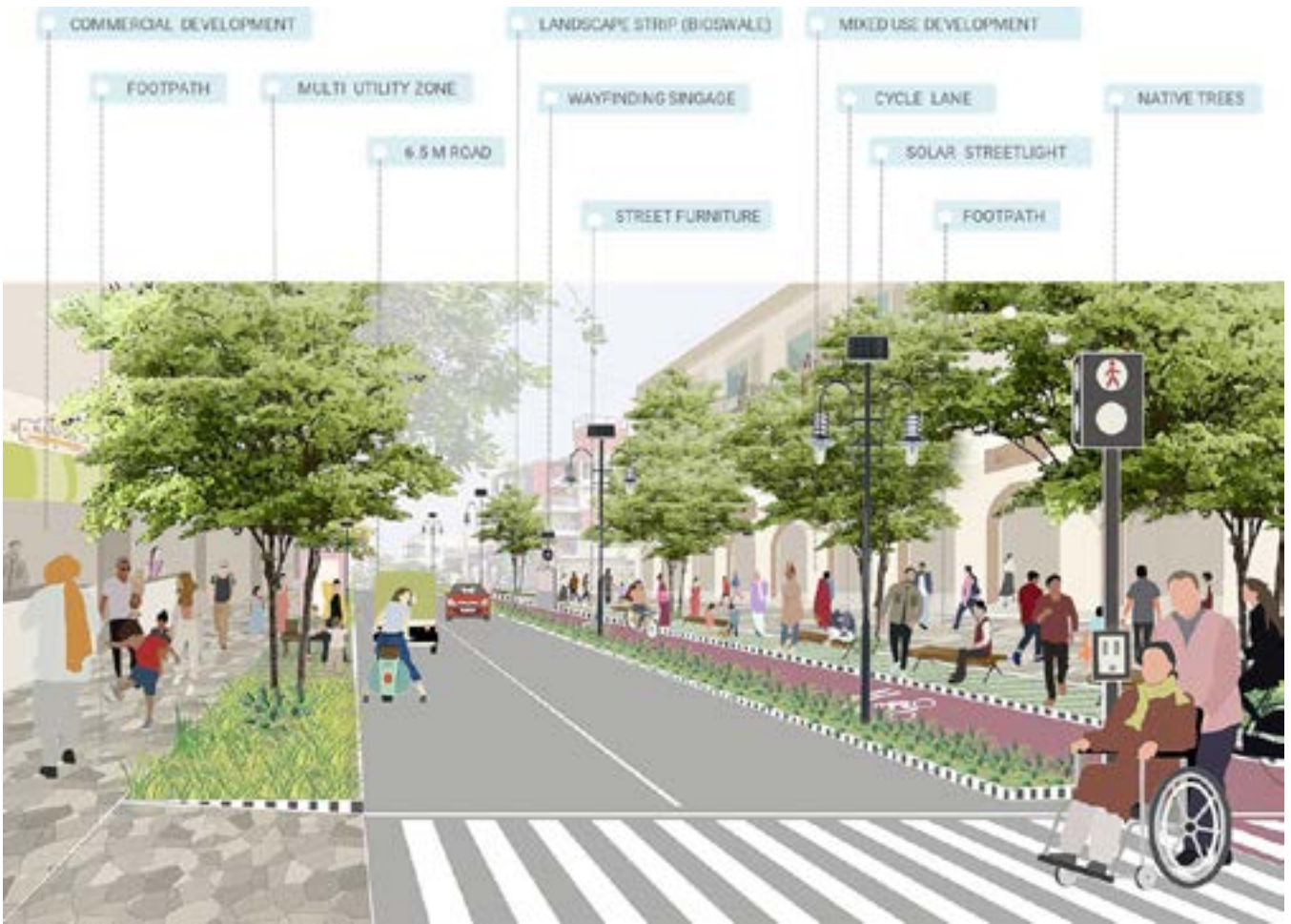


IMAGE 3.2 View from Devaraja market square



Source: UN-Habitat

4



Mysuru Clock Tower

STRATEGIC RESPONSE

4.1 Strategic Response 1: Create Mixed-Use Infill Development and New Neighbourhood Centres

Low-density urban sprawl in Mysuru has emerged as one of the key challenges based on the diagnostics of Mysuru (please refer to the City Profile and Diagnostic Report for Mysuru). This Strategic Response uses Principle 1 – Compact Growth to underpin the two proposed interventions to reduce negative externalities:

- **Intervention 1.1: Create New Neighbourhood Centres**
- **Intervention 1.2: Promote Infill and Mixed-use Neighbourhoods**

4.1.1 Proposed interventions within the strategic response



Intervention 1.1: Create New Neighbourhood Centres

The 2011 LPA master plan for the period 2011–2031 proposes the decentralization of the city's commercial centre. It proposes a 'Special Commercial Zone for district centres', and 'Special Commercial Zone for international convention centre' at Planning District (PD) 43, which is South of the Mysuru conurbation boundary.

At the district level, these commercial centres can serve a wider population and play a regional role with their own agglomeration economies. This intervention, instead, proposes to assess and plan for specific and local needs at the neighbourhood scale within the MCC boundary, by identifying and augmenting several neighbourhood centres.

Local scale commercial activity or public services may already exist within the city informally or formally, but in the form of ribbon development. Identifying these existing areas is a necessary first step, after which they can be enhanced by increasing the variation in commercial unit type, mixed land uses, identifying sites for temporary marketplaces, and focusing NMT infrastructure (pedestrianization of streets, cycling routes, autorickshaw 'pull-in' stations, etc.).

Promoting mixed land uses and small commercial units can respond to local economic and public service needs, for example through grocery stores, nurseries, clinics, and community centres, among others.

In addition to providing local-scale facilities, by focusing on NMT infrastructure in neighbourhood centres, inter-city, local and non-motorized mobility networks become a more efficient mode of transport. Also, this is achieved without bypassing the city core, while the use of public transport increases, and congestion and average city trip length are reduced. Please see Strategic Response 2 for more details on NMT infrastructure improvements at each neighbourhood centre.

Developing temporary marketplaces can increase access to produce at the local level as well as increase employment opportunities away from the city centre. This builds on the existing pockets of population density and provides decentralized employment centres as the city expands.

Promoting specifically local crafts and produce from local traditional farming, can exploit, as well as link the existing efforts (expressed in the LPA master plan) to support tourism and preserve agricultural production, and extend the tourism length of stay potential as tourists venture away from the heritage core. Improving pedestrian accessibility to existing markets increases NMT use within the city's neighbourhoods, and aids in promoting markets as public spaces.

In addition, these nodes, can promote a traditional architectural style and urban form that maintains the city's heritage value beyond what is currently limited to the city core (see Section 3.2: Form-based Codes and Intervention 1.2: Mixed-use Neighbourhoods).

Considerations for the location of new neighbourhood centres are as follows and are also suggested in Figure 3.1. It is further suggested that an additional study be undertaken, including current population, land use, building height, employment, mobility patterns and vacant land ownership data. It is recommended that collection and assessment of population, employment and mobility pattern data sets be disaggregated by gender, age, income to guide the spatial planning, etc. For more details on key data sets, see Strategic Response 4: Digital Governance, Intervention 4.2 (Improve Shared, Updated, and Consistent Data Triangulation in Urban Planning Practice).

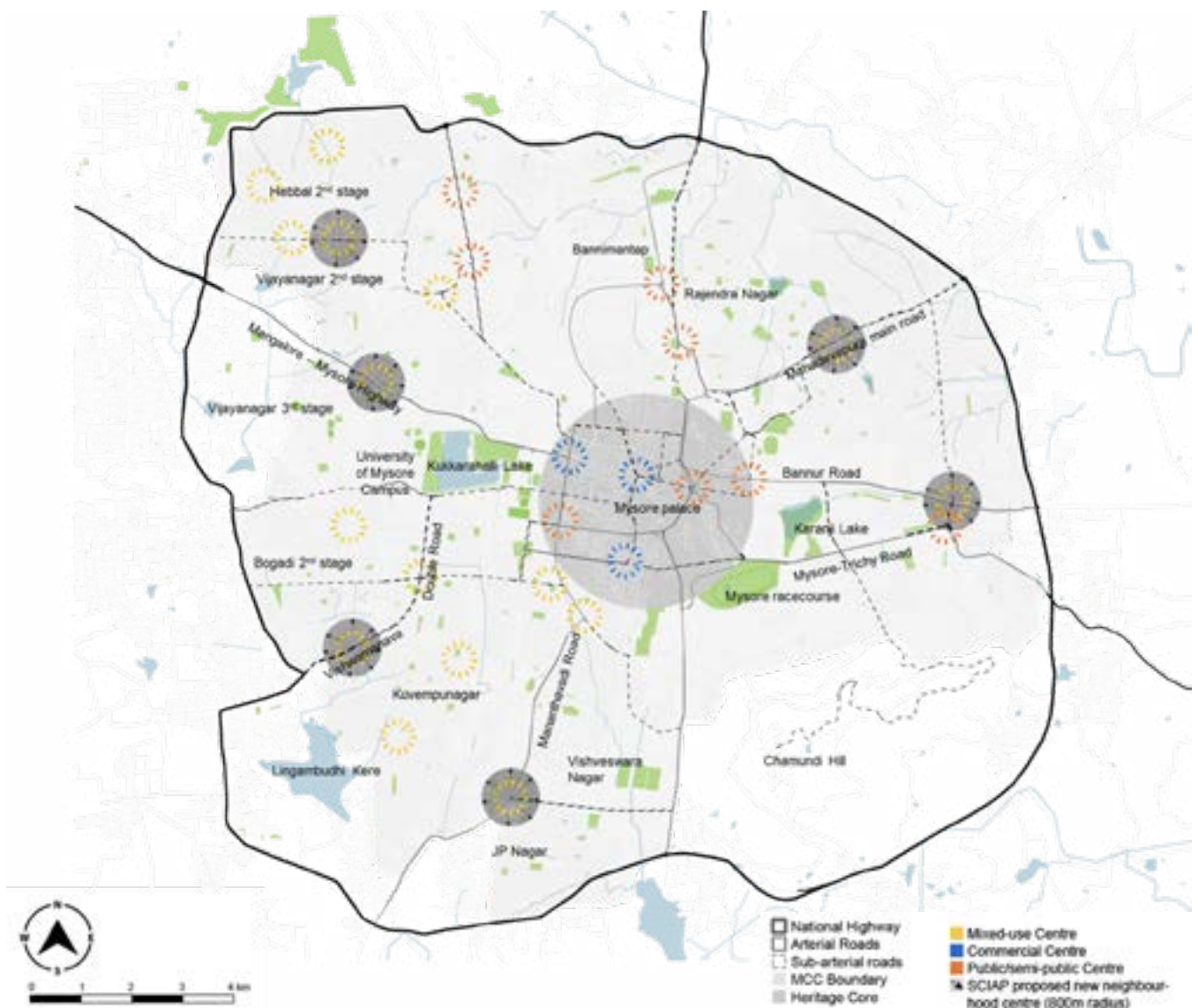
1. **Primary arteries:** These are radial and, therefore, support new neighbourhood centres in their ability to filter long-distance travellers from inter-city and last mile transit points
2. **Key intersection points between two primary or secondary arteries:** Provides an intersection of activity and functions
3. **Existing bus routes and stops:** They can provide existing 'transit' infrastructure along primary arteries from which multi-modal intersections can be developed

4. **Commercial and mixed land use clusters:** To support a vibrant neighbourhood centre
5. **Vacant land site availability within the vicinity of each neighbourhood centre:** This can provide capacity for residential infill, new facilities, open public spaces, or pocket parks (see Intervention 3: Eco-vulnerability for details on use of vacant land for green and public space)
6. The direction of city expansion indicates where additional services may need to be provided to support communities in the city's periphery

Each new neighbourhood centre has a diverse function and, therefore, requires specific interventions. Table 4.1 outlines the suggested neighbourhood centres and the potential each centre holds. Interventions are prioritized at each location depending on context specific attributes.

However, it is recommended that the existing shortage in social infrastructure for women, girls, gender and sexual minorities be assessed and built area or land for them be allocated in all neighbourhood centres. These include but are not limited to the following:

1. Shelters for domestic violence survivors
2. Public toilets and nursing (breast-feeding) rooms
3. Homeless shelters (men, women, families, gender minorities)
4. Creches
5. Primary education facilities
6. Primary healthcare centres, along with skills development and information
7. Working women's hostels
8. Living facilities for the elderly



Map 4.1: Proposed locations for new neighbourhood centres

Source: UN-Habitat

TABLE 4.1 Characteristics of each neighbourhood centre

Neighbourhood centre	Characteristics	Potential outcomes
1 1.2 2.2 2.3	This centre is located on High Tension Double Road, next to large open lands. There is limited NMT infrastructure.	Potential to incentivize development on vacant or under-used land. If supported by form-based codes, has potential to reduce fragmentation between heritage building architecture and urban form in the city centre as well as newer business centre as the city expands towards the north-west.
2 2.2 2.3	This centre is located on the Bengaluru–Mysuru Highway, a key road into the city. It is adjacent to buildings associated with the university, and a dense residential neighbourhood. Several local commercial buildings are located here, such as a farmers’ market and a shopping centre, among others.	Potential to increase permeability between university campus and adjacent neighbourhoods as well as build upon the potential that student traffic can have in creating a vibrant neighbourhood centre. This can also improve safety and create employment opportunities.
3 1.2 2.2 2.3	This centre is located at a roundabout connecting the arterial road, Vishwamanava Double Road, with a secondary road, Udayaravi Road, and neighbourhood roads like the 6th Main Roads. There are substantial vacant lands adjacent to the intersection, a neighbourhood park, and a heritage site.	Potential to expand tourism away from the city core through increased connectivity and temporary, pedestrianized marketplaces.
4 1.2 2.2 2.3	This centre is at the intersection of Mananthavadi Road and Link Main Road. Although there are some small and dense neighbourhoods nearby, there is also substantial vacant or under-developed land parcels. This is also an industrial area.	Potential to incentivize development on vacant or under-used land. If supported by form-based codes, has potential to reduce fragmentation between heritage building architecture and urban form in the city centre, as well as newer business centre as the city expands towards the South.
5 2.2 2.3	This centre is located on Mahadevapura Main Road. It has a high population density and lacks coverage from facilities like a fire station and school.	Potential to improve facility provision to accommodate high demand from a highly populated area of the city.
6 1.2 2.2 2.3	This centre is at the intersection of Bannur Road and Dr Rajkumar Main Road and intersects the 150A 6-lane and sub-arterial 4-lane road. This intersection connects regional and local transport networks. There are a number of bus stops at this intersection. Although there are high density residential neighbourhoods nearby, there are also pockets of vacant land. Land uses adjacent to the intersection are predominantly public or commercial (petrol stations, schools).	With improved NMT and development on currently vacant or under-developed land, rather than being a mobility corridor, this area can provide infill development and create a safe and vibrant new community for school children and nearby residential neighbourhoods.
7 2.2 2.3	This centre is the existing heritage and commercial core. Specific interventions here can improve the quality of the urban environment.	Improving pedestrian access in the city centre can improve the quality of its urban environment, and benefit tourism and economic activities.

Source: UN-Habitat

IMAGE 4.1

Neighbourhood Centre 4, showing adjacent vacant land sites, low density areas adjacent to higher density neighbourhoods (in the background), mainly G+1 buildings adjacent to the road with commercial units, some green coverage and little-to-no pedestrian infrastructure.



Table 4.2 provides a summary of what components are proposed at each neighbourhood centre:

TABLE 4.2

Proposed components for new neighbourhood centres

Intervention component	Impact potential
1.2 Vernacular architectural style mixed-use housing developments in select vacant or under-used plots within a 15-minute walk from each neighbourhood centre ³⁴ (see Intervention 1.2)	Support new, diverse communities – i.e., varied income housing complexes through diverse housing typologies (scales and affordability) – with vernacular style housing and urban form, to bridge new peripheral development (North-west office buildings, modern apartment blocks, areas of expansion to the South), with the city core’s heritage architecture.
2.2 Land use/building use change to increase mixed-use around neighbourhood centres and financial incentives, provision of trading zones (see Strategic Response 2, Intervention 2.3, Section 3.5 for more details on temporary markets at each neighbourhood centre).	To create flexibility to cater to local business (smaller and varied unit sizes) and informal economic activities. Reduce GHG emissions by improving accessibility to facilities and employment within each neighbourhood and consequentially reduce reliance on private vehicles. The strategic location of each centre can improve accessibility for city expansion areas (North-west and South).
2.3 Provision of mobility infrastructure (see Strategic Response 2, Intervention 2.1, Section 3.5, for full list of components).	Improved NMT mobility between the city core and peripheries to improve connectivity between inter-city and paratransit, to provide direct ‘transit’ points between regional and neighbourhood scale travel routes. This will reduce GHG emissions through improved efficiency of public transport, pedestrian and cycling modes of transport.

Source: UN-Habitat

³⁴ Identifying a radius using a 15-minute walk must be based on walkable distance (meaning based on walkability, number of intersections and road length), however Map 4.1 uses a straight-line radius of 800m to give a conceptual indication of the coverage area.

These interventions aim to reduce GHG emissions and encourage a more compact city growth by reducing trip lengths to access facilities and employment, encouraging nodal growth through focused infill. This builds on existing nodes within the city and existing pockets of density that

are characteristic of the city. Rather than encouraging a higher density through increasing FAR, these interventions aim to maintain existing typologies and residential densities through infill. Figure 4.1 re-articulates Intervention 1.1, the creation of new neighbourhood centres.

FIGURE 4.1 Example interventions – Neighbourhood Centres



Source: UN-Habitat



Intervention 1.2: Promote Infill and Mixed-use Neighbourhoods

This strategic response aims to reduce the implications of low-density city growth by promoting infill development over greenfield development, limiting the loss of green coverage, and using existing networks and services more efficiently.

The master plan 2031 states:

“Consideration of housing issues must incorporate urban growth, urban consolidation, neighborhood character and opportunities to facilitate new development within the existing urban fabric.”³⁵

Building on the city-wide vacant land assessment underway by the Karnataka Industrial Areas Development Board (KIADB), it is recommended that mixed-use neighbourhoods be developed on under-used or vacant land sites in the city to make best use of the high coverage

³⁵ Direct quotation from Master Plan 2031

of infrastructure and public amenities. Seventeen per cent of land, or 610 ha within the MCC boundary under residential use, lies vacant and is proposed to accommodate future growth.³⁶

The following criteria can be considered in the identification and prioritization of vacant land sites for new, mixed-use neighbourhoods:

Low density area	Scale of the site	Area of developed/ undeveloped land within the site	Ownership & financial programme	PT service area	Facilities service area (schools, hospitals, fire station)
Existing road coverage	Proximity to existing housing development	Proximity to mixed-use or commercial areas	Proximity to neighbourhood centre	Location (peripheral, second ring road, inner ringroad)	Within low lying area

Although each site may differ depending on the categorization outlined above, the following steps are recommended:

- Define area of under-used land taking into consideration ownership, type of institutional use (if applicable), type and time of users, safety issues or benefits, maintenance programme or requirements
- Assess funding model and promote PPP for collaborative engagement in public space creation
- Undertake consultations with key stakeholders, including local communities and businesses to understand current use and to integrate design ideas, solutions, and local needs
- Adopt form-based codes to maintain contextual, heritage vernacular
- Incentivize mixed-use development on land parcels through the continuation of vacant land taxation and land-use changes (outlined below)

Vacant land tax in Mysuru was increased in April 2021. This may lead to increased development in the city. It is important that form-based codes are adopted and enforced, to support this relatively recent financial incentive for development on both the periphery and infill (see Section 3.2 for more details).

The Mysuru conurbation's projected population density of 72 pph (assuming a population of 21 lakh and an area of 292.42 sq. km.), is much lower than the MCC boundary's current average density of 128 pph. In addition, a density of 150 pph is the recommended global practice for optimum population density of cities. Hence, a lower density in this instance may lead to negative outcomes (see Chapter 2 for details).³⁷ However, the current density within the MCC boundary can be maintained by using 'best practices' from existing neighbourhoods in the MCC's jurisdiction.

Figure 4.2 highlights three different residential neighbourhoods' urban form and land use. Each example shows a high-density area and provides a break down and visualization to help identify key elements to be replicated in new infill neighbourhood development.

Though the average density is relatively high among all the three neighbourhoods, the first example demonstrates a more efficient and vibrant organization of the urban morphology. The first neighbourhood demonstrates a diverse land-use pattern and a higher number of green public spaces within the built-up area. In addition, the first neighbourhood has rooftop greening that is lacking in the other examples. The second neighbourhood demonstrates a better permeability of urban fabric supported by the system of internal roads. Well distributed public spaces,

³⁶ Interpreted from Master Plan 2031; taken from city profile.

³⁷ This benchmark is taken from the 'Five Principles of Neighbourhood Design' which can be accessed at: <https://unhabitat.org/five-principles-of-neighbourhood-design>.

FIGURE 4.2 Best practice assessment from three locations within the city



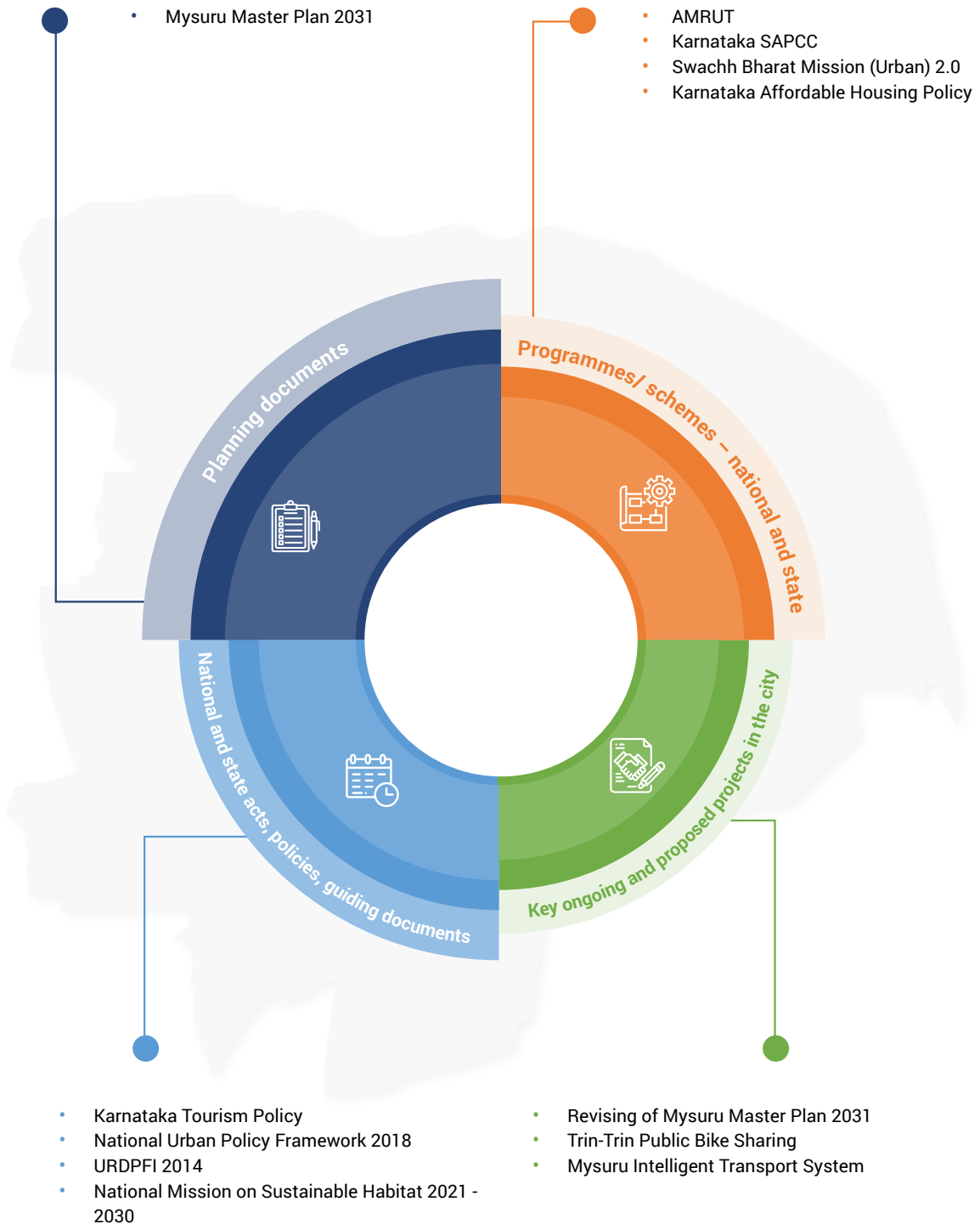
Source: UN-Habitat

green coverage and urban permeability are critical spatial determinants that impact the perception of density, prevent overcrowding, and create a livable urban space. Further design recommendations within the scope of form-based codes are based on local best practices to maintain the local character.

Not only is maintaining the 128 pph density in new neighbourhoods an important element of reducing sprawl as Mysuru expands, but new infill development (as explored in Section 2.3: Key Issues Diagnosed) may also help to reduce the gap between running costs and revenue of, for example, public transport and water supply.

As identified above, newer, privately developed apartment complexes may fragment the urban fabric and form isolated enclaves on the city’s periphery. For the city to grow sustainably, it is recommended that vernacular architectural style, heritage typologies and neighbourhood layouts based on existing neighbourhoods within the city be promoted. To do this, it is important to enforce form-based codes to guide new development, create more consistent density, use facilities and services more efficiently and maintain a compact and integrated city.

4.1.2 Alignment with national, state policies, programmes and ongoing, proposed capital projects in the city



4.1.3 Gender and inclusion

Interventions 1.1 and 1.2 aids women significantly with mixed-use development and improved NMT infrastructure. Both interventions encourage gender inclusive development by improving accessibility to services with neighbourhood centres. Aligning NMT to neighbourhood centres also provides safe and affordable transport to low-income groups.

Through these interventions following developmental goals will be achieved.

- Promotion of markets – usually for informal traders
- Improved NMT for more affordable transport
- Aligning NMT in neighbourhood centres for safer transit points
- Neighbourhood centres (central location for grouping infrastructure and services) for more accessibility on a hyperlocal scale – this usually benefits women who represent the higher percentage at hyperlocal scale than the male workers. It will also provide them with safer urban environmental condition as various activities would be placed in a single place.

- Infill development, particularly mixed-use (i.e., varied housing types within a neighbourhood) increases social inclusion as reduces fragmentation on city-scale by income groups and encourages diverse neighbourhoods

Also, the small commercial units as part of Intervention 1.2 respond to local economic needs and reduces caregiving trip distance for women. Close proximity to groceries, nurseries, clinics, and community centres also significantly benefits women. The neighbourhood centres are recommended to be developed with gender inclusive amenities, such as public toilets, nursing rooms, accessible baby/ child change facilities, etc. (see Table 4.3).

The temporary marketplaces support informal traders and creates job opportunities for women near to their place of residence. Intervention 1.1 by utilising student traffic for vibrant neighbourhood will improve local commercial activity and would offer economic growth. The mixed-use infill development with varied housing increases social inclusion by diverse neighbourhood creation. Interventions for gender inclusive urban development are also suggested in this report (see Annexure 8).

TABLE 4.3 Recommendations of gender inclusive neighbourhood centres

Design element	Recommendations
1 Amenities	<ul style="list-style-type: none"> • Provision and safe access to public toilets (men, women and unisex), private nursing rooms, accessible baby/ child change facilities • Drinking water • Suggested to provide larger toilet compartments for easier access to those with trolleys or parcels, wheelchair users, parents with strollers or small children, those with walking or mobility aids , etc.
2 Access	<ul style="list-style-type: none"> • Clear multi-modal connectivity from neighbourhood centre • NMT amenities like cycling infrastructure, e-rikshaw stand
3 Spatial structure and layout	<p>Planning of neighbourhood centres using built form and open space with consideration to visibility, diverse uses:</p> <ul style="list-style-type: none"> • Mixed-use amenities with clear circulation paths • Site serviced with outdoor seating, landscape, variety of public open spaces (plaza, open air theatres) • Avoid dark corners and blind spots • Designated vendor zones to be provided in centre, include reserved vendor zone for women • Consider adaptability for future needs
4 Built form	<ul style="list-style-type: none"> • Built form to be designed with easily distinguishable entryways and internal passages • Entry to be provided with canopies or recessed entrance suiting climate • Universal accessibility design codes should be followed, e.g., providing ramps with standardised slope • Provide seating, lockers, and rest points inside building
5 Circulation	<ul style="list-style-type: none"> • Access routes to be clear of obstructions and away from any projecting columns or return walls • Vertical circulation module to be designed in easily distinguishable points • Choice of routes suggested to be provided to access different levels, with at least the choice of stairs and lift • Corridors and passageways must be wide enough to allow wheelchair users to approach and gain easy access through doors off the corridor and where necessary turn through 180° • Ramps and routes for easy exit with trolley/ grocery bags

Design element	Recommendations
6 Lighting and shading	<ul style="list-style-type: none"> • Provide pedestrian-scale street lighting • Street lighting to be ensured for safe access at early morning/ evening with pole heights preferably of 3.5–4.5 m. • Shading trees, temporary rain/ sun shelters or prefabricated tensile structures to be provided in context sensitive manner • Seasonal tree suitable to the city to be planted for shading, using two types of trees at equidistance, one of them could be a seasonal flowering tree.
7 Landscape design	<ul style="list-style-type: none"> • Compound walls of shorter height providing a clear line of sight and in permeable material • Suggested to provide shading to some of the seating or gathering areas by gazebos or pavilions • Including visual markers and well-defined paths for safe neighbourhood centre
8 Street furniture	<ul style="list-style-type: none"> • Provide diverse seating options in the site services and in interiors for users • Cut-outs for wheelchair users to sit beside non-disabled companions • Seating to be designed with both back and arm rests • Two-way seating suggested to ensure activities at both sides of the paths (if possible, according to site planning)
9 Signages	<ul style="list-style-type: none"> • Provision of legible signage in multiple languages, such as Kannada, Hindi and English, indicating route and amenity centres • Using recognized symbols/ pictograms to help differently-abled (cognitive difficulties/ reading)
10 Design details	<ul style="list-style-type: none"> • The city to use theme-relevant materials in pavements, seating, signage design. The themes can be developed according to the context and cityscape of Mysuru • Pedestrian-friendly surface finishes for outdoor and indoor areas (material to be smooth, firm and anti-slip, ensuring that wheels and sticks do not sink into them).

Source: UN-Habitat

4.1.4 Climate convergence

Both Interventions 1.1 (new neighbourhood centres) and 1.2 (mixed-use neighbourhoods) have an impact on GHG emissions. Intervention 1.1 promotes walkability by increasing accessibility to 'every day' facilities and services and reduces dependency on private vehicles. Intervention 1.2 reduces emissions by using less materials in the construction of housing and infrastructure, by encouraging compact city growth over materials used in low density city expansion.

Both interventions increase the usage of existing infrastructure. In many cases, increasing usage leads to more efficient use, or, in other words, materials in the existing infrastructure (schools, roads, clinics, etc.) are used to a higher capacity. Adopting a more efficient use of the city's existing infrastructure maintains a more sustainable and strategic city growth.

On the other hand, the construction of new facilities, infrastructure, and housing, as suggested for neighbourhood centres through new, mixed-use

neighbourhoods, may lead to high emissions if sustainable construction methods are not considered. For example, in the construction of new housing, a single housing unit of 72-sq. m., G+2, without a lift, using regular construction materials such as concrete, cement bricks, clay bricks, ceramic and clay tiling, steel, XPS, spray foam and paint, can emit up to 98.65 tCO₂-e.³⁸ On the other hand, a unit built with sustainable construction materials such as fly ash or wood, straw bale, cork and bamboo, has the potential to store 20.03 tCO₂-e per annum.³⁹ Therefore, it is important for new development (Interventions 1.1 and 1.2), or development induced by these interventions to adopt a sustainable construction method (see Annexure 10).

4.1.5 Estimated project costs

Similar to GHG emission calculations, there are no specific interventions to measure the cost implication for Strategic Response 1, Intervention 1.1 New Neighbourhood Centres, and 1.2 Mixed-use Neighbourhoods. The list of actions for this strategic response can be found in Section 4.5 . Section 4.5 (see Annexure 11).

³⁸ This uses the potential CO₂-e emissions per kg of material and the acquisition of material includes demolition, destruction, collection, etc., of the materials, which amounts to 10 per cent of total construction carbon emissions; Kurian, R., Kulkarni, K. S., Ramani, P. V., Meena, C. S., Kumar, A., & Cozzolino, R. (2021). "Estimation of carbon footprint of residential building in warm humid climate of India through BIM." *Energies*, 14(14), 4237.

³⁹ Kuittinen, M., Zernicke, C., Slabik, S., & Hafner, A. (2021). "How can carbon be stored in the built environment? A review of potential options." *Architectural Science Review*, 1–17.

4.1.6 USAF indicators impacted

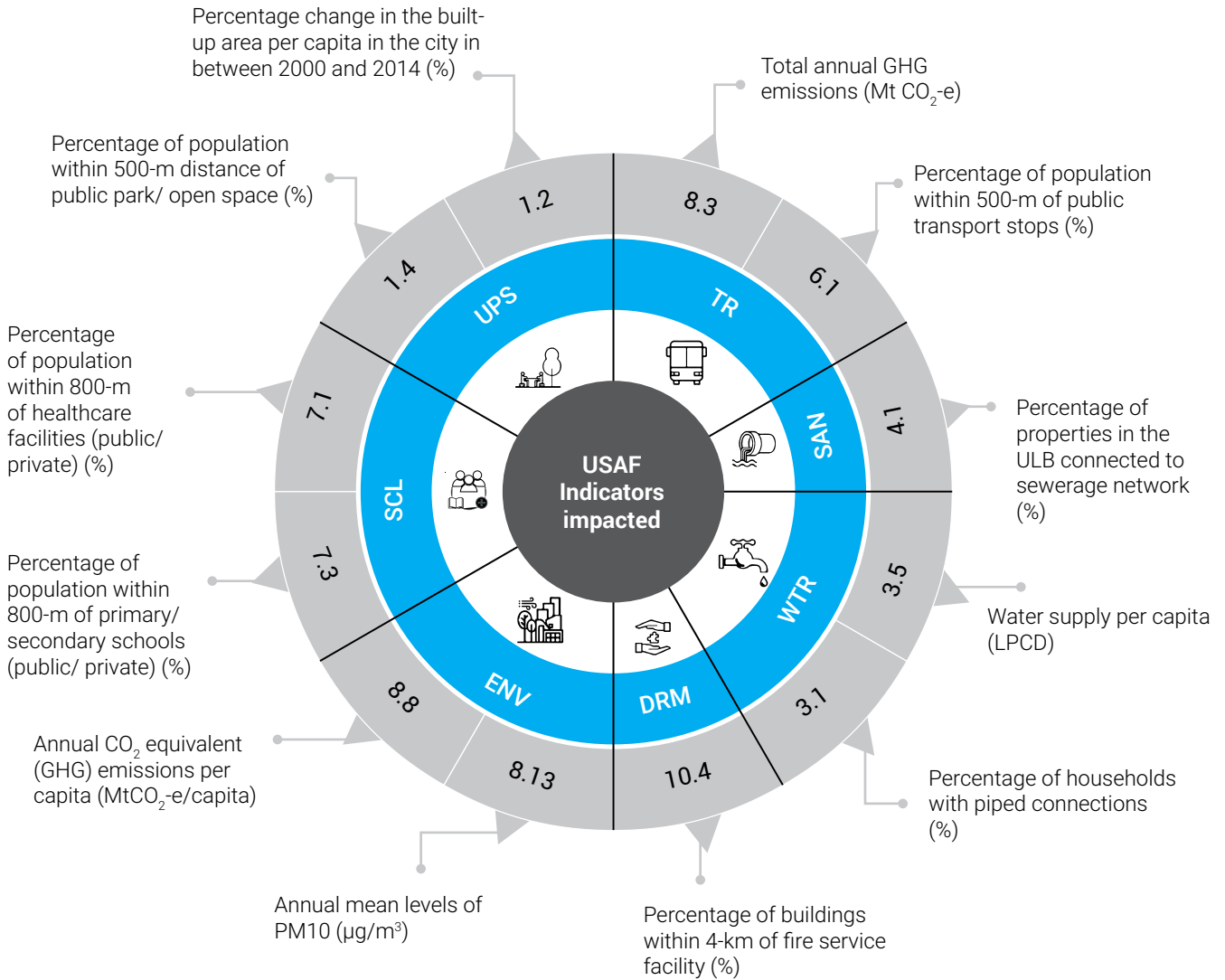


IMAGE 4.2

Busy afternoon street activities observed on Jagannmohan Palace Road



Source: UN-Habitat

4.2 Strategic Response 2: Increase NMT through Cycling Network Expansion and Strategic Implementation of Pedestrian Infrastructure

This strategic response aims to improve the quality of walking and cycling environments, promoting streets as public spaces, not only as mobility corridors. The following section provides spatial prioritization for these NMT improvements and integrates them with existing and proposed planning interventions. The issue of increased travel distances is not only addressed in this Strategic Response, but also within Strategic Response 1: Increase in Urban Sprawl. Principle II – Complete Streets is a guiding principle in designing streets as public spaces.

The following interventions are proposed for increasing the use of NMT in the city:

- **Intervention 2.1: Connecting Neighbourhood Centres with Improved NMT Network**
- **Intervention 2.2: Increase Multi-modal Infrastructure at Neighbourhood Centres**
- **Intervention 2.3: Pedestrianized 'Market Street' at Neighbourhood Centres**

4.2.1 Proposed interventions within the strategic response



Intervention 2.1: Connecting Neighbourhood Centres with Improved NMT Network

In response to the sub-optimal use of NMT, as outlined in Section 2.3 – Key Issues Diagnosed, this intervention focuses on improving the quality and coverage of NMT infrastructure and reducing the transport sector's

contribution to the city's GHG emissions. Despite the recent investment in cycling infrastructure through the implementation of the Trin-Trin docking stations, which has had less uptake than expected, Mysuru only has 0.9 km of cycling track infrastructure out of a total road network of 1,773 km.⁴⁰

Therefore, specific interventions to connect neighbourhoods through an improved NMT network include the construction of cycling infrastructure, as well as comfort and safety interventions such as tree planting, and organizing public transport, private vehicle, and autorickshaw traffic, predominantly through street design. Pedestrian infrastructure improvements are also proposed at specific focal points and are outlined in Interventions 2.2 and 2.3.

Key corridors have been identified for the prioritization of these street design improvements. Due to their radial structure, the primary roads can provide an equitable distribution of infrastructure and connect the city core with neighbourhood centres and the city's peripheries. In addition, promoting cycling on key routes can reduce traffic accidents through the concept of 'safety in numbers'.⁴¹ Several regulations, control mechanisms and financial incentives are proposed to support the implementation of increased and improved NMT networks in Mysuru. These promote the transition to non-motorized and electric vehicle (EV) use.

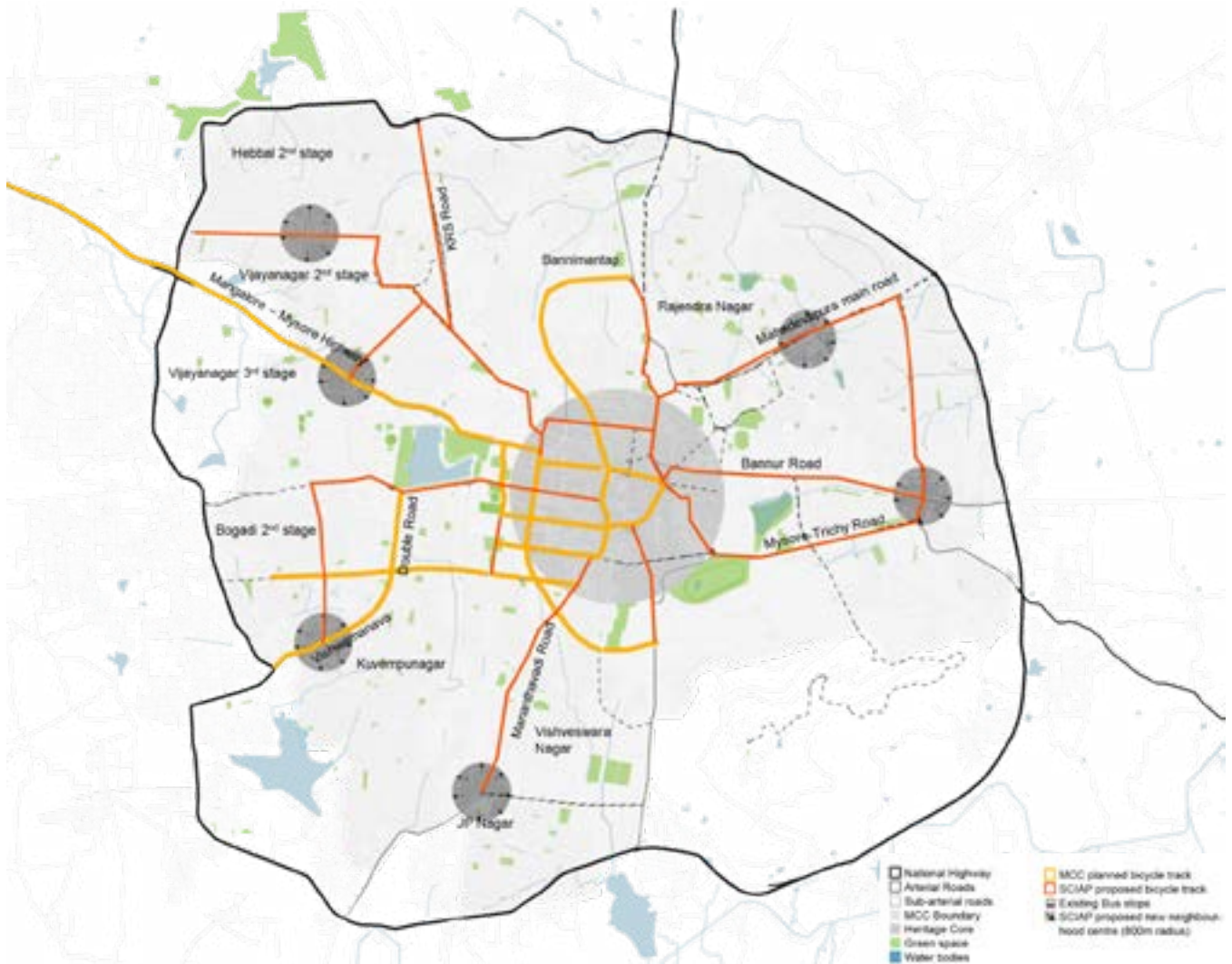
Existing and planned mobility projects have been considered, such as the 11-km cycle network expansion (highlighted in yellow in Map 4.2), which focuses on the city centre, the proposed 'Metro Neo' project and existing key bus depots.⁴² Land use patterns have been considered for determining main routes between residential areas, neighbourhood centres, and industrial and commercial nodes.

Particular attention has been paid to the linkage between the city core and main railway station, to the two mobility streams based on potential population growth scenarios. The first scenario being connectivity to the new industrial area in the North-west and densification due to the airport expansion and 'film and sports' city in the South; and the second being the tourist attractions in the city core and its South-west micro-market.

⁴⁰ This total road length lies within the conurbation boundary and is taken from 2009 data. Source: https://www.gtkp.com/assets/uploads/20091130-162706-2109-articles-59592_Mysuru.pdf.

⁴¹ This is outlined by the European Cyclists Federation here: https://ecf.com/files/wp-content/uploads/ECF_FACTSHEET4_V3_cterree_SafetyNumb.pdf.

⁴² The MCC's planned 11-km cycle routes are: from Field Marshal K.M. Cariappa Circle (Metropole Circle) to Ramaswamy Circle; from Ramaswamy Circle to Ballal Circle (Ashoka Circle); from MN Jois Circle (MUDA Circle) to Kautilya Circle (near Crawford Hall); from Nijalingappa Circle (Vijaya Bank Circle) to New Kantharaj Urs Road; and from New Kantharaj Urs Road up to Ring Road.



Map 4.2: Priority routes for street design improvements

Source: UN-Habitat

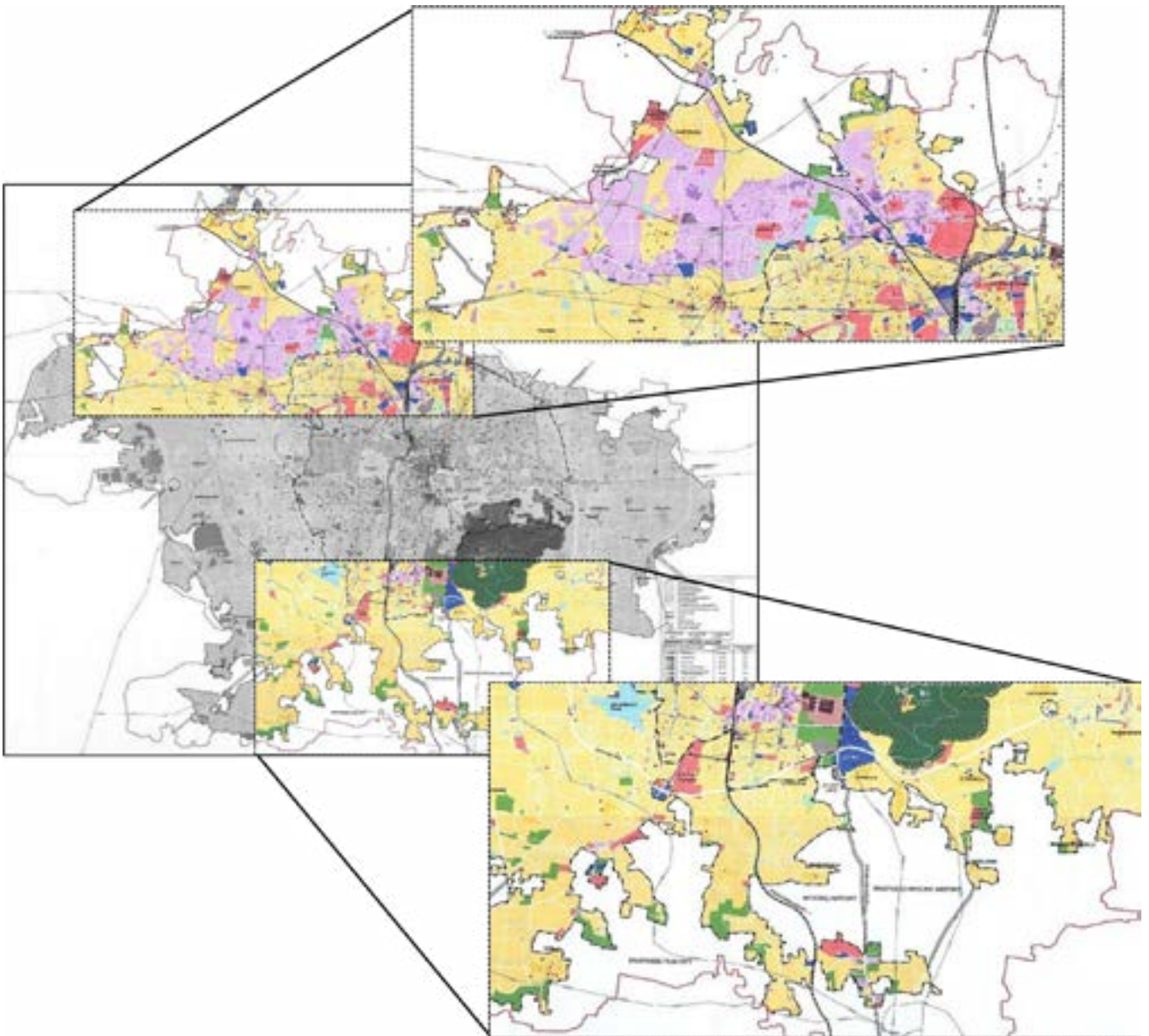
Several regulations, control mechanisms and financial incentives are proposed to support the implementation of increased and improved NMT networks in Mysuru. These promote the transition to non-motorized and EV use. Intervention 2.1 includes the proposal to enforce a shared lane for autorickshaws and bus routes to streamline public transport modes, reduce lane crossings, and increase the efficiency of non-private modes of transport. This could involve road markings as well as enforcement through monitoring technology.⁴³ An additional non-spatial proposal is the expansion of the existing efforts for road cleaning and maintenance through MCC employing community engagement extensively.⁴⁴

The following interventions are proposed for the routes identified in Map 4-2 (priority routes for street design improvements):

1. City-wide bicycle network
2. Enhanced green network (through tree planting)
3. Integrated bus, bicycle and autorickshaw mobility (bus stop upgrading to integrate better with cycling routes and shared bus and autorickshaw lane)
4. Safer e-autorickshaw stops (increase and formalize)
5. Reduced GHG emissions from street lighting

⁴³ M. Shafiq-Ur Rahman et al. (2012). Procedia – Social and Behavioural Sciences, 54 (2012) 261-274.

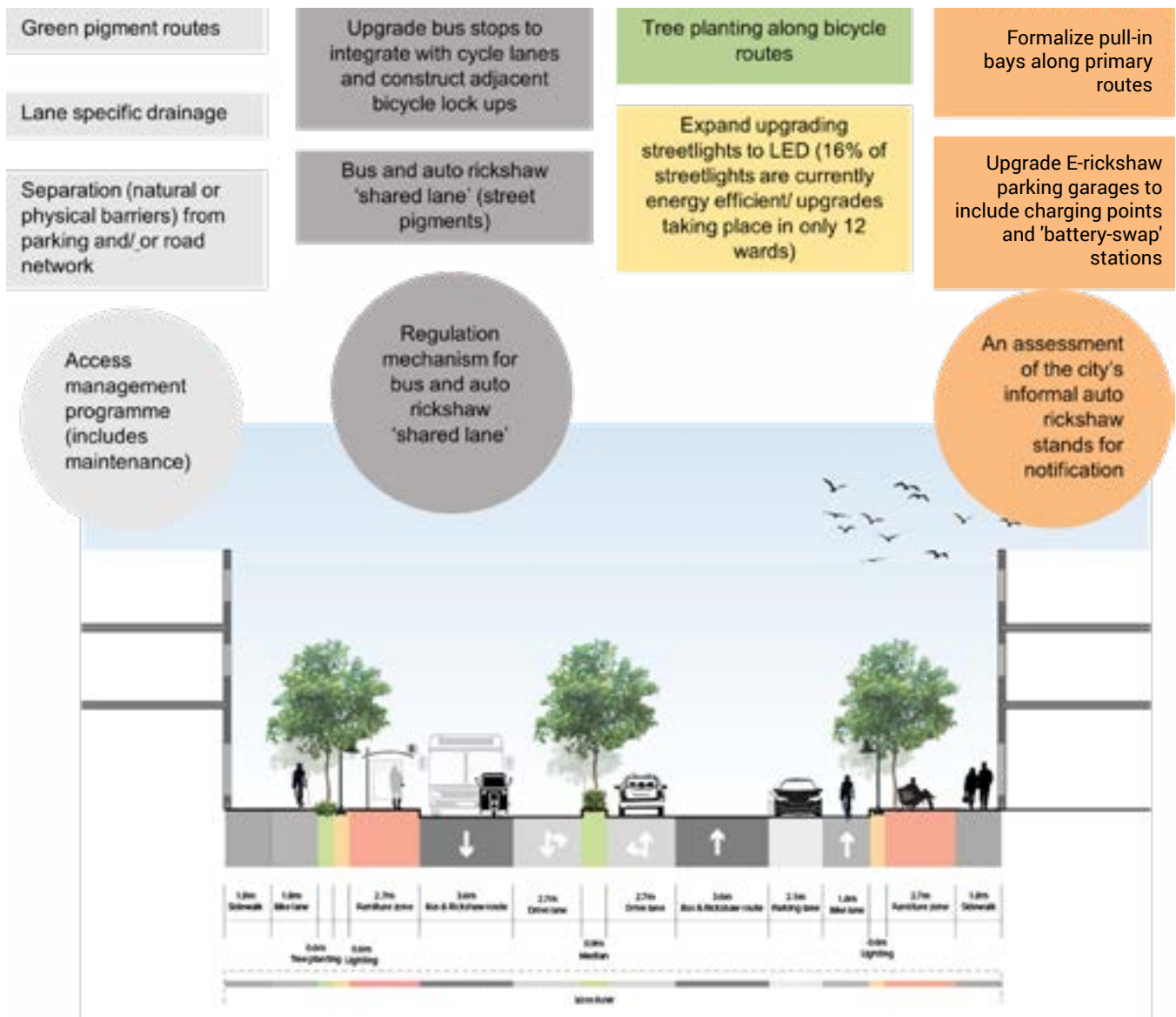
⁴⁴ MUDA (2011). City Sanitation Plan, Mysuru, Karnataka. Available online at: https://www.cseindia.org/static/mount/recommended_readings_mount/02-City-Sanitation-Plan_Mysuru.pdf.



Map 4.3: Proposed land use map for Mysuru conurbation, with proposed industrial area in the North-west (top) and airport extension with the film city (bottom) highlighted

Source: Mysuru Urban Development Authority

FIGURE 4.3 Street Design Example for Priority Roads⁴⁵



Source: UN-Habitat

To illustrate, Krishna Vilas Road and its surrounding area have been taken up as a demonstration area shown in in Figure 4-4. Located in the city core adjacent to Jaganmohan Palace and 2 minutes' walk from the KSRTC bus stand, this neighbourhood has a number of schools and institutions. The following street and circulation redesign measures may create an inclusive and socially-vibrant area -

1. Regulating the traffic flow of the street by making it unidirectional.
2. Making the street child-friendly by including appropriate amenities for children and the differently abled
3. Facilitating mixed use development on the other side of the street to induce activity and promoting vibrancy
4. Promoting NMT related amenities such as cycle tracks and safe crossings.
5. Designing a lane specific drainage system.

⁴⁵ Road design guidelines references: <https://www.itdp.in/wp-content/uploads/2016/07/Urban-street-design-guidelines.pdf>.

FIGURE 4.4 Proposed Street Redevelopment of Krishna Vilas and Laxmi Vilas Road



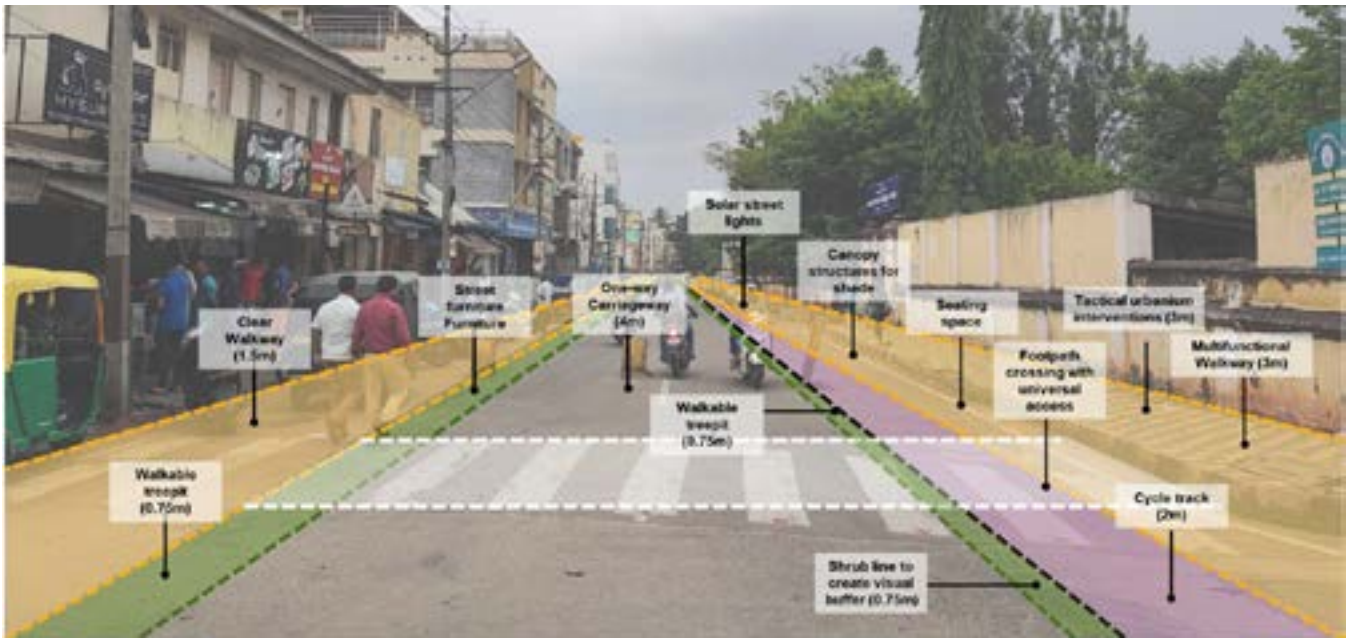
Source: Google Map; UN-Habitat

IMAGE 4.3 Krishna Vilas Road (Before)



Source: UN-Habitat

FIGURE 4.5 Street Design Example for Krishna Vilas Road (Priority Route)



Source: UN-Habitat

FIGURE 4.6 Indicative Krishna Vilas Road rendering (after)



Source: UN-Habitat



Intervention 2.2: Increase Multi-modal Infrastructure at Neighbourhood Centres

As the average trip length for Mysuru has increased from 2.5 km (2005) to 7.43 km (2012)⁴⁶, it is important that

NMT infrastructure is not limited to the city’s historic and commercial centre alone but is expanded into residential neighbourhoods and the industrial zone in the North-west as well. To promote NMT use, it should be linked with other forms of transport. Therefore, multi-modal infrastructure hubs are proposed at intersections within each neighbourhood centre.

Intervention		Opportunity and Impact
Encourage the production and implementation of EV charging points.	➔	There are currently 8 EV charging points across Mysuru. This suggests that small investments in increasing the number of charging points could help behavioural changes in the transition to e-mobility.
Implement autorickshaw pull-in bays or notify existing informal autorickshaw pull-in bays.	➔	Existing, informal pull-in bays suggest a need to increase the provision of these spaces for autorickshaws – this not only provides safety for autorickshaw drivers but also other modes of transport and pedestrian pathways.
Increase bicycle lockups at neighbourhood centres.	➔	This builds on the Trin-Trin system and encourages focused bicycle routes to improve cycle safety.
Formalizing or creating pedestrian sidewalks and widening pedestrian pathways at intersection with pedestrian crossing points.	➔	There is already a high number of pedestrian routes in the city, however, focusing wider pathways at intersections prioritizes pedestrian movement and encourages footfall in a focused way. This is particularly beneficial for commercial activity in mixed-use neighbourhood centres.
Develop a Parking Action Plan as part of a Comprehensive Mobility Plan and expanded formal parking with time-sensitive tariffs within the heritage core along key routes (with a 24 RoW)	➔	Master Plan 2031 emphasizes the need for low carbon mobility plan (LCMP) and parking allowances for new development. Along with this, formal parking tariffs will discourage long-term street parking, increase public transport and NMT use, and aid in decongesting the city core. On-street parking in the city core exists along a few streets. Therefore, it is recommended that this be expanded by a total of 4-km along JBL, and parts of Irwin Road and Chamaraja Road.

IMAGE 4.4 High Tension Road (Before)

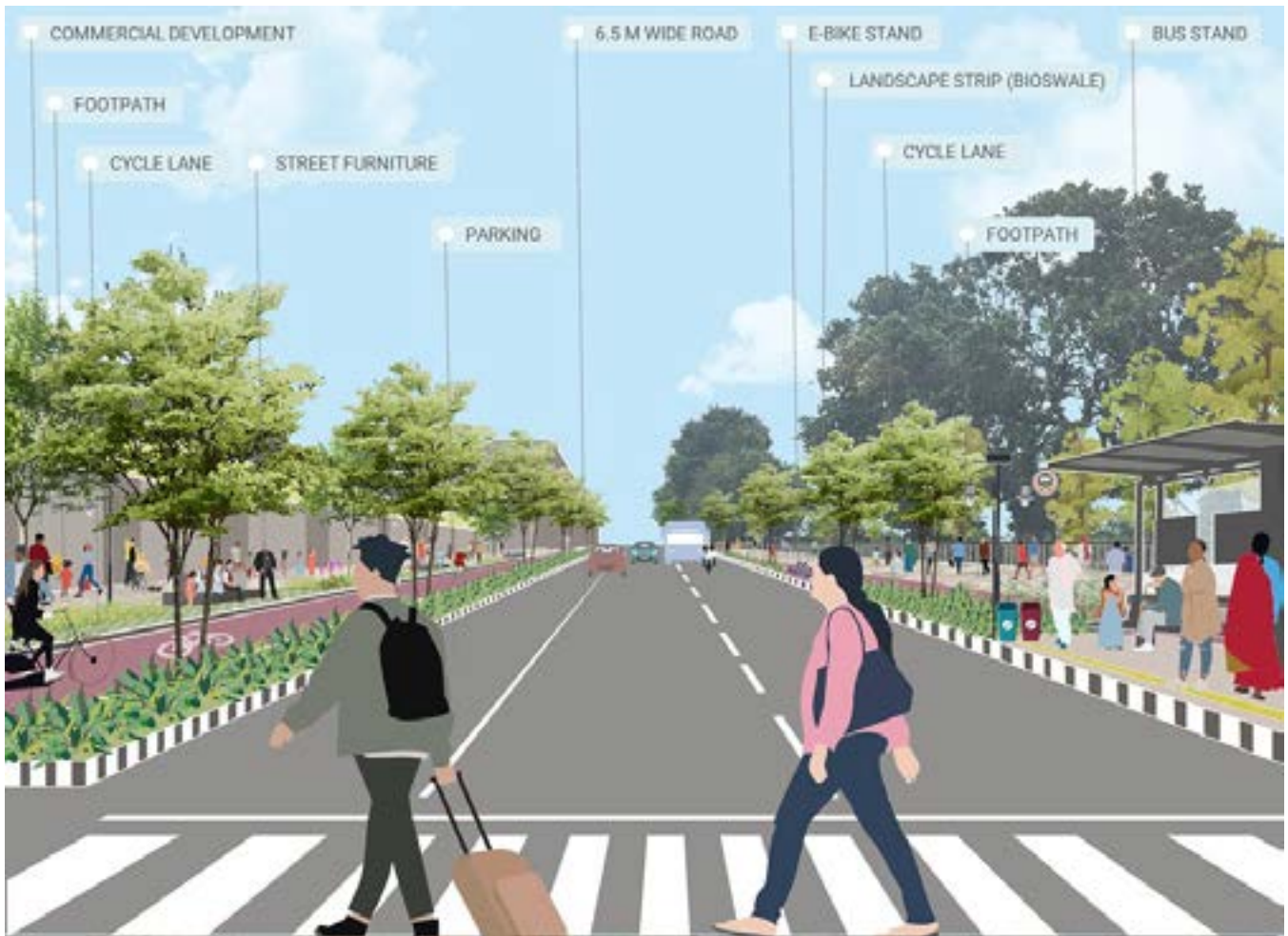


Source: UN-Habitat

⁴⁶ EMBARQ India Integrated Transportation Report & Comprehensive Traffic and Transportation Plan, 2012.

FIGURE 4.7

Indicative Rendering of integration of multimodal hub with public amenities on High Tension Road (After)



Source: UN-Habitat

Although the majority of the city's roads have a dedicated footpath, these are often obstructed. Therefore, implementing widened footpaths⁴⁷, with pedestrian crossings are recommended within these neighbourhood centres, alongside formal trading zones that will be outlined in Intervention 2.3. These proposed interventions are based on the 'complete streets concept', which prioritizes pedestrian and cyclist mobility, including the following:

Image 4.5 shows autorickshaw bays that, if formalized, can improve lane efficiency, segregate modes of transport and reduce congestion and improve safety for pedestrians and transport users. It is necessary that formal pull in bays also include street lighting, street furniture (benches), and battery re-charge and replacement facilities.

For bus stop upgradation, it is recommended to ensure all bus stops have well-lit, shaded and universally accessible

bus shelters with real-time and static information, display helpline and emergency phone numbers.

This intervention also proposes a revision of regulatory frameworks to ensure safety through formalized quality checks and safe battery swap stations. In addition, Intervention 2.1 suggests that an assessment of the city's informal autorickshaw stands can highlight the necessity and opportunity for formalization of these pull-in sites. This proposal can help to reduce traffic and pedestrian accidents and reduce congestion.

Financial incentives for improved NMT and reduced GHG emissions include company car tax breaks for EVs, the rate of which should be assessed and set by the state government. In addition, alongside the existing proposal for seven multi-level car parks in the city core (LPA master plan), formalizing street parking with time-sensitive tariffs

⁴⁷ As specified for smart roads under the Gol's Smart Cities Mission initiative.

IMAGE 4.5

Formalized pull-in autorickshaw bay⁴⁸

Source: Express news service

can help to reduce personal traffic in congested areas while allowing for short-term parking to support commercial activity. Reduced or no parking charges for EVs may also be considered.⁴⁹

The involvement of more women and gender minorities in the transportation sector and street management can create safer mobility systems and streets and encourage more women to travel for work/ leisure.



Intervention 2.3: Pedestrianized 'Market Street' at Neighbourhood Centres

Markets are fundamental to Mysuru's cultural heritage and provide space for trade of local produce. Promoting market spaces across the city can help to decongest and decentralize the economic and tourism activities from the city core and help to provide better accessibility to income generation opportunities for rural agricultural workers. This proposal can incentivize nodal growth and reduce trip length and dependency on private transport means by increasing access to goods within neighbourhood centres.

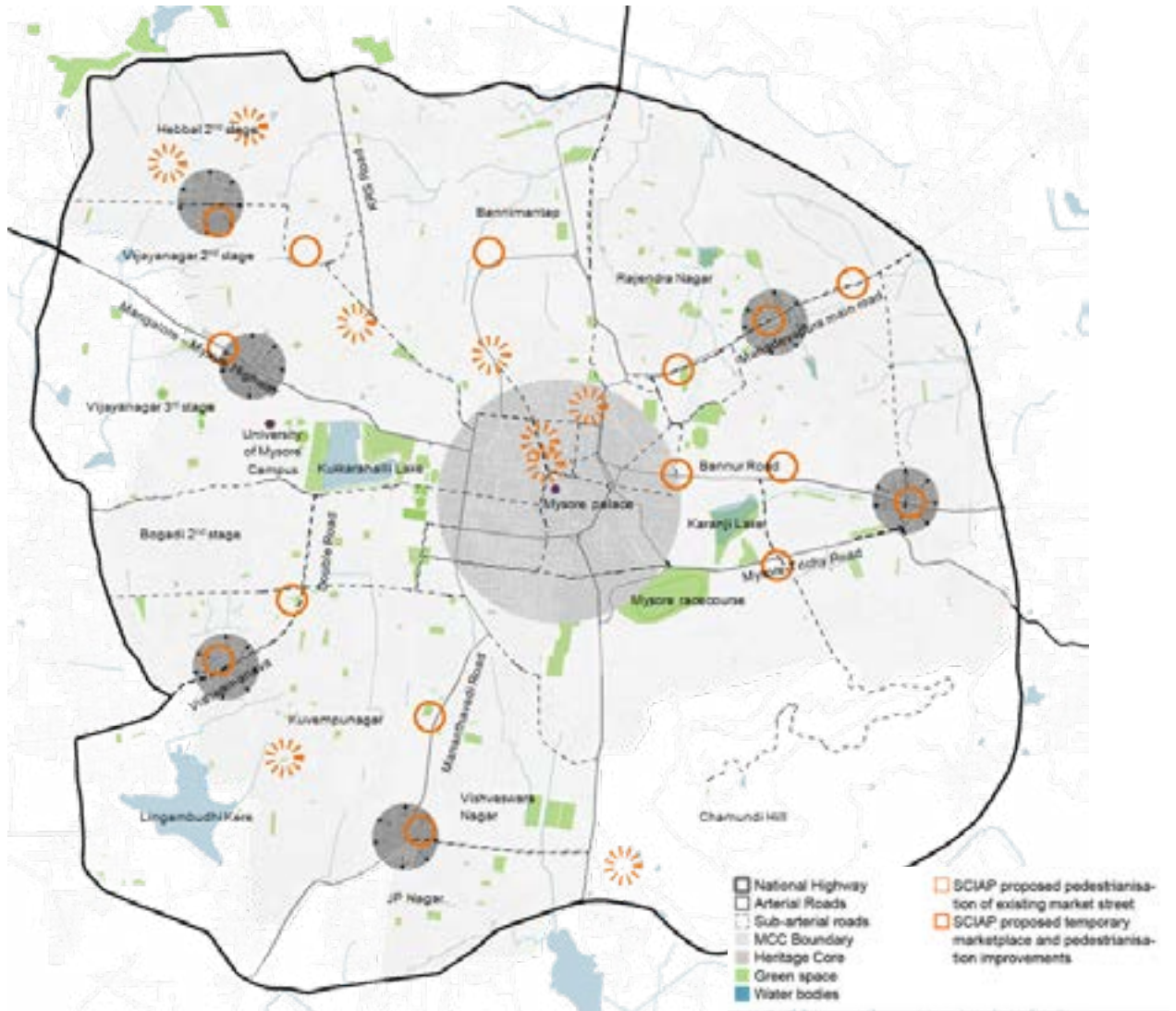
Markets can improve the vibrancy of the pedestrian environment due to their structure and design. Marketplaces in Mysuru, usually ground or G+1, are often open to the street, involve regular social interactions, are flexible in uses and forms, reduce monotonous architectural styles, are permeable structures and, therefore, increase the walkability of an area.

This intervention is in line with recent support for market street pedestrianization. In particular, the 'Streets for People Challenge', led by MUDA through the Smart Cities Mission promotes the improvement of existing markets by pedestrianizing adjacent streets, and proposes new, temporary markets that have a component of traditional and local crafts. Providing reserved vending spaces for female and gender minorities is suggested to encourage women's participation and as an economic support. The presence of women in markets would also act as a bouncing tool to encourage more women to walk on the streets.

Although street pedestrianization may involve a detailed traffic study, existing markets that have potential for the proposed adjacent street pedestrianization, are shown in Figure 4-4. One of these examples is the Devaraja

⁴⁸ A Comprehensive Mobility Plan includes a parking survey; the goal of which is to determine demand for parking and appropriate tariffs. Both a mobility plan and parking survey is recommended.

⁴⁹ Image taken from Express News Service, June 24, 2019. available online at: <https://indianexpress.com/article/cities/pune/pune-prepaid-autorickshaw-booths-to-be-opened-at-four-locations-5796298>.



Map 4.4: Pedestrianized streets with temporary marketplaces

Source: UN-Habitat

Market. It is in the city core, adjacent to Mysuru Palace and 10 minutes' walk from the main railway station. Pedestrianizing the streets adjacent to the market promotes NMT in the city centre by creating a safer, socially inclusive, and vibrant streetscape.

Each pedestrianized street is proposed to be located adjacent to the identified marketplace. Due to the mix of informal and formal traders, interventions (outlined below) are proposed on all pedestrian streets, as well as feeder streets that have a high number of informal traders.

In addition to pedestrianization, new marketplaces can be created on vacant or under-used land adjacent to key

corridors. Using low impact materials and non-permanent structures can provide adequate facilities (shelter, formalized spaces for each vendor, seating, shade), and allows for the marketplace to be 'tested' as a meanwhile use of the space.⁵¹ Using planting (trees, shrubs, and lawns) can help to maintain the space when the market is not in operation (at night). Although dependent on the specific site and area, usually vacant land sites can cause negative impacts on nearby residential and commercial areas.⁵² Increasing the use of these sites, without permanent structures, can prove an efficient, low-cost, and low-risk method of improving safety and quality of the urban environment.

⁵¹ More detail on meanwhile uses, testing functions and activities in public spaces is outlined here: Cannon Ivers, B. (2018). Staging Urban Landscapes: The Activation and Curation of Flexible Public Spaces. Birkhauser, Switzerland.

⁵² Negative impacts of vacant land sites are explored through a number of studies. One reference is: Noh, Y. Newman, G. Jung Lee, R. (2020). Urban decline and residential preference: The effect of vacant lots on housing premiums. Environment and Planning B: Urban Analytics and City Science. Vol 48, Issue 6.

FIGURE 4.8 Devaraja market and proposed pedestrianized street



Source: Google maps, UN-Habitat

FIGURE 4.9 Pedestrianized street interventions⁵⁰



Day time roadblocks for traffic/
crowd management



Street furniture: Seating



Additional shade for informal
traders and pedestrians



Tree avenues: Shaded road



Mixed-use frontages



Vegetated buffer zone and
permeable surfaces

⁵⁰ Reference images taken from UN-Habitat and K. Murali Kundur. On track with cycle lanes. The Hindu. January 30, 2021.

CASE STUDY

Case study for Intervention 2.3 pedestrianised street adjacent to existing markets: Chennai's Pondy Bazaar Pedestrian Plaza (at Theyagaraya Nagar or T Nagar)

Project by the Special Projects Department, GCC and Chennai Smart City Limited, to create an improved social space, a catalyst for economic growth, attract tourists and locals, and provide a safe and vibrant public space for the elderly, disabled and children. This project was implemented at Sir Theyagaraya Road, stretching from Panagal Park to Mount Road (1.4 km). It was noted that around 5,000 people walk through Pongy Bazaar during peak hours in one day, though there are no safety and comfort facilities for pedestrians. Score streets as per your walking and cycling experience.

- Widened, inclusive footpath: The previous footpath of a narrow 2-3 ft has been widened up to 10 ft in Pongy Bazaar and up to 6 ft in other places.
- Vibrant seaters
- Child-friendly play equipment
- Decorative LED lights have replaced the earlier sodium-vapour lamps
- Trees and planters: Around 60 new trees have been planted along the plaza, including native species such as Punnai, Poovarasu, Mugizham etc.
- Utility design: Smart ducting boxes have been provided for underground utilities so that maintenance work in the future does not curb pedestrian space. On the surface, regular utility/junction boxes have been given aesthetic covers to add to the beauty of the plaza.
- Bicycle sharing: Smart Bike cycle sharing stations have been provided at three locations across the Pedestrian Plaza.
- Wall murals
- Feeder vehicles: Battery-operated feeder vehicles are provided in the Pongy Bazaar section of the Pedestrian Plaza for the use of the elderly and for persons with disabilities.
- Women's and men's lounges: restrooms with lounges that host healthcare professionals often for regular medical check-ups of pedestrians.

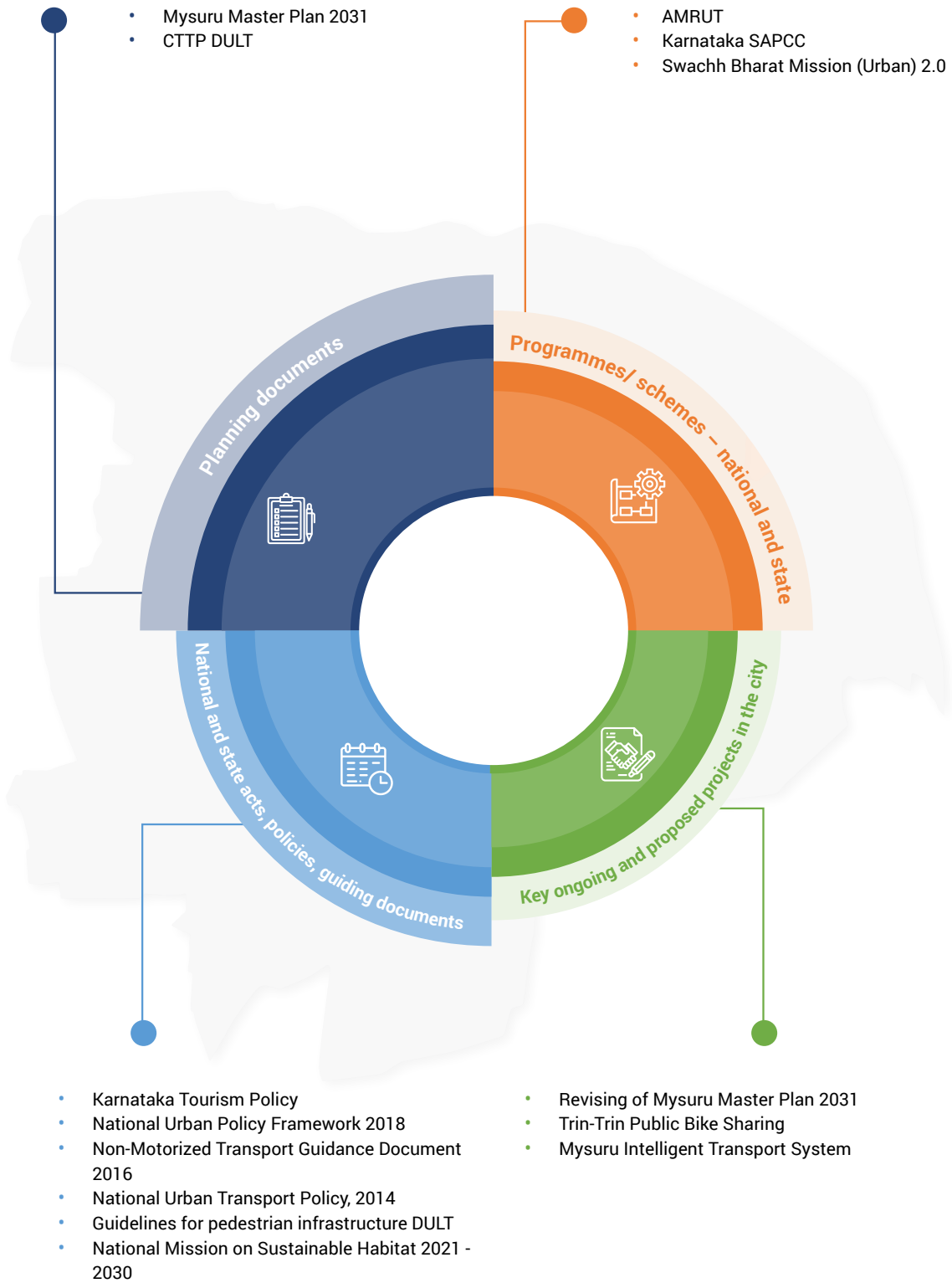
IMAGE 4.6

Chennai's pedestrianised Pongy Bazaar project showing key interventions



Source: <https://www.c40.org/case-studies/chennai-s-pondy-bazaar-pedestrian-plaza/>

4.2.2 Alignment with national, state policies, programmes and ongoing, proposed capital projects in the city



4.2.3 Gender and inclusion

This strategic response has a significant impact on gender and inclusion and encourages more people to opt for sustainable transport choices. Improving NMT infrastructure and creating pedestrianized streets improve accessibility to vulnerable groups (women, children, the elderly, and differently abled). Pedestrianizing streets near markets creates active streetscape and intervention to create temporary markets improves safety for women and children.

Intervention 2.1 recommends all bus stops have well-lit, shaded and universally accessible bus shelters with real-time and static information, display helpline and emergency phone numbers. This strategic response also provides opportunity to create designated vendor zones for women. The nonspatial interventions promoting more women in the transportation sector could benefit with behavioural change and awareness programmes for stakeholders.

In addition, a 'safer travel in the night programme' is recommended. Women perceive night travel as unsafe. While mixed land uses can extend activities into the evening hours, a dedicated 'safer travel in the night programme' is recommended to improve women's access to education and economic opportunities, in the late evenings and night. Some components of safer travel are women led police patrols, street vendors as street marshals, request stop service, etc. see Annexure 7).

Safer Travel in the Night Programmes

1. **Addressing underutilized spaces:** Urban voids should be a priority as they act as unsafe crime zones in cities limiting access along them/ women in turn taking a longer route to destination fearing perceived danger.
2. **Street lighting:** This can be implemented on priority on public and intermediate public transport corridors within a five-minute walking distance. Use of solar streetlights can minimize operating cost.
3. **Women led police patrols:** Police patrols along public and intermediate public transport corridors suggested. Unsafe spaces identified through participatory safety audits will enable a sense of safety at night. For e.g., Kerala's pink police model. The Mahila Police Volunteers and Community Policing may also be partnered for monitoring and reporting to police and authorities.

4. **Night accommodation for women:** Subsidized night accommodation for women may be provided at intercity and interstate terminals. Rent can be waived, or a nominal amount may be charged and male children up to 12 years may be permitted to stay with their mothers.
5. **Request a stop service:** Bus travel often necessitates the need for last mile connectivity, which is often not assured at night, which leads to women having to traverse streets on foot. Women can request the bus driver to stop along the route, in between bus stops after 8:00–9:00 pm.
6. **Street vendors as street marshals:** Citizen monitoring by street vendors may be initiated. They need to be trained to better respond to harassment they may witness on the street such as alerting relevant authorities.
7. **Police help desk:** Providing a help desk supervised by the police at transit terminals can add to safety and security.⁵⁴

4.2.4 Climate convergence

This strategic response has a comprehensive impact on GHG emissions in Mysuru. By approaching NMT from a city-wide, neighbourhood scale and urban design level, these interventions acknowledge diverse mobility networks and transport users. By improving accessibility to facilities and services through neighbourhood centres, with supporting NMT infrastructure, reliance on private vehicles and average trip length is expected to reduce.

Increasing tree planting along major corridors and pedestrianized marketplaces will increase the GHG sequestration potential of the city, provide natural solutions to heat island effects and shade to improve the comfort of travelling by foot and bicycle. Planting along road medians and on buffers between cycle, pedestrian and car routes can increase the amount of permeable surface on roads allowing for rainwater runoff capturing to reduce flooding, as well as contributing to GHG sequestration. The following highlights the impact that increasing tree planting and green coverage can have, associated with the outcomes of implementing the interventions within this strategic response.

The total GHG emissions savings potential for Strategic Response 2 (Increase NMT through the cycling network expansion and strategic implementation of pedestrian infrastructure) is -24.07 in tCO₂-e per annum.

⁵⁴ Center for Catalysing Change. Sakshamaa Briefing Paper (2020). Women's Access and Mobility Plan for Cities in Bihar: Recommendations. Unpublished. Available online at: https://www.c3india.org/uploads/news/C3_Briefing_Paper_MobilitySafety_Findings_08_12_2020.pdf.

TABLE 4.4 GHG emission estimations for Strategic Response 2

Intervention	Project	Potential GHG emissions (in tCO ₂ -e per annum)	Remarks
Intervention 2.1: Connecting neighbourhood centres with improved NMT network	Expand existing efforts to change to LED lights	N/A	This intervention is expected to save 58.77% of the current electricity usage of Mysuru city through street lighting.
Intervention 2.1: Connecting neighbourhood centres with improved NMT network	Bicycle network including, pigment, drainage, separation (natural barrier/planting)	8.56	This is based on the total road length with 1x buffer of 0.6m of permeable surface with lawn and planting. However, specific road quality, existing planting and existing buffers have not been considered.
Intervention 2.1: Connecting neighbourhood centres with improved NMT network	Key route tree planting (along bicycle routes)	4.28	This total is based on a distance of 10m between each sapling. It also is based on a 1-sq.m. permeable surface at the base of each tree. Although there are diverse applicable styles, the sequestration potential for a bioswale has been taken.
Intervention 2.1: Connecting neighbourhood centres with improved NMT network	Specific lane shared between e-autorickshaw and bus, Upgrade bus stops to integrate better with cycle lanes and construct bicycle lock-ups adjacent to bus, e-autorickshaw pull-in bays with battery swap station stops, etc.	N/A	These interventions do not have specific GHG sequestration calculations; however, they are included as they impact emissions through increase in public transport and e-autorickshaw use and integrated public transport and NMT infrastructure.
Intervention 2.2: Increase multi-modal infrastructure at neighbourhood centres	EV charging point, bicycle lock ups, e-rickshaw pull-in bays with battery swap station, formalizing or creating pedestrian sidewalks and widening pedestrian pathways at intersections with pedestrian crossing points, median planting, etc.	0.53	This total is based on a radius of 800m from the neighbourhood centre core intersection and indicates a potential GHG sequestration based on tree planting on either side of two main roads, with a distance of 10m between each tree (total of 320) and permeable street surface (area 1.8m ² x 2 every 10 meters) and median planting (covering at least 50% of the length of the road)
Intervention 2.3: Pedestrianized 'market street' at neighbourhood centres	Pilot project to pedestrianize the street adjacent to Devajara Market: Street length 350m, includes bollards, security, trees, benches, permeable surfaces/ bicycle lane natural separation, painting, signages.	7.43	Total calculated includes 35 saplings and 10% of total pedestrian routes as permeable surfaces.
Intervention 2.3: Pedestrianized 'market street' at neighbourhood centres	Create new, temporary marketplaces at neighbourhood centres	3.27	This uses an average plot size of 1 ha with 25% planting lawn coverage and 40 trees.

Source: UN-Habitat

4.2.5 Estimated project costs

The project costs for Strategic Response 2 Increase NMT through the cycling network expansion and

strategic implementation of pedestrian infrastructure, is INR 4,104.95 crore.

TABLE 4.5

Estimated project costs for Strategic Response 2

Intervention	Project	Estimated Project Cost (in INR lakh)	Remarks
Intervention 2.1: Connecting neighbourhood centres with improved NMT network	Transfer to solar powered light OR expand existing efforts to change to LED lights	10,908.48	This total assumes 68,178 compact fluorescent lamps and halogen bulbs (total within the MCC) are replaced. However, some streetlamps may have already been upgraded as a recent project costing INR 109.01 crore to upgrade streetlamps in 12 wards has already begun. To upgrade the lights in the remaining 53 wards, the total cost could be up to INR 577,753 lakh (however, this does not consider variations in ward size of streetlight numbers). Therefore, this is an estimate between INR 10,908–577,753 lakh.
Intervention 2.1: Connecting neighbourhood centres with improved NMT network	Bicycle network including, pigment, drainage, separation (natural barrier/planting)	513.72	This cost is based on a total street length for all proposed SCIAP and planned MCC bicycle routes (total of 42.81 km).
Intervention 2.1: Connecting neighbourhood centres with improved NMT network	Tree planting. (Street length x tree)	14.9835	As above, this assumes a total of 42.81-km street length, with an average 10 m. between each tree and does not consider existing trees due to lack of data on number of trees on specified routes.
Intervention 2.1: Connecting neighbourhood centres with improved NMT network	Specific lane shared between e-autorickshaw and bus	3,127.09	The street length total is taken from the following approximate lengths: KRS Road (5.1 km), Mangalore-Mysuru Highway (5.66km), Wahadevapura Main Rd (4.3km), Mysuru-Trichy Road (5.5 km), Mananthavadi Road (6.9km), Vishwamanava Double Road (5.3 km). This uses a cost exemplar for a smart city street redevelopment project to indicate the total sum for road improvements.
Intervention 2.1: Connecting neighbourhood centres with improved NMT network	Upgrade bus stops to integrate better with cycle lanes and construct bicycle lock up adjacent to bus stops	2,004.9	This cost is based on the total city-wide number of bus stops that are located along SCIAP proposed and MCC planned cycle lane length (205). This is only the cost for the addition of bicycle lock ups at each bus station although additional works and site-specific studies are needed to best integrate the bicycle lane with bus stops.
Intervention 2.1: Connecting neighbourhood centres with improved NMT network	E-rickshaw pull-in bays with battery swap stations	N/A	This cost is identified within the following intervention (2.2). Whereas the intervention recommends a specific component unit number, an additional study is required for this intervention (2.1) for a better understanding of the number of existing, informal, and required pull-in bays on the city-wide scale for Intervention 2.1.
Intervention 2.2: Increase multi-modal infrastructure at neighbourhood centres	EV charging points	56	This cost has been taken from an existing project within Mysuru (from an existing EV charging point) and is scaled up for all 7 neighbourhood centres. Please note that additional EV charging points may be considered in the city centre.
Intervention 2.2: Increase multi-modal infrastructure at neighbourhood centres	Bicycle lock-ups	68.46	This cost is based on one bicycle lock-up stand per neighbourhood centre, although additional ones may be considered for the city core.
Intervention 2.2: Increase multi-modal infrastructure at neighbourhood centres	E-rickshaw pull-in bays with battery swap station	28	This cost includes an autorickshaw stand as well as a battery swap station at each of the 7 neighbourhood centres.
Intervention 2.2: Increase multi-modal infrastructure at neighbourhood centres	Parking Action Plan to be prepared and formalized, tariff-based on-street parking spaces in the city centre	651.37	This cost includes the expansion of the existing parking spaces along 4km of key roads that circumnavigate the city core. The recommended routes are JBL, part of Irwin Road and part of Chamaraja Road and the cost includes a total of 1,000 new parking spaces.

Intervention	Project	Estimated Project Cost (in INR lakh)	Remarks
Intervention 2.2: Increase multi-modal infrastructure at neighbourhood centres	Formalizing or creating pedestrian sidewalks and widening pedestrian pathways at intersections with pedestrian crossing points	23.24	This cost includes four pedestrian crossings for each of the 7 neighbourhood centres. Although, additional are likely to be needed in the city core, this cost reflects the focus of NMT interventions surrounding a main intersection within each neighbourhood centre.
Intervention 2.3: Pedestrianized 'market street' at neighbourhood centres	Pilot project to pedestrianize the street adjacent to Devaraja Market: Street length 350m, includes bollards, security, trees, benches, permeable surfaces/ bicycle lanes, natural separation, painting, signages, etc.	3,93,750	This total cost is the sum of one project cost for one pedestrianized street and has been scaled up to cover 7 neighbourhood centres and 2 additional (see map for the location of 7 existing markets for pedestrianization).
Intervention 2.3: Pedestrianized 'market street' at neighbourhood centres	Create new 'traditional' market with pedestrian access and public space facilities (see above)	175.8	This cost covers all 15 recommended marketplaces, with temporary structures and planting, drinking water kiosk, parking, waste disposal, and other basic facilities

Source: UN-Habitat

4.2.6 USAF indicators impacted

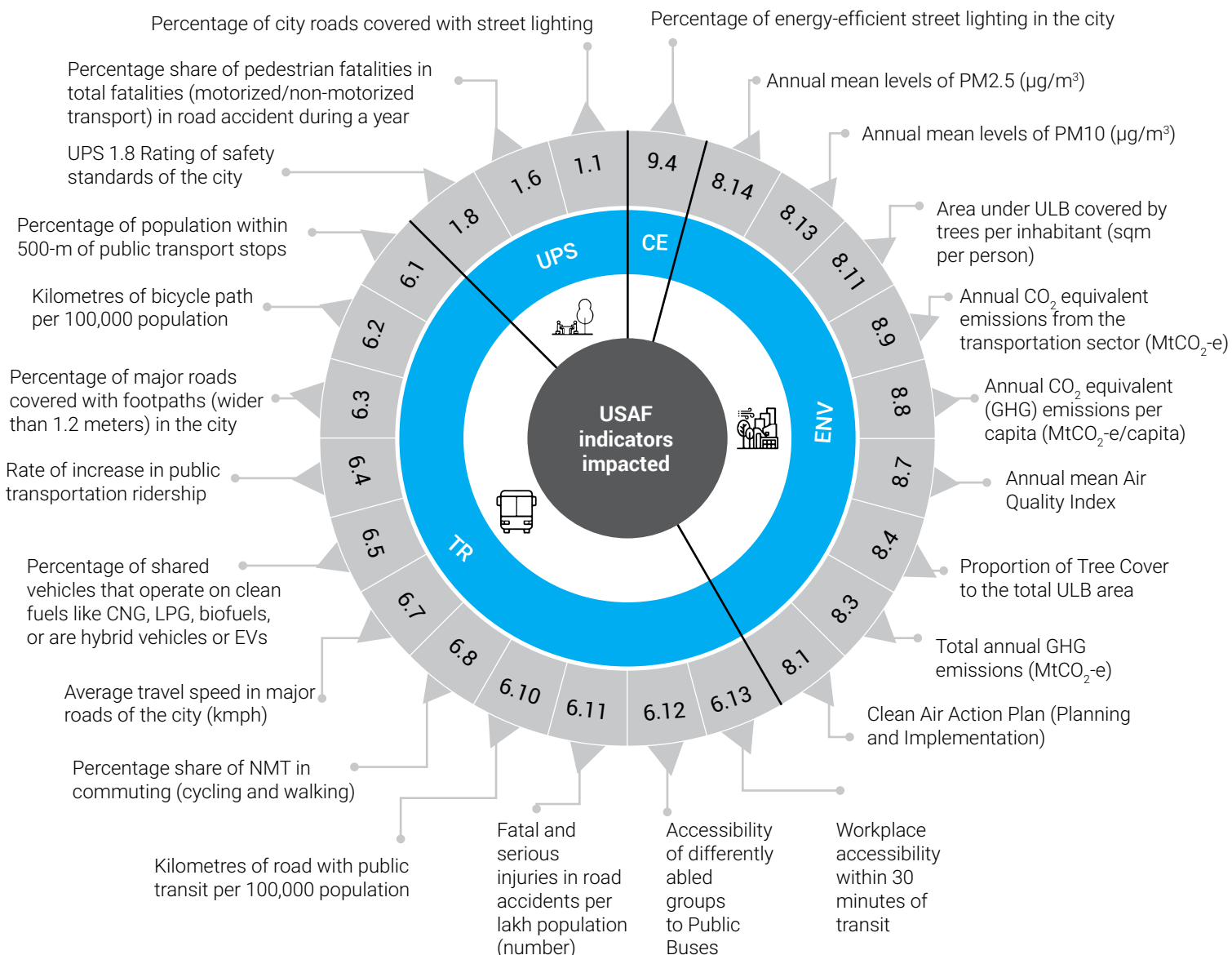


IMAGE 4.7

Autorickshaws encroaching over pedestrian footpath at Sayyaji Rao Road



Source: UN-Habitat

4.3 Strategic Response 3: Increase and Protect Green and Public Spaces

The challenge of vulnerable ecology is based in the quality and maintenance of natural resources. This strategic response aims to provide interventions that both protect, increase, and maintain natural resources in Mysuru at varying scales and locations. Principle III – Eco-sensitive city underpins the interventions within this strategic response.

The following interventions are therefore proposed:

- **Intervention 3.1: Create an Inventory of Under-used Land to Create 5 New Neighbourhood Parks**
- **Intervention 3.2: Increase Green Coverage Potential on Vacant or Under-used Land**
- **Intervention 3.3: Engage Community Groups in the Maintenance and Management of Chamundi Hill**

4.3.1 Proposed interventions within the strategic response



Intervention 3.1: Create an Inventory of Under-used Land to Create 5 New Neighbourhood Parks

Only 2.6 per cent of the total area within the conurbation boundary in 2011 was reserved for open spaces, and 5.5 per cent proposed in the 2031 master plan. In addition, there is a significant reduction of agricultural land from 2011 (13,455.56 ha) to what is proposed in the 2031 master plan (1,098.16 ha). The land categorized as public/ semi-public land within the limits of the Mysuru conurbation (19.81 sq. km.)⁵⁵ is predominantly occupied by institutions,

such as the University of Mysuru, hospitals, government buildings and heritage sites .

This large public/ semi-public area, though is not counted as open space, provides substantial green cover for the city. However, only a small portion of the city's population can access this area, such as government workers or University students. Map 4-5 highlights (in dark green) all public land that is open, or without construction. This shows the open spaces that are not fully accessible to the public and is indicative of the extent of land that has potential for new public spaces.

This intervention recommends the inclusion of two, disaggregated land data categories (green cover and vacant or under-used land) in an existing vacant land inventory project undertaken by KIADB, to understand the potential within Mysuru for increasing public green space. By assessing public/ semi-public land in this way, this intervention aims to increase access to public space and/ or increasing green space. five 5 new neighbourhood scale public open spaces. Considering the AMRUT Service Level Improvement Plan, Mysuru lacks five neighbourhood scale parks, based on requirements for organized green spaces and parks, as per standards prescribed in the URDPFI Guidelines.

Map 4.5 highlights high population density wards, existing public space service coverage based on a 500-m walking distance (considering walkability, i.e., pedestrian street infrastructure). A priority for identifying vacant or under-used land sites must consider population density patterns, and existing public space coverage. For example, the North-west and North-east edges of the MCC boundary may benefit most from new public spaces.

Under-used land may be in the form of abandoned industrial buildings, or of space within institutional or public land, such as within part of a hospital complex. They could be on public land but remain under-used and inaccessible to the public. An example of this process is the case of Vivekananda Park. Owned by the Southwestern Railways, this site was under-used and formerly part of the railway lines. Today, it has been converted into a public garden.

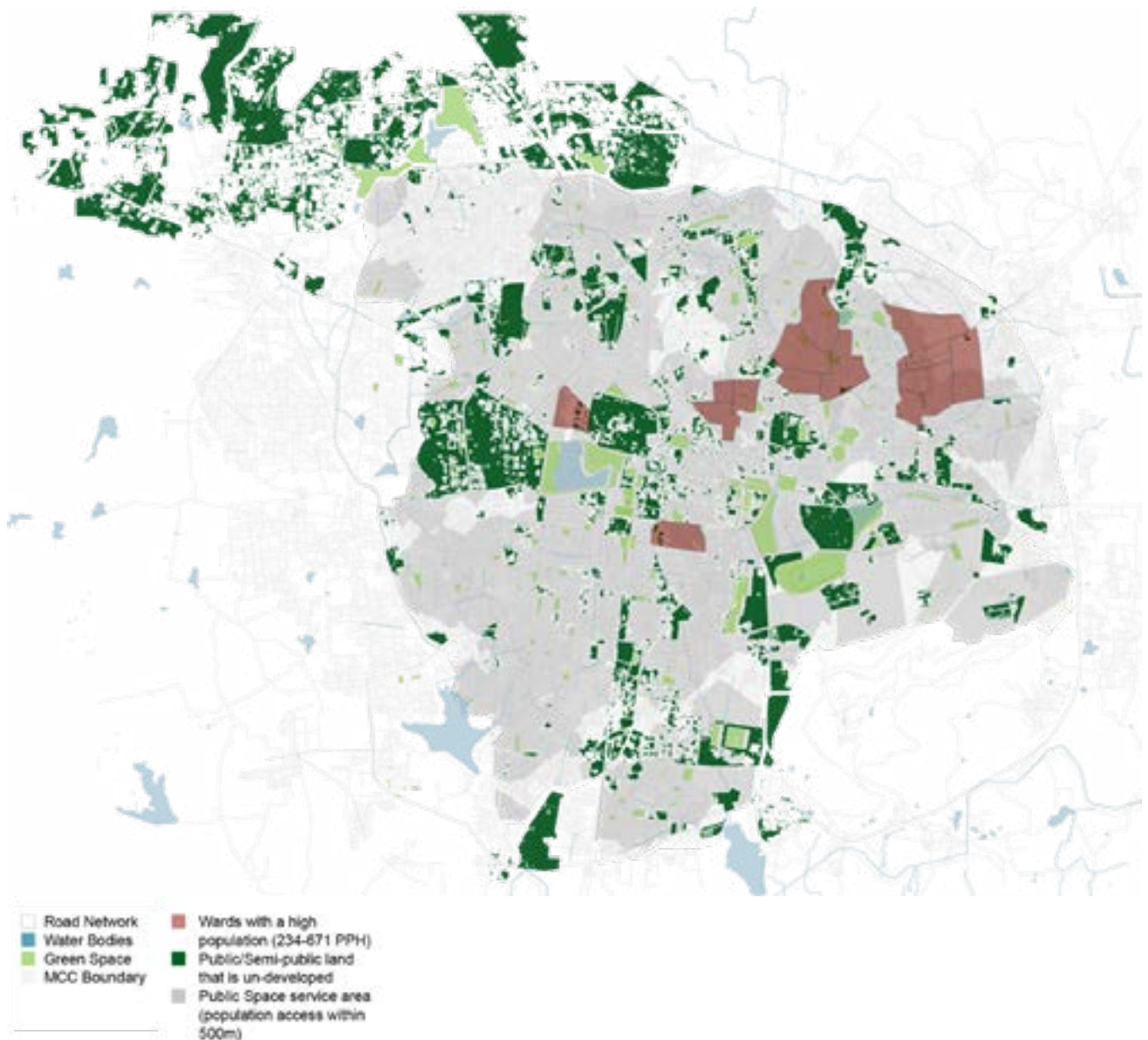
TABLE 4.6

URDPFI guidelines for green spaces and parks

Type of park	Area in sq. m.	Population served per unit	No. of parks in Mysuru	No. of parks proposed (based on population of 8.9 lakh)
Neighbourhood Park (NP) (5,000 -10,000 sq.m)	10,000	15,000	71	76.6

Source: AMRUT Guidelines 2014

⁵⁵ Mysuru–Nanjangud LPA, Master Plan 2031.



Map 4.5: Public land without infrastructure to highlight the city's potential to increase green coverage

Source: UN-Habitat



Intervention 3.2: Increase Green Coverage Potential on Vacant or Under-used Land

This intervention highlights the city's GHG savings potential by spaces more efficiently through increasing planting. Unlike Intervention 3.1, this intervention does not attempt to increase public spaces, but focuses only on increasing green cover.



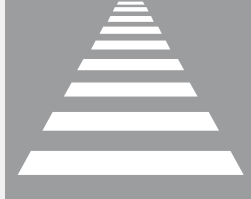


Assessing green coverage on public land through the KIADB survey can help to boost and direct existing planting projects by the Forest Department under the flagship, Green India Mission (GIM). An example of this is the planting of 30,000 saplings in residential, educational and government organization plots. The assessment can highlight where buffer zones can be enforced by planting, for example to protect water bodies from encroachment, overuse, or pollution. It can also provide an indication for the city's potential GHG sequestration to formalize targets and promote greening projects. This is in line with the AMRUT mission to increase green coverage in cities to 15 per cent.

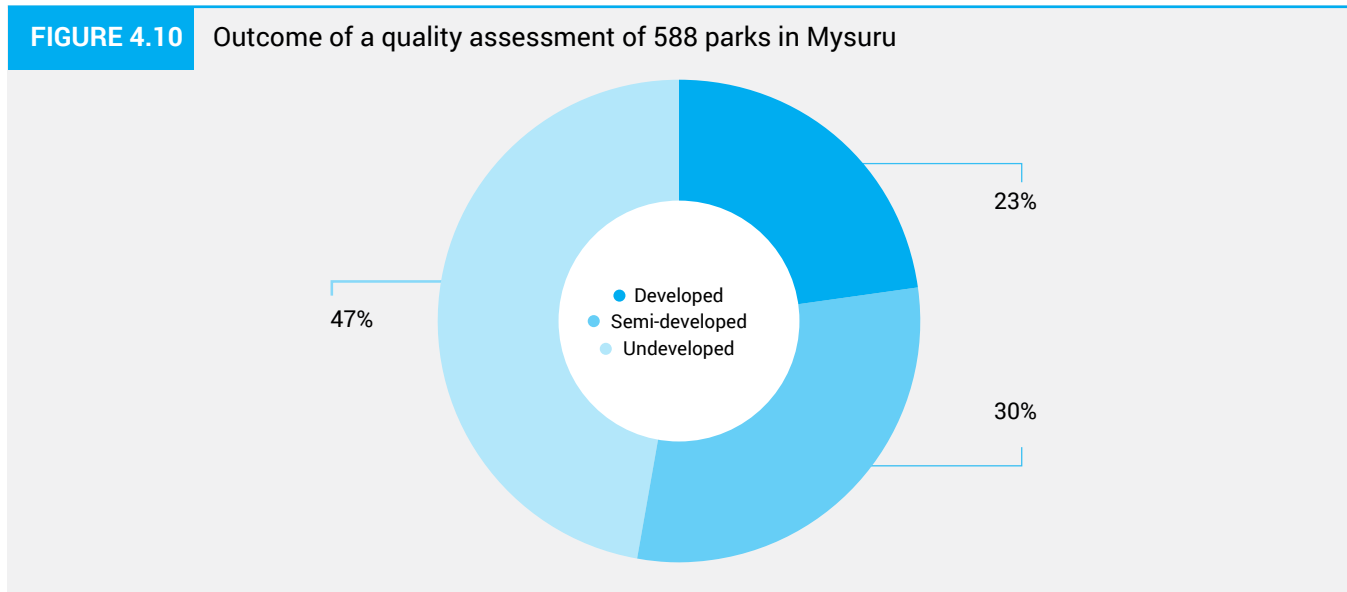
The city's central bus depot is a site of contention due to its location and use. It increases congestion in the city core and is a monofunctional and fragmented site in what is a dense city core with diverse uses. Relatively low-cost and non-intrusive interventions on this site can greatly increase the green coverage in the city centre, connecting with green corridors and green coverage on heritage sites. Using this site more efficiently and increasing the city's GHG sequestration potential can also reduce flooding and heat island effects, as well as increase safety for pedestrians.

Upgrading the bus depot through low-cost and high impact landscape design interventions is an example of how to leverage public/ semi-public land to increase green coverage.

A study by UN-Habitat and MCC in 2021 assesses the quality of 588 parks in Mysuru. This assessment highlights a high percentage of parks that are semi or undeveloped (77 per cent), including a discrepancy between parks in the city core compared to the peripheries (see Figures 3.10 and 3.11). This assessment does not include private parks (for example within the University complex), district or city parks (for example Chamundi Hill or Kukkarahalli). This assessment highlights a current potential that can be leveraged to increase the city's green coverage as well as improve the quality of green public spaces in the city, particularly in highly populated areas.

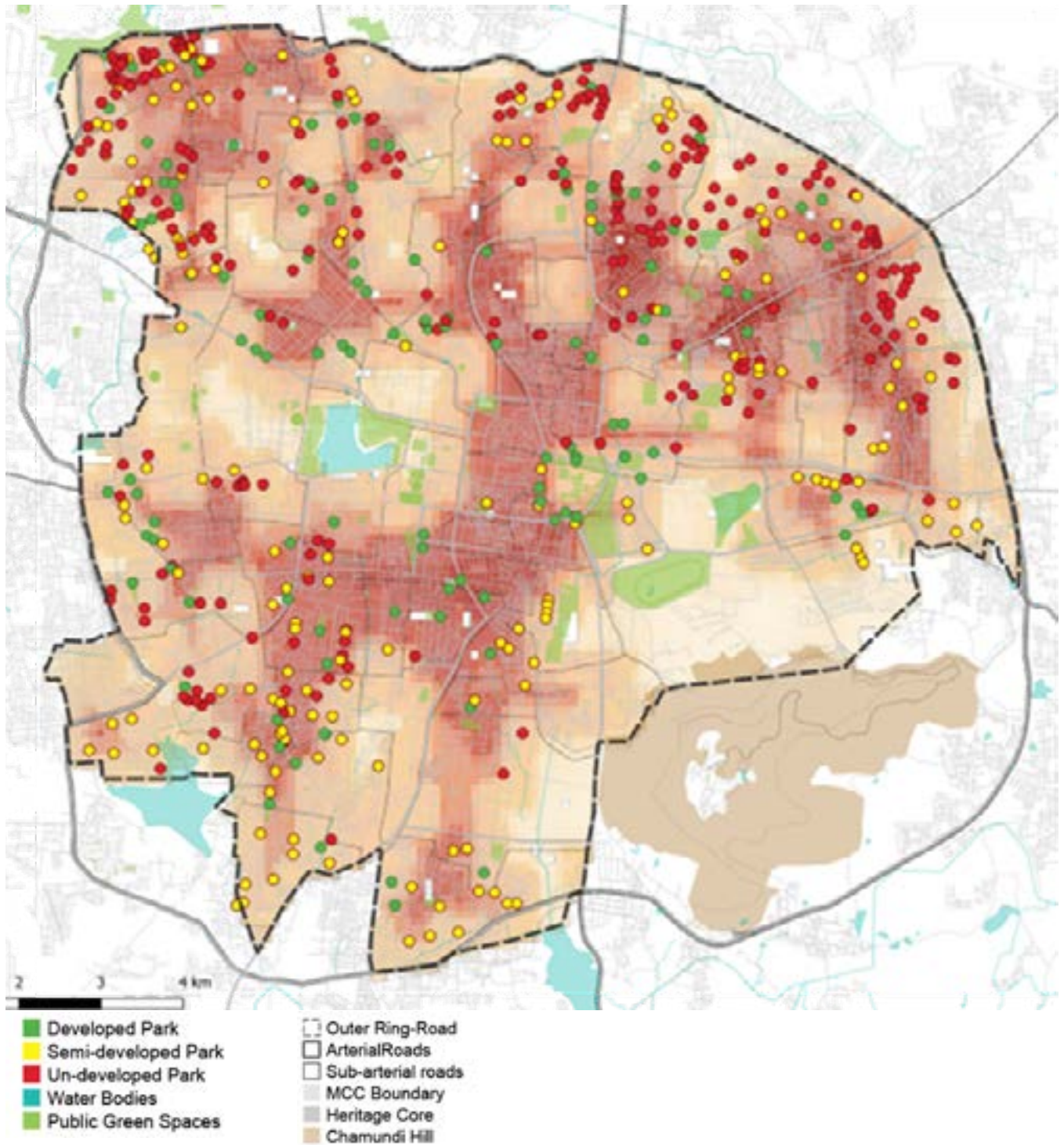
INTERVENTIONS INCLUDE⁵⁶

				
Tree planting for shade and to connect existing tree plantation along key avenues	Permeable paving	Pedestrian crossings (to increase site permeability and pedestrian safety)	Median planting, bioswales and 'pocket' green space	Natural barriers such as bushes or trees (rather than fencing)



Source: UN-Habitat

⁵⁶ Interventions are taken from URDPFI



Map 4.6: Identified priority parks for regeneration

Source: UN-Habitat

In alignment with AMRUT guidelines (2014), it is proposed that a PPP model for the planting and upkeep of these parks be developed in collaboration with local communities. Improving small public spaces increases the city's green network, provides comfort, increases use

of the site, improves the city's resilience to the heat island effect through shade and permeable surfaces, engages local businesses and communities to care for their local environment, increase social cohesion and improve safety in a neighbourhood. The recommended steps to regenerate these neighbourhood parks are as follows:⁵⁷

⁵⁷ Additional tools, such as a city-wide public space assessment or site-specific assessment can be undertaken to fully assess all public spaces in the city, to identify priority areas and specific, focused interventions. Trainings such as the Block-by-Block methodology to work with local stakeholders to design and improve public spaces may also be considered as part of Step 2. See the UN-Habitat Global Public Space Programme for more information on these tools.

FIGURE 4.11 Recommended steps to regenerate neighbourhood parks

<p>1</p>	<p>Identify key 'priority' parks for regeneration.</p> <p>These are defined using the following criteria:</p> <ul style="list-style-type: none"> A. Higher degree of isolation B. Higher population density C. Assessment status ('undeveloped') D. Larger size of park E. Higher accessibility (number of intersections/ walkability, and adjacency to primary or secondary roads) 	
<p>2</p>	<p>Undertake community engagement sessions (including local businesses and residents) and identify focal points within the community</p>	
<p>3</p>	<p>Provide technical capacity for maintenance and management</p>	
<p>4</p>	<p>Develop a maintenance programme in collaboration with community groups (ward officials and local stakeholders)</p>	

Source: UN-Habitat



Intervention 3.3: Engage Community Groups and create a PPP for the Maintenance and Management of Chamundi Hill

Chamundi Hill is both a primary heritage site for the city, as well as a large (8.5 sq. km) area of green coverage. The heritage site is maintained by the Mysuru royal family through funding from tourism. The top of the hill is home to a village of approximately 12,000 inhabitants, as well as several commercial units. There are some preservation interventions, such as a formal boundary to the site and some natural re-planting schemes. In addition, the master plan 2031 aims to protect forest land within the conurbation boundary and proposes a 'Special Agricultural Zone' that acts as a 100-m buffer around the site. This zone helps to maintain the green cover between the city core and Chamundi Hill. Despite these efforts, and as explained in Chapter 2: City Diagnostics⁵⁸, Chamundi Hill is experiencing environmental degradation.

Despite climate change impacts on the city, there is limited evidence to show direct climate change mitigation

or adaptation measures implemented on Chamundi Hill. The Karnataka State Natural Disaster Management Centre (KSNDMC) has a direct impact on monitoring and responding to natural disasters in the district. Although this includes the response to natural disasters as an outcome of climate change, there may be limited climate change monitoring and mitigation in the city, as is evidenced by the lacking GHG emissions measuring system, or Clean Air Action Plan. This is of importance for Chamundi Hill, which is particularly vulnerable to the balance between natural assets and tourism. As is evidenced by the recent landslides, responding to natural disasters, rather than monitoring and mitigating them, may not be enough to protect the plant species and tourism infrastructure.

In addition, the Heritage Commission in Mysuru has a broad and integrated role and is an intervening body on development. However, the body has minimal engagement with local communities and has a primary goal of heritage structure preservation, which may overlook ongoing degradation of the natural environment. Therefore, in summary, it is highlighted that the city is lacking a responsible, city or local level natural environment monitoring, managing, and maintaining government body, specifically with community outreach and engagement programmes.

⁵⁸ This report is available on UN-Habitat India's website. <https://www.unhabitat.org.in/knowledge>.

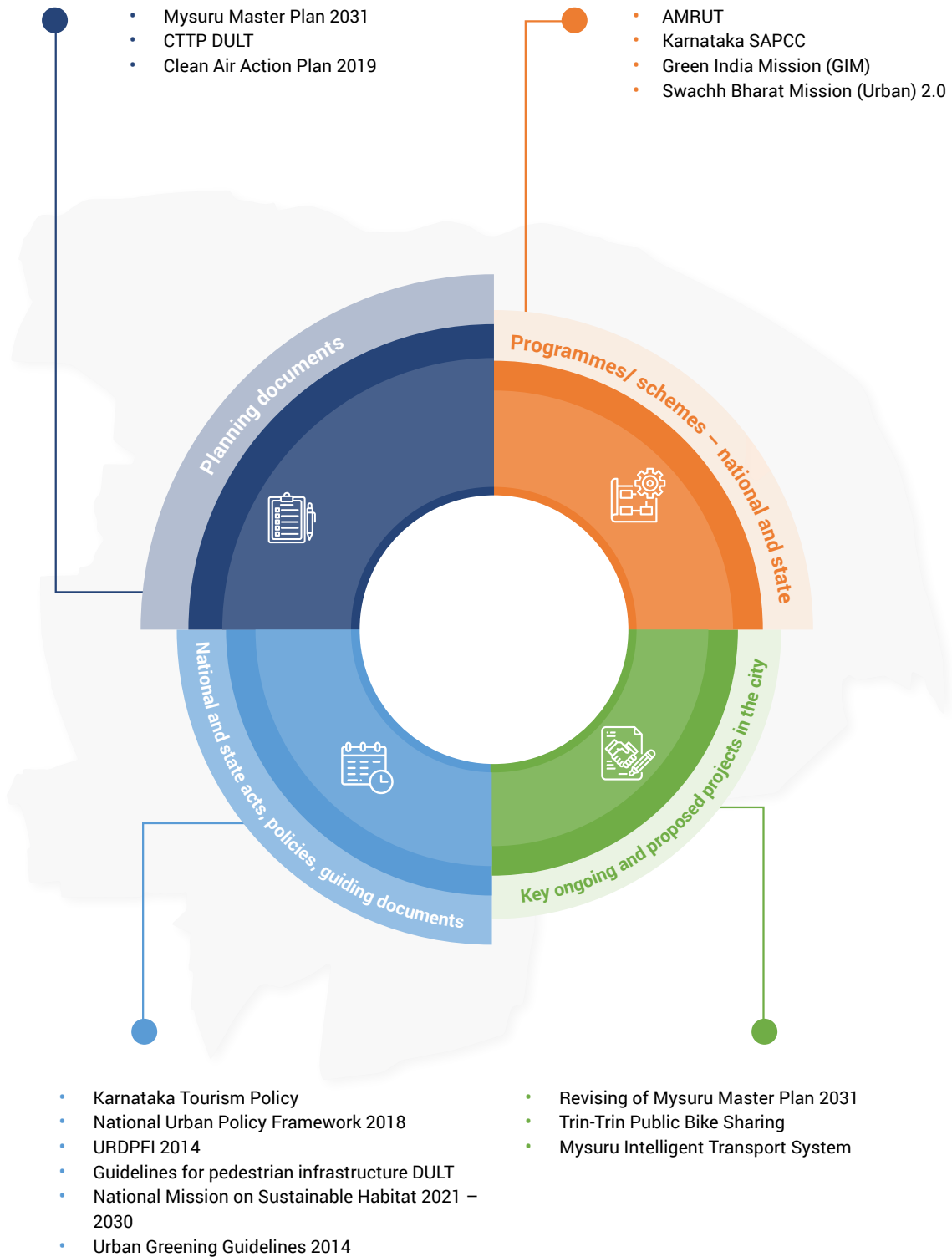
This intervention recommends a PPP to provide a platform for the local community to contribute to decision making and activities related to environmental preservation on Chamundi Hill. It suggests that a specific responsible body, made up of local community, local and city government officials, local stakeholders, and NGOs is necessary to undertake on-going and necessary interventions to the site and leverage existing efforts (e.g., the “Clean Mysore Foundation”).

Recommended interventions for the preservation of Chamundi Hill include environmental protective measures (such as hydroseeding, planting grass and shrubs, natural drains and terracing), environmental monitoring measures (such as ecological assessments, hazard mapping and monitoring), strategic and integrated planning (such as an

integrated economic, tourism strategy that links tourism with ecological practices such as traditional farming and agricultural practices, eco-tourism and ‘green jobs’) and the abovementioned partnership structures (bringing together expertise, knowledge, funding and implementation bodies).

Therefore, this is both a spatial and non-spatial intervention, which primarily promotes participatory practices to improve and protect Chamundi Hill. Although this intervention is focused on Chamundi Hill, and consequently the adjacent Special Agricultural Zone, this recommendation is an attempt to provide a model for a cooperative and integrated approach to environmental preservation and tourism that will become more important as the city’s population and built-up area grows, and with it, pressure on green spaces and heritage sites.

4.3.2 Alignment with national, state policies, programmes and ongoing, proposed capital projects in the city



4.3.3 Gender and inclusion

This strategic response in its Interventions 2 and 3 facilitates gender inclusive public open spaces. Increasing green cover and creating new neighbourhood parks benefit marginalized populations, specifically women and children. Improving amenities in the public open spaces encourage more women to access the space (see Table 4.7).

It is recommended that public space usage and behaviour data, disaggregated by gender, age and income (and

religion, where relevant) be collected and assessed to guide development of public spaces and programming of open spaces. Envisioning streets and markets as public spaces could encourage equitable access for women and marginalized groups.

Intervention 3.4 for Chamundi Hill maintenance and management ensures community-driven action that could provide job opportunities for marginalized groups.

TABLE 4.7 Gender-inclusive public open space design guidelines

Design element	Recommendations
Urban form	<ul style="list-style-type: none"> • Planning of urban form, arrangement of built and open space with consideration to visibility, diverse uses • For smaller public open spaces (POS), the proportion of building height to the width of the POS should be at least 1:2 to avoid a sense of claustrophobia among users (ADB, 2022) • Compound walls providing a clear line of sight and in permeable material • Defined edge of parks/ open spaces with natural landscape plants
Spatial structure and layout	<ul style="list-style-type: none"> • Creating a network of NMT pathways (connected to the city-level network) interlinked to smaller sub-spaces • Providing open spaces of different scales to suit diverse uses • Reusing underutilized spaces in the city for public spaces • Considering adaptability for future needs
Safety, security, and universal access	<ul style="list-style-type: none"> • In the design of pathways, parks, location of toilets ensure a clear line of sight, connected spaces and paths to encourage natural surveillance • Plan for street vending • Provide pedestrian-scale street lighting • Avoid dark corners and blind spots • Universal accessibility design codes should be followed
Age, gender, and ability-inclusive activities	<p>Persons with disabilities</p> <ul style="list-style-type: none"> • Playscapes to be provided to cater the needs of differently abled children • Suggested to include sensory play areas and silent zones for children with intellectual disabilities and the neurodivergent • Natural elements such as lawn, textured stones, trees of different types can be included for sensory stimulation of the differently abled • Universal design standards to be followed in design of benches and equipment <p>Boys and girls</p> <ul style="list-style-type: none"> • Providing spaces for diverse activities that can be enjoyed by both boys and girls, inclusive of age and ability • New activities can be incorporated through rain shelters, outdoor gymnasium equipment and dance areas, art pavilions, water play areas/ interactive fountains, providing spaces for different kinds of sports, such as cricket and badminton, mounds, etc. <p>Elderly</p> <ul style="list-style-type: none"> • Include space for interaction, age-appropriate physical activity such as jogging, group exercise classes.
Nature-based solutions	<ul style="list-style-type: none"> • Trees can also provide shade, break-up larger areas, designing for environmental sustainability, drainage, in situ rainwater harvesting
Audio and visual communication	<ul style="list-style-type: none"> • Communicate zero tolerance for sexual harassment and encourage by-standers and survivors to report harassment along with providing contact details. • The POS can also become a place to understand and bring visibility to women and other gender minorities' contribution to the city.

Source: Adapted from ADB, Fair shared green and recreational spaces guidelines for gender-responsive and inclusive design, 2021; Manual for Gender Mainstreaming in Urban Planning and Urban Development, 2013.

FIGURE 4.12 Short-term, post-lockdown initiative by the Bandra collective in Mumbai to show an example of a public space⁵⁹



Source: Stirworld 2021

4.3.4 Climate convergence

Climate change estimates are based on the increase in green coverage that can be achieved through this strategic response. The interventions outlined above attempt to highlight the capacity that the city has to increase green coverage, and thus, the city's GHG sequestration potential. The total GHG sequestration potential for Strategic

Response 3: Increase and protect green and public spaces, is -6.29 tCO₂-e per annum.

4.3.5 Estimated project costs

The total project costs for Strategic Response 3: Increase and protect green and public spaces, is INR 12,243.01 lakh.

⁵⁹ Stirworld (2021).

TABLE 4.8

GHG emission estimates for Strategic Recommendation 3

Intervention	Project	Potential GHG emissions (in tCO ₂ -e per annum)	Remarks
Intervention 2.3: Pedestrianized 'market street' at neighbourhood centres	Develop 5 new neighbourhood scale parks on vacant land	6.03	This total assumes an 80% coverage of trees and lawn and an average size of 7,500 sq.m (between the parameters of 5,000 and 10,000 sq. m. as defined by URDPFI).
Intervention 3.2: Increase green coverage potential on vacant or under-used land	Increase planting on vacant or under-used land (buffer zones etc)	0.01	This total considers 80% coverage by trees of total open, public/ semi-public space.
Intervention 3.2 Increase green coverage potential on vacant or under-used land	Assess and improve public spaces that are undeveloped	0.25	This total considers a 90% coverage by trees and lawns.
Intervention 3.3 Engage community groups and create a PPP for the maintenance and management of Chamundi Hill	Environmental protective measures including hydroseeding, planting, drainage, terracing)	N/A	The total emissions were not calculated as data for the current green coverage and sequestration potential of this site is not available.
Intervention 3.3 Engage community groups and create a PPP for the maintenance and management of Chamundi Hill	Monitoring mechanisms (ecological assessments and hazard mapping)	N/A	
Intervention 3.3 Engage community groups and create a PPP for the maintenance and management of Chamundi Hill	Integrated planning (create tourism and economic strategy to link with ecological preservation)	N/A	
Intervention 3.3 Engage community groups and create a PPP for the maintenance and management of Chamundi Hill	PPP model for managing and maintaining Chamundi Hill (and nearby Special Agricultural Zone)	N/A	

Source: UN-Habitat

TABLE 4.9

Cost estimates for Strategic Recommendation 3

Intervention	Project	Estimated Project Cost (in INR lakh)	Remarks
Intervention 3.1 – Create an inventory of under-used land for creating 5 new neighbourhood parks	Develop 5 new neighbourhood scale parks on vacant land	50	
Intervention 3.2 – Increase green coverage potential on vacant or under-used land	Increase planting on vacant or under-used land (buffer zones)	204.255	Pilot example of the central bus depot area (1.44 ha) with components such as storm water drains (along plot edge), trees (cost includes 50 saplings), rainwater harvesting, planting, and permeable surfaces, two pedestrian crossings and increased lighting (includes 20 x solar powered).
Intervention 3.2 – Increase green coverage potential on vacant or under-used land	Assess and improve public spaces that are undeveloped (increase green coverage and planting)	11,938.75	47% of all parks, which total 588, are considered 'undeveloped' (therefore, a total of 276 has been used). This cost is based on a park that is 16,000 sq.m.
Intervention 3.3 – Engage community groups and create a PPP for the maintenance and management of Chamundi Hill	Environmental protective measures including hydroseeding, planting, drainage, terracing)	N/A	

Intervention	Project	Estimated Project Cost (in INR lakh)	Remarks
Intervention 3.3 – Engage community groups and create a PPP for the maintenance and management of Chamundi Hill	Monitoring mechanisms (ecological assessments and hazard mapping)	N/A	
Intervention 3.3 – Engage community groups and create a PPP for the maintenance and management of Chamundi Hill	Integrated planning (create tourism and economic strategy to link with ecological preservation)	N/A	
Intervention 3.3 – Engage community groups and create a PPP for the maintenance and management of Chamundi Hill	PPP model for managing and maintaining Chamundi Hill (and nearby Special Agricultural Zone)	N/A	

Source: UN-Habitat

3.3.6 USAF indicators impacted

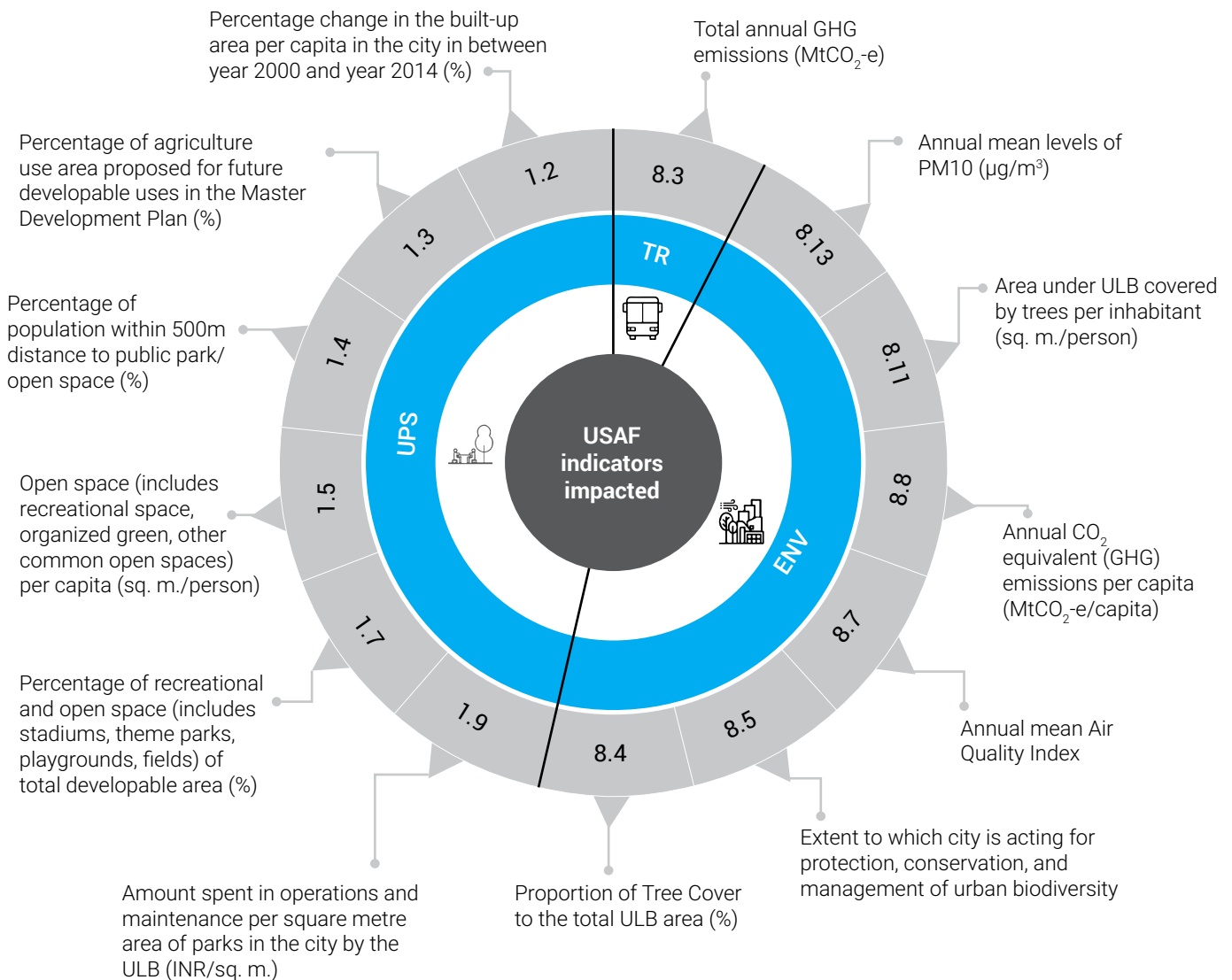


IMAGE 4.8

Statue of Nalwadi Krishnaraja Wadiyar at K.R Circle



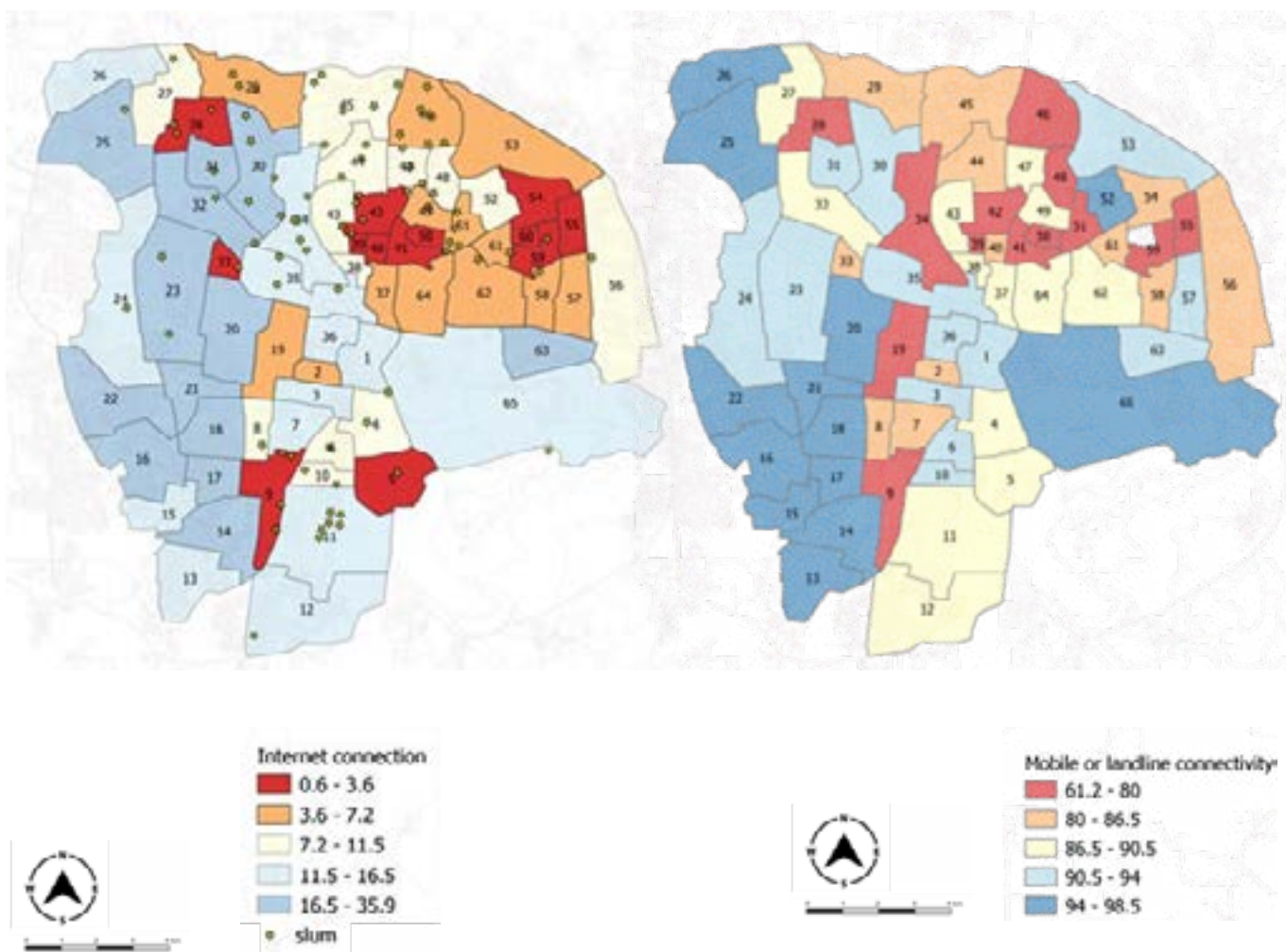
Source: UN-Habitat

4.4 Strategic Response 4: Expand the City’s Use of Digital Infrastructure

Detailed assessment of the digital governance and digital maturity parameters have revealed low performance at the MCC.⁶⁰ Although, when considering the coverage and access to internet and mobile connectivity, most wards have a relatively high accessibility (see Maps 3.12 and 3.13). Wards 59 and 55, however, have a high population

and could be considered a priority for increasing internet accessibility infrastructure. Therefore, this resource can be used more effectively to increase data collection and analysis to support the government to understand current challenges, monitor and maintain services and facilities, and to support evidence-based planning decisions.

In addition to this initial assessment of the city, the practice of undertaking planning processes as part of SCIAP highlighted the limited updated, centralized, open-source, consistent, and digital data sets.



Map 4.7: a) Internet connection average ward accessibility; and b) Mobile or landline connectivity average ward accessibility

Source: UN-Habitat

⁶⁰ Chapter 5 – City Profile and Diagnostic Report Mysuru.

Therefore, the following interventions are proposed within this strategic response:

- **Intervention 4.1: Increase the Use of Data Governance in Mysuru to Reduce Eco-vulnerability, Sprawl and Increase NMT Use**
- **Intervention 4.2: Improve Shared, Updated, and Consistent Data Triangulation in Urban Planning Practice**

4.4.1 Proposed interventions within the strategic response



Intervention 4.1 Increase the Use of Data Governance in Mysuru to Reduce Eco-vulnerability, Sprawl and Increase NMT Use

Sprawl: It has been observed that the static land use planning approach in Mysuru has not been able to respond to the dynamic urbanization witnessed by the city. This may result in haphazard urban growth following an inability to track the land use changes due to lack of accurate and current data. The traditional tools restrict decision-makers to examine rapidly changing complexities periodically.

This intervention recommends establishing an evidence-based, data-driven, dynamic land use database where data is updated at regular intervals with information flow from operations such as land uses, building permission and trade licences.

This intervention can lay the foundation for data-driven urban planning in the city and provide an opportunity for the city's urban planners to practice development stimulations and anticipate the impacts of various urban development programmes for making an informed decision. Adoption of such tools have a huge potential to empower the city to be more decisive and inclusive in its planning process.

Increase in NMT: This intervention advocates protected and equitable NMT to take the spotlight in the city's urban

mobility future and intends to create a baseline for NMT infrastructure that the ULBs may use to create walkable and cyclable urban areas.

The objectives of the intervention will be as follows: -

- Aggregate and visualize city-wide supply and demand data for NMT under a single platform to create a repository.
- Leverage the data to aid ULBs in getting updated NMT-related insights and making informed decisions.
- Leverage the data to aid citizens in accessing NMT services and amenities, and providing their feedback to inform the decision-making process.
- Create a communication channel between the government and citizens for improved development outcomes for NMT and public space sector.

The essence of this intervention pivots around participatory action as an instrument to instil a sense of ownership and belonging among local communities that the intervention intends to serve.

Eco-vulnerability: In the face of rapid urbanization that Mysuru is undergoing, it is of most extreme significance to safeguard the local biodiversity. With the city's average temperature on the rise, the GHG emissions maybe curtailed by increasing green coverage at the neighbourhood scale and make it more resilient also.

The objective of the intervention is to create and sustain flourishing green spaces through a digital platform by streamlining data for evidence-based decision-making to create a sustainable Mysuru.

The intention is to plan green cover growth, public spaces, and recreational amenities by sharing the responsibilities for maintaining these parks and green spaces. This digital platform would facilitate the holistic way of achieving the various components of the intervention with the citizens and ULBs working together.

Basic city environmental mandates like planting native tree species, the participation of communities in plantation/maintenance activities, and better environmental planning would be achieved through this intervention. This will help to realize the cities' biodiversity and ecological growth in a sustainable and participative manner.

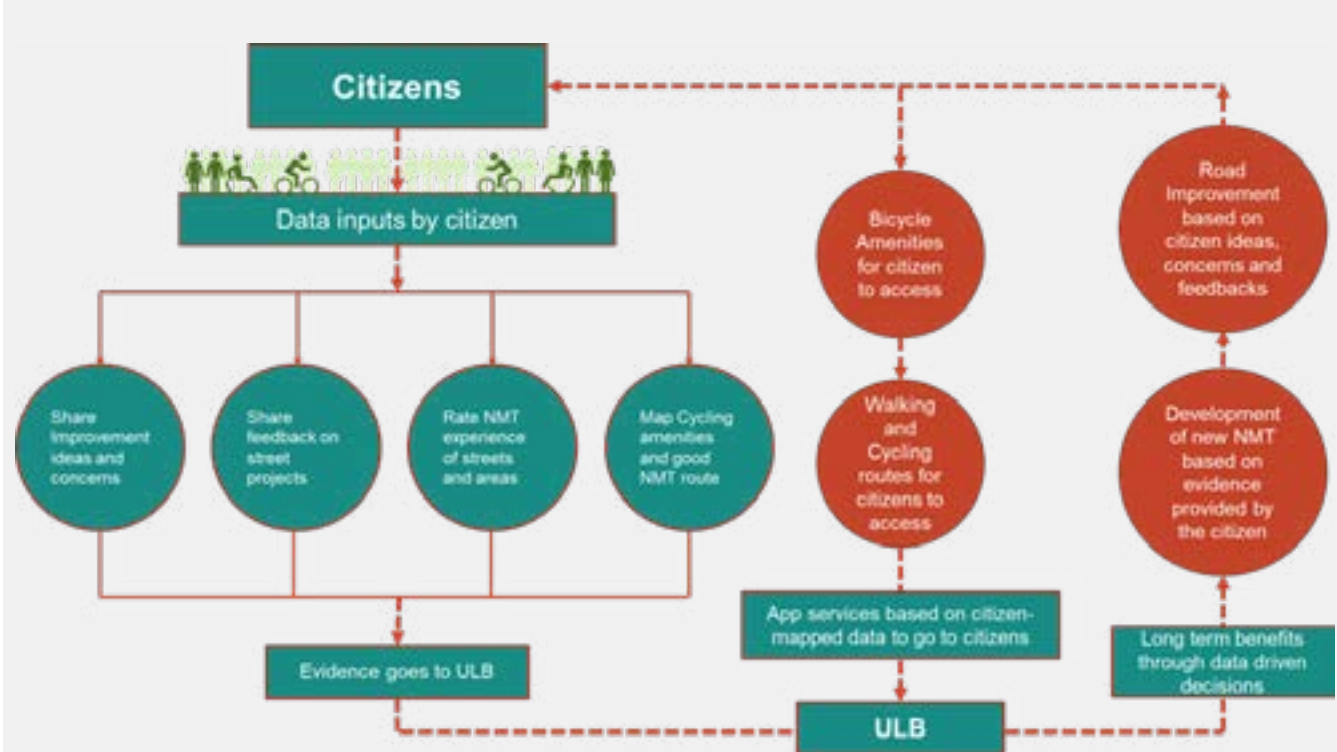
CASE STUDY

Case study for Intervention 4.1: 'Share the Road, Chennai', Tamil Nadu

The project ideation revolved around some of these factors:

- Score streets as per your walking and cycling experience
- Share walking or cycling-related improvement ideas and mark concerns.
- Share feedback on public space and street design projects
- Find cycling facilities such as repair, rental, retail shops and parking spaces.
- Map any cycling facility near you.
- Explore interesting walking and cycling routes in the city.

FIGURE 4.13 Methodology of the digital interface



The process entails developing a digital interface, in the form of intuitive dashboards, for governments and citizens to co-create walking and cycling-friendly cities through meticulous evidence-based decisions and community participation. It includes generating insights from the digital interface and subsequently piloting design solutions for road space appropriation through simple yet effective tactical urbanism interventions that necessitate testing and iteration. Eventually, it can be used to replicate and scale-up such interventions in different areas in a city.

Source: ISCF (niu.a.org)

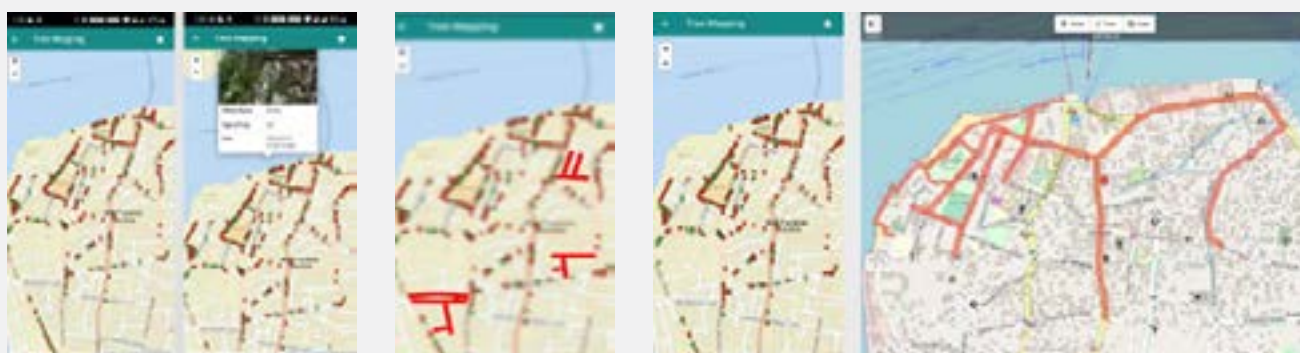
CASE STUDY

Case study for Intervention 4.1: Preserve (Interact with the Green Around You) at Fort Kochi & Matancherry, Kochi, Kerala.

The project ideation revolved around some of these factors:

- Helps citizens interact with the environment
- Data for urban environment
- Aid in green cover planning
- A digital output and a lookout for an ideal solution
- Involving citizens and investing in the existing traditional knowledge of the city's green cover.

FIGURE 4.14 Phase 1 Implementation a) Live GIS output: - Data capture of the mapped trees b) Lanes identified for Planned afforestation c) The Green Infrastructure aided NMT route



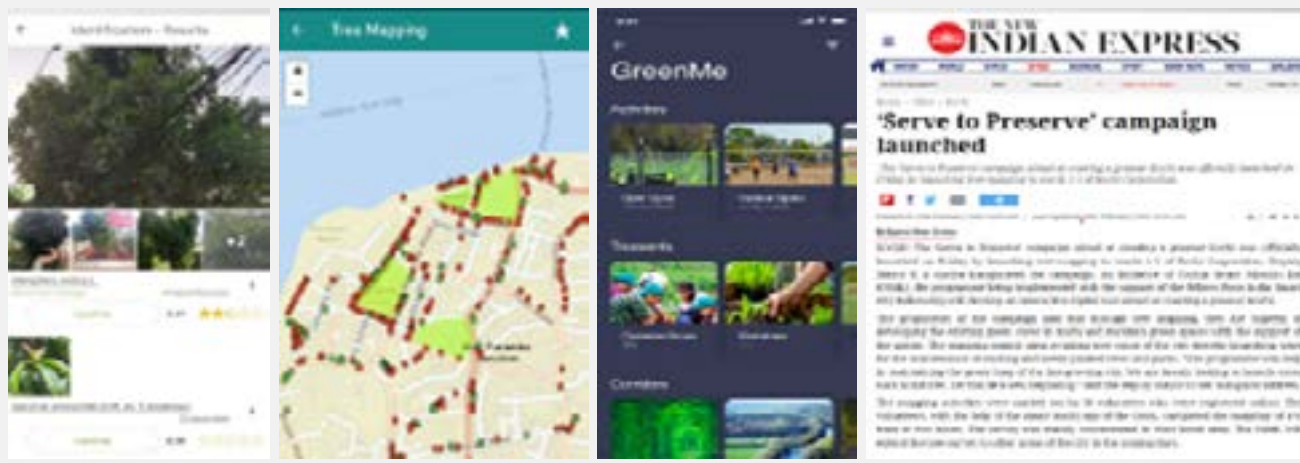
Source: Smartnet projects

This digital platform facilitated a holistic way of achieving the three components of the project with citizens and ULBs working together. Basic city environmental KPIs like planting native tree species, the participation of communities in plantation/ maintenance activities and better environmental planning would be achieved through this intervention. It also helped in envisioning the cities' biodiversity and ecological growth in a sustainable and participative manner.

After the success of the pilot project a scale up strategy was initiated where further detailing and Identification of tree species were initiated, open green space with amenities mapping were created, various other citizen/ NGO/ smart city collaboration were facilitated; and the campaign also had a good media coverage to extend its outreach to other areas.

Source: ISCF (niua.org)

FIGURE 4.15 Scale-up Strategy – a) Identification of tree species; b) Green space mapping with amenities; c) Citizen interaction module, collaboration with NGOs, businesses, and Smart Cities; and d) “Serve to Preserve” campaign covered by The New Indian Express.



Source: Smartnet projects



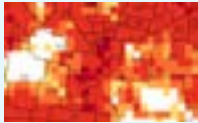







Intervention 4.2: Improve Shared, Updated, and Consistent Data Triangulation in Urban Planning Practice

Without key data sets, planning decisions are limited and lack fundamental and integrated information. The lack of open-source information and transparency reduces citizen trust in government planning decisions, limits community engagement in urban environment as well as private investment. The rapid expansion of the city past the

MCC boundary, has also necessitated the requirement of centralized data management systems that could be shared between administrative boundaries, MCC, MUDA and other relevant departments to streamline decision making between government agencies.

Fundamental data sets in shapefile formats, and how they can inform planning decisions have been indicated in Table 4-10. Additional data triangulation process must be applied to ensure evidence-based spatial planning. Additional data of an informal or subjective nature (qualitative data, or informal economic activities) must also be collected and acknowledged alongside the data sets.

TABLE 4.10 Key data sets to support evidence-based spatial planning

Data Set	Recommendations	Outcome Indication	Graphic Example
Population	Updated more regularly than census, more detail than ward average, open source	This is the basis of all analyses and provides a general understanding of growth and densification potential, and builds future population scenarios	
Facilities/ infrastructure location	Disaggregated by type (for example hospital facilities, grouped by clinics, general hospitals, specialized hospitals)	Understanding lacking facilities by category	
Facilities/ infrastructure capacity	Disaggregated by size, scale, width of pipeline or material (water or sewerage) number of beds (hospitals), number of classes (schools) etc.	Understanding over demand or excess capacity of facilities and infrastructure as one indication for densification potential	
Vacant land	Must match officially recognized definition for vacant land and must include semi-vacant or under-used land	Understanding how efficient land is used and potential for land availability or incentives for development	
Land ownership	Regularly updated (more than every 10 years)	Understanding potential for development, partnerships, limitations to accessibility	
Building heights	Regularly updated	Understanding potential for densification, problematic typologies (views, human scale, architectural variation/ monotonous urban environment)	
Density of intersections	Regularly updated and disaggregated by road category	Understanding walkability, permeability, and accessibility of the city	
Green & blue network (green cover and public space, water bodies, canals, drains, etc.)	Updated regularly disaggregated by types of green coverage, shared definitions between administrative boundaries, regularly reassessed due to land ownership changes	Understanding potential for increase in green cover as well as location, scale, category or 'type' of green space and ownership	

Source: UN-Habitat

4.4.2 Gender and inclusion

This strategic response to improve the city's use of digital infrastructure provides great scope for gender mainstreaming in the city. Evidence-based planning decisions could be taken to identify gender gaps in mobility, infrastructure, employment opportunities, etc. Both interventions contribute towards addressing the needs of marginalized groups, specifically women. It is recommended that key data sets for spatial planning be collected and assessed, disaggregated by gender, age, income (and religion, where relevant). The development of public spaces and programming open spaces, transportation networks, providing neighbourhood centres and mixed-use housing as part of Strategic Responses 1, 2 and 3 would also be benefited by the interventions.

Intervention 4.2 discusses data triangulation in urban planning practice by including qualitative data of a collected, informal, and subjective nature that

acknowledges gender issues and challenges in the city. Also refer annex 9 to further refer to the details of Gender-inclusive guidelines to strengthen governance system.

4.4.3 Climate convergence

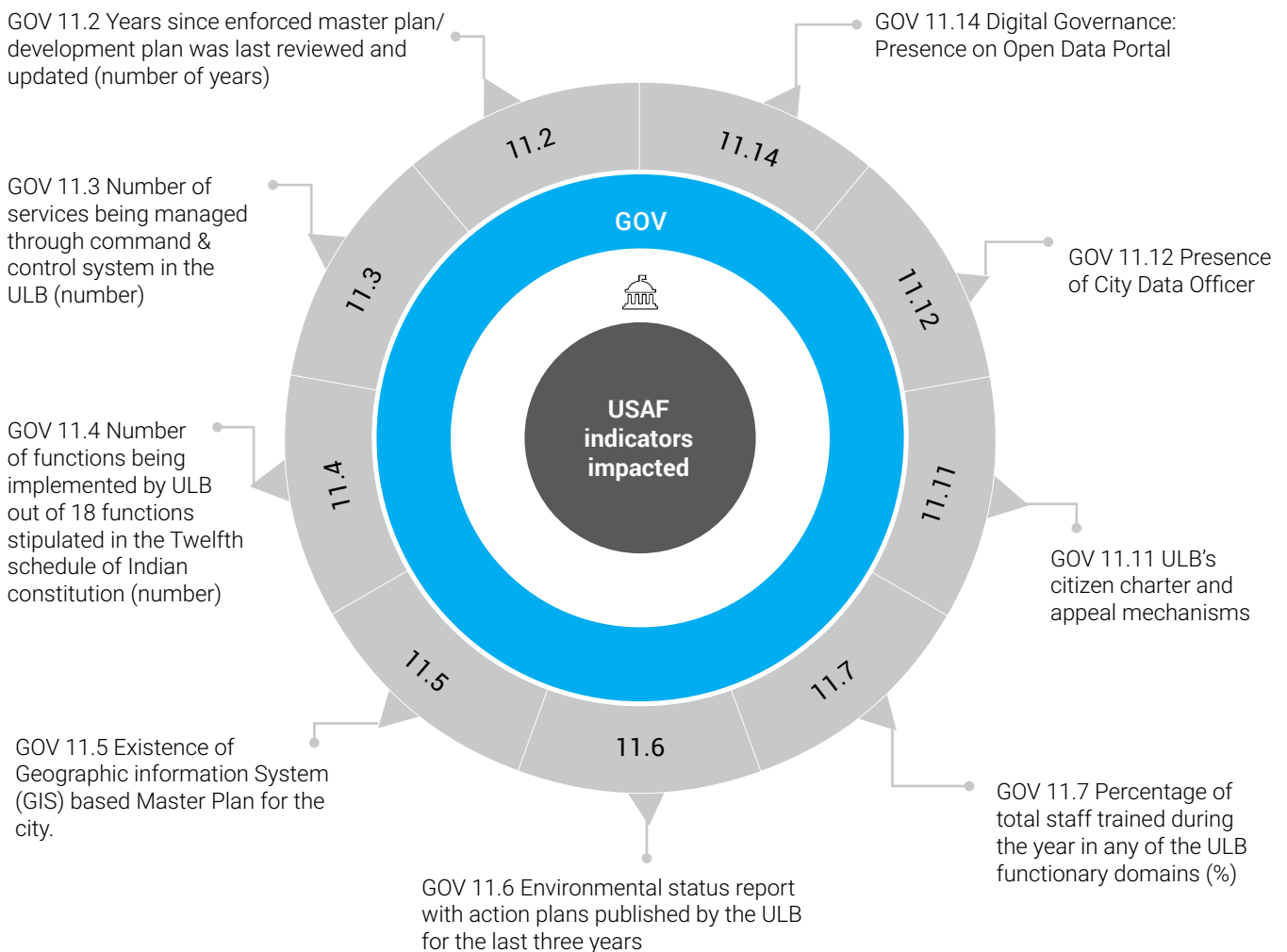
These interventions aim to create more efficient services, reducing excess provision or process wastage. This intervention helps the city understand, monitor and, therefore, reduce its own emissions. (Refer annexure 10)

4.4.4 Estimated project costs

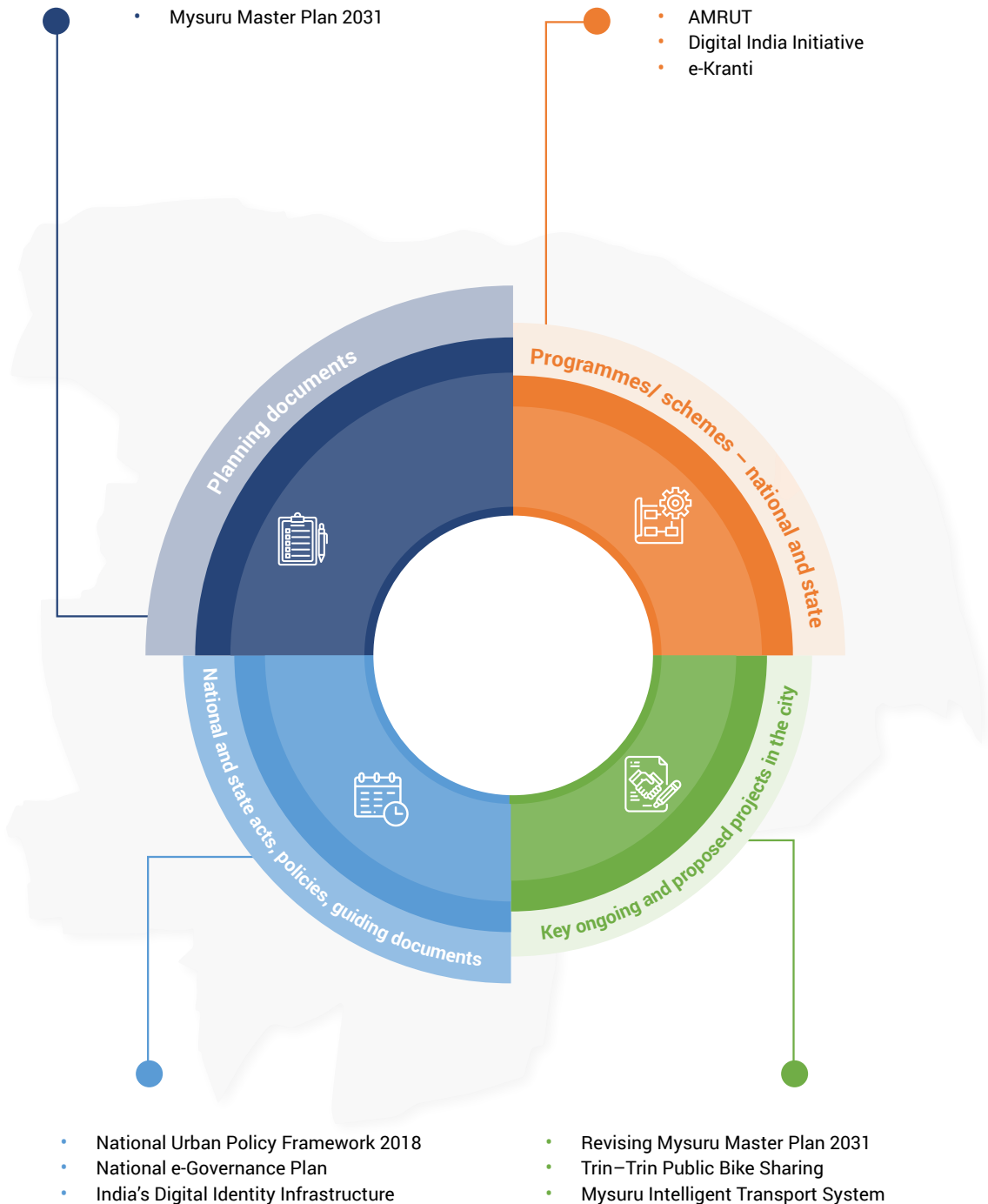
The estimated project costs of these interventions will depend upon the scale at which it will be undertaken. It will depend upon the baseline purpose and the system characteristics. Many factors like technological implications, system configurations, schedules, strategies, and relations to existing systems have to be considered (see Annexure 11).

4.4.5 USAF indicators impacted

Although several indicators are impacted within the transport, environment, and infrastructure sectors, the following are most directly impacted:



4.4.6 Alignment with national, state policies, programmes and ongoing, proposed capital projects in the city



4.5 Actions and Interventions

The steps taken, the sources referenced, and the base metrics used to achieve the GHG potential savings and emissions, as well as the cost estimates for each intervention is included in the Annex. Table 4.11 summarizes the key interventions and actions, the total GHG emissions and block cost estimates, the intervention duration, implementing agency and mission convergence.

TABLE 4.11 Summary actions and interventions

S.No	Strategic Response	Proposed Action / Project	Block Cost Estimate (in Lakh)	Climate Savings Potential (in tCO ₂ -eq per annum)	Location	Nature of Project	Duration (short, medium, long)	Implementing Agency	Sources of Finance	Convergence with National/ State Missions or Schemes
Approach		Implement Form Based Codes			Non-spatial	Planning tool				
A Strategic Response 1										
1	Intervention 1.1 Create new Neighbourhood Centres	Identify new neighbourhood centres	N/A	N/A	Neighbourhood centres: 1. High Tension Double Road; 2 on Bengaluru – Mysuru Highway; 3. roundabout at Vishwamanava	Survey/Assessment	Immediate (0-3 years)	MCC, MUDA, MoHUA	N/A	SBM, AMRUT
2		Increase mixed-uses and small commercial units	N/A	N/A		Policy/ land use adjustment	Medium (3-5 years)	MUDA, MoHUA	N/A	SBM, AMRUT
3		Focus NMT improvements in neighbourhood centres (see Intervention 2.2)	N/A	N/A	Double Road; 4. Mananthavadi Road and Link Main Road; 5. Mahadevapura Main Road; 6. Bannur Road and Dr Rajkumar Main Road; 7. Heritage city core.	Infrastructure development	Immediate (0-3 years)	MCC, MUDA, DULT, KSRTC	See 2.2	SBM, AMRUT
4		Develop new, temporary, local crafts and general produce markets on vacant or under-used land sites (see Intervention 2.3)	N/A	N/A	At proposed new market sites (15 total)	Infrastructure development	Immediate (0-3 years)	MCC, MUDA, MoHUA	See 2.3	DAY-NULM
5		Pedestrianize existing markets to improve public realm and walkability (see Intervention 2.3)	N/A	N/A	At existing market sites (9 total)	Survey/Assessment & Infrastructure development	Immediate (0-3 years)	MCC, MUDA, DULT, KSRTC, Traffic Police	See 2.3	Streets for All

S.No	Strategic Response	Proposed Action / Project	Block Cost Estimate (in Lakh)	Climate Savings Potential (in tCO ₂ -eq per annum)	Location	Nature of Project	Duration (short, medium, long)	Implementing Agency	Sources of Finance	Convergence with National/ State Missions or Schemes
6	Intervention 1.2 Promote infill and mixed-use Neighbourhoods	Promote vernacular architecture and diverse residential neighbourhoods within the MCC boundary	N/A	N/A	Non-specific/ city-wide	Policy amendment/ Infrastructure Development	Medium (3-5 years)	MCC, MUDA, Heritage Commission	N/A	AMRUT, PMAY
B	Strategic Response 2		460760.28	24.08						
7	Intervention 2.1: Connecting neighbourhood centres with improved NMT network	Expand existing efforts to change to LED lights	10908.48	N/A	Along SCIAP proposed and MCC planned bicycle routes	Infrastructure development	Immediate (0-3 years)	MCC, Chamundeshwari Electricity Supply Corporation	PPP (with existing contractor)	Solar City Project
8		Bicycle network including, pigment, drainage, separation (natural barrier/planting)	513.72	8.56	Along SCIAP proposed and MCC planned bicycle routes	Infrastructure development	Immediate (0-3 years)	MCC, MUDA, DULT, KSRTC, MoHUA	Central Government funds (as per existing bicycle lanes)	Cycle4Change, AMRUT,
9		Tree planting. (Street length x tree)	14.98	4.28	Along SCIAP proposed and MCC planned bicycle routes	Infrastructure development	Immediate (0-3 years)	MoEFCC, MCC	PPP, NGOs, Government Grants	Krishi Aranya Pratsaha Yojane (Agriculture Forest Encouragement Scheme), AMRUT
10		Specific lane shared between e-autorickshaw and bus	3127.09	N/A	KRS Road (5.1km), Mangalore-Mysuru Highway (5.66km), Wahadevapura Main Rd (4.3km), Mysuru-Trichy Road (5.5 km), Mananthavadi Rd (6.9km), Vishwamanava Double Rd (5.3 km).	Infrastructure development & Policy Amendment	Medium (3-5 years)	MCC, MUDA, DULT, KSRTC, Traffic Police	MCC, MUDA	AMRUT

S.No	Strategic Response	Proposed Action / Project	Block Cost Estimate (in Lakh)	Climate Savings Potential (in tCO ₂ -eq per annum)	Location	Nature of Project	Duration (short, medium, long)	Implementing Agency	Sources of Finance	Convergence with National/ State Missions or Schemes
11		Upgrade bus stops to integrate better with cycle lanes after undertaking a feasibility study to identify conflicting bus stops with cycle routes, and construct bicycle lock up adjacent to bus stops	2004.90	N/A	Along SCIAP proposed and MCC planned bicycle routes	Infrastructure development	Immediate (0-3 years)	MCC, MUDA, DULT, KSRTC	Central Government funds (as per existing bicycle lanes)	Cycle4Change, AMRUT
12		E-rickshaw pull-in bays with battery swap station	N/A	N/A	Along SCIAP proposed and MCC planned bicycle routes	Infrastructure development	Immediate (0-3 years)	MCC, MUDA, DULT, KSRTC,	PPP, Government Grants	AMRUT, Solar City Project
13	Intervention 2.2: Increase multi-modal infrastructure at neighbourhood centres	EV charging point	56.00	0.53	Neighbourhood centres: 1. High Tension Double Road; 2 on Bengaluru-Mysuru Highway; 3. roundabout at Vishwamanava Double Road; 4. Mananthavadi Rd and Link Main Road; 5. Mahadevapura Main Road; 6. Bannur Road and Dr Rajkumar Main Road; 7. Heritage city core.	Infrastructure development	Immediate (0-3 years)	MCC, MUDA, DULT, KSRTC,	PPP, Government Grants	AMRUT, Solar City Project
14		Bicycle lock ups	68.46			Infrastructure development	Immediate (0-3 years)	MCC, MUDA, DULT, KSRTC,	MCC, MUDA	AMRUT
15		E-rickshaw pull-in bays with battery swap station	28.00			Infrastructure development	Immediate (0-3 years)	MCC, MUDA, DULT, KSRTC	PPP	AMRUT, FAME II
16		Parking Action Plan to be prepared and formalized, tariff-based on-street parking spaces in the city centre	N/A			Study/Assessment & Policy Amendment	Medium (3-5 years)	MCC, MUDA, DULT, KSRTC	MCC, MUDA	, AMRUT
17		Formalising or creating pedestrian sidewalk and widening pedestrian pathways at intersection with pedestrian crossing points	23.24			Infrastructure development	Immediate (0-3 years)	MCC, MUDA, DULT, KSRTC	MCC, MUDA	AMRUT

S.No	Strategic Response	Proposed Action / Project	Block Cost Estimate (in Lakh)	Climate Savings Potential (in tCO ₂ -eq per annum)	Location	Nature of Project	Duration (short, medium, long)	Implementing Agency	Sources of Finance	Convergence with National/ State Missions or Schemes
18	Intervention 2.3: Pedestrianized 'market street' at neighbourhood centres	Pilot project to pedestrianize the street adjacent to Devajara market: Street length 350m, includes bollards, security, trees, benches, permeable surfaces/bicycle lane natural separation, painting, signage	393750.00	7.43	Devaraja Market (heritage core) + 8 additional sites	Survey/Assessment & Infrastructure development	Immediate (0-3 years)	MCC, MUDA, DULT, KSRTC, KSPCB	MCC, MUDA	AMRUT
19		Create new 'traditional' market with pedestrian access and public space facilities (see above)	175.89	3.27	15 new sites	Infrastructure development	Medium (3-5 years)	MCC, MUDA, DULT, KSRTC, MoEFCC, KSPCB, KIADB	PPP	AMRUT
C	Strategic Response 3		94167.66	6.29						
20	Intervention 3.1: Create an inventory of under-used land to create 5 new neighbourhood parks	Develop 5 new neighbourhood scale parks on vacant land	50.00	6.03	Non-specific/city-wide	Infrastructure development	Immediate (0-3 years)	MoEFCC, MCC, MUDA, MoHUA, KSPCB, KIADB	MCC, MUDA	AMRUT
21	Intervention 3.2: Increase green coverage potential on vacant or under-used land	Increase planting on vacant or under-used land (buffer zones etc)	204.26	0.01	Non-specific/city-wide	Survey/Assessment & Infrastructure development	Immediate (0-3 years)	MoEFCC, MCC, MUDA, MoHUA, KSPCB, KIADB	PPP	Krishi Aranya Pratsaha Yojane (Agriculture Forest Encouragement Scheme), AMRUT
22		Assess and improve public spaces that are un-developed (increase green coverage and planting)	11938.75	0.25	Total of 276 parks	Infrastructure development	Immediate (0-3 years)	MoEFCC, MCC, MUDA, MoHUA, KSPCB	MCC, MUDA	AMRUT

S.No	Strategic Response	Proposed Action / Project	Block Cost Estimate (in Lakh)	Climate Savings Potential (in tCO ₂ -eq per annum)	Location	Nature of Project	Duration (short, medium, long)	Implementing Agency	Sources of Finance	Convergence with National/ State Missions or Schemes
23	Intervention 3.3 Engage community groups and create a PPP for the maintenance and management of Chamundi Hill	Environmental protective measures including hydroseeding, planting, drainage, terracing)	N/A	N/A	Chamundi Hill	Survey/Assessment & Infrastructure development	Immediate (0-3 years)	MoEFCC, MCC, MUDA, MoHUA, KSPCB	Central Government funding	PRASHAD Scheme, AMRUT
24		Monitoring mechanisms (ecological assessments and hazard mapping)	N/A	N/A	Chamundi Hill	Survey/Assessment	Immediate (0-3 years)	MoEFCC, MCC, MUDA, MoHUA, KSPCB	Central Government funding	PRASHAD Scheme, AMRUT
25		Integrated planning (create tourism and economic strategy to link with ecological preservation)	N/A	N/A	Chamundi Hill	Policy Amendment & Guideline	Medium (3-5 years)	MoEFCC, MCC, MUDA, MoHUA, KSPCB	Central Government funding	PRASHAD Scheme, AMRUT
26		PPP model for managing and maintaining Chamundi Hill (and nearby Special Agricultural Zone)	N/A	N/A	Chamundi Hill	Policy Amendment & Guideline	Immediate (0-3 years)	MoEFCC, MCC, MUDA, MoHUA, KSPCB	Central Government funding	PRASHAD Scheme, AMRUT
D	Strategic Response 4									
27	Intervention 4.1 Increase the use of data governance in Mysuru to reduce eco-vulnerability, sprawl and increase NMT use	Improve the updating and shared source of data for land uses, building permission and trade licences	N/A	N/A	Non-spatial	Capacity/ Mapping and assessment	Immediate (0-3 years)	MCC, MUDA	MCC, MUDA, KIADB	National Urban Digital Mission, AMRUT
28		Creating a digital interface in the form of instinctive dashboards, to co-create walking & cycling-friendly environment, and subsequently piloting design solutions	N/A	N/A	Non-spatial	Capacity/ Mapping and assessment	Immediate (0-3 years)	MCC, MUDA	MCC, MUDA, KIADB	National Urban Digital Mission, AMRUT

S.No	Strategic Response	Proposed Action / Project	Block Cost Estimate (in Lakh)	Climate Savings Potential (in tCO ₂ -eq per annum)	Location	Nature of Project	Duration (short, medium, long)	Implementing Agency	Sources of Finance	Convergence with National/ State Missions or Schemes
29		Plan green cover growth, public spaces, and recreational amenities by sharing the responsibilities for maintaining these spaces through a digital platform	N/A	N/A	Non-spatial	Capacity/ Mapping and assessment	Immediate (0-3 years)	MCC, MUDA	MCC, MUDA, KIADB	National Urban Digital Mission, AMRUT
30	Intervention 4.2 Improve shared, updated, and consistent data triangulation in urban planning practice	Build, regularly maintain and share a database for urban planning in Mysuru	N/A	N/A	Non-spatial	Capacity/ Mapping and assessment	Immediate (0-3 years)	MCC, MUDA	MCC, MUDA, KIADB	National Urban Digital Mission, AMRUT

Source: UN-Habitat

IMAGE 3.1

Devaraja Urs road



Source: UN-Habitat

5



Statue of Nalwadi Krishnaraja Wadiyar at K.R Circle

ANNEXURES

5.1 Annex 1 - Proposed Framework for Developing Sustainable City Strategies

This document outlines the overall methodology for developing Sustainable City Strategies (SCS) with its foundation in the New Urban Agenda. The following five pillars (except Pillar 1, since it is beyond the scope of SCIAP) of the NUA shall be the guiding elements in formulating the SCS:

1. National Urban Policies (NUPs)
2. Rules and Regulations
3. Urban Planning and Design
4. Financing Urbanization
5. Local Implementation



STEP 1 Assess the relevant Rules, Regulations and Policies associated with the Sector

In order to build a complete picture of the planning legal instruments available, as a first step, list all the relevant plans, policies, rules, and regulations that are applicable to the issue and its predominant sector. It is also essential to map the interrelationships between various instruments and regulations to the issue and develop a schematic for better understanding.

Ascertain the gaps in the existing rules that have prevented progress towards the diagnostic issue. In addition, assess if any regulatory changes would be beneficial to the overarching strategy and/or if the strategy is complementing the regulations.



STEP 2 Identify GHG Impact of the Issue and the related sector

Ascertain if the diagnostic issue aligns positively or negatively with GHG emissions and if the climate consequences can be quantified. Identify what kind of factors pertaining to the diagnostic issue have a significant impact on climate mitigation and if any of the rules and regulations assessed in Step 1 can aid in developing the strategic response. Please use UNIDO's study for this step.



STEP 3 Identify an overarching umbrella strategy/concept that addresses the diagnostic issue in a holistic manner

Most diagnostic issues may be addressed by designing an overarching umbrella strategic response which can be detailed through a series of actions and interventions. For example, a lack of open spaces in a city can be addressed by a strategy that focusses on creating and strengthening an integrated blue-green network which positively impacts the quality of life of the city residents. In some instances, more than one umbrella strategy may be needed but it needs to be kept in mind that we are building a strategic action plan and only the most critical and impactful actions should be prioritized. In addition, emphasis should be laid on inter-sectoral strategy so that multiple sectors are integrated true to the principles of the project and urban development in general (see Figure 5.1).

The strategy can take the form of the following two types-

- 1) City-wide or pan-city application
- 2) Area based development where a few strategic responses may be clubbed together to enhance their impact on the city's urban fabric and it's residents through transformative projects.

FIGURE 5.1 Types of Strategic Responses to Diagnostic Issues





STEP 4 Ascertain Actions and Interventions required to implement the overall Strategy

The actions and interventions may be in any of the following formats/types:

1. City Wide Policy or an amendment to an existing policy
2. City Wide Plan/Network or an amendment to the existing plan through a review process
3. Development Guideline (Urban Design, Landscape, Street Design, etc)
4. Byelaws
5. Detailed Project Report/feasibility Study for an already identified action/project
6. Area-Based Development Plan or a Precinct Design (urban design scale)

For the area based transformative projects, through spatial analyses and consultation with the Tier 1 stakeholders, identify locations for which an urban design scheme can be developed to illustrate the key import of the overarching strategy.

A tabular collation of the actions and interventions as given below may be prepared and the UN-Habitat SCS may detail some of these as part of the strategic planning response to the diagnostic issue (Please see Table 5.1). The work that has already been done by the team such as the Master Plan Reviews, Sanitation Byelaws, UNIDO Investment Projects and projects captured in the CIP need to be integrated into this list and find their place in the overall strategic plan. Similarly, projects from the sustainable city strategy will be integrated into the CIP to complete the loop.

The strategy should clearly articulate that the city managers (municipal commissioners) may use this list to monitor the progress and ensure that these are implemented over the course of five years. Corresponding performance should be mapped using the USAF and captured in the USIR.

TABLE 5.1 Sample Actions and Interventions List

Action	Duration (short, medium, long)	Next Steps	Responsibility	Source of Financing/Mission	USAF Indicator Impacted



STEP 5 Ascertain existing investments in the city and their integration with the overall strategic response

All cities have ongoing national or state level investments through the missions or schemes. It is imperative to map those and integrate the investments into the strategic response for the diagnostic issue. In addition, through

the identification of under-served sections of the city or areas that have multiple deprivations and a higher density of people, areas should be identified for future investments under these missions and schemes.

For example, through spatial diagnosis illustrated above, the strategic response can advise where the next park should be planned so it can be accessed by a greater number of city dwellers. Financial implications for some interventions may be resolved by attaching them with the national and state level schemes, etc.

5.2 Annex 2 – Relevant programmes, plans, legislation at National, State and local level

A. National programmes

Programme	Description
Atal Mission for Rejuvenation and Urban Transformation (AMRUT)	AMRUT launched in 2015 is a national scheme being implemented in the 500 ULBs across India. The components of the AMRUT consist of capacity building, reform implementation, water supply, sewerage and septage management, storm water drainage, urban transport and development of green spaces and parks. Under AMRUT Mysuru is undertaking various projects like upgradation of water supply pipeline system and redevelopment of public parks.
AMRUT 2.0	AMRUT 2.0 launched on 2nd October 2021 is an extension (second phase) of AMRUT. The second phase aims at making the cities 'water secure' and providing functional water tap connections to all households. This is planned to be achieved through circular economy of water. Mission also targets to provide 100% sewage/ septage management in 500 AMRUT cities. One of the key components, proposed projects in the mission is Rejuvenation of water bodies (including urban wetland) and creation of green spaces. ¹
Swachh Bharat Mission Urban	SBM-U launched on 2nd October 2014 aims at making urban India free from open defecation and achieving 100% scientific management of municipal solid waste. The objectives of the mission included elimination of open defecation, eradication of manual scavenging, generating awareness and bringing about a behaviour change regarding sanitation practices, and augmentation of capacity at the local level. SBM-U is implemented by MoHUA in all through States/ UTs in all statutory towns in the country.
Swachh Bharat Mission Urban 2.0	SBM-U 2.0 launched on 2nd October 2021 for a period of five years (till 2026) is an extension (second phase) of SBM-U. The mission aims to make all statutory towns in the country 'Garbage Free' in order to contribute to the achievement of the Sustainable Development Goals (SDG) 2030, which will ultimately improve the quality of life and ease of living of urban populations, thus leading to urban transformation. SBM -U 2.0 through the planned activities also aimed at contributing for Clean Air, Clean Water and Clean Land. The mission is aligned with various National Missions and National Priorities such as National Clean Air Program, Namami Gange, Digital India, National Urban Digital Mission, Smart Cities Mission, Start-up India, Make in India, others.
Jal Jeevan Mission (Urban)	Announced in Union Budget 2021-22, the JJM(U) is applicable for 500 AMRUT ULBs. The mission has a reform agenda focused on financial sustainability and water security of ULBs. Under the mission, the ULBs are proposed to prepare detailed City Water Balance Plans and City Water Action Plan with the focus on improving sustainability and efficiency in water sector which includes Rejuvenation of water bodies and creation of green spaces as one of the components. Application of Sponge Cities concept to reduce floods and enhance amenity value through an Urban Aquifer Management plan is one of key areas of the Mission.
Cycle 4 Change Challenge	In the India Cycles4Change Challenge, 107 cities across the country including Mysuru has come up to test, learn and scale up different cycling-friendly initiatives, kick-starting India's cycling revolution. Under the first phase of 'Cycle4Change', Mysuru would get priority and in Mysuru a dedicated 12-km cycle track has been proposed on wide roads. A survey has already been conducted by the City Traffic Police and the report has been submitted to the MCC. ²
Digital India Initiative (DII)	The next is the Digital India Initiative (DII) which was announced as a flagship programme by the Government in 2015 to transform India into a digital economy with the participation from citizens, governments, and businesses. It promises to transform the country into a digitally empowered society and a knowledge economy with high intellectual capital. The Digital India initiative, in general, aims to achieve a). Digital Infrastructure as a utility for every citizen b). Governance and services on demand c). Citizen digital empowerment

B. State government programmes

Programme	Description
Trin – Trin Public Bike sharing System	Trin Trin is a Government of Karnataka project, partially funded by the World Bank under the Global Environment Facility (GEF) Grant. The project is planned and implemented by the Directorate of Urban Land Transport and Mysuru City corporation. This is a system where bicycles are owned and operated by a civic administration and its associates, for shared, short-term use by local residents as well as visitors, on an easy rental basis. The system involves borrowing a bicycle from any 'docking station' across the city and returning the borrowed bicycle after a ride to any 'docking station', as suits the convenience of the rider. "TrinTrin", the PBS of Mysuru will be implemented and operated by Green Wheel Ride, an Mysuru city-based enterprise engaged in manufacturing eco-friendly battery-operated bicycles and promoting the concept and culture of cycling in Mysuru City. Currently the system features 52 hubs and 450 bicycles.

¹ Atal Mission for Rejuvenation and Urban Transformation 2.0: Operational Guidelines October 2021.

² <https://smarnet.niua.org/indiacyclechallenge>.

Programme	Description
Green India Mission (GIM)	The Forest Department has undertaken the Green Mysuru initiative in Mysore: Under this initiative 30,000 saplings nurtured in nurseries will be planted in the residential areas, educational and governmental organizations and other open spaces within the city. Another 2000 such saplings will be grown alongside highways and roads within and on the outskirts of the city. Similar attempts are also being made to encourage the industries of Mysore to take up a large-scale afforestation programme in collaboration with the Forest Department. Plans for the promotion of urban forestry in the city's parks have also been set in motion. ³
Mysore Intelligent Transport System	Monitoring system with an operational Management Information System (MIS) for everyday operations that include planning, scheduling, utilization, monitoring, and real-time tracking. Provide a safe, convenient and accessible service for transport users.

C. City level planning documents

Programme	Description
Master plan 2031 Mysore Nanjangud Local Planning Area	The Masterplan 2031 for Mysore Nanjangud local planning area was approved in the 2013 for the horizon year of 2031. The finalized revised Master plan for Mysore-Nanjangud local planning area consists of 1. Master Plan Report in Three Volumes (Vol. I- Data Collection, Analysis & Projections, Vol. II- Proposals of Landuse and Transportation, Vol.III- Zoning of Land-use and Development Control Regulations) and 2. Master Plan Maps (Vol. I- Study Maps Vol. II- Proposal maps). The revision of Masterplan 2031 for Mysore Nanjangud local Planning area is under preparation.
City Sanitation Plan Mysore, Karnataka (2011)	The CSP detailed out how city plan delivers the sanitary outcomes defined in NUSP and state strategy, in coordination with other line departments to ensure a well collaborated approach engaging all stakeholders including governmental and nongovernmental service providers. CSP not only emphasis on the physical infrastructure but also focus on behaviour change outcomes, proper usage, institutional reorientation, regular upkeep and maintenance, increased accountability and service delivery by ULBs and their partners. ⁴
District Disaster Management Plan, Mysore district (2017)	District Disaster Management Plan, Mysuru District-2017 (DDMP, Mysuru-2017) enlists the specific actions to be taken during non-disaster time for DRR and mitigation measures. This includes mainstreaming of DRR into development; capacity building; Functional continuity actions; and Emergency Preparedness. This also enlists various structural and non-structural as well as hazard specific mitigation measures and strategies. DDMP, Mysuru - 2017 also describes the linkages with other districts, divisions, state, and national level as per the level of disaster and the emerging needs. Implementation of plan; the responsibility and accountability, and follow-up actions at different levels are also described in this plan. ⁵

D. National level Policy / Guiding documents

Programme	Description
National Urban Policy Framework (NURF) 2018	NUPF outlines an integrated and coherent approach towards the future of urban planning in India. The NUPF is structured along two lines. Firstly, at the NUPF's core lie ten sutras or philosophical principles. Secondly, the ten sutras are applied to ten functional areas of urban space and management. Within each functional area, the status quo and its challenges are analyzed, key priorities formulated, and specific possible actions points suggested. ⁶ Weblink for NUPF.
National Urban Housing & Habitat Policy (NUH&HP) 2007	NUH&HP focuses on provision of "Affordable Housing For All" with special emphasis on vulnerable sections of society. The policy promotes urban planning, appropriate fiscal concessions for housing, technical and cost-effective innovations in the area of housing and infrastructure. The policy emphasizes to promote various types of public-private partnerships for realizing the goal of affordable housing for all. ⁷ Weblink for NUH&HP.
National Urban Transport Policy (NUTP)	NUTP, launched in 2006, aims at providing better mobility and sustainability by focussing on people mobility and not vehicle mobility. The objective of this policy is to ensure safe, affordable, quick, comfortable, reliable and sustainable access for the growing number of city residents to jobs, education, recreation and such other needs within our cities. Weblink for NUTP.

³ <https://ic-ce.com/wp-content/uploads/2021/02/Mysore-compressed.pdf>.

⁴ https://www.cseindia.org/static/mount/recommended_readings_mount/02-City-Sanitation-Plan_Mysore.pdf.

⁵ <https://cdn.s3waas.gov.in/s30d3180d672e08b4c5312dcdafdf6ef36/uploads/2018/08/2018081453.pdf>.

⁶ <https://smartnet.niua.org/nupf> (accessed on 7 December 2021).

⁷ National Urban Housing and Habitat Policy 2007; MoHUA, Gol, https://www.nhb.org.in/Urban_Housing/HousingPolicy2007.pdf (accessed on 7 December 2021).

Programme	Description
Non-Motorized Transport Guidance Document, 2016	The document presents a compendium of strategies and recommendations for integrating accessibility with land use and infrastructure investment decisions in shaping NMT-friendly street designs. The guidance document provides overview about promoting NMT in Indian cities by analysing challenges encountered in attempting to invest in pedestrian and cycling infrastructure around the country. Weblink for NMT Guidance Document.
Urban and Regional Development Plans Formulation and Implementation (URDPFI) Guidelines 2014	URDPFI Guidelines - 2014 provides integrated framework for urban and regional plan formulation and implementation. The guidelines provide comprehensive framework, direction for promoting balanced and orderly regional and urban planning and development. The guidelines also provide provisions of the legal and policy guidelines of the line Ministries, best practices of the States and the planning systems in vogue. The URDPFI Guidelines, 2014 comprise two Volumes. Weblink for Volume 1 and Volume II.
National Mission on Sustainable Habitat 2021-2030	The NMSH 2021-2030 document provide roadmap for States / UTs/ULBs to promote low-carbon urban growth and building resilience of cities to 'bounce back better' from climate related extreme events and disaster risks. Broad interventions to be undertaken at local level are listed under five thematic areas: Energy and Green Buildings; Urban Planning, Green Cover and Biodiversity; Mobility and Air Quality; Water Management; and Waste Management.
National E- Governance plan	The National e-Governance Plan (NeGP), takes a holistic view of e-Governance initiatives across the country, integrating them into a collective vision, a shared cause. Around this idea, a massive countrywide infrastructure reaching down to the remotest of villages is evolving, and large-scale digitization of records is taking place to enable easy, reliable access over the internet. The ultimate objective is to bring public services closer home to citizens, as articulated in the Vision Statement of NeGP. ⁸

E. State level Policy / Guiding documents

Programme	Description
State Action Plan on Climate Change (SAP-CC) for Karnataka	The Karnataka State Action Plan on Climate Change discusses climate trends, projected vulnerabilities, adaptation, and mitigation priorities. It includes a review of policies and programmes for possible mainstreaming of climate change. The report covers the key sectors in detail, including agriculture, animal husbandry, water resources, biodiversity, forestry, the coastal zone, urbanisation, and health. The document concludes with an action plan comprising of about 200 actions, 31 of which have been identified as priorities. ⁹
Karnataka State Disaster Management Plan (KSDMP) 2020-2021	In order to facilitate and guide the Disaster Management activities in the state, Karnataka State Disaster Management Plan (KSDMP) has been prepared and updated annually under the guidance of State Executive Committee (SEC). The KSDMP has been providing relevant inputs to the stakeholders to effectively deal with disasters. the plan encompasses and elucidate various thematic areas of disaster management including Understanding the Risk, Inter-Agency Coordination, Preparedness & Mitigation, Disaster Risk Reduction, Capacity Development, Build Back Better Recovery, Rehabilitation and Reconstruction. ¹⁰
Karnataka Tourism Policy	The Karnataka Tourism Policy 2020-25 aims to position Karnataka as a global tourism brand for visitors as well as for investors. This Policy encourages the development of relevant infrastructure through partnerships between private sector, government, and the community. Strategic interventions have been identified ed with a view to support local entrepreneurship and assist in creating livelihood opportunities for all sections of the society. The Policy provides detailed guidelines for the development of tourism products and services, ensuring quality and minimum standards of development. Thrust is on inclusive socio-economic growth of the sector by encouraging women, backward sections of the society and local level institutions to actively participate in the development process. The Policy lays emphasis on streamlining procedures and proposes to establish efficient online mechanisms for approvals to ensure transparency and faster clearances. ¹¹

⁸ <https://www.meity.gov.in/divisions/national-e-governance-plan>.

⁹ <http://moef.gov.in/wp-content/uploads/2017/08/Karnataka.pdf>.

¹⁰ https://ksdma.karnataka.gov.in/storage/pdf-files/Plans/Volume-I_30-08-2020_compressed.pdf.

¹¹ <https://www.karnatakaturism.org/documents/karnataka-tourismpolicy-englisih.pdf>.

5.3 Annex 3 - Ongoing and planned projects in the city

Sector	Project	Implementing agency	Convergence	Funding partners / Donors	Status (as of December 2021)
WATER SUPPLY					
Water management	24x7 water scheme	ULB, MCC, KUWS, DB	NA	Central, State and ULB	Planning completed, under construction, partially functional
STORM WATER					
Storm water	Storm water drainage system along Hunsur Road near Hinkal, Kalidasa Road	MUDA	Not Applicable	MUDA	Ongoing
SEWERAGE					
Infrastructure	Wastewater treatment plant at Koorgalli	MUDA	Amrut	KUWSDB	Ongoing
SOLID WASTE					
Infrastructure	Comprehensive development of 200 TPD Solid Waste Management Plant in Kesare in Mysuru District.	Mysuru City Corporation	SBM	UNIDO	Ongoing
Infrastructure	Comprehensive development of 150 TPD Solid Waste Management Plant in Rayanakere in Mysuru District.	Mysuru City Corporation	SBM	UNIDO	Financial Bid Opening
C&D Waste	Construction and Demolition waste processing unit	Mysuru City Corporation	SBM	NIE Mysore	Proposed
ECOSYSTEM					
Development of Parks	Conversion of Sewage Farm into a park at Vidyaranyapuram	Mysuru City Corporation	AMRUT / SBM	MCC	Proposed
Development of Parks	Development of 'Water Park' at Vani Vilas Water Works (VWWW)	Mysuru City Corporation	AMRUT	MCC	Proposed
INCLUSIVITY					
Public Toilets	Pink toilets for women	Mysuru City Corporation	Yoga Lakshmi scheme for girl children	GOK	Ongoing
EWS Housing	Construction of houses for Pourakarmikas	Mysuru City Corporation	PMAY	GOK	Put to tender
URBAN TRANSPORTATION					
NMT Infrastructure	Implementation of dedicated cycle track for the India Cycles 4 Change Pilot project in MCC limits	Mysuru City Corporation	India Cycle 4 change	DULT	Put to tender
Infrastructure	Development and beautification of prime circles	Mysuru City Corporation	Not Applicable	MCC	Ongoing

Sector	Project	Implementing agency	Convergence	Funding partners / Donors	Status (as of December 2021)
Infrastructure	Construction of multi-level parking lots near the KSRTC Sub-urban bus stand	Mysuru City Corporation	Not Applicable	MCC	Proposed
GOVERNANCE AND MONITORING					
ICT	Online Property Taxation	Mysuru City Corporation	AMRUT	MCC	Ongoing
HERITAGE AND CULTURE					
Conservation	Restoration of Silver Jubilee clock tower	Mysuru City Corporation	HRIDAY	GOK	Waiting for approval from Special Heritage Committee
Conservation	Reconstruction of Devaraja Market in existing Heritage Style	Mysuru City Corporation	HRIDAY	GOK	Waiting for approval from Govt. of Karnataka
Conservation	Reconstruction of Lansdowne building	Mysuru City Corporation	HRIDAY	GOK	Waiting for approval from Govt. of Karnataka

5.4 Annex 4 - Population Data

This annex outlines the population data used as a basis for all strategic recommendations. As this is a necessary

component to justify all actions and interventions, the data used has been included below.

TABLE 5.2 Population data for Mysuru Conurbation

Year	Population (lakh)	Decadal growth (%)	MCC Area +OG (Ha)	Population Density/Ha	Source
1991	5.88		29242	20	Census 2011
2001	7.55	28.4	29242	26	Census 2011
2011	9.20	21.8	29242	32	Census 2011
2021	16.50	79.3	29242	56	MP 2031
2031	21.00	27.3	29242	72	MP 2031

Source: MCC, Masterplan 2031, Census 2011

TABLE 5.3 Population data for Mysuru City Corporation

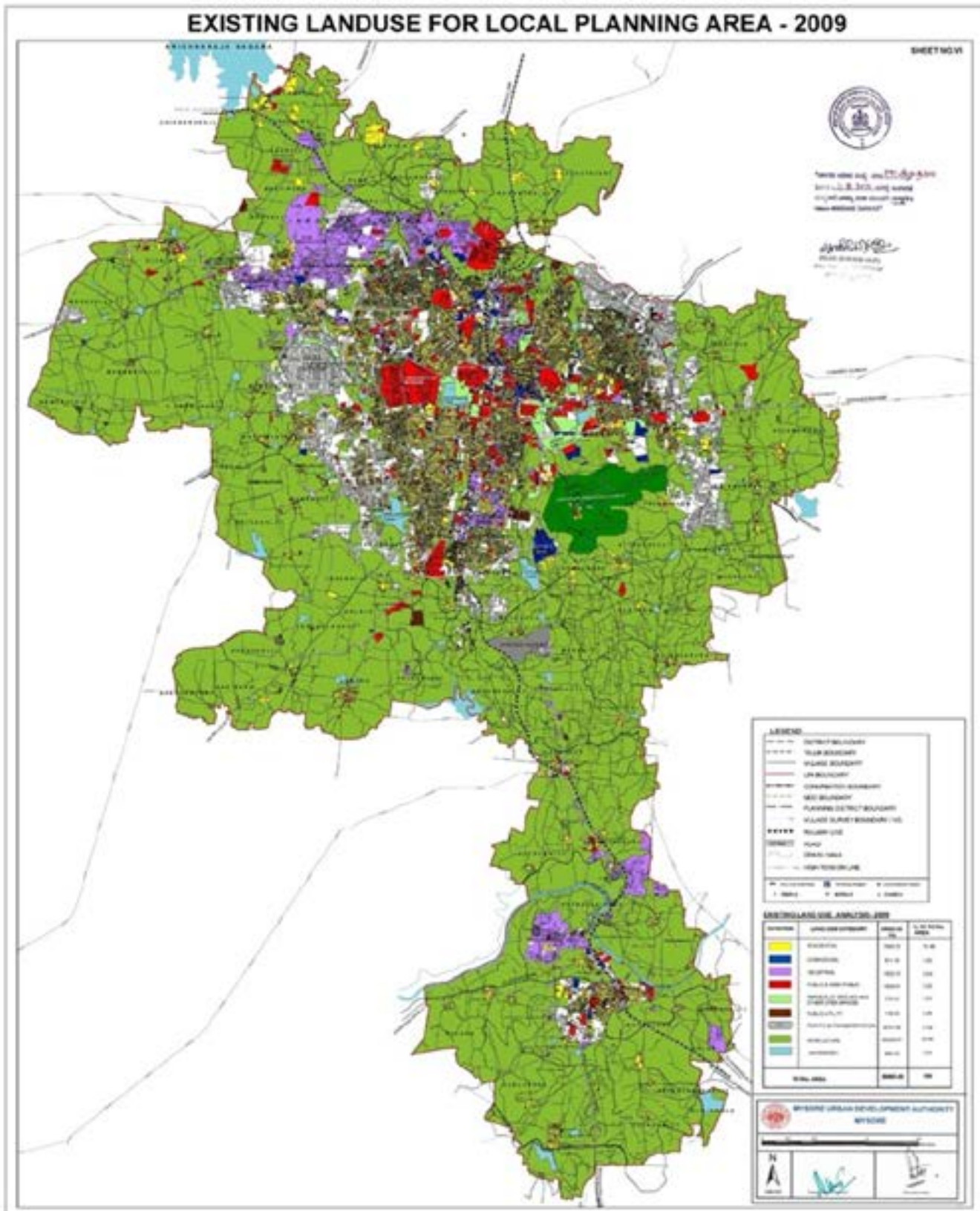
Year	Population (in Lakhs)	Decadal growth (%)	MCC Area (in Ha)	City Average Population Density /Ha
1961	2,53,865		3,730	68
1971	3,55,685	40.1%	3,730	95
1981	4,70,433	32.3%	6,067	78
1991	5,87,648	24.9%	5,825	101
2001	7,55,379	28.5%	8,966	84
2011	8,93,062	18.2%	8,966	100

Source: MCC

5.5 Annex 5 - Land use Reference Maps

These land use maps are included for reference to indicate the basis for understanding current and projected land uses

in the city. More accurate maps were not available for the purpose of this assessment.



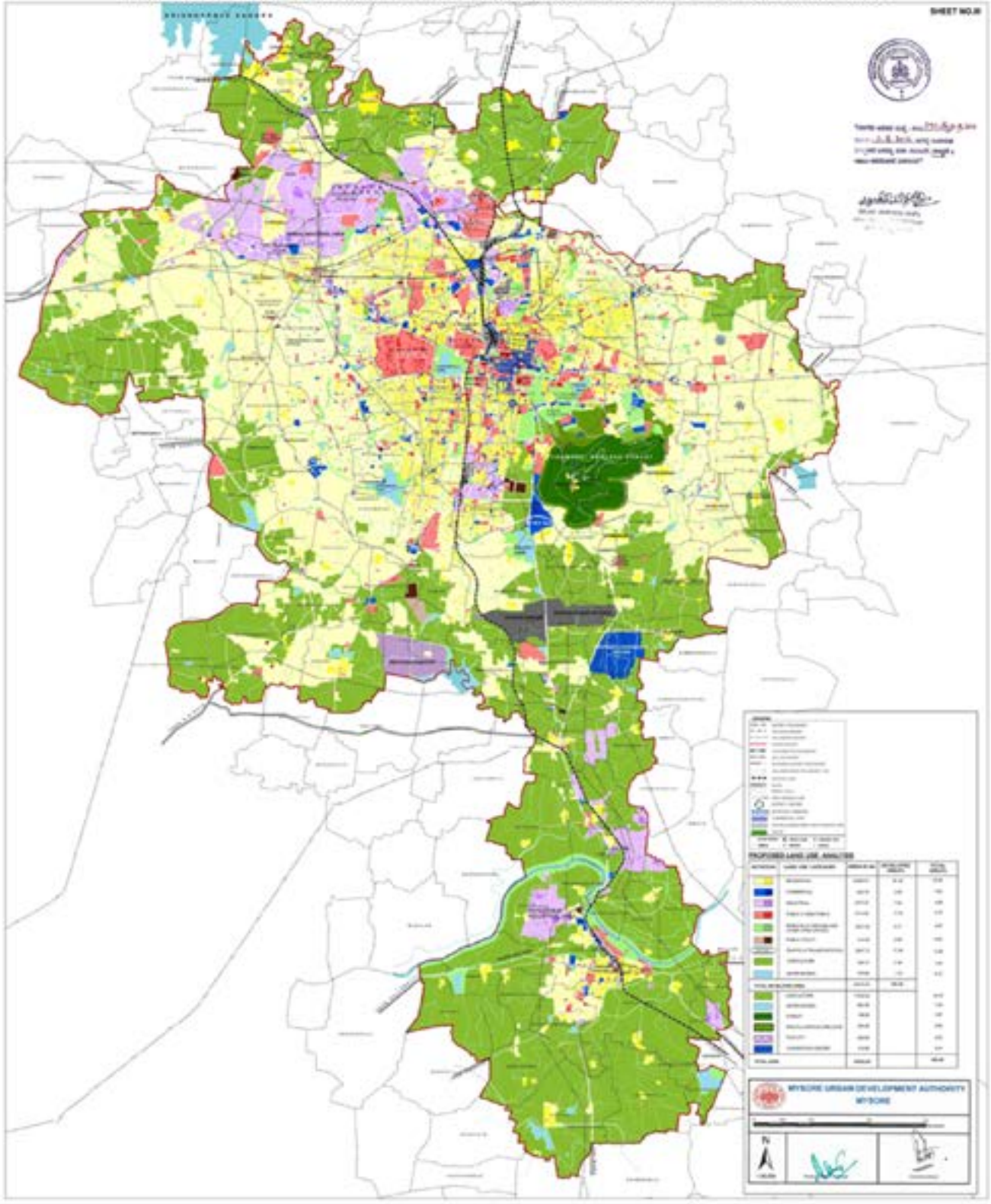
PROPOSED LANDUSE FOR MYSORE - NANJANGUD LOCAL PLANNING AREA - 2031

SHEET NO.1



ಮೈಸೂರು ನಗರ ಅಭಿವೃದ್ಧಿ ಪ್ರಾಧಿಕಾರ
Mysore Urban Development Authority
Mysore

(Signature)
Mysore Urban Development Authority
Mysore



PROPOSED LAND USE ANALYSIS

LAND USE	AREA (HA)	PERCENTAGE (%)	TOTAL (%)
AGRICULTURE	1000	10.0	10.0
FOREST	2000	20.0	30.0
RESIDENTIAL	3000	30.0	60.0
COMMERCIAL	1000	10.0	70.0
INDUSTRIAL	500	5.0	75.0
WATER BODIES	500	5.0	80.0
ROADS	500	5.0	85.0
UNDEVELOPED LAND	1500	15.0	100.0

MYSORE URBAN DEVELOPMENT AUTHORITY
MYSORE

Scale: 1:50,000
North Arrow
(Signature)

5.6 Annex 6 – Gender – inclusive guidelines for Improved public transport and non-motorized transport

It is recommended that the mobility plan collect and report travel behaviour data, disaggregated by gender, age, income (and religion, where relevant). Specifically, the perception and experience of safety and sexual harassment

on streets, access to and waiting for public transport (and paratransit), travel inside the vehicles must be measured. The mobility plan should adopt gender-inclusive indicators and benchmarks (Table 5.4).

TABLE 5.4 Gender-inclusive mobility indicators

Indicator	Measure
1 Developed area near transport (DNT)	Developed area within 500m of frequent bus-based public transport (6 schedules per hour) Informal settlements within 500m of frequent bus-based public transport (6 schedules per hour)
2 Median block perimeter	Median block perimeter (400-600m) bounded by publicly accessible roads on all sides
3 Mode shares, disaggregated by sex, age and income	Percent of walking, cycling, public transport (buses, train and metro-rail separately), intermediate public transport
4 Median non-motorized trip time, disaggregated by sex, age and income	Median walking and cycling trip time
5 Cost on transport per month	Individual monthly expenditure, disaggregated by sex and income; Household monthly expenditure on transport, disaggregated by income groups/ quintiles
6 Sexual harassment faced and perception of safety	Sexual harassment faced by women, girls, gender and sexual minorities on the streets, waiting for buses and IPT, boarding and alighting and traveling inside the vehicles Women, girls', gender and sexual minorities' perception of safety in public spaces, accessing and using public transport in the day and night

The comprehensive mobility plan should include the following amenities as outlined in Table 5.5. The involvement of more women and gender minorities in the

transportation sector can create safer mobility systems and encourage more women to travel for work/leisure.

TABLE 5.5 Gender-inclusive Amenities

Amenities	Requirements
1 Nursing rooms	At least 1 nursing room in every bus terminal, ISBT, railway station and metro-rail station located in well-lit and easily accessible areas
2 Public toilets	Male, female and universally accessible gender-neutral toilets in every bus terminal, ISBT, railway station and metro-rail station, available for use free of cost; located in well-lit and easily accessible areas
3 Waiting rooms	At least 1 AC waiting room for women, trans persons and families with public toilets at inter-state bus terminals and inter-city railway stations.
4 Night shelters	Reserved accommodation for women, trans persons and boys of 15 years and below at inter-state bus terminals and inter-city railway stations at nominal cost, in line with NULM guidelines for night shelters Emergency accommodation for women with boys of 15 years and below, and families.

Amenities	Requirements
5 Pedestrian facilities	Universally accessible footpaths of at least 4m width in bus terminals, railway, and metro stations, subject to a LOS approach
6 Bus stops	All bus stops have well-lit, shaded and universally accessible bus shelters with real-time and static information, display helpline and emergency phone numbers (See Figure 2).
7 Drinking water	Purified water for drinking to be provided, free of charge, at every bus terminal, ISBT, railway station and metro station
8 Vending	Street vending areas to be provided within bus terminals for passenger convenience.
9 Bus depots	Bus depots include at least 1 day care centre, waiting room, nursing room, and well-maintained universally accessible gender-neutral toilets to encourage women and transgender staff.

A. Redesign streets to create safer cities for women and girls

This can be done by creating comprehensive street guidelines for the city, with a focus on gender and universal access (as illustrated by those created for the state of Bihar). These can serve as the basis for redesigning streets. The guidelines can include the following structure:

- Street design principles focused on safety, mobility of care, universal access, environment sustainability, behaviour change
- Land-use and transport integration: Street network planning and location of amenities
- Defining a street hierarchy, and typology based on the land-use context
- Street elements such as footpaths, cycling infrastructure, carriageway, traffic calming elements, pedestrian crossings, IPT stands, street vending, lighting, utilities, street furniture, trees, and other shading devices
- Street design process and team within urban local bodies.

B). Improve public transport and reorganize and improve paratransit

The following recommendations are suggested for reorganization of paratransit:

- Promote e-rickshaws as a green paratransit mode and provide subsidies to unemployed to start e-rickshaws, preferably for people from lower economic groups.
- Encourage women workers in e-rickshaw waste management project initiative of Swachh Bharat Mission as short-term goal as short-term goal; and introduce and encourage female e-rickshaw operators – vahinis – as in the case of Delhi for medium term projects.
- Connect paratransit system to surveillance system as pick up point-destination mapping.

C). Create safer travel in the night programmes

Women perceive night travel unsafe in comparison to men. While mixed land uses can extend activities into the evening hours, a dedicated 'safer travel in the night programme' is recommended to improve women's access to education and economic opportunities, in the late evenings and night. The programmes can focus on the following components.

Safer travel in the night programmes

- Addressing underutilized spaces: Urban voids should be a priority as they act as unsafe crime zones in cities limiting access along them/women in turn taking a longer route to destination fearing perceived danger.
- Street lighting can be implemented on priority on public and intermediate public transport corridors and five-minute walking distance from these. Use of solar streetlights suggested to minimize operating cost.
- Women led police patrols: Police patrols along public and intermediate public transport corridors suggested. Unsafe spaces identified through participatory safety audits will enable a sense of safety in the night. ex: Pink police model followed in Kerala. The Mahila Police Volunteers and Community Policing may also be partnered for monitoring and reporting to police and authorities.
- Night accommodation for women: Subsidized night accommodation for women may be provided at intercity and interstate terminals. Rent can be waived, or a nominal amount may be charged and male children up to an age of 12 years may be permitted to stay with their mothers
- Request a stop service: Bus travel often necessitates the need for last mile connectivity, which is often not assured at night, which leads to women having to traverse streets on foot. Women can request the bus driver to stop along the route, in between bus stops after 8/9pm.

- Street vendors as street marshals: Citizen monitoring by street vendors may be initiated. They need to be trained to better respond to harassment they may witness on the street such as alerting relevant authorities.
- Providing a help desk supervised by the Police at transit terminals.

Source: Women's Access and Mobility Plan for Cities in Bihar: Recommendations, Unpublished, 2020.

5.7 Annex 7 - Gender-inclusive guidelines for public open spaces and community park development

TABLE 5.6

Gender-inclusive public open space design guidelines

Component	Recommendations
Urban form`	<ul style="list-style-type: none"> • Planning of urban form, arrangement of built and open space with consideration to visibility, diverse uses • For smaller public open spaces (POS), the proportion of building height to the width of the POS should be at least 1:2 to avoid a sense of cramped feeling among users (ADB, 2022) • Compound walls providing a clear line of sight and in permeable material • Defined edge of parks/open spaces with natural landscape plants
Spatial structure and layout	<ul style="list-style-type: none"> • Create a network of non-motorized transport pathways (connected to the city-level network) interlinked to smaller sub-spaces • Provide open spaces of different scale to suit diverse uses • Reuse of underutilized spaces in the city for public spaces • Consider adaptability for future needs
	
Safety, security, and universal access	<ul style="list-style-type: none"> • In the design of pathways, parks, location of toilets ensure a clear line of sight, connected spaces and paths to encourage natural surveillance • Plan for street vending • Provide pedestrian-scale street lighting • Avoid dark corners and blind spots • Universal accessibility design codes should be followed

Figure 5 2: Short term post-lockdown initiative in Mumbai, by the Bandra collective
Source: stirworld,2021

Component	Recommendations
Age, gender, and ability-inclusive activities	<p>Persons with disabilities</p> <ul style="list-style-type: none"> Playscapes to be provided to cater the needs of children of different physical and developmental disabilities. Suggested to include sensory play areas, silent zone for mentally retarded and children with autism. Natural elements such as lawn, textured stones, trees of different types can be included for sensory stimulation of the differently abled. Universal design standards to be followed in design of benches and equipment. <p>Boys and girls</p> <ul style="list-style-type: none"> Providing spaces for diverse activities that can be enjoyed by both boys and girls, and inclusive of age, ability. New activities can be incorporated through rain shelters, outdoor gymnasium equipment and dance areas, art pavilions, water play areas/interactive fountains, providing spaces for different kinds of sports such as cricket and badminton, mounds etc. Elderly. Include space for interaction, age-appropriate physical activity such as jogging, group exercise classes etc.
Nature-based solutions	<ul style="list-style-type: none"> Trees can also provide shade, break-up larger areas, designing for environmental sustainability, drainage, in situ rainwater harvesting.
Amenities	<ul style="list-style-type: none"> Public toilets, private nursing spaces, drinking water and spaces for women street vendors should be provided.
Audio and visual communication	<ul style="list-style-type: none"> Communicate zero tolerance to sexual harassment and encourage by-standers and victims to report harassment along with providing contact details. The POS can also become a place to understand and bring visibility to women and other gender minorities' contribution to the city.

Source: Adapted from ADB, Fair shared green and recreational spaces guidelines for gender-responsive and inclusive design, 2021; Manual for Gender Mainstreaming in Urban Planning and Urban Development, 2013.

FIGURE 5.3 Schematic diagram illustrating activities and design conditions for gender-inclusive public open spaces



5.8 Annex 8 – Gender–inclusive development guidelines for neighbourhood centres

Design element	Recommendations
1 Amenities	<ul style="list-style-type: none"> • Provision and safe access to public toilets (men, women and unisex), private nursing rooms, accessible baby/child change facility • Drinking water • Suggested to provide larger toilet compartments for easier access to those with trolleys or parcels, wheelchair users, parents with pushchairs or accompanying small children, those using walking or mobility aids
2 Access	<ul style="list-style-type: none"> • Clear multi-modal connectivity from neighbourhood centre • NMT amenities- cycling infrastructure, E-rikshaw stand etc
3 Spatial structure and layout	<p>Planning of neighbourhood centres-built form and open space with consideration to visibility, diverse uses</p> <ul style="list-style-type: none"> • Mixed use amenities with clear circulation paths • Site serviced with outdoor seating, landscape, variety of public open spaces (Plaza, OAT etc.) • Avoid dark corners and blind spots • Designated vendor zones to be provided in centre, suggested to include reserved vendor zone for women • Consider adaptability for future needs
4 Built form	<ul style="list-style-type: none"> • Built form to be designed with easily distinguishable entryways and internal passages • Entry to be provided with canopies or recessed entrance suiting climate • Universal accessibility design codes should be followed, ex: -providing ramps of slope 1:12 • Provide seating, lockers and rest points inside building
5 Circulation	<ul style="list-style-type: none"> • Access routes to be clear of obstructions and away from any projecting columns or return walls • Vertical circulation module to be designed in easily distinguishable points. • Choice of routes suggested to be provided to access different levels, with at least the choice of stairs and lift • Corridors and passageways must be wide enough to allow wheelchair users to approach and gain easy access through doors off the corridor and where necessary turn through 180° • Ramps and routes for easy exit with trolley/grocery bags
6 Lighting and shading	<ul style="list-style-type: none"> • Provide pedestrian-scale street lighting • Street lighting to be ensured for safe access at early morning/evening with the height of the poles is preferable from 3.5 to 4.5 meters (m) • Shading: Trees, temporary rain/sun shelters or prefabricated tensile structures to be provided in context sensitive manner • Seasonal tree suitable to the city to be planted for shading, using two types of trees simultaneously equidistance suggested, one among the two could be a seasonal flowering tree
7 Landscape design	<ul style="list-style-type: none"> • Compound walls of shorter height providing a clear line of sight and in permeable material • Suggested to provide shading to some of the seating or gathering areas by gazebos or pavilions • Including visual markers and well-defined paths for safe neighbourhood centre
8 Street furniture:	<ul style="list-style-type: none"> • Provide diverse seating options in the site services and in interior for users • Cut-outs for wheelchair users to sit beside non-disabled companions • Seating to be designed with both back and arm rests • Two-way seating suggested to ensure activities at both sides of the paths (if possible, according to site planning)

Design element	Recommendations
9 Signages	<ul style="list-style-type: none"> Provision of legible signage in multiple languages - Hindi and English indicating route and amenity centres Using recognised symbols/pictograms for help differently abled (cognitive difficulties/reading)
10 Design detail	<ul style="list-style-type: none"> The city to use theme-relevant materials in pavements, seating, signage design. The themes can be developed based on the context and cityscape. Pedestrian friendly surface finishes to be provided in outdoor and indoor (Material to be smooth, firm and slip resistant ensuring that wheels and sticks do not sink into them)

5.9 Annex 9 - Gender-inclusive guidelines to strengthen governance system

1. Create a Gender Lab

A Gender Lab is proposed within Municipal corporation to ensure sustained action on gender-inclusive planning, implementation, capacity development and impact assessment. The role of the Lab will be to:

- Become a repository of gender (and where relevant age and income) disaggregated data across different sectors
- Provide inputs to policies, programmes and projects undertaken by the MC (and other agencies in the city), as well as proposed gender-focused initiatives
- Review, and create a gender budget with short, medium, and long-term actions in partnership with respective state-level, Women and Child Welfare Department, Social Welfare Department, Police, UDA, and other agencies; coordinate with departments and agencies to provide support and monitor implementation progress on a quarterly basis
- Build capacity within Institutions such as Municipal corporation, State development authority etc.
- Create and implement communications and behaviour change programmes for MC (and other agencies)
- Consult with and disseminate information to civil society, academic institutes, self-help groups, membership-based and other organizations in the city
- Create human resource policies for a gender-inclusive work environment in MC. This includes but is not limited to creating a gender-inclusive workplace policy, and annual sensitization of all staff.

It is recommended that the Gender Lab include a gender-focused policy/ planning expert, communications and behaviour change expert and human resources expert, and support staff. This can be implemented on a pilot basis for a period of 3 years.

2. Create a Safety Cell to encourage reporting on sexual harassment in public spaces

A safety cell with trained counsellors and legal advisors is recommended within MC to receive complaints related to sexual harassment in public spaces and transport, understand the situation and transfer to relevant agency or authority such as the Police for prompt action.

3. Representation of women and gender minorities

Ensure representation, employment and effective participation of women and gender minorities at leadership and mid-managerial positions in MC, UDA and transportation sector. Build capacity and create opportunities for women's self-help groups in city to participate in the construction and maintenance of public works. This could be street maintenance, community park management etc.

4. Behavioural change and awareness programmes:

Conduct awareness and behaviour change campaigns:

- Institutional awareness workshops on gender sensitization and standard operating procedures
- Awareness campaigns targeting public-men, women, and gender minorities
- Street art and community art campaigns for social awareness
- Priority programmes dedicated for safe mobility and increasing awareness amongst citizens, female and male passengers, bystanders, public transport personnel and shared IPT operators

5.10 Annex 10 - Climate Savings Calculation Methodology

The climate savings data collection methodology is consistent across all sectors, however, there are some variations in its application.

A primary research phase to collect a basis of data for each sector was undertaken. Next, a tailored set of calculations were applied to contextualise this data.

The primary data was based on green coverage, including lawns, planting, and trees. This helped to identify the outcome to interventions that identified methods by which to increase green coverage in the city. The interventions predominantly promote the identification of potential

green space on vacant, under-used land, on parks that are categorized as 'undeveloped' on buffer zones and public or semi-public land, and through the creation of 5 new neighbourhood parks.

Additional interventions that are important for this methodology were street design improvements as a way to increase permeable surfaces and increase tree coverage. Therefore, for each intervention, specific calculations were made based on sequestration rates of lawns and trees. These are found in the table below for reference, alongside the relevant intervention.

The GHG equivalent emissions calculations are outlined in the tables below, and include sources as well as assumptions made for reference.

TABLE 5.7 Basis data for GHG emissions assessment: Regular Housing Structure (720 sq.m, 3 storeys)¹²

Building Material	Quantity (kg)	Source
Cement	69,160	Kurian, R et al (2021)
Concrete	106,315	
Ceramic Tiles	10,308	
Burnt Clay Bricks	64,800	
Total	250,583	

TABLE 5.8 Basis data for GHG emissions assessment: Regular Housing Structure and Green Materials Substitutes CO₂ Storage potential

Regular Structure	Green Structure Substitutes	CO ₂ Content (kgCO ₂ /kg)	Total Mass (kg)	Potential GHG savings potential (tCO ₂ -eq/annum) ¹³	Source
Concrete (27%)	Fly Ash or Wood	-1.84	2,882	5.30	Kuttinen, M et al (2021)
Cement (42%)	Straw Bale	-1.76	4,430	7.80	
Ceramic (4%)	Cork	-2.06	430	0.88	
Burnt Clay (27%)	Bamboo, Earthen Clay, Hemp	-2.24	2,700	6.05	
Total			10,441	20.03	

¹² The acquisition of material includes demolition, destruction, collection, etc. of the materials, which amounts to 10% of total construction carbon emission. Emissions are calculated based on construction and embodied carbon in construction materials. Household usage emissions (such as heating, cooling etc.) are not considered within this emissions estimate.

¹³ The calculations were based on numbers provided for stored carbon dioxide per kg.

TABLE 5.11 Basis data for GHG emissions assessment: Landscaping and green coverage potential for CO₂ storage

Classification	Category	Potential GHG emissions (in tCO ₂ e)	Unit of Measurement	Potential GHG savings potential	Unit of Measurement	Source
Area Basis	Trees	- 8.00	tCO ₂ /ha/annum	0.0008	tCO ₂ /m ² /annum	Chen (2015), Velasco et al. (2014), Nowak et al. (2013)
Area Basis	Lawns	- 2.05	tCO ₂ /ha/annum	0.0002	tCO ₂ /m ² /annum	Raciti et al. (2011), Smith et al. (2018)
Area Basis	Bioswales (trench with planting) ¹⁷	- 3.75	tSO ₂ ha/annum	0.000375	tSO ₂ /m ² /annum	FAO (2021)
Unit Basis	Tree (Neem)	- 0.07	tCO ₂ /tree/annum	N/A	N/A	Sharma, Pradhan, Others (2020)

TABLE 5.12 Example application: Regeneration and conservation of Parks and Public spaces

Classification	Principle	Area (ha) ¹⁸	Number of parks	Ratio of trees	Ratio of lawns	Potential GHG savings potential	Unit of Measurement
Community Park ¹⁹	Regeneration/creation of new community parks	2.5	4	25%	50%	50.25	tCO ₂ /ha/annum
Neighbourhood Park	Conservation buffer (9m buffer around 37 water bodies)	47	38	50%	50%	265.87	tCO ₂ /ha/annum
Canal/ major storm-water drains	Conservation buffer (2m buffer along 21km stretch on both sides)	0.84	N/A	50%	50%	4.2	tCO ₂ /ha/annum

¹⁷ This CO₂ potential for bioswales uses a bracket of 1.5-9 ha. An average of 4.75 has been taken to scale up/down and contextualise the CO₂ storage potential.

¹⁸ This calculation uses the upper area boundary when calculating for potential CO₂ storage.

¹⁹ The definition of community parks and neighbourhood parks uses AMRUT's SLIP template for green spaces and parks. This calculation assumes an average park size of 2.5 ha with 50% green coverage for park regeneration and an 100% green coverage for conservation projects. GHG emissions outcomes are based on emissions savings potential through the creation of green coverage. Activities such as the construction of facilities, or on-going energy usage (for example lighting or formal vending infrastructure) has not been considered within this calculation. Tree, plant and grass species have not been specified; however, carbon sequestration potentials can vary between species.

TABLE 5.13 Basis data for GHG emissions assessment: transport sector emissions

Mode	CO ₂ (kg pax-km) ²⁰	Source
Bus	0.015161	India GHG Program. (2015)
Scooter/Motorcycle (average)	0.31	
Three-wheeler (average Petrol, Diesel and CNG)	0.35338	
Car (average size - petrol)	0.1665	
Car (average size - diesel)	0.183	

TABLE 5.14 Basis data for GHG emissions assessment: transport sector emissions

Mode	Trips per day for 8330 people ²¹	Potential GHG emissions (in CO ₂ e kg/ passenger/day /km)	Potential GHG emissions in CO ₂ e kg/ passenger/day for 12.5km	Potential GHG emissions in CO ₂ e kg/ passenger/year for 12.5km
Bus	27.5724	0.418025156	5.225314455	
Scooter/Motorcycle (average)	570.0294	176.709114	2208.863925	
Three-wheeler (average Petrol, Diesel and CNG)	285.8139	101.000916	1262.51145	
Car (average size -average petrol/ diesel)	0.17475	0.029095875	0.363698438	
Total	4998	278.157151	3476.964388	1269092.001

²⁰ This assumes a full capacity of each mode of transport.

²¹ This calculation assumes that 1666 dwellings in the largest housing complex has around 5 people per dwelling.

TABLE 5.15 GHG emission reductions detail for all the strategic responses

Strategic Response & Key Intervention	Action or project	Total GHG Emissions	Remarks	Item/Component	Emissions/Savings	Unit (ha)	Emissions/Savings	Unit (m2)	Source
Approach	Implement Form Based Codes								
Strategic Response 1									
Intervention 1.1 Create new Neighbourhood Centres	Identify new neighbourhood centres	N/A							
	Increase mixed-uses and small commercial units	N/A							
	Focus NMT improvements in neighbourhood centres (see Intervention 2.2)	N/A							
Intervention 1.2 Promote infill and mixed-use Neighbourhoods	Develop new, temporary, local crafts and general produce markets on vacant or under-used land sites (see Intervention 2.3)	N/A							
	Pedestrianize existing markets to improve public realm and walkability (see Intervention 2.3)	N/A							
Intervention 1.2 Promote vernacular architecture and diverse residential neighbourhoods within the MCC boundary		N/A							
Strategic Response 2		20.6532							

Strategic Response & Key Intervention	Action or project	Total GHG Emissions	Remarks	Item/Component	Emissions/Savings	Unit (ha)	Emissions/Savings	Unit (m2)	Source
Intervention 2.1: Connecting neighbourhood centres with improved NMT network	Expand existing efforts to change to LED lights	N/A	This intervention is expected to save the city of Mysore 58.77 percent of the current electricity usage through street lighting.						
	Bicycle network including, pigment, drainage, separation (natural barrier/planting)	5.1372	Street length - 42.81 km. This is based on the total road length with one buffer of 0.6m of permeable surface with lawn and planting. However, specific road quality, existing planting and existing buffers have not been considered.	Lawns	2.05	tCO ₂ /ha/annum	0.0002	tCO ₂ /m2/annum	Raciti et al. (2011), Smith et al. (2018)
	Key route tree planting (along bicycle routes)	4.2810	This total is based on a distance of 10m between each sapling planting. It also is based on a 1m2 permeable surface at the base of each tree. Although there are diverse styles that are applicable, the sequestration potential for a bioswale has been taken.	Trees	8.00	tCO ₂ /ha/annum	0.0008	tCO ₂ /m2/annum	Chen (2015), Velasco et al. (2014), Nowak et al. (2013)
	Specific lane shared between e-auto rickshaw and bus, Upgrade bus stops to integrate better with cycle lanes and construct bicycle lock up adjacent to bus, E-rickshaw pull-in bays with battery swap station stops, E-rickshaw pull-in bays with battery swap station, Parking Action Plan to be prepared and formalised, tariff-based on-street parking spaces in the city centre	N/A		Bioswales	2.05	tCO ₂ /ha/annum	0.0002	tCO ₂ /m2/annum	Raciti et al. (2011), Smith et al. (2018)

Strategic Response & Key Intervention	Action or project	Total GHG Emissions	Remarks	Item/Component	Emissions/Savings	Unit (ha)	Emissions/Savings	Unit (m ²)	Source
Intervention 2.2: Increase multi-modal infrastructure at neighbourhood centres	EV charging point, Bicycle lock ups, E-rickshaw pull-in bays with battery swap station, Formalising or creating pedestrian sidewalk and widening pedestrian pathways at intersection with pedestrian crossing points, median planting	0.5312	This total is based on a radius of 800m from the neighbourhood centre core intersection and indicates a potential GHG sequestration based on tree planting on either side of two main roads, with a distance of 10m between each tree (total of 320) and permeable street surface (area 1.8m ² x 2 every 10 meters) and median planting (covering at least 50% of the length of the road)	Trees	8.00	tCO ₂ /ha/annum	0.0008	tCO ₂ /m ² /annum	Chen (2015), Velasco et al. (2014), Nowak et al. (2013)
3.6 x lawns				Lawns	2.05	tCO ₂ /ha/annum	0.0002	tCO ₂ /m ² /annum	Raciti et al. (2011), Smith et al. (2018)
Intervention 2.3: Pedestrianised 'market street' at neighbourhood centres	Pilot project to pedestrianize the street adjacent to Devaraja market: Street length 350m, includes bollards, security, trees, benches, permeable surfaces/bicycle lane natural separation, painting, signage	7.4346	Total calculated includes 35 saplings (with 10m between each tree) and 10% of total pedestrian routes as permeable surfaces. This calculation includes all 7 existing markets for pedestrianisation.	Tree (Neem)	0.07	tCO ₂ /tree/annum			Sharma, Pradhan, Others (2020)
	Create new 'traditional' market with pedestrian access and public space facilities (see above)	3.2692	This uses an average plot size of 1 ha with 25% planting lawn coverage and 40 trees.	Lawns	2.05	tCO ₂ /ha/annum	0.0002	tCO ₂ /m ² /annum	Raciti et al. (2011), Smith et al. (2018)
Strategic Response 3		8.3184		Lawns	2.05	tCO ₂ /ha/annum	0.0002	tCO ₂ /m ² /annum	Raciti et al. (2011), Smith et al. (2018)

Strategic Response & Key Intervention	Action or project	Total GHG Emissions	Remarks	Item/Component	Emissions/Savings	Unit (ha)	Emissions/Savings	Unit (m2)	Source
Intervention 3.1: Intervention 3.1 Create an inventory of under-used land to create 5 new neighbourhood parks	Develop 5 new neighbourhood parks on vacant land	6.0300	This total assumes an 80% coverage of trees and lawn and an average size of 7500 m2 (between the parameters of 5000 and 10,000 sq m2 as defined by URDPFI).	Trees	8.00	tCO ₂ /ha/annum	0.0008	tCO ₂ /m2/annum	Chen (2015), Velasco et al. (2014), Nowak et al. (2013)
				Lawns	2.05	tCO ₂ /ha/annum	0.0002	tCO ₂ /m2/annum	Raciti et al. (2011), Smith et al. (2018)
	Increase planting on vacant or under-used land (buffer zones etc)	2.0384	This total considers 50% coverage by trees and lawns of total open, public/semi-public space 19.81 sqkm is the area categorised as public/semi-public in the 2031 Masterplan.	Trees	8.00	tCO ₂ /ha/annum	0.0008	tCO ₂ /m2/annum	Chen (2015), Velasco et al. (2014), Nowak et al. (2013)
Intervention 3.2 Increase green coverage potential on vacant or under-used land	Assess and improve parks that are un-developed (increase green coverage and planting)	0.2500	This total considers a 90% coverage by trees and lawns. 47% of all parks (588) are considered 'un-developed'.	Lawns	2.05	tCO ₂ /ha/annum	0.0002	tCO ₂ /m2/annum	Raciti et al. (2011), Smith et al. (2018)
				Trees	8.00	tCO ₂ /ha/annum	0.0008	tCO ₂ /m2/annum	Chen (2015), Velasco et al. (2014), Nowak et al. (2013)
	Environmental protective measures including hydroseeding, planting, drainage, terracing)	N/A	A total emission was not calculated as data for the current green coverage and sequestration potential of this site is not available.	Trees	8.00	tCO ₂ /ha/annum	0.0008	tCO ₂ /m2/annum	Chen (2015), Velasco et al. (2014), Nowak et al. (2013)
Intervention 3.3 Engage community groups and create a PPP for the maintenance and management of Chamundi Hill	Monitoring mechanisms (ecological assessments and hazard mapping)	N/A							
	Integrated planning (create tourism and economic strategy to link with ecological preservation)	N/A							
	PPP model for managing and maintaining Chamundi Hill (and nearby Special Agricultural Zone)	N/A							

Strategic Response & Key Intervention	Action or project	Total GHG Emissions	Remarks	Item/Component	Emissions/Savings	Unit (ha)	Emissions/Savings	Unit (m2)	Source
<u>Strategic Response 5</u>									
Intervention 4.1 Increase the use of data governance in Mysuru to reduce eco-vulnerability, sprawl and increase NMT use	Improve the updating and shared source of data for land uses, building permission and trade licences Creating a digital interface in the form of instinctive dashboards, to co-create walking & cycling-friendly environment, and subsequently piloting design solutions	N/A							
	Plan green cover growth, public spaces, and recreational amenities by sharing the responsibilities for maintaining these spaces through a digital platform	N/A							
Intervention 4.2 Improve shared, updated, and consistent data triangulation in urban planning practice	Build, regularly maintain and share a database for urban planning in Mysuru	N/A							

5.11 Annex 11 – Cost Estimates Methodology

Block cost estimation for projects suggested as part of sustainable city strategies is done by comparing them to similar projects in India. The method consisted of the following steps:

- Step 1: Preparation of a list of projects suggested by each city under the SCS.
- Step 2: The proposed projects under SCS are broken down into components, and the number of units is calculated.
- Step 3: Under the smart cities mission, projects with similar components are identified.
- Step 4: Creating a master project database with data on project components, sectors, project stage (completed/ongoing/DPR), component unit cost, and information source.
- Step 5: The component's unit cost is calculated by dividing the component's costs by the number of units.
- Step 6: By applying the wholesale price index to the base year, unit component costs are updated to the current year.
- Step 7: Each component and its associated unit cost in the master database are mapped to SCS components.
- Step 8: Multiply the unit cost by the number of units to determine the project cost.

Notes:

The approach was kept the same across all sectors, but there are some differences in how it is applied depending on the components. The estimates were categorised based on a few key sectors that were seen as common and most relevant across all the interventions proposed by the five SCIAP cities. These were Urban Mobility, Housing, Solid-waste management, Area-based, Energy Efficient, and Digital/IT.

The database contains project-related information such as the project's completion year, location, implementing agency, sectors, project status, and component cost.

The example of one data entry example is illustrated below. The first record in the master database is an example of a Smart City Bhubaneswar urban mobility project. It's a public bike-sharing system that began in 2018 with the installation of 2000 bicycles and 400 bicycle stations throughout the city. After reviewing the component wise cost as per the detailed project report, we calculated the per-unit cost of a bicycle (approx. Rs. 60,000) and the per-unit docking station cost (approx. Rs. 3,00,000 per unit for a docking station with a capacity of five cycles). Thereafter, the unit costs are projected to account for inflation using the wholesale price index. So, if any city intervention proposes a public bike sharing project with, let's say, 500 bicycles and 10 docking stations, the unit cost of the bicycle and docking station from the master database could be used to compute the project's overall cost. This type of exercise has been carried out in a variety of sectors based on similar-scale projects planned under the SCIAP cities.

Category	State	City	Component	Project Name	Sector	Impact	Implementing Agency	Year	Index Value	Mention The Project Milestones	Dpr Cost Estimated Project Cost (Rs. Cr.)	Cost per unit/measure (lakh)	Unit of measurement (UOM)	Remarks	Source
Mobility	Odisha	Bhubaneswar	Cycle	Public Bicycle Sharing Scheme (Cycle)	Non-Motorised Transport and Walkability	Transportation and mobility	Bhubaneswar Smart City Limited	2018	1.00099108	Public Bicycle Sharing Project was launched by Hon'ble CM of Odisha dated 26th Nov 2018. As part of the project launch, there are 2000 bicycles deployed and 400 bicycle stations marked across Bhubaneswar.	11.8	0.59	Per Bicycle	Regular Bicycle	https://smartcities.gov.in/node/75

Strategic Response & Key Intervention	Action or project	Estimated Project Cost (in INR lakh)	Remarks	State	City	Project Name	Implementing Agency	Dpr Cost Estimated Project Cost (Rs. Cr.)	Cost per unit/measure (lakh)	Unit of measurement (UOM)	Remarks	Source
Approach	Implement Form Based Codes											
Strategic Response 1												
Intervention	Identify new neighbourhood centres	N/A										
1.1 Create new Neighbourhood Centres	Increase mixed-uses and small commercial units	N/A										
	Focus NMT improvements in neighbourhood centres (see Intervention 2.2)	N/A										
	Develop new, temporary, local crafts and general produce markets on vacant or under-used land sites (see Intervention 2.3)	N/A										
	Pedestrianise existing markets to improve public realm and walkability (see Intervention 2.3)	N/A										

Strategic Response & Key Intervention	Action or project	Estimated Project Cost (in INR lakh)	Remarks	State	City	Project Name	Implementing Agency	Dpr Cost Estimated Project Cost (Rs. Cr.)	Cost per unit/measure (lakh)	Unit of measurement (UOM)	Remarks	Source
Intervention 1.2 Promote infill and mixed-use Neighbourhoods	Promote vernacular architecture and diverse residential neighbourhoods within the MCC boundary	N/A										
Strategic Response 2 410494.87												
Intervention 2.1: Connecting neighbourhood centres with improved NMT network	Transfer to solar powered light OR expand existing efforts to change to LED lights	10908.48	This total assumes 68,178 compact fluorescent lamp and halogen bulb lights (total within the MCC) are replaced. However, some streetlamps may have already been upgraded as a recent project costing 109.01 crore to upgrade streetlamps within 12 wards has already begun. To upgrade the lights in the remaining 53 wards, the total cost could be up to 577.753 INR lakh (however this does not consider variations in ward size of street light numbers). Therefore, there is an estimate between 10,908 and 577,753 lakhs.	Uttar Pradesh	Varanasi	Retrofitting of streetlights (sodium light to LED light) at city level - 36000 Nos. by EESL.	EESL	58.60	0.16	LED lights	Retrofitted	https://smartcities.gov.in/node/149
	Bicycle network including, pigment, drainage, separation (natural barrier/ planting)	513.72	Street length - 42.81 km	Chandigarh	Chandigarh	Dedicated Cycle Tracks shared with Footpath, PART-1	M/s Asphalt Carpet Construction Co. Chandigarh	22.00	12.00	Per Km Road Stretch	Cycle track	https://smartcities.gov.in/node/104
	Tree planting. (Street length x tree)	14.98	Street length - 42.81 km and assumes an average of 10m between each tree. This cost does not consider existing trees due to lack of data on number of trees on specified routes.	Uttar Pradesh	Karimnagar	Tree Plantation Tree Guard_ Impact Project	Kanpur Municipal Corporation	3.50	0.00	tree		https://smartcities.gov.in/node/144

Strategic Response & Key Intervention	Action or project	Estimated Project Cost (in INR lakh)	Remarks	State	City	Project Name	Implementing Agency	Dpr Cost Estimated Project Cost (Rs. Cr.)	Cost per unit/measure (lakh)	Unit of measurement (UOM)	Remarks	Source
	Specific lane shared between e-auto rickshaw and bus	3127.09	Street Length total - KRS Road (5.1km), Mangalore-Mysore Highway (5.66km), Wahadevapura Main Rd (4.3km), Mysore-Trichy Rd (5.5 km) , Mananthavadi Rd (6.9km), Vishwamanava Double Rd (5.3 km). This uses a cost for a street redevelopment to indicate the total sum for road improvements.	Karnataka	Bangalore	Upgrading of Road to include bus lane (bollards, signage, paint)	Bruhat Bengaluru Mahanagara Palike	21.00	95.45	per km		https://smartnet.niuu.org/sites/default/files/resources/Tender%20SURE%20Project%20Report.pdf
	Upgrade bus stops to integrate better with cycle lanes after undertaking a feasibility study to identify conflicting bus stops with cycle routes, and construct bicycle lock up adjacent to bus stops	2004.90	Total city-wide number of bus stops along cycle lane length (205). This is only the cost for the addition of bicycle lock ups at each bus station although additional works and site-specific studies are needed to best integrate the bicycle lane with bus stops.	Rajasthan	Ajmer	Cycle sharing system	Municipal Corporation Ajmer	0.88	9.78	cycle stand	9 cycle per stand	https://smartcities.gov.in/node/134
	E-rickshaw pull-in bays with battery swap station	N/A	Cost is identified within Intervention 2.2 as a specific number has been recommended, whereas an additional study is required for a better understanding of the number of, informal and required pull-in bays on the city-wide scale									

Strategic Response & Key Intervention	Action or project	Estimated Project Cost (in INR lakh)	Remarks	State	City	Project Name	Implementing Agency	Dpr Cost Estimated Project Cost (Rs. Cr.)	Cost per unit/measure (lakh)	Unit of measurement (UOM)	Remarks	Source	
Intervention 2.2: Increase multi-modal infrastructure at neighbourhood centres	EV charging point	56.00	This cost has been taken from an existing project within Mysuru for one EV charging point and is scaled up for all 7 neighbourhood centres. Please note that additional EV charging points may be considered in the city centre.	Karnataka	Chamundeshwari Electricity Supply Corporation (CESC)	EV charging station		8.00		Per charging facility			
	Bicycle lock ups	68.46	Cost of 1 stand per neighbourhood centre.	Rajasthan	Ajmer	Cycle sharing system	Municipal Corporation Ajmer	0.88	9.78	cycle stand	9 cycle per stand	https://smartcities.gov.in/node/134	
	E-rickshaw pull-in bays with battery swap station	28.00	This cost includes an autorickshaw stand as well as a battery swap station at each of the 7 neighbourhood centres.			Battery Swap station (for 8 batteries) for e-rickshaws		1.50		Per battery swap station			
					Karnataka	Tumakuru	Intermediate Para transit Stands, Auto Stands 2 No's	Tumakuru Smart City Limited	0.05	2.50	Per Auto Stand		https://smartcities.gov.in/node/194
	Parking Action Plan to be prepared and formalised, tariff-based on-street parking spaces in the city centre		651.37	This cost includes the expansion of the existing parking spaces along 4km of key roads that circumnavigate the city core. The recommended routes are JBL, part of Irwin Rd and part of Chamaraja Rd and the cost includes a total of 1000 new parking spaces.	Goa	Panaji	Parking with sensors, digital signage, Mobile Applications with all backend system, website development, CCTV	Corporation of the City of Panaji	81.42		Per 123 parking lots		https://connectthings.store/gb/orawan-sensors/bosch-parking-lot-sensors.html
Formalising or creating pedestrian sidewalk and widening pedestrian pathways at intersection with pedestrian crossing points		23.24	This cost includes four pedestrian crossings for each of the 7 neighbourhood centres. Although, additional are likely to be needed in the city core, this cost reflects the focus of NMT interventions surrounding a main intersection within each neighbourhood centre.	Delhi	NDMC	Making of Smart Roads - 3D Zebra Crossing on 24 Crossings	M/s Yatender Singh	0.20	0.83	per crossing		https://smartcities.gov.in/node/105	

Strategic Response & Key Intervention	Action or project	Estimated Project Cost (in INR lakh)	Remarks	State	City	Project Name	Implementing Agency	Dpr Cost Estimated Project Cost (Rs. Cr.)	Cost per unit/measure (lakh)	Unit of measurement (UOM)	Remarks	Source
Intervention 2.3: Pedestrianised 'market street' at neighbourhood centres	Pilot project to pedestrianize the street adjacent to Devajara market: Street length 350m, includes bollards, security, trees, benches, permeable surfaces/bicycle lane natural separation, painting, signage	393750.00	This total cost is the sum of one project cost for one pedestrianised street and has been scaled up to cover 7 neighbourhood centres + 2 additional (see map for the location of 7 existing markets for pedestrianisation)	Chhattisgarh	Bilaspur	A25 3.85 Km of Jawali Mallah covered to form Road has been made walking NMT street		4.80	125.00	per km nmt street		https://smartcities.gov.in/node/160
	Create new 'traditional' market with pedestrian access and public space facilities (see above)	175.8875	This cost covers all 15 recommended marketplaces, with temporary structures and planting, drinking water kiosk, parking, waste disposal, and other basic facilities	Uttar Pradesh	Agra City	Street hawking zone		11.72	1.72	per zone (of 25 meters)		http://164.100.161.224/uploads/tender/5a95382d0d1b7tender_document_of_street_vending_zones_project.pdf
Strategic Response 3		0.09		Uttar Pradesh	Karimnagar	Tree Plantation (Tree Guard_Impact Project)	Kanpur Municipal Corporation	3.50	0.0035	tree		https://smartcities.gov.in/node/144
	Intervention 3.1: Develop 5 new neighbourhood scale parks on vacant land	50.00		Karnataka	Dayanand Vihar Park Ward – 20 (Indira Ngar)	Development and Beautification to Saraswathipuram Park Behind Ramajois Nagara, Tumkauru City	Tumakuru Urban Development Authority	0.10	10.00			https://smartcities.gov.in/node/194
Intervention 3.2 Increase green coverage potential on vacant or under-used land	Increase planting on vacant or under-used land (buffer zones etc)	204.26	Pilot example of the central bus depot area (1.44 ha) with components such as storm water drains (along plot edge), trees (cost includes 50 saplings), rainwater harvesting, planting and permeable surfaces and increased lighting (includes 20 x solar powered).	Andhra Pradesh	Visakhapatnam	Storm Water drain - Construction of gap filling major drains in ABD area	M/s. Maruthi Constructions	6.11	0.55	per m		https://smartcities.gov.in/node/151

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				Delhi	NDMC	Making of Smart Roads - 3D Zebra Crossing on 24 Crossings	M/s Yatender Singh	0.20	0.83	per crossing		https://smartcities.gov.in/node/105
				Tamil Nadu	Tiruchirappalli	9M Height Solar High Mast Light. Supply, Erection, and commissioning of 9M Height Solar High Mast Light at 13 locations (2 works)	ULB	0.85	6.54	per location		https://smartcities.gov.in/node/181
				Uttar Pradesh	Karimnagar	Tree Plantation (Tree Guard Impact Project)	Kanpur Municipal Corporation	3.50	0.0035	tree		https://smartcities.gov.in/node/144
				Rajasthan	Ajmer	Install Rainwater Harvesting System in all the public buildings and in open areas	Municipal Corporation Ajmer	1.80	5.62	Rainwater Harvesting		https://smartcities.gov.in/node/134
	Assess and improve public spaces that are undeveloped (increase green coverage and planting)	11938.75	47% of all parks (588) are considered 'un-developed'.	Uttar Pradesh	Kanpur	Dayanand Vihar Park Ward – 20 (Indira Nagar) Area – 5120 Sq.M. Lawn, pathways, dustbins, fountains, solar lights	Kanpur Municipal Corporation	0.43	43.20		Kanpur Municipal Corporation	http://kmc.up.nic.in/Documentary%20Evidence ANNEXURE/ANNEXURE-4.1(d)%20AMRUT%20SLIP%20Park%20-%20Kanpur.pdf
Intervention 3.3 Engage community groups and create a PPP for the maintenance and management of Chamundi Hill	Environmental protective measures (including hydroseeding, planting, drainage, terracing) Monitoring mechanisms (ecological assessments and hazard mapping) Integrated planning (create tourism and economic strategy to link with ecological preservation) PPP model for managing and maintaining Chamundi Hill (and nearby Special Agricultural Zone)	N/A N/A N/A										

Strategic Response & Key Intervention	Action or project	Estimated Project Cost (in INR lakh)	Remarks	State	City	Project Name	Implementing Agency	Dpr Cost Estimated Project Cost (Rs. Cr.)	Cost per unit/measure (lakh)	Unit of measurement (UOM)	Remarks	Source
Strategic Response 4												
Intervention 4.1 Increase the use of data governance in Mysuru to reduce eco-vulnerability, sprawl and increase NMT use	Improve the updating and shared source of data for land uses, building permission and trade licences		Chose a cost for a similar project/case study?									
	Creating a digital interface in the form of instinctive dashboards, to co-create walking & cycling-friendly environment, and subsequently piloting design solutions		Chose a cost for a similar project/case study?									
Intervention 4.2 Improve shared, updated, and consistent data triangulation in urban planning practice	Plan green cover growth, public spaces, and recreational amenities by sharing the responsibilities for maintaining these spaces through a digital platform		Chose a cost for a similar project/case study?	City	E-Governance	IT Connectivity and Digitalization. Citizen friendly and cost-effective governance and public services						https://smarcities.gov.in/node/134
	Build, regularly maintain and share a database for urban planning in Mysuru			City	E-Governance	GIS ENABLED INTEGRATED INFORMATION SYSTEM. Mapping and Ground Proofing. GIS Application Centre and Remote Sensing Centre and Block Networks. License and Staffing. Mapping all the households in MCL limits on GIS and adding multiple attributes layers. Command centre and network for e-sewa centres at block level to enhance public service levels	Vendor / Supplier - Application software, computer, and peripheral suppliers	INR 45.00 Crores				https://pmidc.punjab.gov.in/wp-content/uploads/2016/12/Ludhiana_Smart_City_Proposal_Revised.pdf



Grand Trunk Road

